THE CITY OF Kalamazoo

PUBLIC SERVICES DEPARTMENT
Water Resources Division
1415 N. Harrison Street
Kalamazoo, MI 49007
Ph.269.337.8701
Fx.269.337-8699

SENT VIA EMAIL

June 13, 2018

Mr. Jason Berndt
Michigan Department of Environmental Quality
Office of Drinking Water & Municipal Assistance
Environmental Health Section
Source Water Unit
2100 West M-32
Gaylord, Michigan 49735

RE: Updated Wellhead Protection Program Plan Report

Dear Mr. Berndt:

Enclosed is one unbound copy of the updated City of Kalamazoo Wellhead Protection Plan (Plan). As you know, the City's original Plan was submitted in December 2003, subsequently approved in early 2004 and updated in 2011.

The City has fulfilled all obligations under the Michigan Wellhead Protection Program by addressing all seven required program elements. Subsequently, the City requests formal approval of the updated Plan from the Michigan Department of Environmental Quality (MDEQ).

Please contact me at 269-337-8535 or via E-mail at talandaj@kalamazoocity.org if you have any comments or questions regarding the Plan. It has been a pleasure working with MDEQ during this process and we are looking forward to the continual progression of our Wellhead Protection Program.

Sincerely,

Jean Talanda
Environmental Programs Manager

Enclosures

Cc: John P. Paquin, Water Resources Division Manager (w/o Enclosures)

CITY OF KALAMAZOO, MICHIGAN

WELLHEAD PROTECTION PROGRAM PLAN

Associated with the City of Kalamazoo Public Water Supply System
Wellhead Protection Program
(WSSN: 3520)

Prepared for:

The Michigan Department of Environmental Quality
Drinking Water and Municipal Assistance Division
Environmental Health Section
Source Water Unit

Prepared by:

The City of Kalamazoo
Department of Public Services
Water Resources Division

May 2018 Update

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

APPENDIX A

APPENDIX B

APPENDIX C

APPENDIX D

APPENDIX E

APPENDIX F

APPENDIX G

APPENDIX H

INTRODUCTION

Background

Michigan Wellhead Protection Program

Michigan's Wellhead Protection Program (WHPP) was developed in response to the 1986 amendments to the federal Safe Drinking Water Act. The purpose of Michigan's WHPP is to protect public water supply systems (PWSS) which use groundwater, from known and potential sources of contamination. Unlike many WHPPs in the country, Michigan's is a voluntary program that is implemented at the local level with the coordination of other organizations.

Although the program is voluntary, PWSSs who choose to participate must develop a local WHPP consistent with the guidelines established by the Michigan Department of Environmental Quality (MDEQ). The seven required program elements are: roles and responsibilities; wellhead protection area delineation; contaminant source inventories; wellhead protection area management; contingency planning; proper siting of new wells; and public education and participation.

The 1996 reauthorization of the federal Safe Drinking Water Act (SDWA) required the MDEQ to complete a Source Water Assessment Program to identify the areas that supply public drinking water, inventory contaminants and assess water susceptibility to contamination, and inform the public of the results. In Michigan, a MDEQ approved local PWSS WHPP is considered a complete source water assessment. PWSSs that do not have an approved WHPP must complete a Source Water Assessment.

Location

The City of Kalamazoo is located in Kalamazoo County in the southwestern corner of Michigan, approximately midway between Detroit and Chicago, and 35 miles east of Lake Michigan (**Appendix A, Figure 1**), covering an area of approximately 26 square miles. According to the U.S. Census data, the City had a population of 75,984 people (V2016), and Kalamazoo County had a population 262,985 people (V2017).

History of the City of Kalamazoo Wellhead Protection Program

Historically, the City had incorporated measures to protect its PWSS groundwater sources before the term "Wellhead Protection" was used. Some of these early examples of groundwater protection efforts included: proper selection of well/wellfield locations with consideration to known and high risk potential contamination sources; purchasing as much available property surrounding

wellheads as possible to control land use; proper well construction and wellhead sealing methods; installation of numerous monitoring wells for the collection of groundwater quality samples and water level monitoring; cooperative/cost sharing agreement with the U.S. Department of Geological Survey (USGS) for observation well installation and monitoring; abandonment of discontinued wells; initiation of an aggressive underground storage tank (UST) removal program by the Fire Marshal (prior to the Leaking Underground Storage Tank regulations), and use of "Sanitation Isolation Districts" around select wellfields to prohibit sanitary and other threats to groundwater.

This City of Kalamazoo Wellhead Protection Program Plan (Plan) represents a summary of selected past, on-going, and planned groundwater supply protection efforts since 1992, the year the City of Kalamazoo (City) formally began a WHPP. This Plan is an update to the revised Plan submitted in June 2011 and subsequently approved by the MDEQ. The Plan was written in accordance with guidance documents available from the MDEQ. Much of the work discussed in this Plan was made possible by funding received from the Michigan Wellhead Protection Grant Program.

It is important to understand the characteristics of the specific hydrogeology and PWSS so that the approach of and selected strategies of the local WHPP are fully understood. The following two sections provide detail regarding both aspects.

Regional Geology and Hydrology

Kalamazoo County is covered with a blanket of unconsolidated glacially derived deposits and alluvial deposits. The glacial sediments range in thickness from 50 to 600 feet and generally consist of outwash of medium to coarse size sands and gravels, and downcut drainage channel sands and gravels. The alluvial deposits consist mostly of recent sands and gravels deposited in present-day streams and are inter-connected with and usually indistinguishable from the glacial deposits. The bedrock consists of the Mississippian-aged Coldwater Shale that underlies the glacial materials, with no known surface outcrops in Kalamazoo County. Mississippian-aged Marshall Sandstone subcrops in the northeastern portion of the County.

All of the groundwater withdrawn for the Kalamazoo PWSS is from glacial drift aquifers. These unconsolidated materials are primarily glacial outwash and channel deposits, consisting of permeable sands and gravels interbedded with relatively low permeable sands, silts, and clays. Although some of these deposits consist of glacial till and glacial lake deposits, it is the outwash plains and downcut glacial drainage channels that constitute the most productive aquifers in the area. Various previous works have identified several aquifers in Kalamazoo County by horizontal geographic extent and recognized that one to three vertically separated aquifers may exist at one geographic location, generally

separated by relatively low permeable silty and/or clayey aquitards. Research and field investigations during the course of the Kalamazoo PWSS capture zone delineations noted as many as four separate vertically distinct but generally hydraulically connected aquifers in the western portion of Kalamazoo County. Aquifer types identified at Kalamazoo's current wellfields include water table/unconfined, semi-confined/leaky artesian, confined/artesian, and flowing artesian.

The regional geology and hydrology are discussed and illustrated in detail in the report "Kalamazoo, Michigan Regional Groundwater Flow Model" dated October 1996, and also within five, water pumping station (WPS) groundwater flow model & capture zone delineation reports referenced later in this plan. In addition, the capture zone delineations were updated in 2017, again discussed in a later section. Final documentation of the updated delineations was provided in conjunction with the 2018-19 WHPP Grant Application Submittal.

Public Water Supply System Characteristics

Water Service Area

The City of Kalamazoo PWSS currently provides services (via written contracts) for the City of Kalamazoo, the northern portion of the City of Portage, the Village of Richland, Kalamazoo Township, Comstock Township, Texas Township, Richland Township, Oshtemo Township, Cooper Township, and Pavilion Township **(Appendix A, Figure 2)**.

Limited Treatment PWSS

The City's PWSS is categorized and licensed as a "Limited Treatment" PWSS, using chlorine as a disinfectant, fluoride for dental health, and sodium hexametaphosphate for iron and corrosion control. In addition, two of its 16 water pumping stations, WPS 1 and WPS 11, have air stripping and iron removal capabilities.

Pumpage

The City of Kalamazoo PWSS is the second largest in Michigan that relies entirely on groundwater, pumping an average of approximately 20 million gallons a day (mgd). The system has a design pumping capacity of approximately 65.95 mgd. When mechanical limitations and managed capacity for water resources management are considered, the system has a capacity of approximately 46.73 mgd. **Appendix A, Figure 3** shows annual pumpage and average for the period 1977 through 2017, and **Table 1** lists details about the WPSs.

Pressure Service District Configuration

The Kalamazoo PWSS is uniquely configured by the use of eight distinct Water Pressure Service Districts, generally defined by topographic elevations. The eight districts are described as the Low, Intermediate, High, East Side High, Super High, Northwest High, Ultra High, and the West Side High. Water can be and is routinely conveyed between pressure districts by use of booster (pumping) stations, bleeder (pressure reducing valves) stations, or a combination booster/bleeder stations. Currently, five of the eight districts have at least one groundwater source (wellfield), with the remaining three of the districts (Northwest High, Ultra High, and the new West Side High District) receiving water only from other districts via use of booster stations. Six of the eight districts have at least one water storage facility. **Appendix A, Figure 4** shows the water service pressure districts and water related facilities, and **Table 2** lists details about the Booster and Bleeder Stations.

Wellfields and Production Wells

Groundwater pumping stations supply all of the water to the Kalamazoo PWSS. Currently, the PWSS consists of 98 active production wells of both gravel-packed and tubular (naturally developed) designs and are located within 17 wellfields. **Table 1** provides detail regarding the WPSs.

The City also anticipates two future WPSs/wellfields within 10 years: a 3.0 million mgd facility in Ross Township near 37th Street/Greer Drive on approximately 200 acres in the East Side High Pressure District, and a 2.5 mgd facility in Oshtemo Township near 6th Street/G Avenue on approximately 28 acres in the Ultra High Pressure District. Initial hydrogeologic investigations and property purchases have been completed for both locations.

Current well design capacities range from 300 gallons per minute (gpm) to 1,500 gpm and well depth ranges from 61 to 348 feet deep. All wells are screened within unconsolidated glacial sands and gravels. WPSs 15 and 16 are not shown since they are currently inactive and will be abandoned within the next few years.

Storage Facilities

There are eight water storage facilities that collectively, can store 15.3 million gallons. They consist of five above-ground tanks, one at-ground level facility, and one below-ground level facility. The storage facilities range in capacity from 350,000 gallons to 7.2 million gallons. **Table 3** summarizes details regarding the water storage facilities. A new 2.5 million gallon elevated water storage tank is currently being constructed at the WPS 22 location.

Table 1. CITY OF KALAMAZOO PUBLIC WATER SUPPLY SYSTEM WATER PUMPING STATIONS

Station Number	Station Name	Constructed /Renovated	Wells	Design Capacity, GPM (MGD)	Limited (L)[1] or Managed (M)[2] Capacity, GPM (MGD)	Pressure District
1	Central	1884/1995	6	6,750 (9.73)	6,000 M (8.64)	Low
2	Born Court	1925/1967	1	2,000 (2.88)	1,200 L (1.73)	Low
3	Balch Street	1917/1969	10	2,800 (5.48)	1,900 L (2.74)	Low
4	Maple Street	1928/1982	10	4,400 (6.34)	2,200 M (3.00)	Low/High
5	Schippers Lane	1914/1952	4	1,200 (1.73)	1,200 (1.73)	Intermediate
8	East Kilgore	1949/1974	6	2,400 (3.46)	2,400 M (2.50)	High
9	West Kilgore	1955/1984	12	2,800 (4.03)	2,000 M (2.50)[3]	High
11	Kendall	1955/1989	7	1,800 (2.59)	1,800 (2.59)	High
12	DeHaan	1957	4	1,200 (1.73)	1,200 (1.73)	High
14	Spring Valley	1958/1969	5	1,600 (2.30)	1,600 (2.30)	Intermediate
17	Konkle	1953/1996	1	700 (1.01)	700 (1.01)	High
18	Emerald	1955	2	1,250 (1.80)	1,250 (1.80)	High
22	Colony Farm	1963/1996	6	2,200 (3.12)	2,200 (3.12)	Super High/High
24	Atwater	1971	16	7,600 (10.94)	3,500 M (5.00)	Super High
25	Campbell	1978	9	4,500 (6.48)	1,400 M (2.00)	East Side High
39	Morrow Lake	1988	1	2,600 (3.74)	1,900 L (2.74)	High
	TOTAL		**100**	**45,800 (65.95)**	**32,450 (46.73)**	

NOTES: 'Limited Capacity Reflects Mechanical Limitations
[2]Managed Capacity is Selected Pumpage for Water Resources Management

Table 2. CITY OF KALAMAZOO PUBLIC WATER SUPPLY SYSTEM BOOSTER/BLEEDER STATIONS

Number	Name	Constructed	Renovated	Capacity gpm	Cu m/min	Pressure District
6	Parker	1938	Booster/Bleeder	2,400	700	Low/High
10	East Main	1954	Booster/Bleeder	2,000	1000	Low/Intermediate
21	Miller Road	1954	Bleeder	0	1400	High/Low
23	Gull Road	1969	Booster/Bleeder	1,000	650	Intermediate/East Side High
23A	Sprinkle	1984	Bleeder	0	200	East Side High/Intermediate
23B	East Main	1984	Bleeder	0	200	East Side High/Intermediate
26	Maple Glen	1976	Booster/Bleeder	500	750	Low/High
27	28th Street	1990	Booster/Bleeder	750	500	Low/High
28	Beech	1993	Booster	1,600	0	High/Ultra High
29	9th Street	1994	Booster	1,600	0	Super High/Ultra High
30	Parkview	1980	Bleeder	0	2400	Super High/High
31	Prairie	1996	Booster	3,200	0	Low/Northwest High
32	Almena	2003	Bleeder	0	-	Westside High/Super High
33	33rd Street	1990	Bleeder	0	1300	High/Low
34	"KL Ave"	2003	Bleeder	0	-	Westside High/Super High
35	Drake/KL	2009	Booster/Bleeder			Super High/High NWH/High NWH/Super High
36	West Main	2011	Bleeder	0	-	Super High/West Side Low
41	West Main	2018	Bleeder	0	-	West Side High/ West Side Low

Table 3. CITY OF KALAMAZOO PUBLIC WATER SUPPLY SYSTEM WATER STORAGE FACILITIES

Name	Constructed	Renovated	Capacity gpm	Pressure District
Beech	2007	Elevated	2,500,000	Northwest High
Blakeslee	1932	Ground	7,200,000	Low
Dartmouth	1939	Elevated	350,000	High
Edgemoor	1939	Elevated	750,000	High
Gull Road	1982	Elevated	1,500,000	East Side High
Mount Olivet	1955	Elevated	500,000	Intermediate
Stadium Drive	1994	Elevated	1,500,000	Super High
6th Street	2005	Elevated	1,000,000	Ultra High
TOTAL			**15,300,000**	

Customer Base

As stated earlier in the Plan, the City of Kalamazoo PWSS currently provides services via written contracts to the City of Kalamazoo, the northern portion of the City of Portage, the Village of Richland, and all or part of Kalamazoo Township, Comstock Township, Texas Township, Richland Township, Oshtemo Township, Cooper Township, and Pavilion Township. There are approximately 40,187 accounts, including 34,832 residential, 3,050 commercial, 1,749 multifamily, 314 seasonal, and 144 industrial. The City of Galesburg also can receive a small amount of City water but is a non-contracted customer. The Kalamazoo PWSS serves approximately 121,000 residential customers.

CITY OF KALAMAZOO WELLHEAD PROTECTION PROGRAM

As stated previously, this WHPP Plan represents a summary of selected past, on-going, and planned groundwater supply protection efforts since 1992, the year the City formally began a WHPP. This Plan was written in accordance with guidance documents available from the Michigan MDEQ. Much of the work was made possible by funding received from the Michigan Wellhead Protection Grant Program.

The City's original WHPP Plan was submitted to the MDEQ in December 2003 and approved by the MDEQ in early 2004. Subsequently, the City of Kalamazoo received the Exemplary Wellhead Protection Program Award by the Michigan Section American Water Works Association (AWWA) the same year. The City also received the Exemplary Wellhead Protection Program Award by the

Michigan Section AWWA in 2013 and by the national AWWA award in 2014. The Michigan Section AWWA awarded the City's Wellhead Protection Team the Richard Husby Public Awareness Award for promoting, developing and implementing public education activities in 2007. The City Also has received recognition plaques from the MDEQ Water Division and Groundwater Guardian Organizations (1998-2017) for the Wellhead Protection Program. Copies of the awards and plaques are included in **Appendix B**.

Wellhead Protection Program Elements

Appendix A, Figure 5 shows the seven elements of the Michigan Wellhead Protection Program. Each Element will be discussed in the following section specifically as it pertains to the Kalamazoo's WHPP. **Appendix A, Figure 6** presents a conceptual model of how the City's Wellhead Protection Program process is generally organized and implemented.

Wellhead Protection Area/Capture Zone Delineations

By federal and state definition, a Wellhead Protection Area (WHPA) is an area(s) surrounding the WPSs through which contaminants could move toward and eventually reach and impact the wellfields. WHPAs are primarily determined by the process of delineating time-of-travel (T.O.T.) capture zones, areas that theoretically indicate the time period in which source water – and theoretically contaminants - could reach a WPS under a given set of pumping conditions. In Michigan, the delineation of a 10-year capture zone is required. The five-year and one-year capture zones have also been performed for all of Kalamazoo's WPSs. Subsequently, these three T.O.T. capture zones are used to concentrate three different levels of effort to prevent groundwater contamination from occurring, based upon perceived risk. The State of Michigan requires that for delineation of a WHPA, a hydrogeologic study needs to be completed to compile readily available information, complete field work necessary to better understand the hydrogeologic system, and use an appropriate groundwater model to identify the WHPA.

In 1995, the City retained the services of the Peerless-Midwest Company, a highly reputable firm with extensive experience with groundwater modeling primarily in Michigan and Indiana, to complete all of the necessary groundwater flow modeling/capture zone delineations. Subsequently, representatives of the City, Peerless-Midwest, and the MDEQ met to discuss the strategy to delineate all of the City's (then) 19 active wellfields. After much review and discussion of available hydrogeologic and PWSS data, it was agreed that an initial regional groundwater model was appropriate. This regional model served as a precursor to the individual capture zone delineations and demonstrated that the water budget for the west side of the Kalamazoo River (where 15 of the 19 WPSs were located) was adequately understood, and served as a general hydrologic template for the subsequent models.

The U.S. Geological Survey MODFLOW (McDonald and Harbaugh, 1988) and associated programs were selected for this and all of the subsequent groundwater models since it have the ability to simulate multiple layers, confining layers, flow between layers, and groundwater-surface water interaction. In addition, it has been thoroughly tested and consequently, there is a high degree of confidence in this software. This was critical since the hydrogeology of the Kalamazoo area is highly complex due to the multiple aquifers, variability of semi-confining to confining conditions, and large amounts of groundwater withdrawals and in some cases, artificial recharge. In October 1996 the report "Kalamazoo, Michigan Regional Groundwater Flow Model" was submitted and subsequently approved by MDEQ.

The following are titles, dates, and a brief summary of the five original groundwater flow model & capture zone delineation reports/projects:

- "Kalamazoo, Michigan Water Pumping Stations 11 & 12 Groundwater Flow Model & Capture Zone Delineations" dated March 1998. WPSs 11 and 12 were selected for the first capture zone delineation groundwater flow model since it was well documented that the two wellfields were hydraulically connected, there was numerous hydrogeologic data for the area, the hydrogeology was complex/multi-layered, and there was past and present contaminant concerns. WPS 11 has an air stripping and iron removal capability (due to the detection of vinyl chloride in the early 1980s). These two stations were modeled using seven layers. It is interesting to note that although these two stations are within each of their respective cone of influence, the model indicated that their capture zones do not co-mingle. They are located in the northwest portion of the PWSS.
- "Kalamazoo, Michigan Water Pumping Stations 1, 2, 3, 4 & 7 Groundwater Flow Model & Capture Zone Delineations" dated November 1999. This model addressed the WPSs that are geographically in the same area near the Crosstown Ponds and hydraulically connected, with the exception of WPS 4 that does not respond to or affect the other WPS pumping regimes. They were also modeled using seven layers. Central Wellfield/Water Pumping Station 1 is the oldest wellfield, serving the City since the 1880's. Central's complete renovation in 1995 included replacement of all of its 19 production wells with six higher capacity wells, and the addition of air stripping and iron removal capabilities. The renovation made it the newest and largest pumping facility.
- "Kalamazoo, Michigan Water Pumping Stations 8, 9, 15, 16, 17, 18, 22 & 24 Groundwater Flow Model & Capture Zone Delineations" dated September 2001. This model addressed the eight southernmost WPSs: the "Milwood Stations" or WPSs 15, 16, 17 & 18, the Kilgore Road WPSs 8 & 9, and WPSs 22 & 24, the two most southwesterly located stations in the PWSS. WPSs 15 & 16 are not currently active but were modeled to

their original design pumping capacity in case they are rehabilitated later. They were all modeled using four layers.

- "Kalamazoo, Michigan Water Pumping Stations 5 & 14 Groundwater Flow Model & Capture Zone Delineations" dated September 2002. These two WPSs were modeled together since they are located relatively close to one another and were both located east of and near the Kalamazoo River. They were modeled in three layers. WPSs 5 & 14 are the only two Stations in the Intermediate Pressure Service District.
- "Kalamazoo, Michigan Water Pumping Stations 25 & 39 Groundwater Flow Model & Capture Zone Delineations" dated December 2002. WPSs 25 & 39 are the two most eastern stations and are located just west of Campbell Lake and near the southeastern portion of Morrow Pond (Kalamazoo River impoundment), respectively. They were modeled using three layers.

The original City of Kalamazoo capture zone delineations were performed by Peerless-Midwest. The groundwater modeling/capture zone reports were jointly prepared by the Peerless-Midwest Company (John R. Barnhart, Bob Masters, and Mike Chapman) and the City of Kalamazoo Department of Public Services (John P. Paquin). No WHPAs have changed due to pumpage rates.

In 2017, the City retained Fleis and VandenBrink to update the capture zone delineations, incorporating the deletion of the abandoned WPS 15 and WPS 16. The project team reviewed monthly WPS flow data for the period 2012-2016. The data were used to calculate the average day pumping for the maximum months at each WPS. This was done using both a 5 and a 10-year span. The pumping updated models were run using the pre/post processor Groundwater Vistas Version 7, which incorporates MODFLOW. The models were run in in steady-state mode. Model output was used as import into MODPATH. Particles were tracked in reverse from the pumping centers. 1, 5 and 10 year time-of-travel zones were calculated for each WPS. A high density of particles was used to provide clear definition of each WHPA. **Appendix A, Figure 7** shows the *draft version* of the updated composite capture zone delineation figure (1, 5 and 10 year times-of-travel). The City is currently in the process of attaining additional pumping information from surrounding communities to refine the final capture zone delineations.

Contaminated Source/Transport Study

In 1981, a volatile organic compound (VOC) (Vinyl Chloride) was detected in the WPS 11 wellfield, eventually causing the shutdown of the station in 1985. The subsequent hydrogeologic/contamination source investigation did not determine the source. An air stripper was added, along with iron removal to the WHP. The City has retained Fleis and VandenBrink to complete a contaminant source/transport study for chlorinated solvents near WPS 11 using a WHP Grant.

A summary report and recommendations are expected in 2018 to provide options for managing the system given the continued presence of solvents at the wellfield.

Contaminant Source Inventories

Initial Contaminant Source Inventories

Initially, Contaminant Source Inventories (CSIs) were prepared for each respective delineated area(s) after completion and approval of each groundwater flow model/capture zone delineation report. The goal of a CSI is to identify existing (known) and potential sources of contamination (sites) that might represent a threat to the PWSS. The City used the required 10-year T.O.T. capture zones with a one-quarter to one-half mile buffer area as the CSI data boundaries since the City recognized that there may be cases that a groundwater contaminant plume exists up-gradient from a currently delineated capture zone that has the potential to migrate down-gradient into a WHPA.

After much consideration, it was decided that the most cost-effective and comprehensive strategy to complete the City's CSIs was to start with an electronic database service that provided the majority of potential sources of contamination information requested by MDEQ. EcoSearch Environmental Resources, Inc. provided the database listings for the first two CSI reports, Environmental Database Resources, Inc. (EDR) provided the database listings for the third and fourth CSI reports, and FirstSearch Technology Corporation (FTC) provided the database listings for the fifth and sixth CSI reports.

After the database listings were reviewed, modifications and additions were then made to the report based on in-house knowledge and other supplemental informational sources, including the City Fire Marshal Office, MDEQ Storage Tank Division (Kalamazoo District Office), MDEQ Environmental Response Division (Kalamazoo District Office), MDEQ Drinking Water and Radiological Protection Division (Lansing), Waste Management Division (Lansing), and the Kalamazoo County Environmental Health and Laboratory Services Bureau. Examples of non-database service information that was acquired include oil and gas well permit locations, groundwater dischargers, land restricted (covenant) sites, abandoned wells, and stormwater related sites. Subsequently, all of the information was reviewed, cross-checked, re-organized, and plotted in various figures as considered appropriate.

The following are all of the initial CSI reports prepared by the City and approved by the MDEQ:

- "Kalamazoo, Michigan Contaminant Source Inventory for Water Pumping Stations 1, 2, 3, 4, 7, 11 & 12" dated September 2000. This

report combined the 10-year T.O.T. capture zones for the first two groundwater delineation models that addressed seven WPSs.

- "Kalamazoo, Michigan Contaminant Source Inventory for Water Pumping Stations 15, 16, 17 & 18" dated September 2002.
- "Kalamazoo, Michigan Contaminant Source Inventory for Water Pumping Stations 8 & 9" dated September 2002.
- "Kalamazoo, Michigan Contaminant Source Inventory for Water Pumping Stations 22 & 24" dated September 2002.
- "Kalamazoo, Michigan Contaminant Source Inventory for Water Pumping Stations 5 & 14" dated December 2002.
- "Kalamazoo, Michigan Contaminant Source Inventory for Water Pumping Stations 25 & 39" dated March 2003.

2005 CSI Update, GIS Database, and Risk Assessment Project

In 2005, the City of Kalamazoo worked with Fishbeck, Thompson, Carr & Huber (FTC&H) to collectively update its CSIs for all of its WHPAs. The update consisted of the following:

1. Updating various state and federal database information;
2. Conducting Freedom of Information Act Requests for and file review of selected state agency files;
3. Contacting local agencies;
4. Populating the existing CSI MS-Access database with the new information; and
5. Updating the Geographic Information System (GIS) capabilities of the MS ACCESS database.

New to the CSI process was a prioritization method that used a numeric ranking system to help prioritize the CSI data. Primarily, the ranking tool took into consideration four general data types:

1. Current Land Use – how the site is currently used;
2. Environmental Data – a variety of environmental data available from state and federal databases, and consideration whether the site has participated in environmentally-friendly programs;
3. Groundwater Vulnerability – such factors as depth to groundwater, soil type and recharge; and
4. Water Supply Vulnerability – whether the site is within the 1, 5 or 10 year capture zone.

The scoring tool applied weight to the various data types which resulted in a numeric score for each site. The greater the score, the higher the likelihood the site will pose a threat to water supply wells. Detail of the process and results of

the 2005 CSI update is reported in "Deliverable No. 1 Contaminant Source Inventory Update City of Kalamazoo Michigan September 2005."

2010 CSI, GIS Database, and Risk Assessment Update

In 2010, the City and FTC&H again performed the five-year CSI update for all of the WHPAs and in some cases, slightly revised the numeric ranking system either by adding new criteria or adjusting some of the weight values. For example, known nonconforming use sites relative to the formal adoption of the Wellhead Protection Overlay (Ordinance No. 1825) in 2007 (updated in 2015) were taken into consideration. In addition, new environmental information was available during this update period, resulting in additional site categories and significant increases in sites listed in the Facility Index System (FINDS) and Liquid Industrial Waste or Emergency Generator categories. Subsequently, the MS ACCESS database/GIS were also updated.

In summary, 630 sites were scored in the 2010 CSI with 99 different scores. The range of the scores was 21 to 330 points. Of the seven jurisdictions that the City's capture zones extend, 65 percent of the sites in the CSI are located within the City of Kalamazoo, 10 percent in the City of Portage, nine percent in Comstock, six percent in Kalamazoo Township, five percent in Texas Township, 4 percent in Oshtemo Township, and less than one percent cumulative total within the Village of Richland, Richland Township, or situated across multiple jurisdictions. The 2010 CSI update is reported in "Contaminant Source Inventory Update for the City of Kalamazoo Michigan September 2010."

2017 CSI, GIS Database, and Risk Assessment Update

In 2015/16, the City and Fleis & VandenBrink performed the five-year CSI and Risk Assessment update for all of the WHPAs and in some cases, slightly revised the numeric ranking system either by adding new criteria or adjusting some of the weight values. Currently, a CSI GIS layer is being developed by Fleis & VandenBrink for the City's GIS website.

Roles and Responsibilities

The goal of this element is to identify and indicate involvement of individuals and/or organizations that will help develop and implement the local WHPP.

City of Kalamazoo

The City of Kalamazoo administration is solely responsible for complying with and for the administration of the WHPP. Examples of these duties and responsibilities includes: preparing and submitting all appropriate program reports to MDEQ; preparing and submitting WHP Grant Contract reports to the MDEQ and fulfilling obligations therein (project management); and ensuring that

the obligations of all seven required program elements are met (including WHPP updates). The City is also responsible for integrating wellhead protection strategies within all water resources management programs and projects as appropriate and to the most practical extent possible. City staff also selects and supervises all consultant/contractor assistance on a project-by-project basis.

Wellhead Protection Committee

The local WHP Committee serves three purposes: to fulfill the general MDEQ requirements for a local WHP Committee, fulfill the MDEQ WHP Grant Program requirements, and fulfill the national Groundwater Foundation Groundwater Guardian Program requirements. The City has consistently exceeded the minimum requirements for committee membership for all three purposes. **Table 4** indicates the current members of the committee. The local WHP Committee is typically used in non-technical roles but members do periodically contribute to technical issues, especially from a review and comment role. The Committee typically focuses on public education and participation, selection of management strategies and projects for grants and Groundwater Guardian Program, contamination issues, and interaction with the community regarding the WHPP. The team members are carefully selected to optimize opportunities to tap local expertise for all of the seven elements.

Kalamazoo County Health and Community Services

The City has had a collaborative relationship with the Kalamazoo County Health and Community Services on groundwater programs and projects, focusing primarily on public education and participation, well abandonments, contamination issues, and public media releases regarding certain water quality issues. An example of this collaborative relationship was the joint-funded and managed Kellogg Foundation Grant Project "Groundwater Protection Through Local Government and Business Community Action and Education" from 1995-2001. Through this grant, two committees were formed: the "Kalamazoo Area Wellhead Information Network (KAWIN)" – currently titled the "Safe Drinking Water Partners of Southwest Michigan" (SDWP) – and the Kalamazoo Area Groundwater Education Committee (KAGEC). The City was a primary member in both of these committees. KAGEC eventually merged with KAWIN/SDWP. The City also co-managed the Kalamazoo County Monitoring Well Inventory Project with Kalamazoo County that resulted in approximately 7,000 monitoring wells being identified and entered into the County's well database. The City also promoted Kalamazoo County's past "Business Environmental Education Assistance Program" (BEEAP) that linked area businesses with the County's and City's groundwater protection programs.

Table 4. WELLHEAD PROTECTION COMMITTEE MEMBERSHIP

Current Members
John P. Paquin Water Resources Division Manager (City)
Jim Williams Fire Marshal (City)
Jean Talanda Environmental Programs Manager – Water (City)
James W. Brode Senior Project Manager (F & V)
Kathleen M. Buckham Retired Executive Director, Kal. Conservation District/Current Farmer.
Jamie Baker (Oshtemo Township)
Sarah Davis Safety/Environmental Dir. (KALSEC)
Frank Wolf Woods Lake Association (retired – General Citizen)
Megan Kaiser Sustainability Specialist (Bell's Brewery)
Michelle Mahar Science Teacher (Gull Lake High School)
Jeff Reicherts Groundwater Specialist (Kalamazoo County)
Bill Hughes Retired – General Citizen

More recent examples of collaborative efforts include responses to the Orchard Hill neighborhood groundwater contamination, Allied Paper (Operation Unit 1) Superfund Site, the Enbridge Energy crude oil release, and media releases for water quality issues such as sanitary sewage overflows (SSOs). The historic close relationship between the City and the County on groundwater related efforts has been beneficial to both governments and is anticipated to continue into the foreseeable future.

MDEQ

The City recognizes the critical role of the MDEQ to administer and manage the WHPP from a regulatory standpoint (approving groundwater models, contaminant source inventories, local WHPPs, etc.), from an advisory role (providing guidance documents, attending meetings, etc.), and to provide funding where possible, such as through the WHP Grant Program. MDEQ staff is often invited to attend the City's WHP Committee meetings and on occasion provide State WHPP updates and guidance on grant project selection.

Other Roles and Responsibilities

In general, non-City water contract customers (neighboring governments) and the general citizens using City water should have a vital interest in and should take seriously their organizational and/or personal role in helping protect their own drinking water supply.

Business, professional, and environmental organizations such as the City of Kalamazoo Environmental Concerns Committee (ECC), the Kalamazoo Environmental Council (KEC), Kalamazoo River Watershed Council (KRWC), Kalamazoo River Cleanup Coalition (KRCC), Kalamazoo County Chamber of Commerce (Environmental Affair Committee), local media, etc., all have a role in wellhead protection, either by their direct (formal) or indirect (informal) professional services provided to the City, or by initiating public interest and educating citizens regarding environmental protection issues in general, or specifically by providing support to drinking water protection initiatives.

City staff has had memberships/participation with the Michigan AWWA and their Groundwater Committee, Michigan Water Environment Association (MWEA), the National Ground Water Association (NGWA), and the national Groundwater Foundation Groundwater Guardian Community Program. Staff continues to provide and help coordinate various groundwater presentations at conferences, seminars, workshops, and meetings. In addition, the City has in the past teamed up with the Michigan Groundwater Stewardship in well abandonment and groundwater education projects, and periodically works with faculty and students at Western Michigan University in water related projects. Finally, the K-12 public and private educational institutions have had a role in groundwater education by allowing presenters into their classrooms and participate in other events, and by incorporating groundwater education into their curriculums.

New Production Wells/Wellfields

The goal of this element is to insure that a mechanism exists for incorporating new or replacement wells or wellfields into the WHPP when the water supply is expanded, an increase in water use is desired, or susceptibility of existing wells or wellfields to contamination may necessitate the future development of new production facilities.

The City has historically and routinely considered groundwater source protection/wellhead protection in its decision-making when replacing or adding a new water production well. However, the City can now more thoroughly investigate area conditions with the CSI/Risk Assessment (RA). Collaboration between Water Resources Division staff (Environmental Programs Manager) and the Engineering Division staff (Senior Civil Engineer) serves as an effective current mechanism: Water Resources staff addresses the hydrogeologic assessment/safe yield, property acquisition, potential environmental impacts,

known and potential sources of contamination, current and proposed land use, and current and projected water use; and Engineering staff addresses the water main, electrical, necessary engineering drawings, and other engineering details of the well/wellfield project. They work jointly to prepare and submit necessary permits.

Contingency Planning

The goal of a WHPP contingency plan is to prepare a PWSS for natural, environmental, or other threats by the use of carefully prepared actions/responses. The main elements of a WHPP contingency plan are the identification of personnel, testing equipment, procedures, materials, etc. that can be used for the rapid correction or mitigation of threats to the water supply.

Generally, all of the components of a WHPP contingency plan are contained within the City's "City of Kalamazoo Department of Public Services Water Pumping and Distribution System Emergency Response Plan" (ERP), prepared in compliance with "The Public Health Security and Bioterrorism Preparedness and Response Act of 2002." The document is currently being revised and serves as the guide for the Kalamazoo Department of Public Services to decide what actions are necessary to govern the immediate response to an emergency, including how to remedy the problems caused by the emergency and recover from it. MDEQ understands the importance of maintaining confidentiality in respect to certain PWSS protection strategies, especially relative to fulfillment of recommendations from the confidential "Vulnerability Assessment," a document mandated in The Public Health Security and Bioterrorism Preparedness and Response Act of 2002. Those sensitive strategies will not be discussed in this WHPP Plan document.

In 2006, the City retained Fleis & VandenBrink to prepare a Water Supply Emergency Response Plan with the specific objective to fulfill MDEQ's requirement of the WHPP for a Contingency Plan. Updated water supply information was provided in earlier pages of this Plan. The "Water Supply Emergency Contingency Plan"; "Alternate Water Supply"; and five "City of Kalamazoo Water Service Area Notice to Customers" templates were presented 2011 Wellhead Protection Program Plan Report. The City again worked with Fleis & VandenBrink to update its Water Emergency Plan through 2012, re-formatting the document. City Staff is currently working in-house to update and maintain its ERP. For more information or to request a copy for the most recent draft call the City's Water Resources Division Manager.

Wellhead Protection Area Management

The goal of developing management strategies (management plans) is to recognize, categorize, and prioritize threats to the PWSS and plan for and implement measures to minimize risk to its groundwater supplies. The City has

numerous challenges, given the large and widely distributed capture zone areas, older urban core, and the significant amount of older wellfields. Consequently, the City has implemented and currently uses numerous and a wide variety of management strategies in the attempt to minimize risk to its PWSS groundwater source areas. **Appendix A, Figure 8** shows the large array of WHPP management strategies implemented for the City of Kalamazoo's PWSS.

Groundwater Protection Resolution

On July 20, 1998, City of Kalamazoo, Michigan Resolution No. 98-77 – "A Resolution which Expresses Intent of the City of Kalamazoo to Participate in Groundwater Protection Efforts and Which Encourages Its Citizens to Do So" was adopted by the City Commission. This was a formal first step in introducing the City Commission to the Wellhead Protection Program. The Resolution also set the groundwork for the City's efforts in completing all of the necessary program elements, preparation of the Wellhead Protection Program Plan and subsequent MDEQ approval, and served as a precursor to the formal adoption of the WHP Zoning Overlay and Performance Standards Ordinances.

Wellhead Protection Zoning Overlay and Performance Standards

From a regulatory perspective, the two primary WHPP management strategy tools are the "Wellhead Protection Zoning Overlay" (Ordinance No. 1825 as Appendix A: Chapter 3, Section 3.5 of the City Code of Ordinances) and "Performance Standards for Groundwater Protection Within Wellhead Protection Capture Zones and Stormwater Quality Management" (Ordinance No. 1826 as Appendix A, Chapter 8, Section 8.3), both formally adopted by the City Commission in May 2007. In 2015, the City updated both the Performance Standards, primarily to align them with new requirements in the 2015 Phase II Stormwater NPDES Permit. **Appendix C** contains Ordinance 1825 and Ordinance 1826.

Wellhead Protection Zoning Overlay
The objectives of the wellhead Protection Zoning Overlay Ordinance (Overlay Ordinance) are to:

1. Prevent the creation or establishment of non-compatible land use activities within WHP capture zones that have the potential to contaminate groundwater sources, or prevent/limit the City's ability to obtain necessary State well permits to replace or add wells when necessary;
2. Protect designated groundwater supplies from contamination resulting from spills, leaks, and other releases into groundwater supplies caused by the improper storage, handling, use, production, or discharge of Regulated Substances within capture zones by the use of Performance Standards and/or other best management practices (BMPs);

3. Minimize interruptions to businesses by only regulating specific designated land-use activities within specific designated time-of-travel capture zones, as based upon determined potential risk to the PWSS; and
4. Prevent or minimize public and private losses due to contamination of the public water supply by avoiding expenditure of public money for costly pollution remediation projects and/or replacement of PWSS assets.

Generally, the above objectives are accomplished by prohibiting certain higher risk to groundwater activities within the one-year capture zone, and requiring that sites within the 5-year and 10-year capture zones to adhere to the Performance Standards or implement other acceptable BMPs and/or the prepare Spill Response Plans to prevent/minimize the risk of groundwater contamination. It also addresses existing nonconforming sites.

Performance Standards

Updated in 2015, the Performance Standards for Groundwater Protection Within Wellhead Protection Capture Zones and General Stormwater Quality Management (Performance Standards) serves as the technical reference for the WHP Zoning Overlay Ordinance and for Site Plan Review. It provides:

1. General Site Plan Review Standards (e.g. regarding site design, process activities, regulated substance storage, waste, etc.);
2. Land use specific Site Plan Review Standards (e.g. dry cleaning, fueling, repair shops, junk/savage yards, etc.);
3. Stormwater quality management criteria (groundwater risk assessment, discharge strategies, treatment, spill containment, etc.);
4. Addresses nonconforming land uses;
5. References potentially applicable environmental regulations;
6. Provides information regarding contaminated property management; and
7. Provides other useful information within the Appendices.

The most common applications of these standards has been the requirement for secondary containment of Regulated Substances over the 55 gallon/440 pound threshold, stormwater discharge management within WHPAs by either prohibiting stormwater infiltration within one-year and five-year T.O.T. capture zones or requiring stormwater treatment prior to infiltration dependent on various factors, and/or the preparation of spill contingency plans.

Other Jurisdictions with Capture Zones

The City has worked with Prein and Newhof, which represents many of the outside-the-City township water customers, to present, explain, and encourage the formal adoption of both the WHP Zoning Overlay Ordinance and the Performance Standards for their jurisdictions. Consequently, a "Model Township Ordinance" and "Model Performance Standards" were prepared. The Township versions of the ordinances are primarily the same as the City's with the exception

of revisions to accommodate certain rural conditions, such as the use of septic systems where sanitary service is not available, private wells where water service is not available and accommodating stormwater infiltration in capture zones where surface waters are not readily available for discharge. In addition, the Townships will likely adopt a typical Ordinance format instead of using a WHP Zoning Overlay. The Townships have expressed a willingness to adopt the "Township" versions of both ordinances but may not actually do so until the new water contracts are finalized (negotiations ongoing). The exception has been Texas Township that adopted a slightly modified version of the City's WHP Zoning Overlay and Performance Standards.

Site Plan Review

The second primary management strategy is a formalized Site Plan Review process developed in 2000 that addresses proposed new and re-development that meets specific criteria.

In addition to the previously discussed use of the WHP Zoning Overlay Ordinance and the Performance Standards, the Site Plan Review Process also uses a Site Plan Review Application Packet. Originally the packet contained a "Water Resources and Environmental Protection Questionnaire" that provided the first set of pertinent questions regarding potential environmental issues and initiates the consideration of setting certain conditions for site plan approval, as appropriate. The City provided the Water Resources and Environmental Protection Questionnaire to select neighboring Townships and has encouraged its use.

The Environmental Protection Questionnaire was recently incorporated into the Site Plan Review Project Checklist included as **Appendix D**. On average, the City utilizes the Site Plan Review process on 40-70 proposed new and re-development sites per year.

Nonconforming Use Project

In 2010 as a follow-up to the adoption of the WHP Zoning Overlay and Performance Standards Ordinances, City staff worked with FTC&H to identify businesses located within WHP capture zones, and specifically those that were known to or were likely to possess Regulated Substances above the designated thresholds. A cover letter and Questionnaire were sent out to 34 businesses that were identified as priority sites, based on a number of developed criteria. Subsequently, the objective was to determine which businesses were in compliance and those that needed to meet the Performance Standards and/or prepare a Spill Response Plan.

Voluntary Spill Response Plans

In 2004 and 2005 (prior to the adoption of the WHP Overlay and Performance Standards), the City initiated a MDEQ grant funded project with FTC&H to identify businesses located within capture zones that were not currently obligated under state or federal law to prepare spill response plans (SRPs) but still posed a reasonable risk to groundwater, based on their land use activities (e.g. storage and/or use of chemicals). One unique part of the project was that the information about the businesses would be kept confidential unless the business voluntarily provided the City a copy. The City contacted 59 businesses by providing them a letter explaining the free and confidential project. General information was provided to the City from FTC&H, such as how many SRPs were completed, type of businesses, location relative to capture zones, and the type and quantities of chemicals that existed.

Of the 59 businesses contacted, six declined due to lack of interest, seven declined since they reportedly did not have significant storage of chemicals, nine declined since they already had a SRP, six did not respond, four were subject to PIPP or SPCC regulations and thus were not eligible, seven declined but would consider participation in the future, and 20 accepted. Of the 20 that businesses that were interested and eligible, FTC&H performed site assessments and conducted a walk-through of each of the sites. SRPs were then prepared for the businesses using a template prepared by FTC&H (contained as Attachment 2 in the Performance Standards). Following the preparation of the SRPs, the materials were delivered to the site, along with a cover letter that listed additional recommended practices (if appropriate) to reduce the probability of chemical releases. All of the 20 businesses allowed the City to recognize them with a framed Certificate of Appreciation, and in a groundwater education pre-movie theater video ad.

CSI GIS Database and Risk Assessment

Details regarding the CSI GIS Database and Risk Assessment were provided earlier in this Plan. Since these initiatives were above and beyond the scope of the traditional CSI requirement, they are also considered management strategies developed to help manage actual and potential sources of contamination. Currently the Water Resources staff and the Fire Marshal are discussing the possibility of having a common database that has chemical storage information since the information is important for both assessing risk to groundwater and the safety of Public Safety Officers responding to fires. This could be accomplish in a variety of ways, including the expansion of the existing CSI database that covers approximately half of the City, using the existing BS&A parcel database, or preparing a new GIS compatible database for all City properties, using all available information. The acquisition of chemical storage information is also being reviewed and discussed to find ways to collaborate.

The City currently utilizes the Chemical Inventory and Storage Form questionnaire as part of the Right To Know regulations and for the wellhead protection programs. This questionnaire included as **Appendix E** is distributed via the Public Safety Officers during annual inspections and Site Plan Reviews, and can be obtained on the City's Protect Your Water Website (www.protectyourwater.net).

In 2010 as a follow-up to the adoption of the WHP Zoning Overlay and Performance Standards Ordinances, City staff worked with FTC&H to identify businesses located within WHP capture zones, and specifically those that were known to or were likely to possess Regulated Substances above the designated thresholds. A cover letter and Questionnaire were sent out to 34 businesses that were identified as priority sites, based on a number of developed criteria. Subsequently, the objective was to determine which businesses were in compliance and those that needed to meet the Performance Standards and/or prepare a Spill Response Plan. A comprehensive "Nonconforming Use Identification and Action Plan" table was prepared to track all of the businesses.

Cooperation and Coordination with Other Units of Government

Cooperation and coordination with MDEQ and participation with Kalamazoo County programs were discussed in the previous Roles and Responsibilities section of the Plan. However, the extra effort and progress made to achieve these objectives also make them management strategies, along with assistance provided to other governments, discussed as follows.

Staff works with MDEQ to prioritize and cooperate as much as possible to investigate, evaluate, and remediate (if necessary) sites of concern. Examples of the type of past cooperative efforts by the City include: use of staff in researching, evaluating, and recommending courses of action on contaminated groundwater sites; sharing water level measurements and water quality data from samples collected from the numerous City owned production and monitoring wells in the area; analyzing groundwater samples at the Water Reclamation Plant state-certified laboratory to assist in lowering site investigative costs; and drilling and installing monitoring wells to assist in site investigations.

The City actively promotes the use of the Kalamazoo County Household Hazardous Waste Collection Program and the Kalamazoo County's Well Abandonment Program. In addition, the Cities of Kalamazoo and Portage work together on land use projects that may pose environmental concerns to the other's jurisdiction (e.g. proposed development within WHPAs).

Finally, staff has assisted other non-Kalamazoo County governments by providing presentations to them about the City's WHPP (e.g. Village of Paw Paw, Plainfield Township, City of Rockford), providing both Ordinances to be used as

templates for other governments, and allowing the use of the pre-movie video ads.

U.S. Geological Survey Cooperative Water Level Monitoring Program

The City has participated in the cost-sharing USGS Cooperative Water Level Monitoring Program for several decades. In 2011, the City contributed approximately $50,000 to the program. The City's participation has made possible the collection of groundwater and surface water levels from numerous USGS observation wells (OWs) and surface water gauging stations in Kalamazoo County. This water level data is periodically used in hydrogeologic/hydrologic studies, exploratory source investigations, and groundwater-surface water inter-relationship evaluations. USGS OWs are located at City's WPSs 1, 4, 9, 11, 18, 22, 24, 25, and 39. The City also initiated and was a primary partner in a regional group to have additional OWs either installed or incorporated into the USGS network, including at the Gourdneck State Game Area and the Western Michigan University (WMU) former Lee Baker property. In 2018, the City funded a "Real Time" groundwater gauging station at its Central Wellfield location and a Real Time surface water gauging station on Portage Creek at Reed Street.

Local Monitoring Well Network

Since 1981, the City has installed numerous monitoring wells at and/or in the vicinity of some of its wellfields to assist in hydrogeologic and/or contaminant investigations. Some of the general locations of Monitor Wells (MWs) include in and around the Central Wellfield (WPS 1), WPSs 11 and 12, WPS 14, WPS 4, WPS 2, WPS 5, and WPS 18. In addition, the City worked with MDEQ to have principle responsible parties (PRPs) of groundwater contamination install many MWs near Wellfield 7.

MWs installed on City owned property or Right-of-Ways by other organizations – primarily consultants retained by PRPs – are recorded by the use of Temporary Access Agreements. To date, there have been nearly approximately 180 MWs installed via the Temporary Access Agreement process.

Well Abandonments

The City has a policy to properly plug old production and monitoring wells after they are replaced or no longer usable or accessible. Two examples of extended well plugging efforts include the following.

In 1998, the City prepared and submitted a proposal to participate in the MDEQ Abandoned Well Management Program Demonstration Project. Although the project was not selected and consequently no funds were available to perform the proposed work, significant work was accomplished, including: research of

potential well plugging candidates within WHPAs; prioritization of identified candidates; and the preparation of a collaborative framework to perform well abandonments.

In 1999/2000, a specific well abandonment project was used as a Groundwater Guardian Program Project. The City collaborated efforts with Kalamazoo County and the Michigan State University (MSU) Groundwater Stewardship Program (GSP) to have well abandonment efforts partially funded by a GSP grant. Criteria for well abandonment candidates included that the well be a residential well, located within a WHPA, and abandoned/unused prior to 1983. A City Registered Well Driller and other staff performed the removal of existing pumps and motors and drop pipes, and well plugging of approximately 10 wells. One well plugging was used as a demonstration project for public education of neighborhood residents and a W.M.U. geology class. The demonstration well plugging was performed at no cost by the Ohio Drilling Company.

Land Purchases for Wellfields

The City attempts to purchase as much property for and around wellfields as possible so land use activities can be directly controlled by the City, thus minimizing risk to the groundwater. In addition, greater property size provides more flexibility in the original design of wellfields and well spacing, and better allows for the accommodation for future well replacements or additions to meet well isolation distance requirements. Some examples of large tracks of land purchased for wellfields include: WPS 9 (50.4 acres), WPS 14 (20 acres), WPS 22 (22 acres), WPS 24 (717 acres), WPS 25 (406 acres), and WPS 39 (68 acres). Other notable wellfield sizes include: WPS 1 (18.4 acres), WPS 4 (8.5 acres), WPS 11 (16.2 acres), WPS 12 (12.6 acres), and WPS 18 (7.8 acres). In 1993 after the first of three hydrogeological investigations, the City purchased approximately 204 acres in Ross Township for a proposed 3 MGD wellfield. In 2003, two parcels of property adjacent to WPS 11 were acquired for the purpose of adding vacant property adjacent to the wellfield. In 2009 after a hydrogeological investigation, the City purchased approximately 28 acres for a future 2.5 MGD wellfield site in Oshtemo Township. In 2010, the City purchased approximately 1.5 acres of additional property to square off the existing parcels owned in Ross Township.

Integration with Stormwater Management Program/Multi-Program Facility Inspections

Since 2003, the City of Kalamazoo's separated stormwater collection system has been considered a "Municipal Separate Storm Sewer System (MS4)" and consequently is regulated under the Environmental Protection Agency (EPA) Phase II Stormwater Rules of the Clean Water Act, administered by the MDEQ. Since both the WHPP and the Phase II Stormwater Program are water quality based programs, they have some similarities: Both have a requirement for a

public education program; both can require that evaluations/inspections of facilities be performed to determine contaminant sources and the need to implement best management practices; and both have a goal of improving water quality.

To cost-effectively address the public education requirements of both programs, City staff has developed a Public Education and Outreach Plans/approach to optimize its opportunities to educate the public about wellhead protection and stormwater quality management at nearly all of the same events, and uses many of the same outreach strategies for both programs.

In a similar manner, City staff optimizes the opportunities to obtain as much relevant information about a facility's potential to affect water quality as possible at each facility visit, whether the inspection was initiated by concerns about wellhead protection, stormwater quality, cross-connections or the industrial pre-treatment inspection program. This approach has proven to be cost-effective since it optimizes staff time and to minimizes interruption to the businesses by avoiding unnecessary multiple visits. Another benefit is that since groundwater and surface water are typically inter-connected in Kalamazoo County, if you help protect either groundwater or surface water quality, you may help protect the other.

Public Education Targeted Within WHPAs

The City recognizes groundwater education targeted toward specific WHPAs as a management strategy for WHPAs, relative to groundwater education used to reach the other public sectors discussed in the next element section "Public Education and Participation." Two examples how the City has used groundwater education as a WHPA management strategy include when a two-sided 11 x 17-inch flyer was prepared and distributed to neighborhood residents within the WHPAs for WPS 11 & 12 via formal neighborhood associations, and neighborhood residents were invited to see an abandoned well being plugged.

Public Education and Participation

Appendix A, Figure 9: Public Education & Outreach illustrates the large number of and wide diversity of strategies that the City of Kalamazoo has implemented since 1992. In general, the puzzle piece colors represent the following Categories of public education and outreach: Green is primarily strategies that include school and community events; red represents strategies that are designed to target the general public on an ongoing basis, with the exception of the large Home Builder Expo annual event; blue targets water customers, City employees, and visitors; and the purple piece represents the Groundwater Guardian Program.

Appendix F provides the table "City of Kalamazoo Water Resources Public Education & Outreach Summary" for the period June 2011 through May 2018. The table summarizes events/locations, attendees, type and number of items distributed, and educational model demonstrations given. As can be seen by reviewing our attached "Water Resources Public Education & Outreach Summary" table, we again had a significant variety of strategies and reached tens of thousands of people.

The City was recognized for its efforts by receiving the "2007 Richard Husby Public Awareness Award" and plans to continue its current approach and continually seeks to initiate additional opportunities and innovative techniques to educate the public regarding groundwater protection. The following provides additional detail regarding some of the strategies shown in **Appendix A, Figure 9**.

School and Community Outreach and Education

Groundwater School Education Program

The City considers its groundwater education efforts in schools as a priority and it is a primary component of its public education and outreach efforts. Many of the current and past WHP Committee members have participated in the preparation, organization, and implementation of the on-going successful groundwater school education program. Over the years, the Committee has prepared various teacher handouts, including tables listing various groundwater education activities and how they met the Science Standards and Benchmarks, a volunteer presenter network summary, and "Learn About Groundwater! Hands-On Educational Tools for Classrooms" brochure.

The City has used WHP Grant funding to purchase multiple Groundwater Simulators, two EnviroScapes, a TerraFlow Simulator, and numerous "Jugs Kits" for demonstrations at schools and other events. Several types of "teaching' posters and groundwater lesson books have been distributed to elementary teachers. The Committee initially focused on several Kalamazoo Public Schools (KPS) since a team member was the Science and Math Curriculum Coordinator for KPS; this provided a unique opportunity to directly engage many teachers in "train the trainer," "Career Day," and curriculum oriented meetings. For a few years in the early 2000s, the models were stored at the KPS Stockroom Facility for teacher use via a formal material check-out list. At that time, each model contained a teacher model evaluation form. Currently, all of the City demonstration models and educational distribution items are stored at its Public Services 1415 Harrison Street Facility.

Subsequently, school presentations/model demonstrations were expanded from KPS and provided on a regular basis to other school districts, including Mattawan, Portage, Parchment, and various private schools, including a "Home School" Group. Our volunteers have even extended into Spring Valley, Gull Lake,

Battle Creek, Coldwater, Vicksburg, and Galesburg-Augusta schools. In addition, Committee members and other volunteers have provided presentations, model demonstrations, and facility tours to college classes and specialized learning institutions, including WMU, Kalamazoo Valley Community College (KVCC), Kalamazoo College (K-College), Davenport College, Miller College, the Kalamazoo Area Math and Science Center (KAMSC), Turn 2 Middle School Youth Group, and the Mobile Learning Adventure. Our success is partially demonstrated by the repeat requests that we receive for presentations.

Community Groups and Events

A wide variety of organizations have used our group to provide presentations and model demonstrations and/or make available/provide groundwater and other water quality education materials to their members, including: 4-H, Boy Scouts, Girl Scouts, Master Gardeners, City of Kalamazoo Environmental Concerns Committee, Kalamazoo County Environmental Health Advisory Group (EHAC), Kalamazoo County Chamber of Commerce Environmental Committee, Neighborhood Meetings, Optimist Club, and churches. Perhaps the most unusual groups to which we have provided groundwater information to include visiting dignitaries, Colleagues International from Tajikistan, and the Army 415 Liaison Unit. In addition, informational booths have been set up during "Bronco Bash" festivities during WMU's Homecoming celebrations, Conservarama, Bronson Health Fair, and Earth Day events. The City has also regularly participated in the annual Battle Creek Water Festivals, providing staff and giving model demonstrations and presentations. Occasionally, Staff provides facility tours and distributes water quality related information to a wide variety of organizations (see **Appendix F**).

Professional and Governmental Organizations

City staff has provided numerous presentations to a wide variety of professional and governmental organizations. Some examples include: presentations at the AWWA Annual and Regional Meetings; MWEA Conferences; MDEQ Groundwater Conferences; NGWA Conferences, MDEQ Seminars and Workshops, Michigan Water Rural Association (MRWA) Conferences and meetings, Michigan Society of Planning Officials (MSPO); Kalamazoo's Industry Day Seminars, Safe Drinking Water Partner Meetings, EHAC, and at various watershed related forums and meetings. Periodically, City staff serves on various professional organizational committees.

General Public Outreach and Education

Website

In March, 2003, the City launched the first wellhead protection website in Michigan "www.protectyourwater.net" – a stand-alone website to the City's main one. In 2007, the City retained LKF Marketing and performed a major upgrade to www.protectyourwater.net, including placing it on the City's main server and

organizational framework, and significantly enhancing the graphics., The City tested Survey Monkey for the website to include a brief survey to website visitors to learn how they found out about the website, and to ask some brief questions regarding interest in and knowledge of water topics. **Appendix G** contains the Google Analytics Report for the website from March 2018 showing general user statistics, demographics, access devices, traffic sources, network connections, average search engine ranking, and content accessed. The City continues routine operations and maintenance for the website using WHP Grants.

Movie Theater Ads

On Friday, March 18, 2005, three 30-second Groundwater Education and Outreach Cinema Ads debuted in a 15-minute trailer that continuously looped before and in-between movies at the Kalamazoo 10 Goodrich Quality Theatres. The City of Kalamazoo Wellhead Protection Team came up with the original ideas and material for the Ads in PowerPoint, and Digital Talking Screen Media professionally produced them, including graphic design, animation of our water drop "mascot," and a professional voice for the text. Additional videos and theater changes occurred as follows: three more videos at Kalamazoo 10 in Fall, 2005; 2 more videos at Kalamazoo 10 in spring, 2006; 3 still ads at the RAVE Movie Theater, Fall 2006; a new video at Kalamazoo 10 in Winter, 2006; 1 new video at Celebration Cinema Theaters (Unique Screen Media Contract) in Spring 2010; and 2 new videos for Celebration Cinema in 2011.

Video Contests

Class project contests for its multi-media film classes were conducted in 2014 and 2017 for high school students through the Kalamazoo Regional Educational Service Agency (KRESA) using WHP Grant funding. Prizes were awarded to the top videos selected by the Wellhead Protection Team; the winners were added to the active ads that are periodically rotated at Kalamazoo 10 and Rave theaters and posted on the City's www.protectyourwater.net website. The successful pre-movie trailer campaign continued, rotating 12 original 30-second ads and two contest winners from the 2013 competition and four from the 2016 contest winners from the two and three high-school media classes, respectively.

Public Survey

In 2005, the City's WHP Committee decided to have a public survey prepared to learn more about community attitudes and knowledge of certain aspects of water resources related issues. The project was made possible by a WHP Grant received from the MDEQ. The Committee contracted the services of the independent Kercher Center for Social Research at WMU to assist with the selection and wording of the questions, and the mailing, collection, examination, and analysis of the survey data.

In April 2006, an anonymous survey was sent to a random sample of 2000 Kalamazoo County residents. The sample was generated by Survey Sampling, Inc. The response rate was 27.7% and is quite normal for community mailed

questionnaires of this nature. This sample size enables us to infer about the population (Kalamazoo County) from the sample with 95% confidence (i.e., a 5 point margin of error).

Five-year updates to the public water resources and behavioral surveys were conducted in July 2012 and May 2017 using a WHP Grant received from the MDEQ. The City's WHP Committee contracted the services of the Kercher Center for Social Research to select a random sample of 2000 Kalamazoo County residents. The response rate was 22% in 2012 and was quite normal for community mailed questionnaires of this nature. The response rate was 15.4% in 2017 which is slightly lower than typical for previous surveys of this area but within normal ranges for mailed questionnaires to general audiences. The 2017 Drinking Water Protection Survey of Kalamazoo County is provided in **Appendix H**.

The survey results have been very useful in helping select and support management and education and outreach strategies (e.g. public support for the WHP Ordinance).

Metro Bus Ad Campaign
On July 1, 2008, the City began using the rear placards on 20 City metro buses to present the groundwater protection message "Protect Groundwater – It's What You Drink" (see website for additional information and photograph). After one year, the number of buses was reduced from 20 to 10 to save costs and continued through September, 2010 when WHP grant funding expired. The City continued use of this strategy with WHP grant funds received through 2013. From 2014 to present the number of placarded buses were reduced to 6/year with two new placard designs introduced in 2015.

Articles
Staff has written articles for the various publications, including a wellhead protection article in "Enterprise" (Chamber of Commerce), a water conservation article "Encore Magazine," an article regarding movie theater ads in "The Aquifer" (Groundwater Foundation), an article about the City's WHP Ordinances in "Water Works News" (AWWA, Michigan Section), and various brief articles in the City's "CityLink" publication about the Wellhead Protection Program and the Groundwater Guardian Program/Community Designation status.

Webinar
In 2009, the City was featured in the Groundwater Foundation Webinar titled "Groundwater Guardian Showcase: Adult Groundwater Education" that included presenters John Paquin, Kalamazoo, Michigan; Janine Reed, Sequim-Dungeness, Washington; and Gabrielle Belfit, Barnstable County (Cape Cod), Maine.

In summary, the webinar educated viewers about how Groundwater Guardian teams from across the U.S. are educating adults about groundwater and related

resources in their community. The webinar presented case studies of innovative and successful adult education programs, including using movie trailers to share wellhead protection information, providing training for septic system owners, and targeting education efforts at tourists and regional municipal officials.

Home Builder Expos

From 2006 through 2012, the City partnered with the City of Portage, Kalamazoo County Administration, Kalamazoo County Road Commission, and the Kalamazoo County Drain Commissioner's Office in cost sharing for two booths at the Kalamazoo Home Builders Expos. Approximately one-third of the booth space has been dedicated to groundwater protection/wellhead protection information. As can be seen on **Appendix F**, tens of thousands of groundwater educational materials have been distributed just via this one annual event.

Billboards, Television Segment, and Radio Ads

In the mid-1990s, part of the funding received from the groundwater grant from the Kellogg Foundation via the Kalamazoo County Environmental Health was used to display several "Protect Groundwater" billboards across the County. The City was a primary partner with the County in this grant project that was discussed previously in this Plan.

Also in the mid-1990s, a gardening television segment was used on a local TV network to briefly discuss the importance of reducing the use of chemicals in gardening to minimize the risk to groundwater.

From 2011 through 2017 the City collaborated with the City of Battle Creek in using radio groundwater protection ads using WHP Grant funding. The City continues to utilize the radio ad campaigns. The City measures success by the number and cross-section of people reached, number and type of materials distributed, variety of strategies implemented, and feedback received. The continued radio ad campaign that carefully considered geographic coverage, demographics, ad type, frequency, and duration, and overall cost effectiveness expanded to make the important relationship between safe and reliable drinking water and consumable goods – specifically beer and coffee since there are several microbreweries and coffee shops that serve beverages that are a minimum 90% water.

The implementation of the radio ad campaign and its collaborative efforts with the City of Battle Creek was a success, using 15-second ads, and three 30-second ads, which have been available for listening on our website since the fall of 2015. Since the fall of 2017, the City has run its radio ads independently since Battle Creek decided not to fund the ads in 2017-18. The City will again collaborate with Battle Creek if and when they decide to participate again.

Social Media

Through the use of WHP Grant funding, the City is in the process of creating an outreach strategy via social media. This includes the potential use of well

established media such as Facebook, Instagram and/or Twitter for the City's advertisements. Additionally, use of these ad distribution channels will allow the City to obtain data on whom and how the ads affect so as to continually improve the outreach strategies.

Water Customer Outreach

Utility Bill Inserts
In 2003, the City included approximately 34,000 water drop magnets on a groundwater protection message card in the residential billings. The card and magnet were previously provided as a grant project deliverable.

Annual Consumers Confidence Report/Water Quality Report (CCR)
The City has always included a section of the CCR to specifically discuss wellhead protection and stormwater quality management. All of the water customers review this publication. Between 40,000 and 42,000 of these are distributed on an annual basis. According to the Public Surveys performed in 2006, 2012, and 2017, approximately one-half of the customers read the CCR.

Facility Customer Interface/Tours/Newsletters
The City provides tours of its facilities on an occasional basis. **Appendix F** shows the number of tours provided, to whom the tours were being provided to, and what information was distributed to the attendees. Since 2001, the number of water pumping station/wellfield tours has decreased due to security concerns. However, wellhead protection is always discussed at each facility tour, including those at the wastewater treatment plant.

In addition to tours, the City has information available to the public regarding water (CCR, etc.) at the Public Services Stockbridge and Harrison Street Facilities, and City Hall. At the Stockbridge Facility, information regarding well abandonment is provided since water service connections are arranged there. People that may have a private well that are hooking up to municipal water are encouraged to plug their old well. In addition, the City's bi-annual "View from the Curb" publication is occasionally used to distribute water related information.

Public Services Week, Industry Day, Bring Your Child to Work Day, and City Visitors
In May 2018, the City held "Public Services Week" that included two days of presentations and two evenings of facility tours. Periodically, the Wastewater Treatment Plant hosts "Industry Day" when representatives of area industries are invited to hear or provide presentations, have lunch, and tour the facilities. Wellhead protection is always discussed as one of the subjects. A bag of groundwater education items are provided to the attendees during "Bring Your Child to Work Day." Finally, in most cases, official City visitors are presented various items from the City, typically including groundwater protection educational items.

Groundwater Guardian Program, Groundwater Foundation

The City has been recognized as a Groundwater Guardian Community for 19 straight years (1998-2017) from The Groundwater Foundation, "a private non-profit educational organization that informs and motivates people to care about and for groundwater." The City is also in the process of completing the necessary work its Groundwater Guardian Community status for 2018.

Each year on February 15, applicants must have submitted an Annual Application to the Groundwater Foundation, describing Result Oriented Activities" or "ROAs." On August 31 each year, an Annual Report must be submitted that detailed the completion of or significant progress of the ROAs. The Groundwater Guardian Review Committee reviews and makes a recommendation whether or not a community qualifies as a Groundwater Guardian Community. City staff served on the Groundwater Council Review Committee and served as Chair of the Groundwater Guardian Council from 2009 to 2013. For more information regarding this program, please visit www.guardian@groundwater.org or call 800-858-4844.

MDEQ Wellhead Protection Grant Program

The City has received nine $70,000 grants from the State of Michigan Wellhead Protection Grant Program for the following time periods: April 1, 1999 through May 31, 2000 (Round 1); October 1, 2000 through September 30, 2001 (Round 3); October 1, 2001 through September 30, 2002 (Round 4); October 1, 2002 through September 30, 2003 (Round 5); October 1, 2003 through September 30, 2004 (Round 6); October 1, 2004 through September 30, 2005 (Round 7); October 1, 2005 through September 30, 2006 (Round 8); October 1, 2006 through September 30, 2007 (Round 9); July 1, 2008 through June 30, 2009 (Round 10); and October 1, 2009 through September 30, 2010 (Round 11). The City applied for the grant period of October 1, 2010 through September 30, 2011 but for the first time it was not awarded any funding. The City has received seven additional grants from the State of Michigan Wellhead Protection Grant Program for the following time periods: October 1, 2010 through September 30, 2011 (Round 12) for $70,000; October 1, 2011 through September 30, 2013 (Round 13) for $54,400; October 1, 2012 through September 30, 2012 (Round 14) for $44,000; October 1, 2013 through September 30, 2014 (Round 15) for $49,000; October 1, 2014 through September 30, 2015 (Round 16) for $63,312.50; October 1, 2015 through September 30, 2016 (Round 17) for $60,000; and October 1, 2016 through September 30, 2017 (Round 18) for $70,000.

Primarily, these grants have been used to complete all of the groundwater flow models and capture zone delineations, and prepare CSI/RAs. Secondarily, the funds provided funding necessary for public education and participation projects - especially the purchase of groundwater education materials for the school groundwater education program and public events - and for the development and

groundwater education program and public events - and for the development and maintenance of www.protectyourwater.net. Finally, grant funds have helped finance management strategies, such as the WHP Zoning Overlay Ordinance, the Performance Standards Ordinance, site-specific spill contingency plans, and many related projects discussed in previous sections of this Plan.

Wellhead Protection Reality: Examples of Contamination and Responses

Unfortunately, the City has had its share of experiences of groundwater contamination affecting its wellfields – one of the primary reasons that the City takes its WHPP so seriously.

WPS 1 (Central Wellfield)

In 1980, detections of VOCs, most notably Tetrachloroethylene (Perchloroethylene/PERC/PCE), were detected at Water Pumping Station 1 (Central Wellfield). The hydrogeologic/contamination source investigation determined that the VOCs originated from a former dry cleaners company. Two production wells were taken out of service and used as "capture" or "diversion" wells to keep the VOCs from entering the PWSS. The water was then diverted to the stormwater collection system. The aquifer was too prolific to abandon. Consequently, in 1995, after test drilling, all of the 17 remaining production wells were plugged and six new 1,500 gpm wells were constructed. A new water pumping station with air stripping to remove the VOCs and iron removal filtration was constructed – at a cost of approximately $7.0 million.

WPS 11 (Kendall Wellfield)

In 1981, VOCs (Vinyl Chloride) was detected in the WPS 11 wellfield, eventually causing the shutdown of the station in 1985. The subsequent hydrogeologic/contamination source investigation did not determine the source. However, like the Central Wellfield, it was too important of a WPS to abandon so air stripping was added, along with iron removal. The total cost of this project was approximately $2.5 million.

Wellfield 7 (S. Park/Crosstown)

In 1997, detections of low levels of hydrocarbons were found in two of the production wells at Wellfield 7. This five well wellfield is piped to the five production wells at WPS 3. Consequently, WPS 3 was shutdown, a hydrogeologic/source contamination investigation was conducted. It was determined that a Leaking Underground Storage Tank (LUST) system immediately next to the wellfield property was responsible. The gasoline station shut down and went out of business. MDEQ released approximately $500,000 toward the project, resulting in the installation of monitoring wells, purge wells, and a groundwater remediation system. Due to the initially high annual

operations and maintenance costs, there have been periods where the groundwater remediation system was inactive.

However, since the beginning of the detection of groundwater contamination, City and MDEQ staff worked collaboratively to make this project as cost-effective as possible. For example, annual operations and maintenance costs have been significantly reduced by changing the operation schedule from a 24/7 scenario to operating the system only during the four month summer peak season. In addition, the City has waived the wastewater discharge fees. Consequently, the City can safely use WPS 3 (with the Wellfield 7 production wells).

Other Wellfield Contamination

Low (non-action) levels of VOCs have also been detected at WPS 2 (Born Court) in 1988, WPS 12 (Stadium Drive) in 1997, and WPS 14 (Spring Valley) in 1982. In addition, spills have occurred at WPS 4 (back-up diesel fuel generator), WPS 22 (broken hydraulic hose on equipment), and WPS 24 (back-up diesel fuel generator).

Allied Paper Site (Operating Unit 1)

The Allied Paper Site is Operating Unit 1 (OU-1) of the Allied Paper/Portage Creek/Kalamazoo River Superfund Site. It is within a MDEQ-approved 5-year WHP Capture Zone for WPSs 1, 2, 3, 4, and 7. The City has been on record for stating that the Remedial Investigation (RI) did not efficiently characterize the hydrogeology or contaminants at the site, resulting in a flawed RI Report. Currently, the site is in the feasibility portion of the Superfund process and remedy alternatives are being considered for selection. The City has stated that only two long-term remedy alternatives would be acceptable: off-site waste removal or a contaminant containment system that provides hydraulic barriers both horizontally and vertically. The selection of the remedy by EPA has occurred for generally a cap and monitor system.

Enbridge Energy Crude Oil Release

On July 26, 2010, a rupture of a 30-inch pipeline in Marshall, Michigan owned by the Enbridge Energy Company released approximately one million gallons of crude oil into Talmadge Creek, a tributary to the Kalamazoo River. The City of Kalamazoo WPS 39, a Ranney Collector Well, is located approximately 36 miles downstream from the release location on the south side of Morrow Lake, an impoundment of the Kalamazoo River. A portion of the oil reached Morrow Lake and within the WHP Capture Zone of WPS 39.

It was reasoned that if the oil was within the capture zone, it could be infiltrated through the bottom of the river sediment, into the groundwater, and eventually be drawn into the Ranney Collector laterals (the closest end of one is approximately

120 feet from the river). Consequently, wellhead protection measures were implemented, including the following: immediate shutdown of WPS 39; participation in the Enbridge Pipeline Release Unified Command meetings; close monitoring of the status of the contamination; collaboration with Kalamazoo County, MDEQ, and Enbridge Energy and their contractors; preparation and implementation of a MDEQ-approved WPS 39 re-activation plan; installation of five monitoring wells at WPS 39 property; and sampling of WPS 39 on a monthly basis for several years.

SUMMARY

The City of Kalamazoo has always taken a comprehensive and thorough approach to its WHPP since it formally began its program in 1992. It became obvious early on that the groundwater modeling and capture zone delineations would take several years due to the number of and wide distribution of its wellfields. Therefore, all elements were worked on simultaneously as much as possible to continue the progress of the program. One exception was that the contaminant source inventories could not be performed until the delineations were done. However, the other elements – especially public education and outreach – quickly developed into effective portions of the program.

Generic (not specific to capture zones) management strategies also were developed in the early years and with a couple exceptions, were effectively implemented. It became clear that there was no single or even known defined group of strategies that would necessarily be appropriate for Kalamazoo; therefore many strategies were tried.

It was decided after the WHPAs were delineated, and despite the WHPP's progress, formal Ordinances were needed to more effectively prohibit higher groundwater risk land use activities from occurring within WHPAs, and to minimize risk to those that were present. The formal adoption of the WHP Zoning Overlay and Performance Standards, and the Site Plan Review process are arguably the three most important management strategies from an administrative and regulatory level for Kalamazoo's WHPP.

Much of Kalamazoo's past and ongoing WHPP activities are well documented in the City's documentation associated with MDEQ WHP Grant Program. For example, the grant proposals show the selected activities and the final reports show the completion or significant progress made, documented by the deliverables.

The City of Kalamazoo plans to continue its aggressive and pro-active WHPP approach by: participating in the MDEQ WHP Grant Funding Program as it is available; continuing participation in the Groundwater Guardian Program; maintaining as many existing management strategies as possible while considering new ones; completing its revisions to its Water Emergency

Response Plan; maintaining updates to its Contaminant Source Inventories every five years; maintaining currency in capture zone delineations as necessary; enhancing its public groundwater education, outreach, and participation activities; and following proper new well placement protocol.

APPENDICES

APPENDIX A

Figure 1 - Location Map
Figure 2 - Water Service Area 2018
Figure 3 - Public Water Supply System Annual Pumpage
Figure 4 - PWSS Districts & Facilities
Figure 5 - Wellhead Protection Program Elements
Figure 6 - Kalamazoo WHPP Model
Figure 7 - PWSS WHP Capture Zone Composite Map
Figure 8 - WHPP Management Strategies
Figure 9 - Public Education & Outreach Strategies

Figure 1

ALAMO

COOPER

RICHLAND

COMSTOCK

KALAMAZOO

OSHTEMO

TEXAS

PORTAGE

PAVILLION

DATE: 05/14/18

DRAWN BY: WEE

CITY OF KALAMAZOO WATER SERVICE AREA ~ 2018

CITY OF KALAMAZOO
Department Of Public Services
Water Division
415 STOCKBRIDGE AVE.
KALAMAZOO, MICHIGAN 49001
PH.# (269)-337-8601 FAX # (269)-337-8533

SHEET 1 OF 1

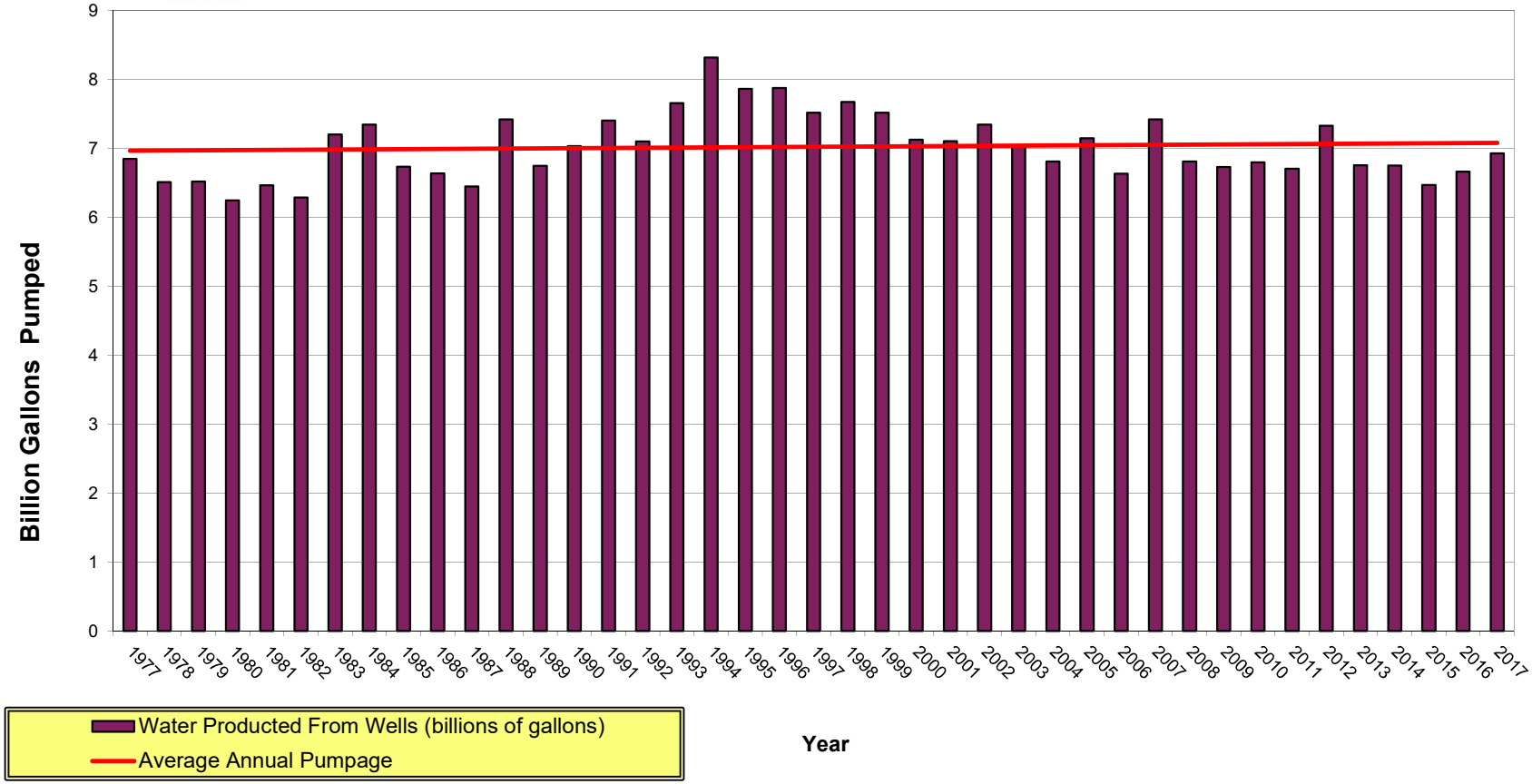
NO SCALE

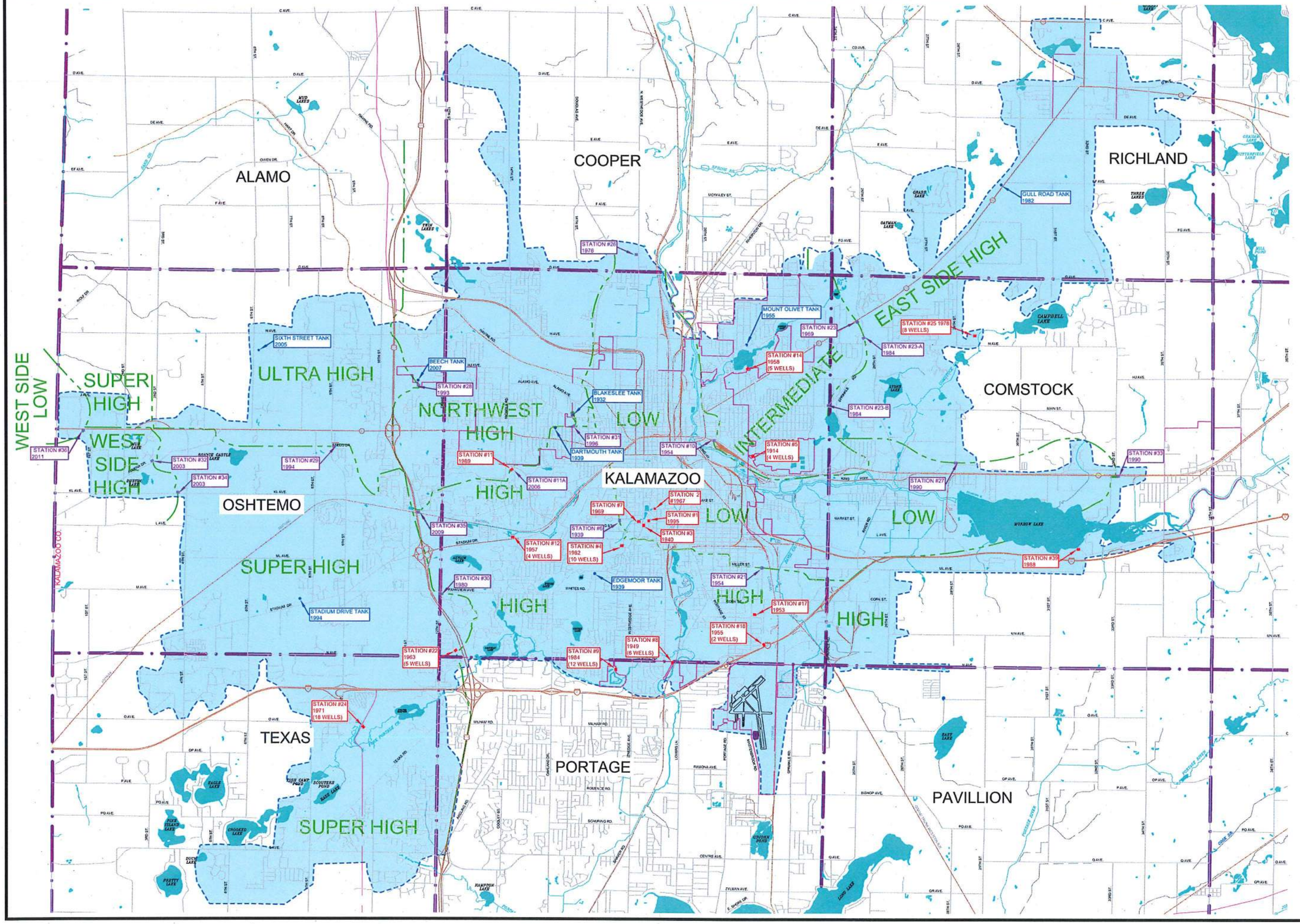
Figure 2

Figure 3

Public Water Supply

Annual Pumpage: 1977 to 2017





DATE: 05/14/18

DRAWN BY: WEE

CITY OF KALAMAZOO WATER SERVICE AREA ~ 2018

CITY OF KALAMAZOO
Department Of Public Services
Water Division
415 STOCKBRIDGE AVE.
KALAMAZOO, MICHIGAN 49001
PH.# (269)-337-8601 FAX # (269)-337-8533

SHEET 1 OF 1

NO SCALE

Figure 4

Figure 5

WELLHEAD PROTECTION PROGRAM

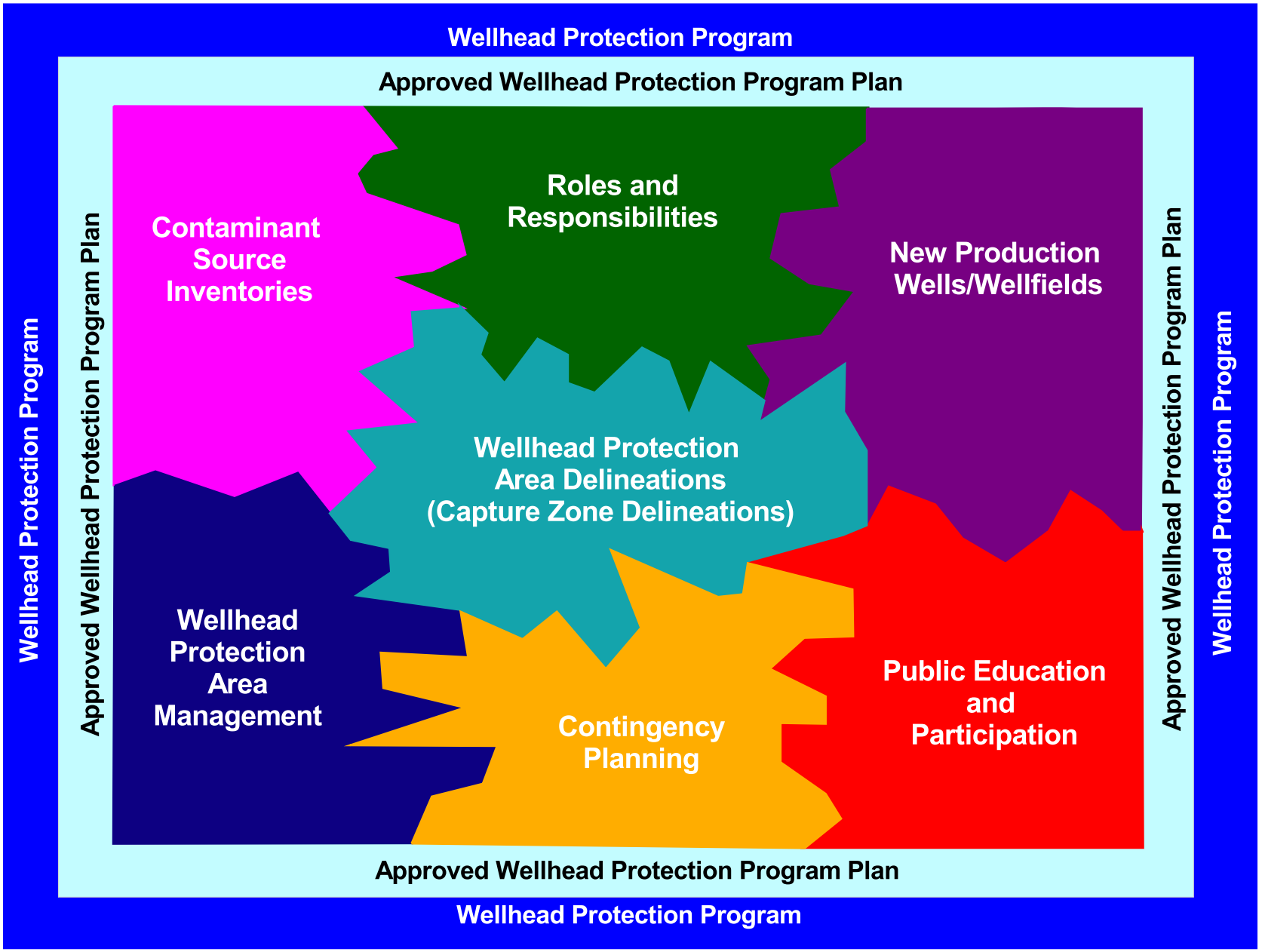
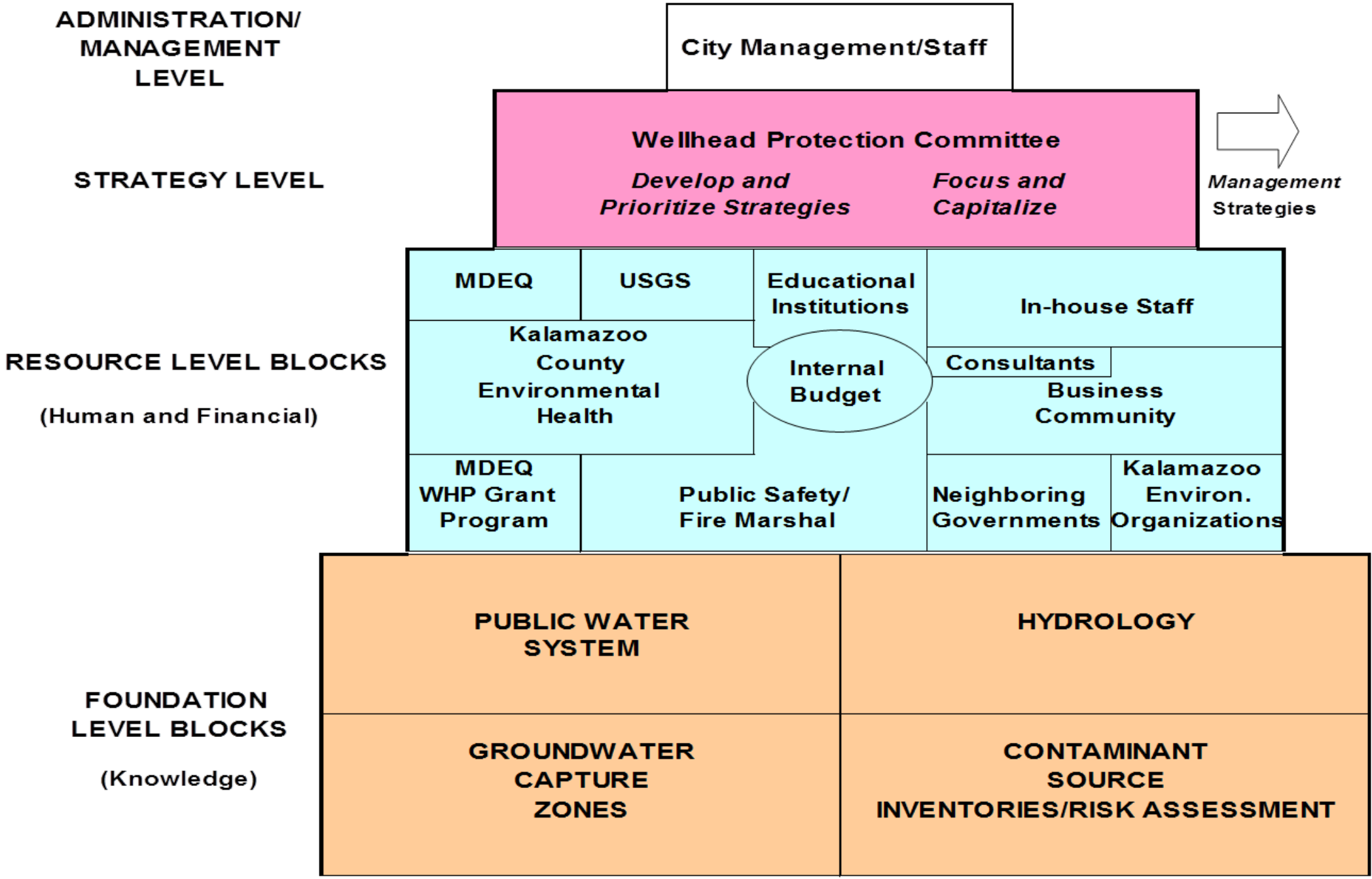
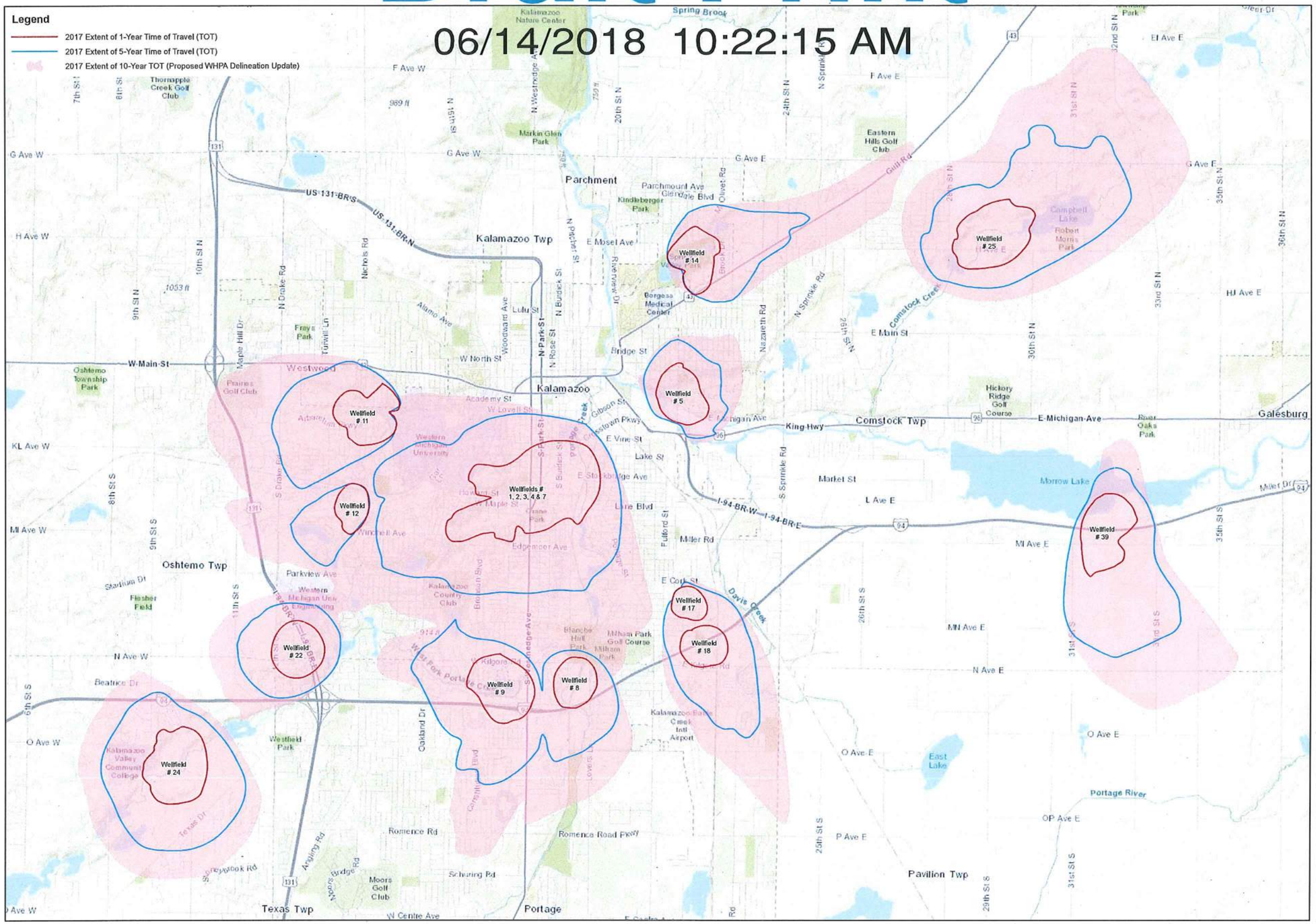


Figure 6: KALAMAZOO WHPP MODEL



Draft Print

06/14/2018 10:22:15 AM



FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

CITY OF KALAMAZOO
KALAMAZOO COUNTY, MICHIGAN

2017 Proposed Wellhead Protection Area (WHPA) Delineation Update

DRAWN BY	DATE
AJP	10/3/2017
PROJECT NO.	PROJECT
P13290	2017 Update
FILE LOCATION	
FIG2_2017PropDelin	
SOURCES	

FIGURE 2

Figure 7

Figure 8

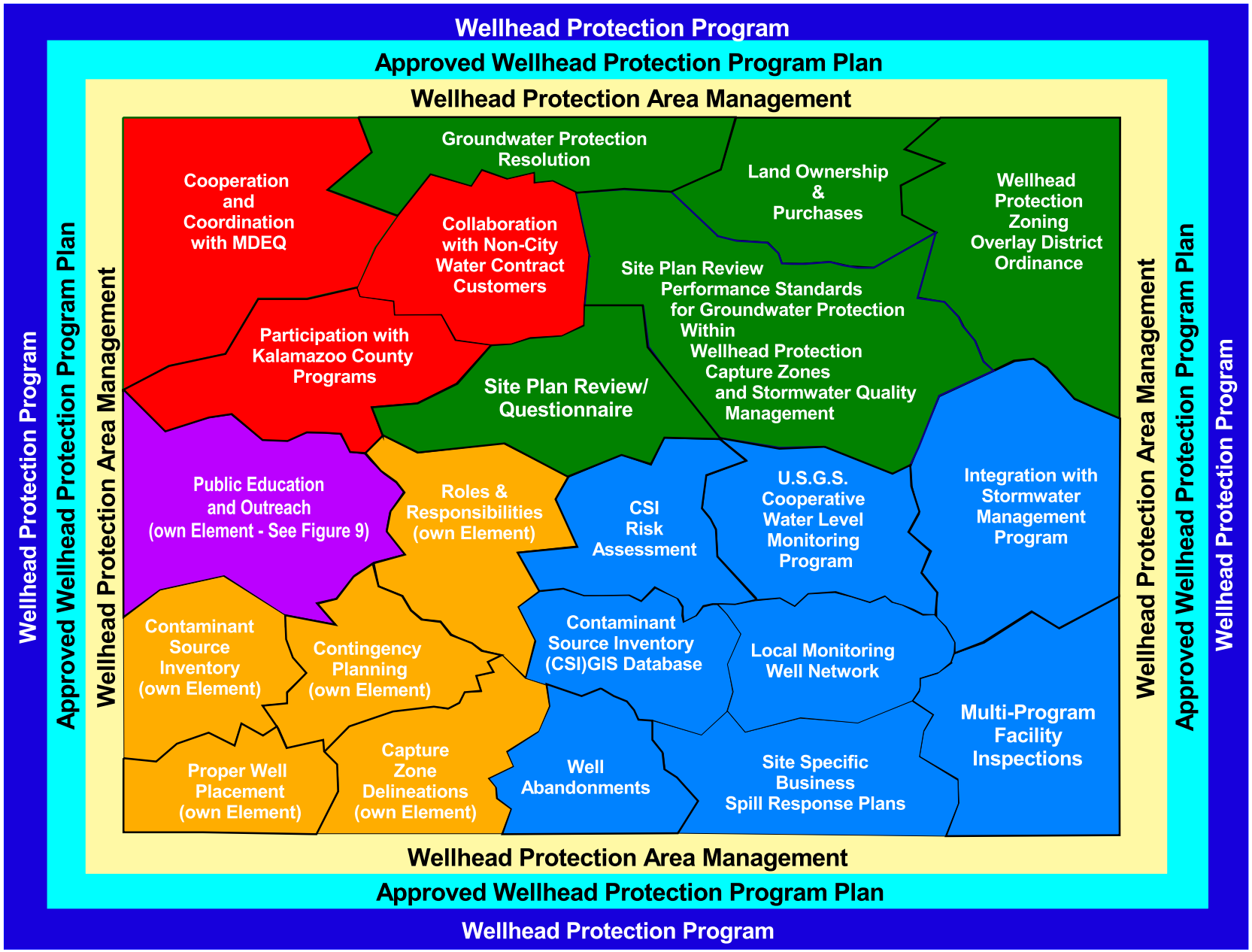
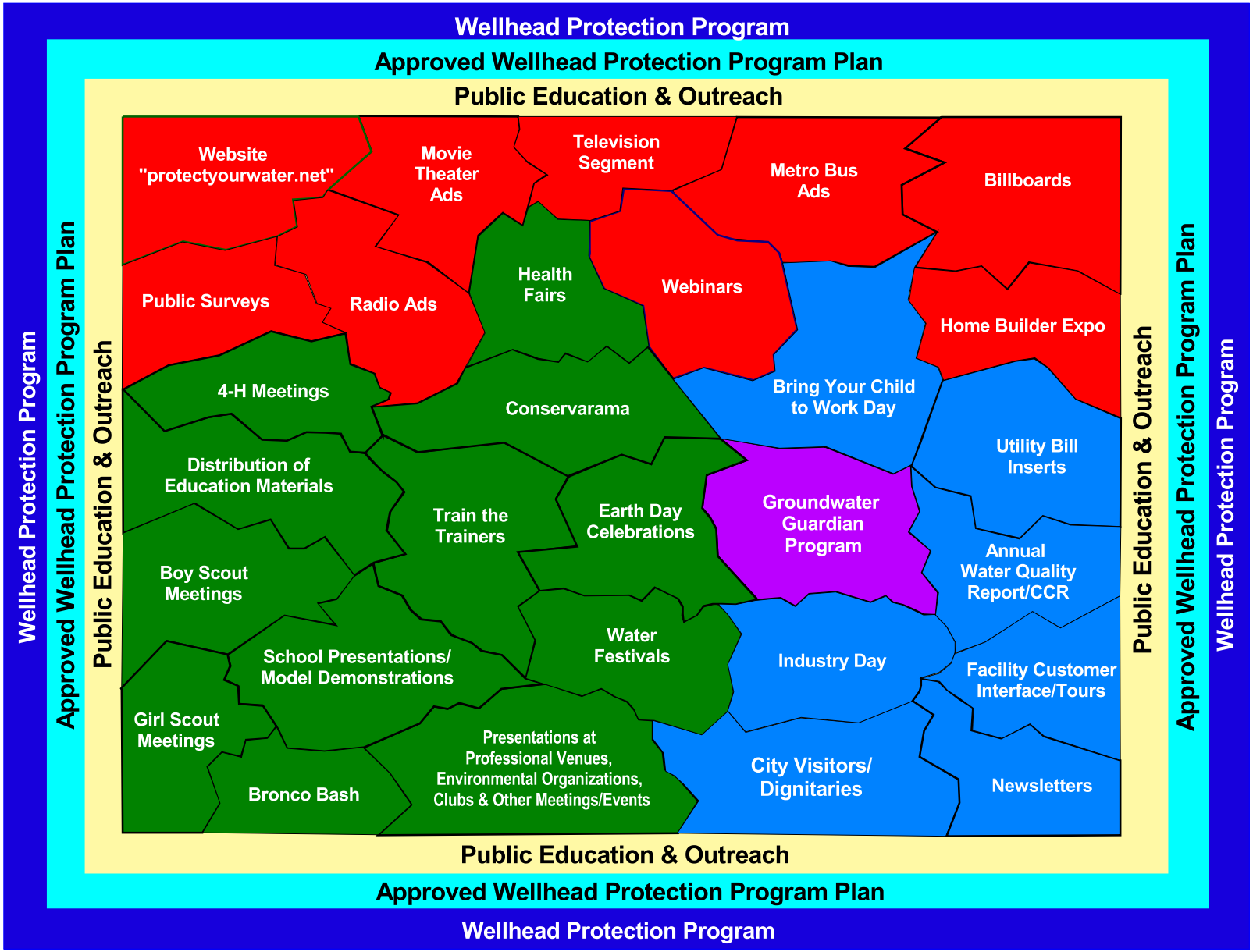

Wellhead Protection Program
Approved Wellhead Protection Program Plan
Wellhead Protection Area Management
Groundwater Protection Resolution
Cooperation and Coordination with MDEQ
Collaboration with Non-City Water Contract Customers
Land Ownership & Purchases
Wellhead Protection Zoning Overlay District Ordinance
Site Plan Review Performance Standards for Groundwater Protection Within Wellhead Protection Capture Zones and Stormwater Quality Management
Participation with Kalamazoo County Programs
Site Plan Review/ Questionnaire
Public Education and Outreach (own Element - See Figure 9)
Roles & Responsibilities (own Element)
CSI Risk Assessment
U.S.G.S. Cooperative Water Level Monitoring Program
Integration with Stormwater Management Program
Contaminant Source Inventory (own Element)
Contingency Planning (own Element)
Contaminant Source Inventory (CSI)GIS Database
Local Monitoring Well Network
Multi-Program Facility Inspections
Proper Well Placement (own Element)
Capture Zone Delineations (own Element)
Well Abandonments
Site Specific Business Spill Response Plans
Wellhead Protection Area Management
Approved Wellhead Protection Program Plan
Wellhead Protection Program

Figure 9

Public Education & Outreach



APPENDIX B

Wellhead Protection Program Awards by American Water Works Association, MDEQ and Groundwater Guardian Organizations

City of Kalamazoo

INTER-OFFICE**MEMO**

To: Pat DiGiovanni, City Manager, ICMA-CM

From: Jerri Barnett-Moore, Public Services Director

Date: September 13, 2004

Subject: Receipt of 2004 Exemplary Wellhead Protection Program Award

A representative of the Michigan Department of Environmental Quality (MDEQ) would like to present the City of Kalamazoo the 2004 Michigan Exemplary Wellhead Protection Program Award plaque at the September 20, 2004 City Commission meeting.

BACKGROUND

Michigan's Wellhead Protection Program (WHPP) was developed in response to the 1986 amendments to the federal Safe Drinking Water Act. The purpose of the WHPP is to protect public water supply systems (PWSSs) that use groundwater from becoming contaminated. The City of Kalamazoo PWSS is the largest in Michigan that uses groundwater as its source. In December 2003, staff prepared and submitted "City of Kalamazoo, Michigan Wellhead Protection Program Plan" to MDEQ for formal approval. In March 2004, the City received formal approval of its WHPP Plan from MDEQ, a requirement for eligibility for the Exemplary WHPP Award.

In June 2004, the City submitted a formal nomination application for the Michigan Section American Water Works Association (AWWA) 2004 Exemplary Wellhead Protection Program Award. In July, the City received formal notification that it had received the Award. On August 10th, the Award was presented to City staff at the Awards Luncheon at the AWWA-Michigan Water Environment Association Joint Annual Conference at the Amway Grand Plaza and DeVos Place in Grand Rapids.

Should you have any questions, please call me at #8746. Thank you.

Michigan Section
American Water Works Association
P.O. Box 609
Grand Ledge, Michigan 48837-0609

July 31, 2013

Mr. John P. Paquin
Environmental Programs Manager
City of Kalamazoo
Department of Public Services
Environmental Services Division
1415 North Harrison Street
Kalamazoo, MI 49007-2565

Dear Mr. Paquin:

SUBJECT: 2013 Large System Exemplary Wellhead Protection Program Award

Congratulations!!! The City of Kalamazoo has been selected as the recipient of the "2013 Exemplary Wellhead Protection Program Award" for a large-sized system from the Michigan Section of the American Water Works Association (MI-AWWA).

The City of Kalamazoo has done an excellent job at implementing an effective wellhead protection program and should be proud of this accomplishment. The Groundwater/Source Water Committee of MI-AWWA was particularly impressed with the methods you have used to integrate the program with local, regional and state programs. We encourage you to continue to actively implement your program. Let us know if we can assist you in any way.

We look forward to seeing you at the 2013 Annual Conference of Michigan Section AWWA at the Amway Grand Plaza Hotel, Grand Rapids where you will be formally recognized for this accomplishment at the Awards Luncheon Wednesday, September 11 beginning at 11:45 a.m. The luncheon cost for you, and any other representatives from the City, will be complimentary. Please forward the names of those who will be attending.

Sincerely,

John J. Bayha, P.E., Chairman
AWWA Groundwater/Source Water Committee

cc: Ms. Sue Foune, City of Kalamazoo
Mr. Michael Wetzel, City of Kalamazoo
Mr. Wayne Kukuk, MDEQ
Mr. Eric Way, MI-AWWA

American Water Works Association

Dedicated to the World's Most Important Resource™

March 12, 2014

Mr. John Paquin
City of Kalamazoo Dept. of Pub. Svcs
1415 Harrison St
Kalamazoo, MI 49007-2565

Dear Mr. Paquin:

I am pleased to inform you that your utility has been selected as the recipient of the Exemplary Source Water Protection Award for Large Groundwater Systems. This award recognizes organizations in North America who have developed and are implementing exemplary source water protection programs.

In recognition of this honor, an award will be presented to you during the AWWA Annual Conference & Exposition scheduled for June 8-12, 2014 in Boston, Massachusetts. The presentation is scheduled for Monday, June 9 during the 1pm plenary session. Details regarding the presentation will be sent to you later by Linda Moody, assistant staff advisor for the AWWA Technical & Educational Council.

The Association's Officers and Directors join me in congratulating you on this honor.

Sincerely,

David LaFrance
Executive Director

DL/lm

Michigan Section
American Water Works Association

Presents this

2007 Richard Husby Public Awareness Award

to

The City of Kalamazoo's Wellhead Protection Team

In recognition of significant accomplishments in promoting an awareness and understanding of water supply issues among the general public through the development and implementation of public education activities.

THE THANKS OF ALL OUR MEMBERS IS EXTENDED TO YOU FOR HELPING TO MAINTAIN THE HIGH STANDARDS OF OUR SECTION.

Chair, Michigan Section AWWA

Secretary-Treasurer

AMERICAN WATER WORKS ASSOCIATION
MICHIGAN SECTION

STATE OF MICHIGAN

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

WATER DIVISION

We commend the

DEQ

City of Kalamazoo

for its efforts to protect the
health of its citizens and the natural resources of Michigan
by implementing an approved

WELLHEAD PROTECTION PROGRAM

Jennifer M. Granholm, Governor

OFFICIAL SEAL

Steven E. Chester, Director

EQC 2063 (4/2004)


1998
1999
2000
2001
2002
2003
2004
GROUNDWATER GUARDIAN
2005
2006
2007
2008
2009
2010
2011
USGS
science for a changing world
2012
2013
2014
2015
2016
2017
GROUNDWATER GUARDIAN
THE GROUNDWATER FOUNDATION
A program of The Groundwater Foundation
www.groundwater.org

APPENDIX C

Ordinance 1825 (Wellhead Protection Overlay)

Ordinance 1826 (Performance Standards)
Note: Actual Performance Standards document is available upon request

CITY OF KALAMAZOO

ORDINANCE NO. 1825

AN ORDINANCE TO CREATE APPENDIX A: CHAPTER 3, SECTION 3.5, WELLHEAD PROTECTION OVERLAY

THE CITY OF KALAMAZOO ORDAINS:

Section 1. Chapter 3, section 3.5 of Appendix A of the Kalamazoo Code of Ordinances is hereby created to read as follows:

A. Intent / Purpose

The intent of the City of Kalamazoo Wellhead Protection Overlay Ordinance is to safeguard the health, safety, and welfare of persons served by the City of Kalamazoo Public Water Supply System by protecting groundwater that serves as drinking water, thus providing a safe potable water supply now and for future generations.

B. Definitions

The following definitions apply to this ordinance:

Best Management Practices (BMP) means the best available methods, activities, maintenance procedures, technologies, operating methods or management practices for preventing or reducing the quantity of Regulated Substances entering groundwater and surface water from a particular land use activity.

Capture Zone means that area through which water travels below the surface and reaches a City well or wellfield within a specified period of time (under specified conditions set by the MDEQ). This ordinance addresses both a one-year and ten-year time-of-travel capture zone.-

City means the City of Kalamazoo.

Groundwater means the water below the land surface in a zone of saturation, excluding those waters in underground piping for water, wastewater, or stormwater distribution/collection systems.

Michigan Department of Environmental Quality (MDEQ): shall include its predecessors and successors.

Performance Standards means those BMPs and engineering controls contained within the document "City of Kalamazoo Performance Standards for Groundwater Protection within Wellhead Protection Capture Zones and Stormwater Quality Management."

RCRA means the Resource Conservation and Recovery Act of 1976 (Pub. L. 94-580; 42 U.S.C. 6901 et seq.), as amended.

Regulated Substances shall include:

1. Substances for which there is a material safety data sheet (MSDS), as established by the United States Occupational Safety and Health Administration, and the MSDS cites possible health hazards for said substance;

2. Hazardous Waste, as defined by the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended;

3. Hazardous Substance, as defined by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) when the hazardous substance is the focus of remedial or removal action being conducted under CERCLA in accordance with the U.S. EPA regulations;

4. Radiological materials; and

5. Biohazards.

Regulated Substances shall not, however, include:

1. Substances in an amount equal or less than 2200 pounds that are in an area capable of fully containing a total release of said substance or an area that would drain the substance to a wastewater treatment system, excluding septic tanks systems, capable of treating the released substance(s);

2. Substances in a parked or stopped vehicle in transit, provided the vehicle is stopped or parked for less than 72 hours;

3. Substances, such as gasoline or oil, in operable motor vehicles or boats so long as used solely for the operation of the vehicle, but not the tanker portion of a tank truck;

4. Pressurized gases such as chlorine, propane, hydrogen, and nitrogen when in a chemical storage tank;

5. Refrigerants contained within equipment and used for on-site air cooling or in household appliances;

6. Substances contained within electrical utility transformers/switches; or

7. Substances used in construction for which all necessary permits have been obtained, and in accordance with the "Performance Standards."

Release means the spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing of one or more regulated substances upon or into any land or water within a capture zone. Release includes, without limitation, leakage of such materials from failed or discarded containers or storage systems and disposal of such materials into any on-site sewage disposal system, dry-well, catch basin, or landfill. The term "release" when used and applied herein does not include:

1. Disposal in accordance with all applicable legal requirements, including those in RCRA and CERCLA, of hazardous wastes in a Facility that has received and maintained all necessary legal approvals for that purpose;

2. Disposal of any substance in compliance with applicable legal requirements, including without limitation, the terms and provisions of a valid municipal, state, or federal permit;

3. Disposal, in accordance with all legal requirements, of any substance to a sanitary sewer system that has received and maintained all necessary legal approvals for that purpose;

4. Disposal, in accordance with all legal requirements, of "sanitary sewage" to subsurface sewage disposal systems as defined and permitted by the State of Michigan or Kalamazoo County Environmental Health;

5. A release for which there is no obligation to report under Federal, State, or other local regulations that occurs on an impervious ground surface (e.g. building floor or concrete driveway) that is effectively cleaned up before reaching permeable ground (e.g. unpaved), a dry well, a storm sewer, or surface water body; or

6. The application of agricultural chemicals, fertilizers, mineral acids, organic sulfur compounds, etc. as used in routine agricultural operations and applied under the "Generally Accepted Agricultural Management Practices," and consistent with label directions approved by the United States Environmental Protection Agency or the Michigan Department of Agriculture.

Spill Contingency Plan: A written site-specific plan conforming to the specifications contained in the "Performance Standards," including the documentation of general site operations; Regulated Substance storage areas; potential for releases of Regulated Substances and an analysis of the potential destination of such releases; and procedures to be followed in the event of a release.

Wellhead: is any individual well used for supplying water.

C. Responsibility for Administration

The City's Department of Public Services ("Department") shall administer, implement, and enforce the provisions of this Section. Any powers granted or duties imposed upon the Department may be delegated in writing by the Department Director to third parties as said Director deems appropriate.

D. Prohibitions within Ten (10) Year Time-of-Travel (TOT) Capture Zone.

Within a ten-year time-of-travel capture zone, no person shall, nor cause or allow another over whom he or she has control to:

1 Release or allow the release of a Regulated Substance, alone or in combination with other materials (such as fill) in such a manner that the substance gains access to the ground, to a storm sewer or surface water or in any other way such that the substance might enter the groundwater if doing so creates a reasonable likelihood of an adverse impact upon the groundwater;

2. Possess a Regulated Substance, including fuels (e.g. gasoline, diesel, kerosene, etc.) exceeding fifty-five (55) gallons aggregate for liquid materials, or four-hundred forty (440) pounds aggregate for dry weights, unless prepackaged and intended for retail sale or for commercial or household use (such as salt used in water softeners, fertilizers, pesticides, herbicides, etc.), or unless engineering controls are designed and implemented consistent with the City's "Performance Standards," BMPs, the City's Fire Code, and applicable State of Michigan laws and regulations. The following, however, shall not be considered prohibited activities:

a. The use of underground oil and water separators and stormwater treatment structures which meet the conditions of the "Performance Standards;

b. The use of current hazardous waste storage areas at RCRA permitted facilities;

c. Laboratory activities, consistent with all Federal, state, and local regulations.

3. Operate a scrap and recycling yard;

4. Operate a sanitary / solid waste landfill;

5. Use oil, waste oil or similar liquid petroleum-type products for dust suppression;

6. Install a private water well for the purpose of drinking water or irrigation if, in the determination of the Department, public water service is reasonably available;

7. Install or use a private water well not installed for the purpose of drinking water or irrigation unless it is determined by the Department that the well owner (or representative) has scientifically demonstrated that the well will not cause an adverse impact to the public water supply;

8, Use any private well if said use is likely to cause an adverse impact to the public water supply;

9. Excavate, extract, or mine sand, gravel, bedrock or any other type of earth if a permit or site plan review is required unless the property owner has established, to the Department's satisfaction, that the activity will not cause an adverse impact to the public water supply;

10. Allow the presence of an abandoned well, which is defined as any well which has either been discontinued for more than one year, is in such disrepair that its continued use for obtaining groundwater is impractical, has been left uncompleted, is a threat to groundwater resources, or is a health or safety hazard. A well shall not be considered abandoned if it has been properly plugged pursuant to The Groundwater Quality Control Act, Part 127, 1978 PA 368; or

11. Drill for natural gas or petroleum, whether for exploration, production or otherwise.

E. Prohibitions Within One (1) Year Time-of-Travel (TOT) Capture Zone.

Within a one-year time-of-travel capture zone, no person shall, nor cause or allow another, over whom he or she has control, to:

1. Engage in any activity prohibited in the 10-Year TOT Capture Zone;

2. Possess Regulated Substances, including fuels (e.g. gasoline, diesel, kerosene, etc.), exceeding fifty-five (55) gallons aggregate for liquid materials or four-hundred forty (440) pounds aggregate for dry weights, such as sometimes occurs with activities such as fueling service establishments, motor vehicle repair, body repair; trucking or bus terminals; primary metal product industries; metal plating, polishing, etching, engraving, anodizing or similar processes; lawn, garden, pesticide and agricultural services with on-site bulk mixing or blending of fertilizers, pesticides and other industry-related chemicals for commercial application; and dry cleaning facilities with on-site cleaning service; or

3. Construct or replace any privy, privy vault, septic tank, cesspool, or other facility intended or used for the disposal of domestic or non-domestic wastewater.

F. Well Isolation Distance Restrictions

Within either capture zone, no person shall cause or allow uses or activities that would violate the terms and conditions set forth in the document "Minimum Well Isolation Distances (From Contamination Sources and Buildings), Part 127, Act 368, P.A. 1978 and Act 399, PA 1976" as prepared by the MDEQ, Water Division, as it may be amended, which, for the purpose of this section, shall be deemed to apply to all persons, unless approved in writing by the Department Director or his or her designee.

G. Determination of Capture Zone Boundaries

In determining whether a property is within a capture zone, the following shall apply:

1. Where a capture zone line that delineates the boundary of one or more zones passes through a property, the entire parcel shall be subject to the restrictions that apply to the more restrictive zone.

2. The Environmental Services Superintendent, or his or her designee, shall have the authority to interpret the capture zone and determine where the boundaries of the different zones fall, if in dispute. Said interpretation may be appealed to the Director.

H. Continuation of Existing Non-Conforming Facilities and Land Uses

1. Existing nonconformities for land uses/activities will be allowed within a capture zone only if in accordance with Chapter 9 "Nonconformities" of Appendix A (Zoning Ordinance) of the City of Kalamazoo Code of Ordinances.

2. In addition, the facility must meet the requirements of the "Performance Standards" and/or shall prepare a Spill Contingency Plan within two years from the adoption date of this ordinance or one year from the date of contact from the City regarding recognition of Non-Conforming status, whichever is sooner. The City reserves the right to approve / determine which option(s) is to be implemented for the specific circumstance.

I. Requirements Regarding Release of Regulated Substance

1. Upon discovery of a release within a capture zone, the owner and person in control of the property on which a release occurred, as well as the person responsible for the release, shall take appropriate reasonable actions to mitigate the potential impact of the release on groundwater and remediate the release. Remediation must be conducted in a timely manner and in accordance with applicable law. Wastes generated during remediation of a Regulated Substance release must be handled in accordance with all applicable legal requirements. Storage of these materials for a period of greater than ninety (90) days must be reported to, and approval obtained from, the Environmental Services Superintendent or designee by said persons.

2. All releases shall be documented in writing and mailed to the Department within ten (10) business days of said incident. Initial release notification shall include, at a minimum, the following:

    a. Location of the release (name, address, and phone);
    b. Reporting party's name, address, and phone (if different from above);
    c. Emergency contact and phone;

d. Description of the nature of the incident, including date, time, location, and cause of the incident; type, concentration, and volume of substance(s) released;
e. Map showing exact release location, and relevant site features (i.e. paved area, storm sewer catch basins/inlets, water features, etc.), scale, and north arrow;
f. All measures taken to clean up the release; and
g. All measures proposed to be taken to reduce and prevent any future release.

3. The Environmental Services Superintendent or his/her designee shall use the Regulated Substance Release Report to determine if and where any additional investigative work needs to be completed to assess the potential impact of the release. The owner or operator shall retain a copy of the written notice for at least three years.

J. Inactive Operations

This section applies to any business or other operation ("operation") that is inactive, is within a capture zone, and at which there are regulated substances. For purposes of this section, "inactive" is defined to include those businesses / operations that are unoccupied and have no activity for at least thirty (30) days. Those who own or control such an inactive operation shall do the following:

1. Within 7 days of the operation becoming inactive, take such steps as necessary to secure the site such that vandals and all other persons cannot gain access to the regulated substances;
2. Within 30 days of the operation becoming inactive, provide to the superintendent a document that identifies the site, the date of inactivity, the regulated substances that exist on site, and the name, address and telephone number of both the owner and the person in control of the site; and
3. Within 6 months of the operation becoming inactive, remove all regulated substances from the site; this does not included those substances used for heating, cooling, or electrical lighting.

K. Enforcement

1. Whenever the Department determines that a person has violated a provision of this Ordinance, the Department may order compliance by issuing a written Notice of Violation to the responsible person/facility.

2. If the Department requires abatement of a violation and/or restoration of affected property, the notice shall set forth a deadline by which such action must be completed. Said notice may further

advise that, should the violator fail to remediate or restore within the established deadline, the work will be performed by the Department, with the resulting expense thereof charged to the violator.

L. Variance / Appeal Rights

1. If an owner of property within a capture zone believes the requirements of this ordinance impose an unreasonable burden on the use of the owner's property, the owner may seek a variance from the Department Director (or his or her designee). Such a request must be in writing with enough detail to allow the Director to understand the situation and proposed variance. If the Director determines that additional information is needed, the request for additional information shall be made within 30 days of the owner's request. Within 30 days of the receipt of such additional information, or, if no such request is made, within 30 days of the owner's request, the Director shall issue a written response to the owner. The response shall grant, deny, or partially grant the request. A grant, partial or complete, may relieve the property owner from strict compliance of this ordinance. Reasonable conditions may be imposed as part of such a grant. The Director shall be guided by the primary goal of protecting the city's wellfields without creating undue hardship upon the property owners affected.

2. Any person receiving a Notice of Violation may appeal the determination set forth within the Notice to the Department Director by submitting a written notice of appeal to the Department. The notice of appeal must be received by the Director within 30 days from the date of the Notice of Violation, with enough detail to allow the Director to understand the situation. Within 30 days of the receipt of such an appeal shall issue a written response to the appeal unless additional information is requested by the Director, in which case the response shall issue within 30 days of receipt of the information. The Director's response shall affirm, reverse, or modify the Notice of Violation being appealed.

3 If the person who has made a variance request or an appeal of a Notice of Violation does not agree with the Director's decision, said person may appeal the matter by filing an action in the Kalamazoo Circuit Court, which may affirm, reverse or modify the decision being appealed. Such an appeal must be filed within 30 days of the Director's final decision.

M. Abatement / Remedial Activities by the Department

1. The Department is authorized to take or contract with others to take reasonable and necessary abatement or remedial activities whenever the Department determines a violation of this Ordinance has occurred and that the responsible party cannot or will not timely correct the violation, or when no known responsible party exists. The responsible party shall reimburse the City for all reasonable expenses thus incurred by the City.

2. If the City desires the responsible party to reimburse it for reasonable abatement activity expenses, the City shall, within 90 days of the completion of said activities, mail to that person a Notice of Claim outlining the expenses incurred, including reasonable administrative costs, and the amounts thereof. The person billed shall pay said sum in full within 30 days of receipt of the claim. If the person billed desires to object to all or some of the amount sought by the Department, said person may file, within the same 30-day period, a written objection so stating. The Department shall, within 30 days of its receipt of the objection, provide an opportunity for the objecting party to present facts or arguments supporting said objection. If the Department determines that some or the entire amount originally billed is appropriate, the person shall pay said sum within 30 days of receipt of that determination. If the amount due is not timely paid, the City may cause the charges to become a special assessment against the property and shall constitute a lien on the property. In the alternative, the City may attempt collection of the sum due by filing a civil lawsuit.

N. Injunctive Relief

If a person has violated or continues to violate the provisions of this Ordinance, the Department may petition the appropriate court for injunctive relief restraining the person from activities that would create further violations, or compelling the person to perform necessary abatement or remediation.

O. Violations Deemed a Public Nuisance

In addition to the enforcement processes and penalties provided, any condition caused or permitted to exist in violation of any of the provisions of this Ordinance is a threat to public health, safety, and welfare, and is declared and deemed a nuisance, and may be summarily abated or restored at the violator's expense, and/or a civil action to abate, enjoin, or otherwise compel the cessation of such nuisance may be taken by the City.

P. Criminal Prosecution

Any violation of this Ordinance shall be considered a misdemeanor, punishable by a fine of not more than $500.00 or imprisonment of not more than 90 days. Each day a violation exists shall be deemed a separate violation. A citation charging such a misdemeanor may be issued by the Director, his or her designee, or a member of Public Safety.

Q. Remedies Not Exclusive

The remedies listed in this Ordinance are not exclusive of any other remedies available under any applicable federal, state, or local law and it is within the discretion of the Department to seek cumulative remedies."

Section 2. Subsections 20, 21, and 22 within Section 28-38 of the Kalamazoo City Code are hereby repealed.

REPEALER

All former ordinances or parts of ordinances conflicting or inconsistent with the provisions of this ordinance are hereby repealed.

SEVERABILITY

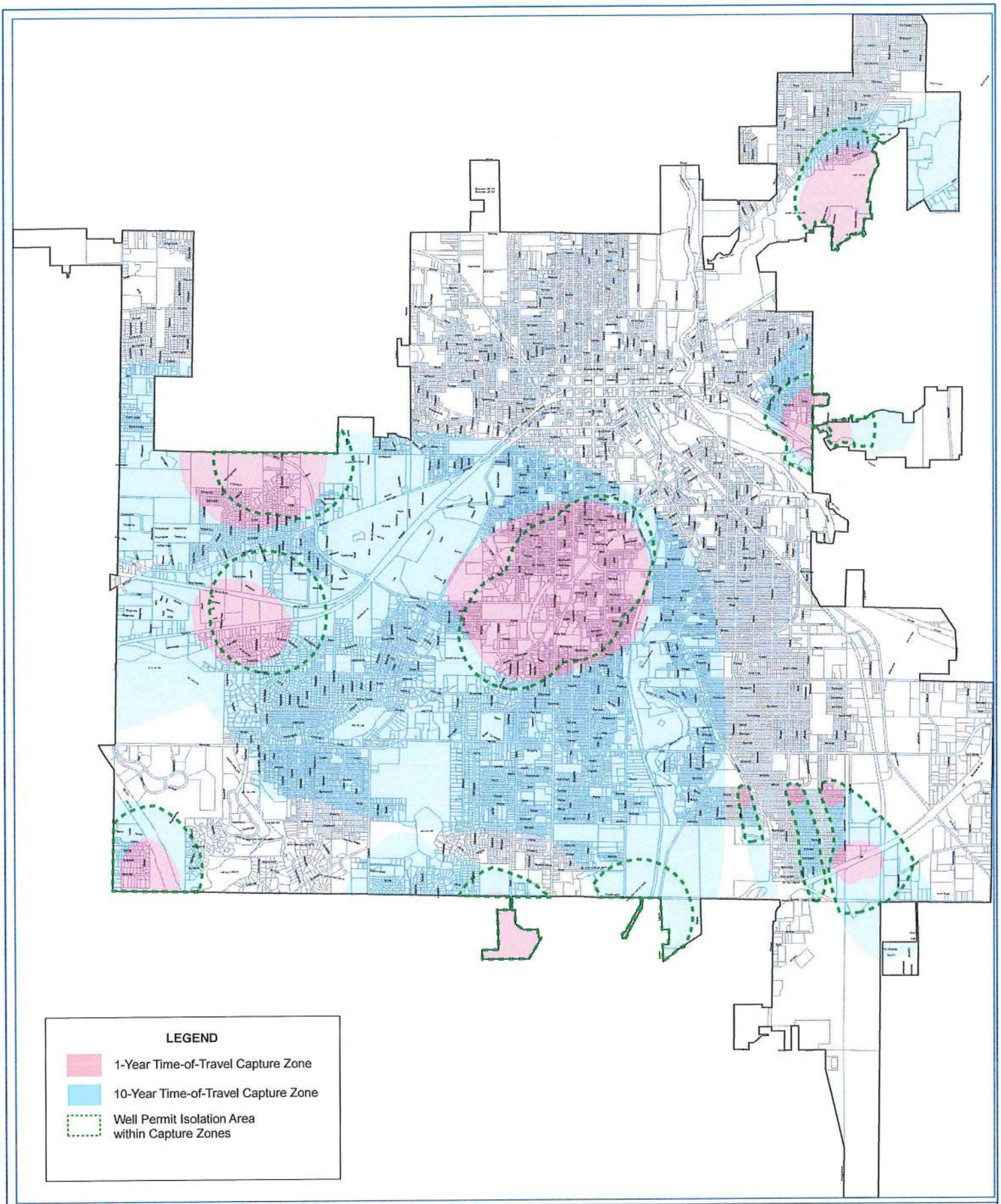
If any section, subsection, sentence, clause, phrase or portion of this ordinance is for any reason held invalid or unconstitutional by any Court of competent jurisdiction, said portion shall be deemed a separate, distinct and independent provision and such holding shall not affect the validity of the remaining portions of this ordinance.

CERTIFICATE

The foregoing is a true and complete copy of the ordinance adopted by the City Commission of the City of Kalamazoo at a regular meeting held on May 21, 2007. Public notice was given and the meeting was conducted in full compliance with the Open Meetings Act, (PA 267, 1976). Minutes of the meeting will be made available as required by the Act, and the ordinance was duly recorded, posted and authenticated by the Mayor and City Clerk as required by the Charter of said City.

Hannah J. McKinney, Mayor

Scott Borling, City Clerk



THE CITY OF Kalamazoo

Wellhead Protection Zoning Overlay

FIGURE 1

N

0 2,000 4,000 8,000 Feet

The maps from the City of Kalamazoo's GIS are not at survey accuracy. The City of Kalamazoo assumes no legal responsibility for the information contained on this map.

CITY OF KALAMAZOO, MICHIGAN

ORDINANCE NO. 1826

AN ORDINANCE TO ADOPT PERFORMANCE STANDARDS FOR GROUNDWATER PROTECTION WITHIN WELLHEAD PROTECTION CAPTURE ZONES AND STORMWATER QUALITY MANAGEMENT AND TO AMEND SECTION 8.3 OF THE ZONING ORDINANCE (APPENDIX A OF THE CODE OF ORDINANCES)

WHEREAS, the Kalamazoo City Zoning Ordinance includes regulations that pertain to the submission, review and approval of site plans for development and redevelopment projects for properties within the city and includes specific information that must be provided on all site plans; and

WHEREAS, the site plan regulations contain language that pertains to storm water management and ground water protection measures that must be adhered to for all such projects; and

WHEREAS, the Department of Public Services has created a new set of regulations entitled Performance Standards for Groundwater Protection Within Wellhead Protection Capture Zones and Stormwater Quality Management, which are intended to be used during the site plan review process and in association with the Wellhead Protection Overlay Zoning District; and

WHEREAS, the Performance Standards provide more in-depth requirements that are intended to help safeguard the drinking water source for Kalamazoo and protect surface water quality from high-risk land use activities; and

WHEREAS, on April 11, 2007, the Planning Commission reviewed the draft of the Performance Standards and unanimously recommended its implementation and adoption by the City Commission; and

WHEREAS, the City Commission has determined that the implementation of the Performance Standards will promote the health, welfare, and safety of the community, will advance the continued economic growth and redevelopment of the City of Kalamazoo, and will help to protect the vital water resources in the city for the benefit of the citizens and business community; and therefore, it is in the best interest of the City to adopt the Performance Standards.

THE CITY OF KALAMAZOO ORDAINS:

Section 1: Section 8.3.H.7.L.and Section 8.3.H.7.X.of the Zoning Ordinance, Appendix A to the Code of Ordinances, City of Kalamazoo, Michigan are amended by adding the following language to both sections: *The proposed development shall comply with the regulations of the City of Kalamazoo's "Performance Standards for Groundwater Protection within Wellhead Protection Capture Zones and Stormwater Quality Management."*

SEVERABILITY

If any section, subsection, sentence, clause, phrase or portion of this Ordinance is for any reason held invalid or unconstitutional by any Court of competent jurisdiction, said portion shall be deemed a separate, distinct and independent provision and such holding shall not affect the validity of the remaining portions of this Ordinance.

CERTIFICATE

The foregoing is a true and complete copy of an ordinance adopted by the City Commission of the City of Kalamazoo at a regular meeting held on May 21, 2007. Public notice was given and the meeting was conducted in full compliance with the Open Meetings Act, (PA 267, l976). Minutes of the meeting will be available as required by the Act, and the ordinance was duly recorded, posted and authenticated by the Mayor and City Clerk as required by the Charter of said City.

Hannah J. McKinney, Mayor

Scott A. Borling, City Clerk

APPENDIX D

Site Plan Review Checklist

City of Kalamazoo - Site Plan Review
Project Checklist

Site Plan Review is an administrative process through the Site Plan Review Committee. The Committee is comprised of members of many City Departments, including Public Safety, Public Services, Building and Trades, Community Planning and Economic Development (CPED).

The first step in Site Plan Review, is the Pre-Application meeting. If you have not yet scheduled this meeting, please contact the Senior Development Planner at 269-337-8076 or bauckhamr@kalamazoocity.org. The Pre-Application meeting allows applicants to ask questions about their plan, the process, this checklist as it relates to their project, or to finalize application with staff,

All Site Plans must be developed using this checklist, which will also serve as the review and approval coversheet during the process. Using this checklist, provide all information pertinent to the project and note on which plan page the information can be found. Assistance and questions with this form or the process can be answered by the Senior Development Planner at any point during the process.

General Site Plan Review Plan Requirements.

- Drawn at an engineering scale of between 1"=50' or 1"=20' with a north arrow
- Name, address, email, phone number of property owners, applicant, and firms/professionals involved in the project. *Verify property address with City Assessor's Office*
- Address, legal description, and Parcel Identification Number (PIN) of subject property
- All plans must be submitted in an electronic format (PDF) plus one hard copy in 11" x 17" format.
- Application is not complete until the application form and fee are submitted

Applicable Codes, Policies, & Plans. When preparing your site plan, please refer to these applicable plans and codes for information and requirements.

Zoning Ordinance

2025 Master Plan

2015 Michigan Building Code
2015 Michigan Residential Code
2015 Michigan Mechanical Code
2015 Michigan Plumbing Code

ADA - ICC A117.1-2009

Chapter 28, Kalamazoo Code of Ordinances, as Amended, as Amended

Soil Erosion and Sedimentation Control - Chapter 30, Kalamazoo Ordinances, as Amended

Flood Plain Management - Chapter 29 City of Kalamazoo Ordinances, as Amended

Chapter 38 of the City of Kalamazoo's Code of Ordinances, as Amended

MMUTCD

NACTO

Complete Streets Policy, City of Kalamazoo

ITE Trip Generation

MDEQ - Uniform Stormwater Standards 1-4

Title 40 of the Code of Federal Regulations (CFR) as Amended, US EPA

Natural Resources and Environmental Protection Act (NREPA), Act 451 of 1994 Part 41, as Amended

Recommended Standards for Wastewater Facilities, Current Addition (10 States Standards)

Standard Construction Specifications for Wastewater, City of Kalamazoo, Current addition

Wellhead Protection Zoning Overlay - Chapter 3, Section 3.5, Ordinance No. 1825 as Appendix A

Performance Standards for Groundwater Protection Within Wellhead Protection Capture Zones and Stormwater Quality Management - Ordinance No. 1826 as Appendix A, Chapter 8, Section 8.3

Phase II Stormwater NPDES Permit

https://kalamazoopublicsafety.org/fire/marshal/

Maker of Acceptable Knox Box (www.knoxbox.com)

USEPA Safe Drinking Water Act, 42 U.S.C. § 300f

MDEQ, Michigan Safe Drinking water Act 1976 PA 399, as Amended

Recommended Standards for Water Works, Current Addition (10 States Standards)

City of Kalamazoo's Standard Specifications for Water Main and Service Installation, Current Edition

www.protectyourwater.net

Date Received: _____

City of Kalamazoo - Site Plan Review
Site Plan Checklist

Please include this completed checklist with your Site Plan Review application and subsequent plan revisions. Application and questions can be directed to the Senior Development Planner, Rob Bauckham at 269-337-8076 or bauckhamr@kalamazoocity.org.

Applicant & Owner Information:

Applicant Name, address, email, and phone number:

_____

_____

_____

Property Address and Parcel Identification Number (PIN) :

_____

_____

_____

Property Owner Name, Address, email, and phone number

_____

_____

_____

Existing Conditions. All projects should provide information related to the site's existing conditions. Projects involving no new construction of buildings or additions less than 1,500 square feet and those not increasing a site's impervious coverage more than 10%, do not need to include a topographic site survey.	Site Plan: Found on Page	SPRC: Revision Required	Revision Made: See Page	SPRC: 2nd Revision Required	2nd Revision Made: See Page	Approved
Vicinity Maps illustrating adjacent streets and existing structures (within 200'), zoning, land use, and 2025 Master Plan Land Development designation of adjacent parcels.	____	☐	____	☐	____	☐
Note presence of special district or designation such as: Historic District	____	☐	____	☐	____	☐
Brownfield Redevelopment Authority (BRA)	____	☐	____	☐	____	☐
State/Federal List for Soil/Groundwater Contamination - If yes, also contacted MDEQ.	____	☐	____	☐	____	☐
Endangered/rare species/habitat area - if yes, also contact MDNR.	____	☐	____	☐	____	☐
Required reporting for RCRA /US EPA Hazardous Waste Handler site (note site type: small quantity generator, large quantity generator, transporter, treatment/storage/disposal, notifier, other)	____	☐	____	☐	____	☐
Solid Waste Facility	____	☐	____	☐	____	☐
Baseline Environmental Assessment (BEA)	____	☐	____	☐	____	☐
Tax capture or deferment area (such as CIA, TIF, NEZ, etc)	____	☐	____	☐	____	☐
Natural Features Protection - 2025 Master Plan	____	☐	____	☐	____	☐
Wellhead Protection Area	____	☐	____	☐	____	☐
Location and type of existing features on the subject property and on adjacent properties, such as woods, wetlands, streams, rivers, lake, drains, 100-year flood plains, floodway, wetland, soil contamination, groundwater contamination etc. Also required are: Topography (2' contour lines labeled with USGS datum)	____	☐	____	☐	____	☐
Tree Inventory (note all trees 10" or greater at diameter breast height or dbh on the site with species type, condition, and remain/ remove status)	____	☐	____	☐	____	☐
If project disturbs an area greater than 1 acre within 500' of a lake or steam, note on plan and call MDEQ.	____	☐	____	☐	____	☐
Location, dimensions, and/or capacities of existing property lines; lots; recorded and unrecorded easements (including County drains); all utilities, including water, sewer, electric, gas, phone, cable, Internet, etc.; wells and cisterns, hydrants; Fire Department Connections, rights-of-way (including sidewalk, trails, landscaping, lighting, pavement, notes on vacation, etc. within it); and points of access	____	☐	____	☐	____	☐

	Site Plan: Found on Page	SPRC: Revision Required	Revision Made: See Page	SPRC: 2nd Revision Required	2nd Revision Made: See Page	Approved
Location of existing buildings and structures (such as signs, light fixtures, refuse areas, parking areas, fences, drainage, above/underground storage tanks, Fire Department Connection, fire service with backflow prevention type etc.) on the subject property, including set-backs, structure use, if planned to remain or be demolished, and age of structure if to remain.	____	☐	____	☐	____	☐
Proposed Site Plan. The following is the checklist of plan details and documentation required for the proposed site plan. Provide all information relevant to project. Please check with the Senior Development Planner if you are unclear on any provision prior to making application.						
Planning and Zoning Alignment with 2025 Master Plan	____	☐	____	☐	____	☐
Building Location, including distance from property lines	____	☐	____	☐	____	☐
Building elevations, including number of stories and locating doors windows, facade materials, signage, and lighting	____	☐	____	☐	____	☐
Off-street parking (vehicle and bicycle) & loading, including location, barrier free, quantity, dimensions, signage	____	☐	____	☐	____	☐
All on-site lighting, including location, height, type, wattage	____	☐	____	☐	____	☐
Signage - type, location, and size	____	☐	____	☐	____	☐
Site Access for All Modes (vehicle, pedestrian, bicycle, transit) including location, dimension, radii, materials, signage	____	☐	____	☐	____	☐
Refuse location & screening	____	☐	____	☐	____	☐
Landscape Plan, including fences, walls, plant schedule (number, size, species), and incorporate of existing trees and vegetation	____	☐	____	☐	____	☐

Notes: _____

	Site Plan: Found on Page	SPRC: Revision Required	Revision Made: See Page	SPRC: 2nd Revision Required	2nd Revision Made: See Page	Approved
Building & Trades						
Soil erosion control measures	____	☐	____	☐	____	☐
Final site grading/topography (2' contour lines labeled with USGS datum)	____	☐	____	☐	____	☐
USGS first floor elevation of buildings	____	☐	____	☐	____	☐
Locations, dimensions, area, use and construction type of all buildings	____	☐	____	☐	____	☐
ADA accessible routes	____	☐	____	☐	____	☐
Occupant egress path from all structures	____	☐	____	☐	____	☐
KDPS - Fire Marshall (Full List of Requirements can be found *here*)						
Installation of Knox Box	____	☐	____	☐	____	☐
Proper location & sizing of: Fire Department Connection (FDC)	____	☐	____	☐	____	☐
FDC Signage	____	☐	____	☐	____	☐
Hydrants	____	☐	____	☐	____	☐
Water mains serving fire protection systems	____	☐	____	☐	____	☐
Building identification (street number & name)	____	☐	____	☐	____	☐
Protective bollards	____	☐	____	☐	____	☐
Vehicular access & circulation	____	☐	____	☐	____	☐
On-site Storage or Use of Hazardous Chemicals. *Permit from Fire Marshall maybe required* SDS information	____	☐	____	☐	____	☐
Right to Know Survey/Chemical Inventory Storage Form Part 1	____	☐	____	☐	____	☐
Wellhead Protection/Chemical Inventory Storage Form Part 2	____	☐	____	☐	____	☐
Classify hazard class of site and/or structure(s)	____	☐	____	☐	____	☐

Notes: _____

	Site Plan: Found on Page	SPRC: Revision Required	Revision Made: See Page	SPRC: 2nd Revision Required	2nd Revision Made: See Page	Approved

Notes: _____

_____

_____

_____

Public Services - Transportation & Utilities						
Location and dimensions of new rights-of-way	____	☐	____	☐	____	☐
Site access for all modes (vehicle, pedestrian, bicycle, transit) including location, approach type, dimension, radii, materials, signage	____	☐	____	☐	____	☐
Access & circulation of site or proposed street network	____	☐	____	☐	____	☐
Improvements to existing off-site rights-of-way for all modes (vehicle, pedestrian, bicycle, transit)	____	☐	____	☐	____	☐
Location and dimension of proposed traffic control measures, including acceleration, deceleration, and passing lanes, traffic signals or signs, etc	____	☐	____	☐	____	☐
Location and dimension of utilities & easements for gas, electric, phone, cable, etc	____	☐	____	☐	____	☐

Notes: _____

_____

_____

_____

Public Services - Environmental/Wellhead Protection						
Wellhead Protection Area (WHPA)						
Stormwater Compliance with Performance Standards	____	☐	____	☐	____	☐
Groundwater Infiltration Compliance	____	☐	____	☐	____	☐
Manufactured Treatment Device Worksheet	____	☐	____	☐	____	☐
Hazardous Material Storage present? If yes, complete Hazard Material Storage Forms 1 & 2	____	☐	____	☐	____	☐
Management of abandoned wells, cisterns, and above or underground storage tanks, including information on installation, operation, capping, or removing	____	☐	____	☐	____	☐
Installation of new well (temporary or permanent) with or without a Reduced Principle Backflow Prevention Assembly.	____	☐	____	☐	____	☐

	Site Plan: Found on Page	SPRC: Revision Required	Revision Made: See Page	SPRC: 2nd Revision Required	2nd Revision Made: See Page	Approved
Soil contamination present? If yes, MDEQ approval required for proposed stormwater infiltration.	____	☐	____	☐	____	☐
Property/site drains present? Detail connection to sanitary or storm sewer, on-site holding tank with pumping/disposal plan, or other.	____	☐	____	☐	____	☐
Detail direct or indirect discharge into or toward a strom sewer, drain, wetland, pond, lagoon, or other surface water feature?	____	☐	____	☐	____	☐
Detail all grade changes, cutting, and fill, including management of existing vegetation and soil erosion and/or sedimentation.	____	☐	____	☐	____	☐

Notes: _____

_____

_____

_____

Public Services - Stormwater Management

Stormwater structures and systems, including size of development area (small 1/2 acre or less, medium 1/2 to 1 acre, and large 1+ acres)	____	☐	____	☐	____	☐
If there is any change (increase or decrease), complete:						
Uniform Standard 1: Water Quality Treatment Volume Work sheet	____	☐	____	☐	____	☐
Uniform Standard 2: Chanel Protection Volume Worksheet	____	☐	____	☐	____	☐
Site Discharge Calculation Worksheet	____	☐	____	☐	____	☐
Properly buffer water features on adjacent properties	____	☐	____	☐	____	☐
If site is to discharge into a County drain and/or is adjacent to an MDOT street, please contact appropriate authority for more information, additional standards, and permitting.	____	☐	____	☐	____	☐

Public Services - Water

	____	☐	____	☐	____	☐
Location & capacity of water main, water service, and hydrants.	____	☐	____	☐	____	☐
For new water service also detail:	____	☐	____	☐	____	☐
Size of line required	____	☐	____	☐	____	☐
Use for fire service	____	☐	____	☐	____	☐
Domestic meter size required	____	☐	____	☐	____	☐
Irrigation meter size required						
For new public water mains:	____	☐	____	☐	____	☐
Located in public right-of-way -or-	____	☐	____	☐	____	☐
Located in easement dedicated to COK	____	☐	____	☐	____	☐
MDEQ PA399 Permit Application						

	Site Plan: Found on Page	SPRC: Revision Required	Revision Made: See Page	SPRC: 2nd Revision Required	2nd Revision Made: See Page	Approved
Quantity of new hydrants _____	____	☐	____	☐	____	☐
Fire Service (note: existing systems may require inspection & up-grade)	____	☐	____	☐	____	☐
Locate cross-connections	____	☐	____	☐	____	☐
Backflow prevention devices	____	☐	____	☐	____	☐

Notes: _____

_____

_____

_____

Public Services - Sanitary Sewer

Sanitary sewer service lateral location and sizing						
All existing & proposed new, including identification & depth of underground utility crossings	____	☐	____	☐	____	☐
Clean-out at ROW/easement	____	☐	____	☐	____	☐
Invert elevation of existing lateral at ROW/easement lines which will continue to be active.	____	☐	____	☐	____	☐
Invert Elevation of proposed new lateral at ROW/easement line.	____	☐	____	☐	____	☐
Sanitary main U.S. invert elevation.	____	☐	____	☐	____	☐
Sanitary main D.S. invert elevation.	____	☐	____	☐	____	☐
Compliance with Chapter 28 of the City of Kalamazoo Ordinances & Engineering Best Practices	____	☐	____	☐	____	☐
Discharge Basis of Design Flow Rate, per connection: (Residential – Multi-Family 3+; Commercial – Restaurant, Laundry Facility, Manufacturing, Hotel/Motel, Medical, and others as required)						
Contribution Per REU: (gpd)	____	☐	____	☐	____	☐
Total REU's with justification/calculation	____	☐	____	☐	____	☐
Average Flow Rate(gpm)	____	☐	____	☐	____	☐
Peaking Factor with justification/calculation	____	☐	____	☐	____	☐
Peak Flow Rate(gpm)	____	☐	____	☐	____	☐
If a new connection is proposed, a Sanitary Sewer Connection Application Form is required	____	☐	____	☐	____	☐

Summary of Site Calculations	Site Plan: Found on Page	SPRC: Revision Required	Revision Made: See Page	SPRC: 2nd Revision Required	2nd Revision Made: See Page	Approved
Gross site area	____	☐	____	☐	____	☐
Area of site covered with impervious and semi-pervious surfaces	____	☐	____	☐	____	☐
Number and type of housing units	____	☐	____	☐	____	☐
Square footage of commercial, manufacturing, or institutional uses - site total and by floor area per building	____	☐	____	☐	____	☐
Number of vehicle & bicycle parking spaces provided, including barrier-free	____	☐	____	☐	____	☐
Number of trees (at or greater than 10" (dbh) saved and/or removed with proposed plan, including species type, size, and health	____	☐	____	☐	____	☐
Estimated number of vehicle trips per day generated by the proposed use (refer to ITE trip generation)	____	☐	____	☐	____	☐
If generating more than 1,000 vehicle trips/day are generated, a complete traffic impact analysis	____	☐	____	☐	____	☐
Light grid/illumination plan, if required.	____	☐	____	☐	____	☐
If requiring 20 or more parking spaces or impervious surface greater than 6,000 square feet, complete the following:	____	☐	____	☐	____	☐
Water Quality Treatment Volume worksheet	____	☐	____	☐	____	☐
Chanel Protection Volume Worksheet						
Calculations for proposed sewer main, sewer lead, water main, water service, and hydrants.	____	☐	____	☐	____	☐

Additional Notes:

APPENDIX E

Chemical Inventory and Storage Form

THE CITY OF Kalamazoo

CHEMICAL INVENTORY AND STORAGE FORM
PART 1

KALAMAZOO DEPARTMENT OF PUBLIC SAFETY
RIGHT TO KNOW QUESTIONAIRE

DATE COMPLETED:		
NAME OF PREMISES:		
SITE ADDRESS:		
SITE TELEPHONE:		
EMERGENCY TELEPHONE:		(Numbers should be direct to facility representatives and available 24 hrs. Number should by-pass automated phone trees)
QUESTIONAIRE COMPLETED BY:		
PHONE:		
EMAIL ADDRESS:		
SITE USE: Please check most appropriate box	☐	CHEMICAL USER (Chemicals used in activities on site)
	☐	CHEMICAL PRODUCER (Chemicals manufactured at this site, includes packaging)
	☐	OTHER (Chemicals are stored on site, but not used or produced. Such as service stations, retail store, storage facility)

Emergency Contacts: (Include Private Alarm / Security Companies, Maintenance Staff)				
NAME	TITLE	BUSINESS PHONE	HOME PHONE	CELL PHONE

EMERGENCY VENDORS	
SPILL CLEAN UP COMPANY	
ADDRESS:	
PHONE NUMBERS REGULAR and AFTER HOURS NUMBERS:	

KALAMAZOO DEPARTMENT OF PUBLIC SAFETY
RIGHT TO KNOW QUESTIONAIRE

CHEMICAL TYPE SURVEY Check 1 Box for Each Category				
CHEMICAL TYPE	**SPECIFIED QUANTITY**	**HAVE AT OR ABOVE SPECIFIED QUANTITY**	**HAVE BUT BELOW SPECIFIED QUANTITY**	**DO NOT HAVE**
CLASS 1				
Explosives & Blasting Agents (Not including Class C Explosives)	Any Quantity	☐	☐	☐
CLASS 2				
Poison Gas	Any Quantity	☐	☐	☐
Flammable Gas	100 gal. Water Capacity	☐	☐	☐
Non-Flammable Gas	100 gal. water capacity	☐	☐	☐
CLASS 3				
Flammable Liquid	1000 gallons	☐	☐	☐
Combustible Liquid	10,000 gallons	☐	☐	☐
CLASS 4				
Flammable Solid (Dangerous when wet)	100 lbs.	☐	☐	☐
Flammable solid	500 lbs.	☐	☐	☐
Spontaneously Combustible Material	100 lbs	☐	☐	☐
CLASS 5				
Oxidizer	500 lbs	☐	☐	☐
Organic Peroxide	250 lbs	☐	☐	☐
CLASS 6				
Poison	500 lbs	☐	☐	☐
Irritating Material: Liquid	1000 gallons	☐	☐	☐
Irritating Material: Solid	500 lbs	☐	☐	☐
CLASS 7				
Radioactive Material (Yellow III Label)	Any Quantity	☐	☐	☐
CLASS 8				
Corrosives: Liquid	1000 gallons	☐	☐	☐
Corrosives: Solid	500 lbs	☐	☐	☐
NO DOT CATEGORY				
Known Human Carcinogen	Any Category	☐	☐	☐

The Michigan Occupational Safety and Health Act (MIOSHA) requires that the Department of Public Safety prepare and disseminate to our Officers a plan for executing the department's responsibilities with respect to each site within the City of Kalamazoo where hazardous chemicals are used or produced. There are no exemptions based on the quantity of chemicals at the site. The purpose of the act is to ensure firefighter safety.

KALAMAZOO DEPARTMENT OF PUBLIC SAFETY
RIGHT TO KNOW QUESTIONAIRE

HAZARDOUS CHEMICAL DEFINITIONS

Carcinogen – A chemical is considered to be a carcinogen if: 1) it has been evaluated by the International Agency for Research on Cancer (IARC) and found to be a carcinogen or potential carcinogen; or 2) it is listed as a carcinogen or potential carcinogen in the Annual Report on Carcinogens published by the National Toxicology Program (NTP) (latest edition), or 3) it is regulated by OSHA as a carcinogen.

Combustible liquid – Any liquid having a flashpoint at or above 100 degrees F (37.8 degrees C), but below 300 degrees F (93.3 degrees C), or higher, the total volume of which make up 99 percent or more of the volume of the mixture.

Corrosive (liquid and solid) – Any liquid or solid that causes visible destruction or irreversible damage to human skin tissue. Also, it may be a liquid that has a severe corrosion rate on steel.

Explosives and blasting agent (not including Class C explosives) – "Explosive" means a chemical that causes a sudden, almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure, or high pressure. "Blasting Agent" means a material designed for blasting. It must be insensitive that there is very little probability of: 1) accidental explosion, or 2) going from burning to detonation.

Flammable liquid – Any liquid having a flashpoint below 100 degrees F (37.8 C), except any mixture having components with flashpoints of 100 degrees F (37.8 C) or higher, the total of which makes up 99 percent or more of the total volume of the mixture.

Flammable gas – A gas that can burn with the evolution of heat and a flame. Flammable compressed gas is any compressed gas of which: 1) a mixture of 13 percent or less (by volume) with air is flammable, or 2) the flammable range with air is under 12 percent.

Flammable solid – A solid, other that a blasting agent, or explosive, that is liable to cause fire through friction, absorption or moisture, spontaneous chemical change, or retained hear from manufacturing or processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard.

Flammable solid (dangerous when wet) – - Water Reactive Material (Solid) - Any solid substance (including sludges and pastes) which react with water by igniting or giving off dangerous quantities of flammable or toxic gases. (Sec.171.8).

Irritating material - liquid and solid - A liquid or solid substance which, upon contact with fire or air, gives off dangerous or intensely irritating fumes.

Non-flammable gas - Any compressed gas other than a flammable compressed gas.

Organic peroxide - An organic compound that contains the bivalent -0-0 structure and which may be considered to be a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms has been replaced by an organic radical.

Oxidizer - A chemical that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases. Example being: chlorate, permanganate, inorganic peroxide, or a nitrate, that yields oxygen readily.

Poison (Less dangerous poisons, toxic) - substances, liquid or solids (including pastes and semi- solids) so toxic to man that they are a hazard to health during transportation.

Poison gas (Extremely dangerous poisons, highly toxic poisonous gases or liquids) - a very small amount of the gas, or vapor of the liquid, mixed with air is dangerous to life.

Radioactive material (yellow 111 label) - Any material, or combination of materials, that spontaneously gives off ionizing radiation.

Spontaneously combustible material (Solid) - A solid substance (including sludge's and pastes) which may undergo spontaneous heating or self-burning under normal transportation conditions. These materials may increase in temperature and ignite when exposed to air.

THE CITY OF Kalamazoo

CHEMICAL INVENTORY AND STORAGE FORM
PART 2

DRINKING WATER PROTECTION QUESTIONNAIRE

Please summarize the activities at this site, including principal products or services provided:

_____

_____

Please check the corresponding box if your facility has prepared any of the following:
☐ Pollution Incident Pollution Plan (PIPP)
☐ Risk Management Program/Plan (RMP)
☐ Spill Prevention Control and Countermeasures Plan (SPCC)
☐ Storm Water Pollution Prevention Plan (SWPPP)
☐ Hazardous Waste Contingency Plan (HWCP)
☐ Other Spill Contingency Plan, please explain.

Please check the corresponding box if your facility has prepared or is designated as any of the following:
☐ Listed as a Part 201 Site under Act 451
☐ Listed as a Part 213, Leaking Underground Storage Tank, Site under Act 451
☐ Baseline Environmental Assessment
☐ Due Care Plan
☐ Other known release of a regulated substance or ongoing contamination, please explain.

Kalamazoo's wellhead protection ordinance (No. 1825) defines the following as Regulated Substances:

1. Substances for which there is a materials safety data sheet (MSDS), and the MSDS cites possible health hazards
2. Hazardous Waste, as defined by the Resource Conservation and Recovery Act (RCRA) of 1976
3. Hazardous Substance, as defined by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)
4. Radiological materials
5. Biohazards

EXAMPLES OF REGULATED SUBSTANCES INCLUDE

A. PETROLEUM PRODUCTS Examples: Gasoline, Motor Oil, Heating Oil, Diesel, Used Oil
B. RADIOLOGICAL MATERIALS Common Uses: Gas Chromatography, Scientific Research, Gauges, Manufacturing, Medicine
C. INORGANIC COMPOUNDS (Metals, Metal Compounds and certain Acids and Bases) Examples: Chromium, Arsenic, Cyanide, Nitrate, Hydrochloric Acid, Sodium Hydroxide
D. FERTILIZERS, PESTICIDES, AND OTHER SYNTHETIC ORGANIC COMPOUNDS Examples: 10-10-10, Ammonium nitrate, Atrazine, Carbofuran, Simazine, Bone Meal
E. VOLATILE ORGANIC COMPOUNDS (VOCs) Examples: Paints, Varnish, Solvents, Thinners, Adhesives,
F. SALT Examples: Calcium Chloride, Sodium Chloride, Sand/Salt Mixtures

Do you use or store regulated substances onsite?

◯ **Yes** ◯ **No**

If you answered "no" to this question, you do not need to complete page 5 of the questionnaire.

DRINKING WATER PROTECTION QUESTIONNAIRE

Please check any boxes that describe the activities that occur at your property.

Commercial

- ☐ Analytical and clinical laboratories
- ☐ Animal feedlots
- ☐ Auto washes
- ☐ Boat builders/refinishers
- ☐ Car rental and service stations/automotive repair
- ☐ Commercial establishments with fleets of trucks and cars
- ☐ Concrete/asphalt/coal/tar companies
- ☐ Drum recycling and cleaning
- ☐ Dry cleaners and laundries
- ☐ Equipment repair
- ☐ Food processors/meat packers/slaughter houses
- ☐ Fuel oil distributors/stores
- ☐ Furniture stripping or refinishing
- ☐ Gas stations
- ☐ Junk and salvage yards
- ☐ Motor vehicle repair/service shops
- ☐ Pesticide application services/pesticide stores/retailers
- ☐ Petroleum bulk storage (wholesale)
- ☐ Photographic development
- ☐ Printing
- ☐ Salvage yards/impoundment lots
- ☐ Truck or rail tanker cleaning
- ☐ Wood preserving and treatment

Manufacturing

- ☐ Chemical, paint, and plastics manufacturing
- ☐ Furniture manufacturing
- ☐ Metal manufacturing (including metal plating)
- ☐ Mining operations/injection wells
- ☐ Other manufacturing (textiles, rubber, glass, etc.)
- ☐ Pulp and paper industry

Transportation

- ☐ Airport maintenance/fueling areas
- ☐ Governmental agencies with fleets of trucks and cars
- ☐ Salt piles/sand-salt piles
- ☐ Trucking/bus terminals
- ☐ Vehicle maintenance operations (transportation/trucking, contractors/construction, auto dealers)

Utilities

- ☐ Aboveground oil pipelines
- ☐ Electric power generation substations

Waste Disposal

- ☐ Landfills/dumps/transfer stations

If you store regulated substances onsite, please summarize the security measures at this site, including fencing, lighting, and flow valves (are they locked when not in use?):

_____

_____

_____

DRINKING WATER PROTECTION QUESTIONNAIRE

REGULATED SUBSTANCES INVENTORY – INDOOR STORAGE AREAS

Our priority is to inventory materials stored in aggregate quantities greater than 55 gallons or 440 pounds. Aggregate quantity means the total storage amount of each material onsite, regardless of container size.

If your facility stores any regulated substances in INDOOR storage areas onsite, please list the specific types of materials below.

Material Name *(Chemical or Brand)*	Material Use	Container Type[1]	Container Material	Max. Quantity Stored Onsite (with Units)	Are floor drains present in storage area? If yes, are they connected to sanitary sewer, storm sewer, or other?		Containers properly labeled?	How often is the area inspected?	Are walls and floors impervious? Please list material.
Example: **Hydraulic oil**	**Lubricant**	**Drum**	**Steel**	**55 Gallons**	☐ Yes ☑ No		**Yes**	**Weekly**	**Yes, concrete**
					☐ Yes ☐ No				
					☐ Yes ☐ No				
					☐ Yes ☐ No				
					☐ Yes ☐ No				
					☐ Yes ☐ No				
					☐ Yes ☐ No				
					☐ Yes ☐ No				

[1] Examples: aboveground storage tank (AST), underground storage tank (UST), drum, bags, bottles, pails.

DRINKING WATER PROTECTION QUESTIONNAIRE

REGULATED SUBSTANCES INVENTORY – OUTDOOR STORAGE AREAS

Our priority is to inventory materials stored in aggregate quantities greater than 55 gallons or 440 pounds. Aggregate quantity means the total storage amount of each material onsite, regardless of container size.

If your facility stores any regulates substances in <u>OUTDOOR</u> storage areas onsite, please list the specific types of materials below.

Material Name *(Chemical or Brand)*	Material Use	Storage Container Type[1]	Storage Container Material	Max. Quantity Stored Onsite (with Units)	Secondary containment structure present? If yes, describe containment, including material and size.		How often is the area inspected?	Is the storage area covered?
Example: **Diesel**	**Truck Fuel**	**AST**	**Steel**	**500 Gallons**	☑ Yes ☐ No	**Concrete dike, 750 gallons**	**Weekly**	**Yes**
					☐ Yes ☐ No			
					☐ Yes ☐ No			
					☐ Yes ☐ No			
					☐ Yes ☐ No			
					☐ Yes ☐ No			
					☐ Yes ☐ No			
					☐ Yes ☐ No			
					☐ Yes ☐ No			

[1] Examples: aboveground storage tank (AST), underground storage tank (UST), drum, bags, bottles, pails.

APPENDIX F

Water Resources Public Education
&
Outreach Summary:
January 2011 through May 2018

Water Resources Public Education & Outreach Summary

Item	Quantity	Date	Event or Location	No. in Attendance
Onsite tour of WRP and presentation on water and wastewater systems.		6/6/2011	WMU Environmental Science Class	25 Students
Protect Groundwater Notepads	22	8/3/2011	Kalamazoo Area Math & Science Center 4th to 6th Grade Students	22 Students
Groundwater Protection Magnets	22			
"Making Discoveries-Groundwater Activities" Manual	1			
The Story of Drinking Water Teachers Manual	1			
Onsite tour of operating City water pumping station and well field. Presentation provided regarding ongoing efforts to protect wells from nearby LUST site contamination.		8/12/2011	WMU Hydrogeology Class	23 Students
Onsite tour of WRP and presentation on water and wastewater systems.		8/22/2011	WMU Environmental Science students	24 Students
30-second movie theater video ads at Celebration Cinema		Continuous	General Public Movie Viewers at Celebration Cinema	50,000/month
Metro Bus Educational Placards		Continuous	General Public in the Kalamazoo Metropolitan Area	~100,000 General Public
www.protectyourwater.net		Continuous	Internet	General Public Website Viewers
Onsite tour of WRP and presentation on water and wastewater systems.		10/6/2011	Group of visitors from Kazakhstan	10 Visitors
Groundwater Protection Magnets	50	10/26/2011	Kalamazoo Environmental Council's Water Quality Forum	50 Participants
City of Kalamazoo Water Quality Report	9			
Common Questions About Your Water Quality Brochure	5			
Protect Groundwater Coasters	4	1/18/2012	Oakwood/Winchell Neighborhood Meeting Water Presentation	23 Citizens
2010 Water Quality Reports?CCR's	3			
Household Guide to Water Conservation Brochure	7			
Common Questions About Your Water Quality Brochure	6			
Groundwater Protection Magnets	6			
Protect Groundwater Notepads	5			
Backflow Prevention Brochures	6			
"Protect Groundwater" Pencils	105	2/16/2012	Galesburg Agusta 2nd Grade Classes	105 2nd Grade Students
Enviroscape Model Demonstration				
Groundwater Simulator Demonstration				

Water Resources Public Education & Outreach Summary

Item	Quantity	Date	Event or Location	No. in Attendance
"Protect Groundwater" Pencils	295	3/7- 3/10 2012	Greater Kalamazoo Home Builder's Association Home Expo	Over 13,000 citizens
Groundwater Protection Magnets	148			
Protect Groundwater Keychains	221			
Stormwater Education Sponges	250			
Groundwater Basics Brochure	15			
Household Water Conservation Brochures	11			
Backflow Prevention Brochures	8			
Let's Learn About Drinking Water Brochure	16			
Our World of Water Activity Book	60	4/19/2012	Mattawan Elementary School 3rd Grade Classroom	60 Students
Water Drop "stress ball" figure	60			
Water Conservation Animal Sticker Sheet	60			
Water Cycle Bookmarks	60			
Water Magic Activity Teachers Manual	2			
Groundwater Protection Magnets	60			
"Protect Groundwater" Pencils	60			
Henry Goes Underground Books	2			
Protect Groundwater Erasers	60			
Protect Groundwater Notepads	60			
The Story of Drinking Water Teachers Manual	2			
Protect Groundwater T-Shirts	7			
Groundwater Simulator Demonstration				
Plain Talk About Drinking Water Book	1	4/30/2012	Colleagues International Visitor from Nepal	1 Visitor
The Story of Drinking Water Teacher's Guide	1			
Water Magic Activity Teachers Manual	1			
Safe Drinking Water Act Poster	2			
Water Drop "Stress Ball" Figure	1			
Protect Groundwater Keychain	1			
Protect Groundwater Notepad	1			
Brochure "Needed: Clean Water"	1			
General Informational Brochure on Wastewater/Environment	1	7/26/2012	Kalamazoo Area Math & Science Center	9 Students & 1 Teacher
Tour of KWWTP - Informational Treatment Plant Brochure	32	8/16/2012	W.M.U. Hydrogeology Class	30 Students and 2 Teachers
Tour of KWWTP - Informational Treatment Plant Brochure	11	9/26/2012	W.M.U. Water Resources Man. Class	10 Students and 1 Teacher
Tour of KWWTP - Informational Treatment Plant Brochure	61	11/10/2012	W.M.U. Env. Engineering Class	60 Students and 1 Teacher

Water Resources Public Education & Outreach Summary

Item	Quantity	Date	Event or Location	No. in Attendance
Our World of Water Activity Book	11	1/29/2013	Portage Brownie Troop	11 Brownies, 2 Co-Leaders
Water Drop "stress ball" figure	13			
Water Conservation Animal Sticker Sheet	11			
Water Cycle Bookmarks	13			
Groundwater Protection Magnets	13			
"Protect Groundwater" Pencils	13			
Protect Groundwater Erasers	13			
Protect Groundwater Notepads	13			
Protect Groundwater T-Shirts	2			
Household Guide to Water Conservation Brochure	2			
Common Questions About Your Water Quality Brochure	2			
Stormwater Education Sponges	2			
Groundwater Simulator Demonstration				
Water Drop "stress ball" figure	1	3/15/2013	Purchasing Trade Show, Battle Creek	Purchasing Industry Reps.
Groundwater Protection Magnets	50			
"Protect Groundwater" Pencils	30			
Protect Groundwater Erasers	25			
Protect Groundwater Notepads	50			
Protect Groundwater Keychain	25			
Tour of KWWTP - Informational Treatment Plant Brochure	19	4/6/2013	W.M.U. Env. Engineering Class	18 Students and 1 Teacher
Tour of KWWTP - Informational Treatment Plant Brochure	24	4/30/2013	Webelo Cub Scout Troop (Winchell)	9 scouts, parents, and siblings
Protect Groundwater Notepads	25	5/3/2013	Ice Cream Social Lake View Elementary	80 Citizens
Water Conservation Animal Sticker Sheet	25			
Household Guide to Water Conservation Brochure	25			
Water Cycle Bookmarks	25			
Groundwater Protection Magnets	25			
Backflow Prevention Brochures (AWWA)	25			
City of Kalamazoo Wellhead Protection Brochure	10	5/18/2013	Asylum Lake Celebration	Approximately 100 citizens
Groundwater Basics Brochure (AWWA)	10			
Our World of Water Coloring Book	3			
Tour of KWWTP - Informational Treatment Plant Brochure	26	6/25/2013	Milwood Magnet PASS Academy	6th & 7th Graders

Water Resources Public Education & Outreach Summary

Item	Quantity	Date	Event or Location	No. in Attendance
Water Drop "stress ball" figure	7	7/9/2013	CIS's "Think Summer" Program; Hillside Middle School	49 3rd, 4th, 5th graders, teachers
Groundwater Protection Magnets	52			
"Protect Groundwater" Pencils	52			
Protect Groundwater Erasers	52			
Protect Groundwater Notepads	52			
Stormwater Education Sponges	3			
Protect Groundwater T-Shirts	3			
Our World of Water Activity Book	52			
Protect Groundwater Coasters	3			
Groundwater Simulator Demonstration				
Tour of KWWTP - Informational Treatment Plant Brochure	8	10/25/2013	W.M.U. Ecology Class	7 students, 1 teacher
Tour of KWWTP - Informational Treatment Plant Brochure	2	11/1/2013	W.M.U. Ecology Class	2 students
Tour of KWWTP - Informational Treatment Plant Brochure	12	11/9/2013	Cub Scout Troop (Grades 1-5)	8 scouts and 4 adults
Tour of Laboratory, KWRP		4/8/2014	Exchange Student Program	2 Brazilian students
Tour of Laboratory, KWRP		4/13/2014	Biology Class	9 students, 1 teacher
Tour of KWRP - Informational Treatment Plant Brochure		11/9/2013	Ciub Scout Troop	20 scouts, 5 adults
Tour of KWRP - Informational Treatment Plant Brochure		4/4/2014	Kalamazoo County Environmental Health	4 staff
Tour of KWRP - Informational Treatment Plant Brochure		6/3/2014	K-College Students	25 students
Tour of KWRP - Informational Treatment Plant Brochure		7/25/2014	4th Grade Earth Science	4 students
Tour of KWRP - Informational Treatment Plant Brochure		7/31/2014	St. Martin of Tours Episcopol Church	8 kids, 4 adults
General Groundwater/Surface Water Quality External Outreach		8/14/2014	Apple Tree Day Care Learning Event	15 kids, 3 adults
Groundwater Protection Pencils and Erasers	18			
Our World of Water (Children) Activity Books	18			
Water Cycle Bookmarks	18			
Poster - Groundwater and Land Use in the Water Cycle	1			
Water Magic Water Activities Teacher Guide (K-3)	1			
Tour of KWRP - Informational Treatment Plant Brochure		10/6/2014	Michigan Rural Water Class	22 Students, 1 teacher
Presentations and Wastewater Treatment Plant Tour		10/9/2014	Industry Day	30 Area Industrial Customers
Key Tags - Protect Groundwater Message	17			
Protect Groundwater Keychains	16			
Protect Groundwater Coasters	13			
Groundwater Protection Magnets	10			
Common Questions About Your Water Quality Brochure	5			
Household Guide to Water Conservation Brochure	3			
Backflow Prevention Brochures (AWWA)	2			
The Groundwater Jug Kit Exercise		11/15/2014	Almena Happy Helpers 4-H Club Project Day	5 Kids, 2 Parents
Water Cycle Bookmarks	5			
Water Drop "stress ball" figure	5			

Water Resources Public Education & Outreach Summary

Item	Quantity	Date	Event or Location	No. in Attendance
Tour of KWRP		11/21/2014	Kazoo Middle School	30 Students, 2 Teachers, 2 Parents
Groundwater Protection Pencils and Erasers	34			
Plain Talk About Drinking Water Book	1			
Protect Groundwater T-Shirts	4			
Tour of KWRP		2/28/2015	W.M.U. Sustainability Group	11 Students and 1 Teacher
Water Related Educational Booth for Earth Day		4/22/2015	Borgess Hospital Cafeteria	Hundreds Staff/Hospital Visitors, 6 Volunteers
Key Tags - Protect Groundwater Message	16			
Groundwater Protection Message Notepads	15			
Protect Groundwater Coasters	14			
Groundwater Protection Magnets	5			
Common Questions About Your Water Quality Brochure	2			
Household Guide to Water Conservation Brochure	5			
Backflow Prevention Brochures (AWWA)	1			
Groundwater Protection Pencils with Erasers	21			
Groundwater Protection Erasers	6			
Our World of Water Activity Book	11			
Water Conservation Animal Sticker	5			
Stormwater Education Sponge	22			
AWWA Groundwater Basics Brochure	1			
Tour of KWRP and Laboratory		4/22/2015	Kalamazoo Area Math & Science Center	21 Students and 1 Teacher
Groundwater Protection Magnets	22			
Key Tags - Protect Groundwater Message	22			
Tour of KWRP		4/23/2015	W.M.U. Microbiology Class	10 Students and 1 Teacher
Colleagues International Presentation		6/9/2015	Presentation regarding City Environmental Programs to 4 Russian members of the Open World Leadership Center Program	4 Russians, 1 local interpreter, 4 presenters
Kalamazoo County Fair		8/10 - 8/14/15	Watershed Model Demo/Educational Booth	Approximately 900 General Public
Common Questions About Your Water Quality Brochure	15			
Household Guide to Water Conservation Brochure	14			
Groundwater Protection Message Notepads	31			
Kalamazoo Water Festival at the Riverview Launch		9/19/2015	General Public	Approximately 600 people attended
Presentations and Wastewater Treatment Plant Tour		10/20/2015	Ladywood Catholic Girls High School	27 Students and 4 Teachers
Household Guide to Water Conservation Brochure	2			
Groundwater Protection Message Notepads	22			
Key Tags - Protect Groundwater Message	20			
Stormwater Education Sponges	6			
Plain Talk About Drinking Water Handbook	1			

Water Resources Public Education & Outreach Summary

Item	Quantity	Date	Event or Location	No. in Attendance
Tour of KWRP		11/19/2015	Gull Lake High School Environmental Class	16 Students and 2 Teachers
Groundwater Protection Message Notepads	14			
Key Tags - Protect Groundwater Message	10			
Tour of KWRP		1/23/2016	National Guard	4 National Guard Staff
Municipal Utility Directors Meeting		2/23/2016	20 Municipal Utility Directors	20 Municipal Utility Directors
Groundwater Protection Message Notepads	20			
Protect Groundwater Coasters	20			
Tour of KWRP	36	3/24/2016	High School Conservation Biology, KNC	34 Students, 2 Teachers
Tour of KWRP	22	4/20/2016	KAMSC Advanced Environmental Class	21 Students and 1 Teacher
Tour of KWRP	6	5/4/2016	Steeler Industries Staff	
Presentation RE: Water Resources Management - KWRP Focus	10	6/15/16	Environmental Concerns Committee	10 Members, 2 City Staff
Tour of KWRP	30	6/23/2016	W.M.U. Geography Class	30 students, 2 Teachers
Tour of Central Water Pumping Station	5	7/28/2016	Bell's Brewery Staff	5 Bell's staff, 2 City staff
Family Health Center Event	40		General Citizens	40 Citizens
Household Guide to Water Conservation Brochure	40			
Groundwater Protection Message Notepads	40			
Key Tags - Protect Groundwater Message	40			
Groundwater Protection Message Magnets	40			
Tour of KWRP	NA	Jan 2016	W.M.U. Environmental Impact Class	NA
Tour of KWRP	2	Mar 2016	WMU	2 people
Tour of KWRP	6	Mar 2016	MWEA Class	6 people
Tour of KWRP		Mar 2016	Kalamazoo Nature Center	25 attendees
Tour of KWRP		April 2016	WMU	2 people
Tour of KWRP		May 2016	Wightman & Associates Engineers	6 people
Tour of KWRP		June 2016	Kalamazoo ECC Group	10 people
Tour of KWRP		June 2016	WMU Geography Class	12 people
Tour of KWRP		June 2016	Church group (discussed Flint & Kalamazoo Water)	14 people
Tour of KWRP		Aug 2016	MDOT Engineers	6 people
Tour of KWRP		Aug 2016	WMU Hydrogeology Class	Over 30 students
Tour of KWRP		Oct 2016	General Tour	18 people
Tour of KWRP		Dec 2016	City of Kalamazoo Employee Tour	4 people
Tour of KWRP		3/31/17	WMU Geology Water Resources Management	10 people
Issues & Ale - Do you know where your drinking water comes from?		4/25/17	Bell's Brewery - Panel Participation	~140
Purchasing Reverse Trade Show		4/27/17	Purchasing Reverse Trade Show	50 people
Key Tags - Protect Groundwater Message	50			
Protect Groundwater Coasters	50			

Water Resources Public Education & Outreach Summary

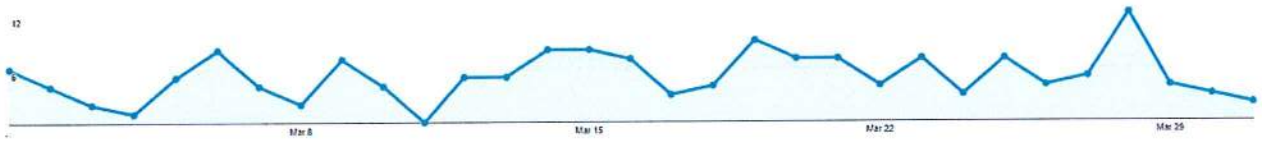
Item	Quantity	Date	Event or Location	No. in Attendance
Tour of KWRP		5/10/17	KAMSC Advanced Environmental Class	8 students
No Water No Beer Festival (Distributed CCR's and spoke)		5/24/17	Bell's Brewery - Short Presentation	80
Consumer Confidence Reports	20			
Tour of KWRP		6/23/17	WMU Hydrogeology Class	25 people
Tour of KWRP		6/28/17	National Association of Women in Construction	10 people
Tour of KWRP		6/30/17	Catalyst Development & Peggy Rice	9 people
Tour of KWRP		7/27/17	Parks & Rec Program for Youth	30 children
Tour of KWRP		8/3/17	Parks & Rec Program for Youth	38 children
Tour of KWRP		8/14/17	Parks & Rec Program for Youth	20 children
Tour of KWRP		8/18/17	WMU Hydrogeology Class	25 people (?)
COK Public Services Week		5/21/18 Week	Public	
Tour of KWRP	2		Public	
Tour of Central Water Pumping Station	2		Public	
Common Questions About Your Water Quality Brochure	26		Public	
Our World of Water Activity Book	25		Public	
Groundwater Protection Erasers	25		Public	
Groundwater Protection Message Notepads	50		Public	
Key Tags - Protect Groundwater Message	50		Public	
Water Conservation Animal Sticker	50		Public	
Backflow Prevention Brochures (AWWA)	25		Public	
Groundwater Protection Pencils with Erasers	50		Public	
Groundwater Simulator Demonstration	2		Public	
Groundwater Basics Brochure (AWWA)	25		Public	
MDOT Better Roads, Cleaner Streams	25		Public	
Continuation of 30-second pre-movie and theater lobby water ads		Ongoing	Movie goers at Kal. 10 and Celebration Cin.	50,000 monthly
Metro Bus Placard Educational Ads		Ongoing	Gen. Public in Kalamazoo Metropolitan Area	Thousands
Radio Educational Ads (Townsquare Media) with City of Battle Creek		Ongoing	Radio listeners of 103.3 FM and 107.7 FM	Thousands
Social Media Outreach (LKF Marketing)		Ongoing	Facebook, LinkedIn, Google AdWords, YouTube	Thousands
www.protectyourwater.net - Major Technology Upgrades in 2015		Ongoing	Internet users - City/LKF Marketing Prjt.	Thousands

APPENDIX G

Visitor Statistics www.protectyourwater.net
Google Analytics Statistics March 2018

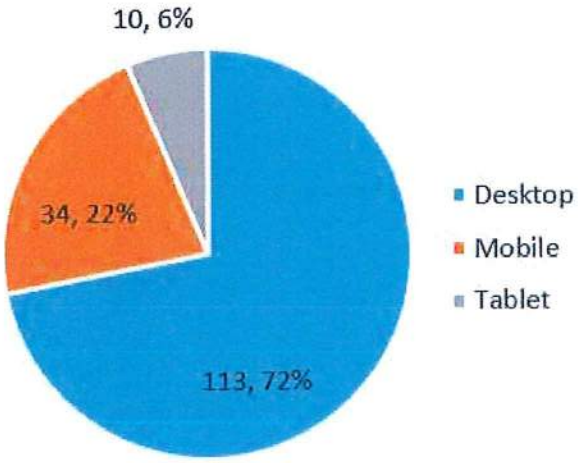
General Statistics

The website statistics for March are as follows.



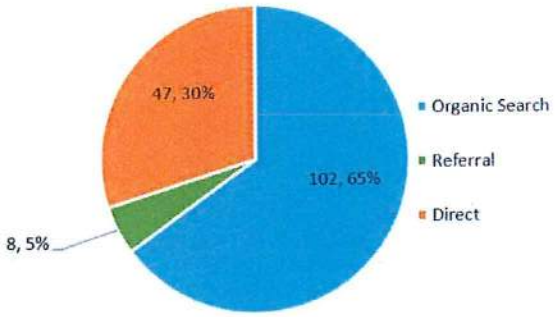
	June	July	Aug	Sept	Oct	Nov	Dec	Jan '18	Feb	Mar
Sessions	201	150	162	147	160	227	168	137	131	157
Pageviews	557	257	581	391	469	575	388	274	359	341
Average Pageview per Session	2.77	1.71	3.59	2.66	2.93	2.53	2.31	2.00	2.74	2.17
New Sessions (percent)	86.57	92.67	84.57	78.23	86.25	88.99	88.01	84.00	83.21	86.00
Direct Entrances	69	29	49	39	38	39	86	45	36	47
Bounce Rate (percent)	76.62	82.67	63.58	65.31	60	51.98	65.48	65.69	71.76	61.78
Number of Users who visited 3+ times	19	0	13	23	9	13	11	16	11	10
Average Time Spent on Site	1:26	0:44	2:04	1:48	2:35	1:52	1:38	1:38	1:38	0:58
Users who saw only 1 Page	154	124	103	96	96	118	110	90	94	97
Users who saw Multiple Pages	47	26	59	51	64	109	58	47	37	60
Multi-page Users Pageviews	510	231	478	295	405	466	330	227	322	281
Multi-page Users Pages/Session	10.85	8.88	8.24	5.78	6.33	4.27	5.7	4.8	8.7	4.9

Visitors used the following devices to view the website:



Traffic Sources

This traffic came from the following sources:



The following were the top referring sites:

- Archive.KalamazooCity.org (2)
- SLELOInvasives.org (2)
- KalamazooCity.org (1)

Topping the Network Location charts were internet providers. Other notable networks include (by sessions):

- City of Kalamazoo City Hall (10)
- Kalamazoo RESA (2)
- Oldham College (2)
- General Motors LLC (1)
- Kalamazoo College (1)
- Kalexsyn Inc. (1)
- State of Missouri Office of Admin. (1)
- State of N.H. Dept. of Health and Human Services (1)
- U of M – Flint (1)

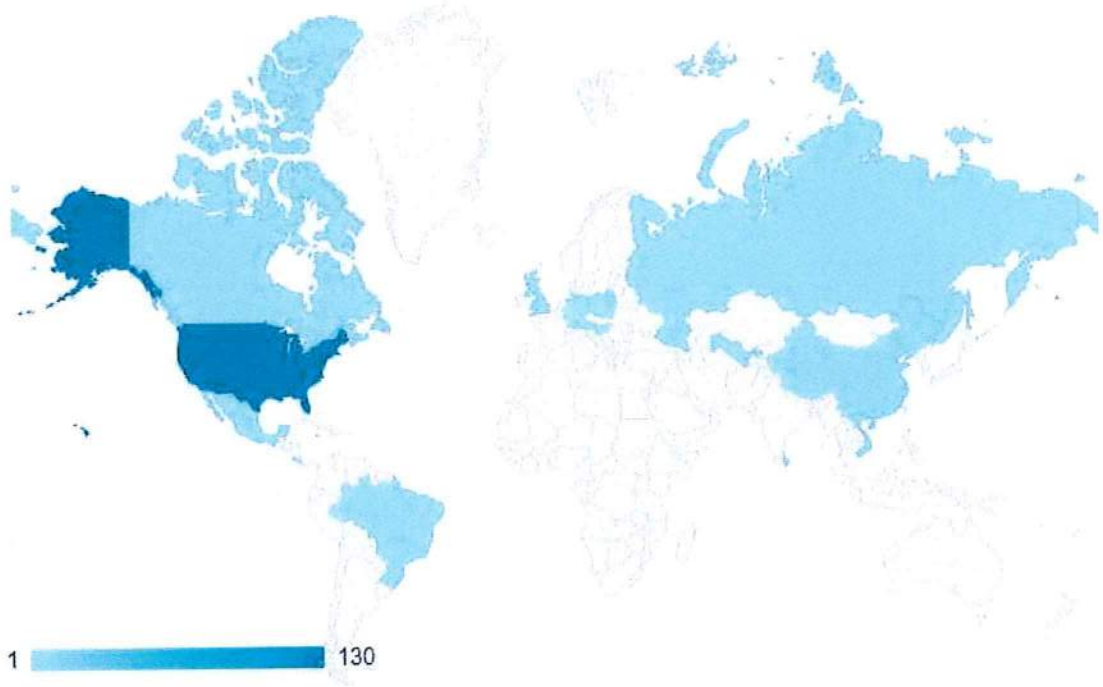
Of the 64 Network Locations listed, 7 had "college," "school," "university," or "education" in the name. They accounted for 11 sessions or 14% of total sessions.

Top 20 keywords/phrases based on average search engine ranking* include (based on position within Google search):

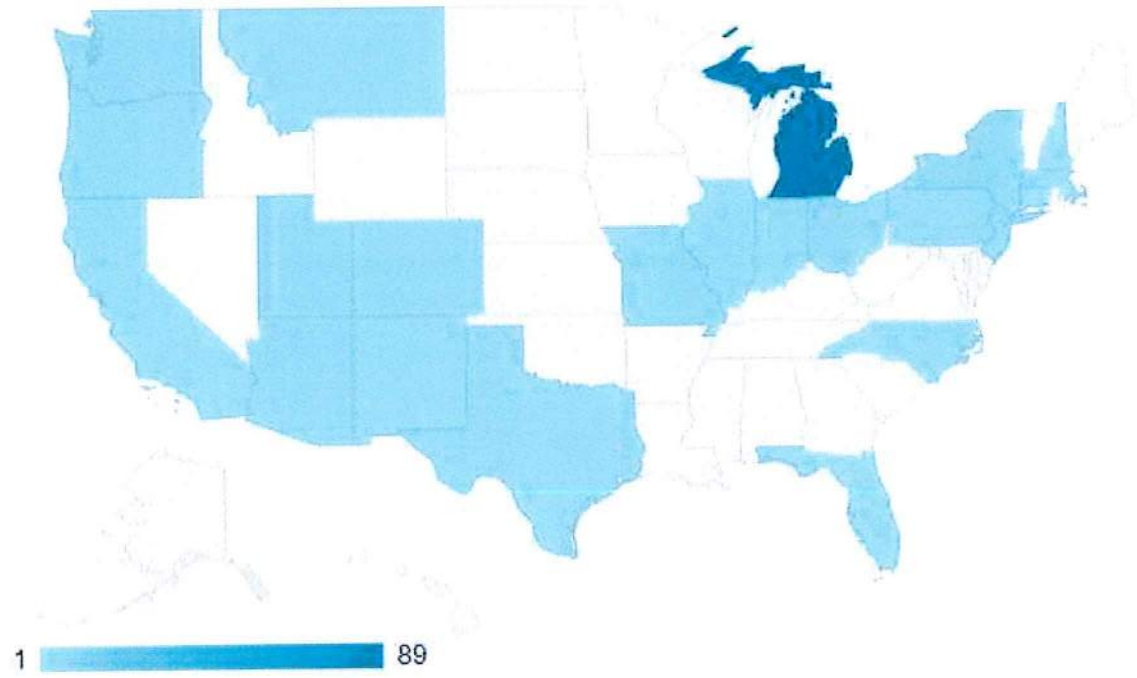
1. Water crossword puzzle answers (1.0)
2. Stab well (3.8)
3. Ccr Kalamazoo (4.0)
4. Protect your water (5.4)
5. Is Kalamazoo tap water safe to drink (6.0)
6. Stormwater (6.5)
7. Crossword puzzle on water (7.0)
8. Kalamazoo water treatment plant (7.5)
9. Water vocab (8.0)
10. Kalamazoo water quality (8.0)
11. Backflow protection Battle Creek MI (8.3)
12. Contaminated water (8.5)
13. Groundwater (8.5)
14. Water on earth from series water smart crossword puzzle #1 answer (8.7)
15. Tap water (8.7)
16. Water vocabulary(8.7)
17. Water crossword puzzle (9.0)
18. Groundwater vocabulary (9.0)
19. Vocabulary water (9.0)
20. Conserving water can save money while protecting the environment (9.0)

*Note: average search engine ranking is very challenging to define due to the localization of search engine results.

Traffic came from 18 countries, most from the U.S. The view below is by sessions.

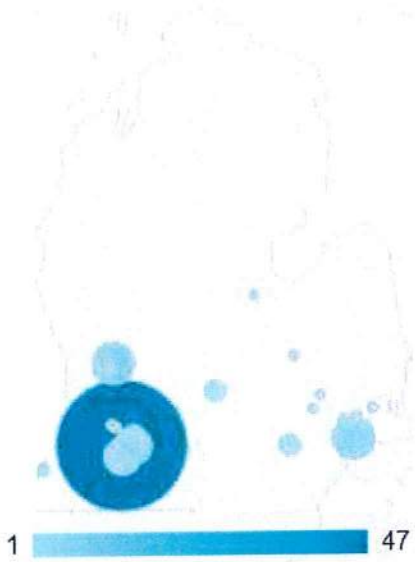


Within the United States, traffic came from 24 states; Michigan having the most (by sessions):



Top ten cities within Michigan by sessions:

- Kalamazoo (47)
- Grand Rapids (6)
- Detroit (5)
- Portage (4)
- Comstock Township (4)
- Ann Arbor (2)
- Lansing (2)
- Richland (2)
- Benton Harbor (1)
- Commerce Charter Township (1)

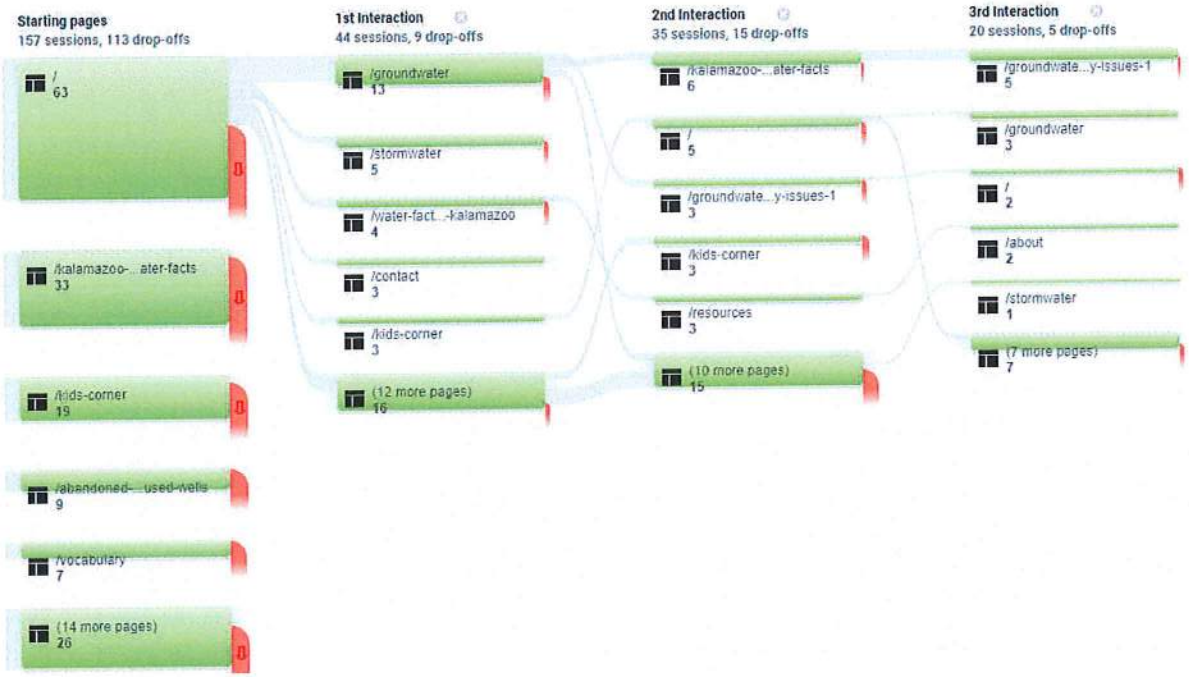


Content

The top pages based on pageviews and percentage of total pageviews are below. The homepage is topping the chart.

		341 % of Total: 100.00% (341)
1.	Home | Protect Your Water	**80** (23.46%)
2.	Kalamazoo Water Facts | Protect Your Water	**54** (15.84%)
3.	Kids Corner | Protect Your Water	**38** (11.14%)
4.	Groundwater | Protect Your Water	**25** (7.33%)
5.	About Protect Your Water / Wellhead Protection | Protect Your Water	**17** (4.99%)
6.	Stormwater | Protect Your Water	**16** (4.69%)
7.	Abandoned, Unused Wells | Protect Your Water	**15** (4.40%)
8.	Groundwater Quality Issues | Protect Your Water	**14** (4.11%)
9.	Resources | Protect Your Water	**12** (3.52%)
10.	Vocabulary | Protect Your Water	**12** (3.52%)

Visitors' flow from the source through their 3rd interaction are as follows. The forward slash represents the homepage.



The top 10 landing pages (by sessions) include:

	157 % of Total 100.00% (157)
Home | Protect Your Water	63 (40.13%)
Kalamazoo Water Facts | Protect Your Water	33 (21.02%)
Kids Corner | Protect Your Water	19 (12.10%)
Abandoned, Unused Wells | Protect Your Water	9 (5.73%)
Vocabulary | Protect Your Water	7 (4.46%)
Stormwater Regulations | Protect Your Water	5 (3.18%)
About Protect Your Water / Wellhead Protection | Protect Your Water	4 (2.55%)
Media | Protect Your Water	2 (1.27%)
Kits and Models | Protect Your Water	2 (1.27%)
Proper Disposal | Protect Your Water	2 (1.27%)

The top 10 exit pages by sessions) include:

	157 % of Total: 100.00% (157)
Home | Protect Your Water	39 (24.84%)
Kalamazoo Water Facts | Protect Your Water	32 (20.38%)
Kids Corner | Protect Your Water	20 (12.74%)
Abandoned, Unused Wells | Protect Your Water	9 (5.73%)
Vocabulary | Protect Your Water	7 (4.46%)
Groundwater | Protect Your Water	5 (3.18%)
Stormwater | Protect Your Water	5 (3.18%)
Groundwater Regulations | Protect Your Water	4 (2.55%)
Stormwater Regulations | Protect Your Water	4 (2.55%)
Kalamazoo Water Facts | Protect Your Water	4 (2.55%)

APPENDIX H

The 2017 Drinking Water Protection Survey of Kalamazoo County

!

Kercher Center for Social Research
Western Michigan University

August 2017

Prepared by:

Whitney DeCamp
Director, Kercher Center for Social Research
Western Michigan University

Ryan Castillo
Department of Sociology
Western Michigan University

Brian Lunn
Department of Sociology
Western Michigan University

" #

$%

The 2017 Drinking Water Protection Survey of Kalamazoo County was sent to a random sample of households in Kalamazoo County. This executive summary serves to highlight key findings generated from the responses.

& ! '

A strong majority (74%) of residents continue to be aware that groundwater is the source of drinking water in Kalamazoo County.

Most residents who believe that they know how rain and melting snow are handled identified a separate storm sewer as the system used (38%). However, more residents simply reported not knowing (43%).

Newspapers and local online news (36%), public water supply annual water quality reports (32%), and television (29%) serve as the most common sources of information about drinking water, groundwater, and other water resource matters in Kalamazoo County. The next most popular response indicated that the respondents had received no information from any source (25%).

('

About two-thirds (67%) of residents get their tap water from a public water supply system.

Among residents who have a private well, about half (49%) report having their well water tested periodically. However, only a small number (3%) do so at least annually.

The primary reasons for not testing well water are: confidence that the water is safe (44%), a belief that testing water is too much trouble (15%), and other concerns (41%).

No respondents (0%) reported that it was the cost of testing or concerns about results that kept them from testing their well water.

Write-in responses explaining the other concerns were mixed, but many of them indicate that the residents simply had not considered it before.

A small portion of residents (15%) used bottled water as their primary source of drinking water. The remaining residents were roughly split between drinking unfiltered tap water (44%) and drinking filtered tap water (40%).

In comparison to previous survey findings, improving taste (47%) and health concerns (30%) remain the top reasons for filtering tap water. However, improving clarity dropped (13% to 4%) and having another reason increased (13% to 18%). This change is statistically significant.

Many of the other reasons supplied through write-in responses suggest that filtering water is a matter of convenience or because filters were already built-in to the house or appliances. Given that filtering is inherently not more convenient than not filtering, it is possible that such responses also refer to a filter already being present.

A near two-thirds majority of residents (64%) report using all their medications/ supplements or disposing of them at a Red Med Box. About one-forth (26%) put them in their garbage, and only a small number (2%) reported flushing them.

For leftover household chemicals, most residents reported either taking them to a hazardous waste disposal center (72%) or never having to dispose of such products (18%). Most of the remaining residents (17%) reported putting them in the garbage.

Residents were roughly split between never applying fertilizer, pesticides, and/or herbicides to their lawns (38%) and doing so once or twice per year (39%). The remaining (22%) did so three or more times per year.

The vast majority of residents do not have an unused well or have properly plugged theirs (89%). Of the remaining, most report not knowing the answer (10%) and only a small number are aware of an unused and non-plugged well (1%).

) #'

Despite concerns about lead in drinking water in Michigan and nationally, Kalamazoo County residents tended to agree that their drinking water is safe, with 74% agreeing and only 12% disagreeing. Importantly, this is not a significant change since the 2012 survey, indicating that the water crisis in Flint has not negatively affected opinions about the safety of Kalamazoo County water.

A plurality of residents (43%) agreed with the statement that elevated iron and/or hardness in drinking water is a health concern. Nearly one-third (33%) felt neutral about the statement and one-fourth (25%) disagreed.

The vast majority of residents (90%) agreed that pollutants from streets, parking lots, and other impervious surfaces can negatively affect the water quality of rivers, lakes, or groundwater. Only a small number of residents (2%) disagreed.

Fluoridation continues to receive strong support, with most residents agreeing that fluoride should continue to be added to drinking water (70%) or feeling neutral about it (18%).

When asked explicitly about lead, most residents (52%) did not have an opinion about whether the City of Kalamazoo is making an acceptable effort to address concerns. Most of the remaining responses (36%) were agreement that the City is making an acceptable effort.

A slight majority of residents (54%) reported being neutral on the statement that industrial and commercial businesses in Kalamazoo County are making an acceptable effort to protect our water resources. The remaining responses were nearly split between agreeing (26%) and disagreeing (20%), with agreement having a slight edge.

Similarly, the most common response to the statement that local governments are making an acceptable effort to protect groundwater was feeling neutral (46%). However, most of

the remaining responses were agreement (40%), with only a small minority disagreeing (14%).

Another related statement concerned whether local governments are making an acceptable effort to protect surface water through stormwater management. Residents were largely split between agreement (44%) and feeling neutral (43%). The remaining residents (13%) disagreed.

This represents a significant change since 2012, when agreement was slightly higher in categorical responses (48%) and disagreement was also higher (20%).

The mean has remained stable at around 3.3, which indicates that this is a move toward neutrality rather than a shift toward agreement or disagreement.

Residents report being eager to become better informed (76%), supporting ordinances addressing water quality (82%), and taking actions to conserve water (78%).

* '

The full details of the methodology, sample, and results are reported in the following sections. In addition to more statistical information relating to the above findings, the results also include all write-in responses and comments provided by participants. The comments provided for the two final prompts (“how do you feel about the safety of the drinking water in Kalamazoo County?” and “we welcome your comments and suggestions about the water resources of Kalamazoo County, including any concerns that you might have about the drinking water”) are particularly detailed, including a wide variety of thoughts, opinions, criticisms, and suggestions. Given the diversity of these comments, it would be impossible to adequately summarize them, so they are included in-full at the conclusion of this report.

+ ! !

A questionnaire was designed through collaboration between the Kercher Center for Social Research and the City of Kalamazoo Wellhead Protection Committee. The instrument from the most recent Drinking Water Protection Survey was used as a base model, and changes made were based on recommendations from the committee and an analysis of responses in the previous survey. In June 2017, the questionnaire was sent to a random sample of 2,000 Kalamazoo County households. Each was addressed to a specific adult occupant, with “or current resident” added below that name. Over the following six weeks, a total of 308 surveys were returned by respondents. The response rate was 15.4 percent and, although slightly lower than typical for previous surveys of this area, is within normal ranges for mailed questionnaires to general audiences. This report summarizes the findings of the study.

Age of Participants	Number	Percent	Percent in 2012	Percent in 2006
18-24	2	0.7	---	
25-34	23	7.6		
18-35	---		13.9	10.1
35-49	54	17.8	---	
50-64	108	35.6		
36-64	---		51.2	59.8
65 or Older	116	38.3	34.8	30.2
Total Valid	303		445	338
Missing	5		4	12

The majority of respondents were over the age of 50, with those between the ages of 50 and 64 (36 percent) and those 65 or older (38 percent) representing similarly sized groups of participants. They were followed by ages 35-49 (18 percent) and then 25-34 (8 percent). Less than one percent of the participants were college-aged young adults. This distribution is slightly higher than what would typically be expected for Kalamazoo County. The 2010 Census would expect only about 16 percent of the population to be over age 65. The years since that time may result in some aging of the population, but this sample is slightly skewed towards an older age, as is common with mail-based surveys.

In addition, 99 percent of respondents had a high school degree or higher compared to 93 percent in the county according to the 2010 Census. Further, 58 percent reported a college degree or higher compared to 35 percent in the Census. Thus, the sample is slightly more educated than the population. This discrepancy is also common with mail-based surveys. Importantly persons with less than a four-year college degree are still represented in the sample (42 percent).

Although many areas in Kalamazoo County were represented in this sample, the most commonly reported ZIP codes were 49009 (16 percent), 49024 (11 percent), and various other ZIP codes representing areas covered by the Kalamazoo post office.

The 2017 sample is statistically similar to that of the 2012 survey.

"

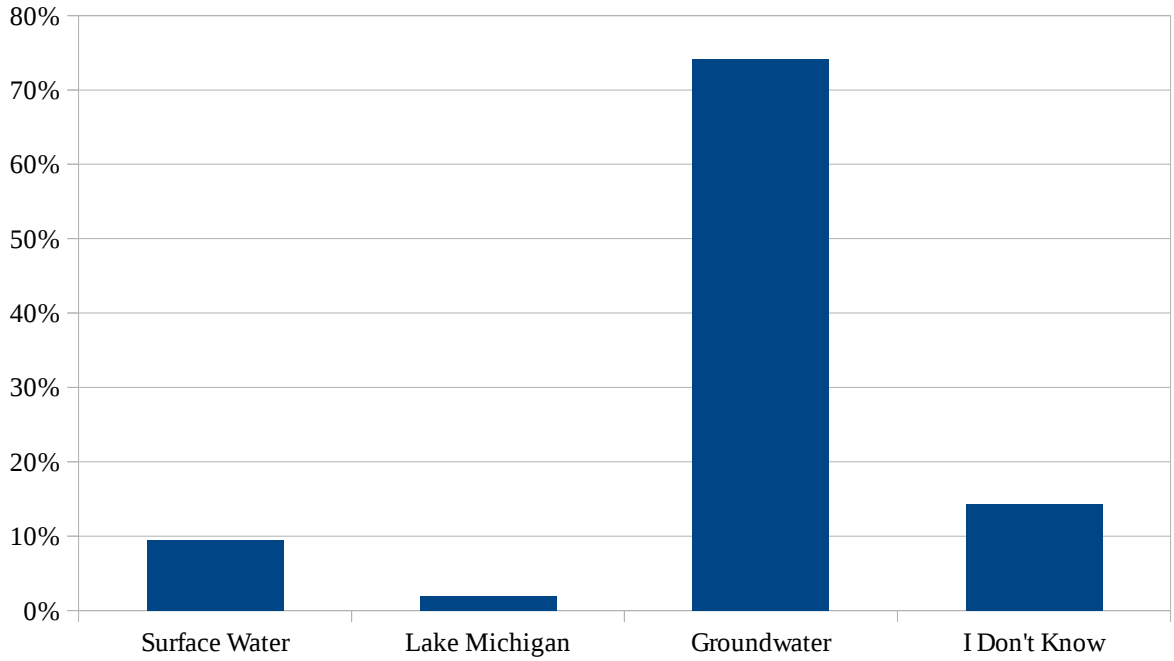
Education Level of Participants	Number	Percent	Percent in 2012	Percent in 2006
Less than high school	2	0.7	1.3	1.5
High school diploma or GED	25	8.3	15.0	13.9
Some college, vocational training, or Associate Degree	98	32.5	30.3	29.9
Four-year college degree (e.g., B.A., B.S.)	87	28.8	30.5	32.2
Master's, doctoral, or professional degree (e.g., M.A., M.D., J.D., Ph.D.)	90	29.8	22.9	22.4
Total Valid	302		446	388
Missing	6		3	12

ZIP Code of Participants	Number	Percent	Percent in 2012	Percent in 2006
49001 - Kalamazoo	30	9.9	7.3	8.8
49002 - Portage	24	7.9	7.9	8.8
49004 - Kalamazoo	23	7.6	7.0	8.5
49006 - Kalamazoo	25	8.3	8.8	7.7
49007 - Kalamazoo	4	1.3	3.4	2.1
49008 - Kalamazoo	23	7.6	5.0	6.7
49009 - Kalamazoo	48	15.9	16.8	20.1
49012 - Augusta	9	3.0	2.0	1.0
49024 - Portage	34	11.3	14.1	9.8
49034 - Climax	1	.3	1.1	.8
49048 - Kalamazoo	21	7.0	9.1	10.8
49052 - Fulton	1	.3	2.0	1.3
49053 - Galesburg	7	2.3	.7	.3
49060 - Hickory Corners	1	.3	1.1	1.5
49071 - Mattawan	3	1.0	.2	.3
49080 - Plainwell	4	1.3	.5	1.3
49083 - Richland	9	3.0	.2	.0
49087 - Schoolcraft	7	2.3	2.7	3.1
49088 - Scotts	8	2.6	2.9	2.1
49097 - Vicksburg	18	6.0	1.4	1.5
Total Valid	302		441	388
Missing	8		8	12

Note: Names associated with ZIP codes represent post offices, but not necessarily addressee location. For example, Mattawan is located outside Kalamazoo County, but the Mattawan ZIP code does include some addresses in Kalamazoo County. Households were selected using county information - not merely ZIP codes - to ensure households were located within Kalamazoo County.

# #

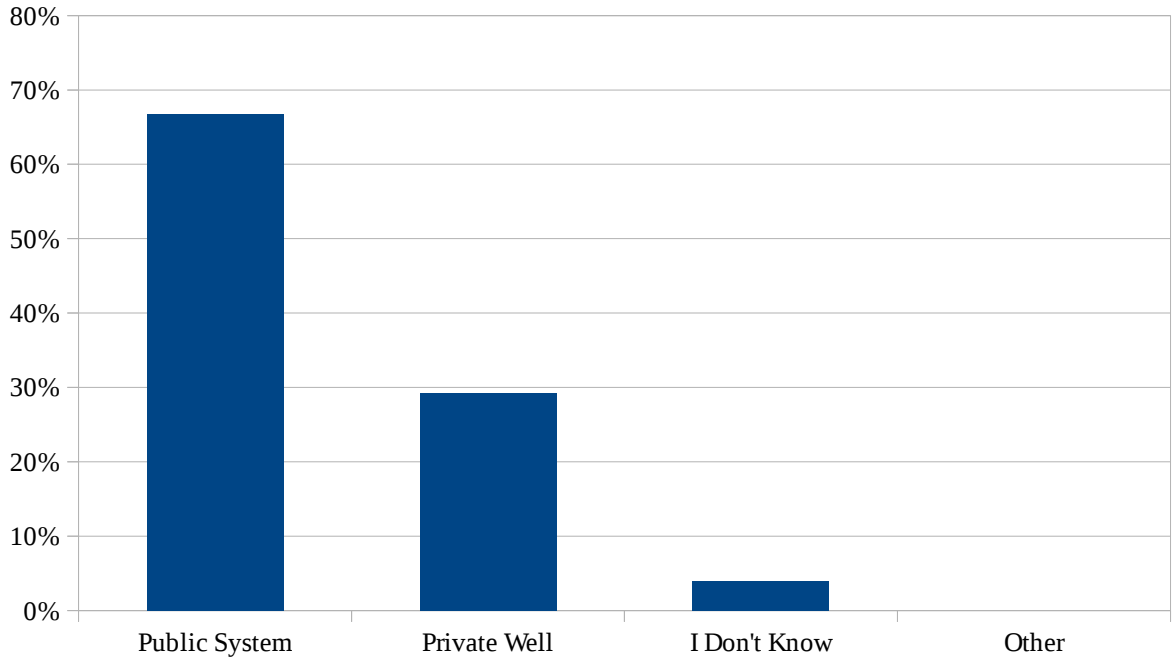
! "



	2017		2012		2006	
	Number	Percent	Number	Percent	Number	Percent
Lakes, rivers, and streams in the County	28	9.5	43	9.9	27	6.9
Lake Michigan	6	2.0	11	2.5	13	3.3
Groundwater	218	74.1	329	75.8	282	72.5
I don’t know	42	14.3	51	11.8	67	17.2
Total Valid	294		434		389	
Missing	14		15		11	

Year-to-year difference (2017 vs. 2012) is statistically significant (p > .05)

#
"



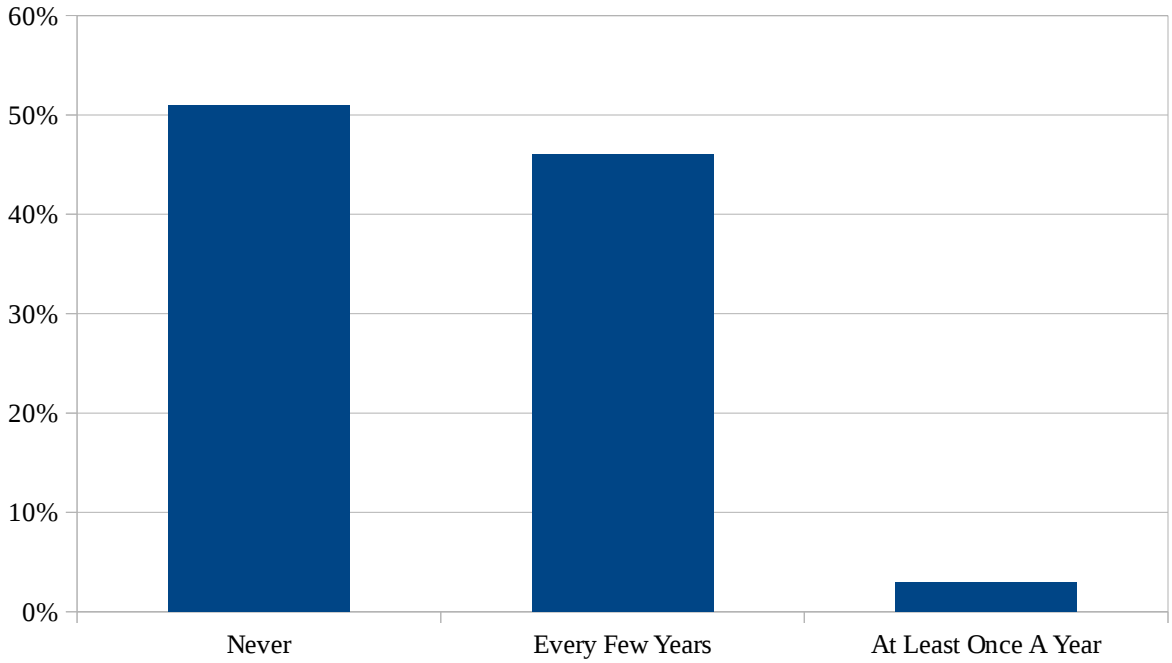
	2017		2012		2006	
	Number	Percent	Number	Percent	Number	Percent
By a public water supply system	205	66.8	295	66.3	267	67.1
By a private well	90	29.3	126	28.3	117	29.4
I don’t know	12	3.9	23	5.1	14	3.5
Other (Asked 2006-2012)	--	--	1	.2	0.0	0.0
Total	307		445		398	
Missing	1		4		2	

Year-to-year difference (2017 vs. 2012) is statistically significant (p > .05)

$

$

% & ' & "

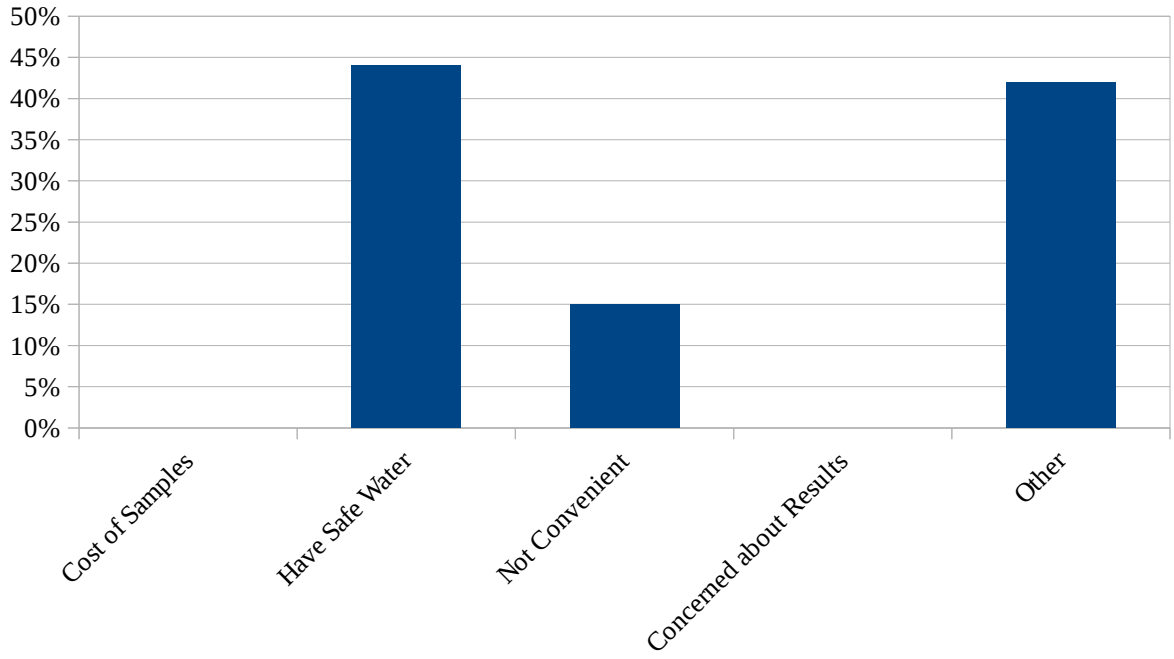


	2017		2012		2006	
	Number	Percent	Number	Percent	Number	Percent
Never	45	50.6	53	43.1	50	43.1
Every few years	41	46.1	65	52.8	57	49.1
At least once a year	3	3.4	5	1.1	9	7.8
Total Valid	89		123		116	
N/A (I don’t have a well)	217		320		279	
Missing	2		6		5	

Year-to-year difference (2017 vs. 2012) is statistically significant (p > .05)

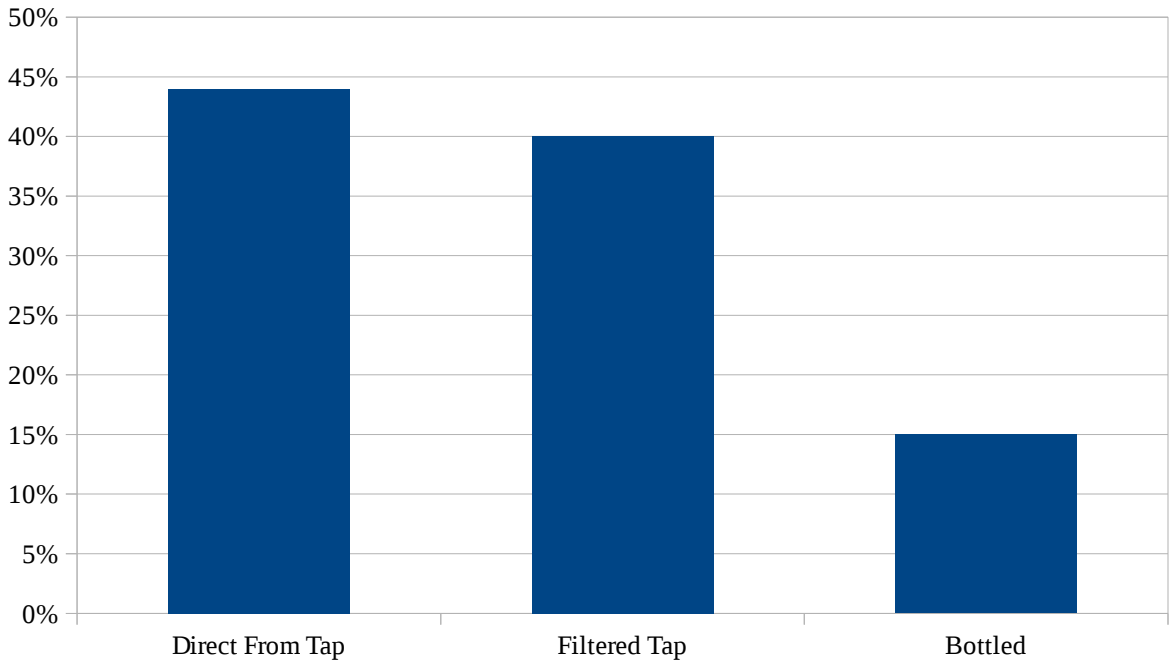
(

%) & * + $' & & "



	2017		2012	
	Number	Percent	Number	Percent
Cost of samples	0	0.0	5	9.4
Have safe water—not necessary	18	43.9	14	26.4
Not convenient—too much trouble	6	14.6	9	17.0
Concerned about the results and consequences	0	0.0	0	0.0
Other	17	41.5	25	47.2
Total Valid	41		53	
N/A	263		390	
Missing	4		6	

Year-to-year difference (2017 vs. 2012) is statistically significant (p > .05)

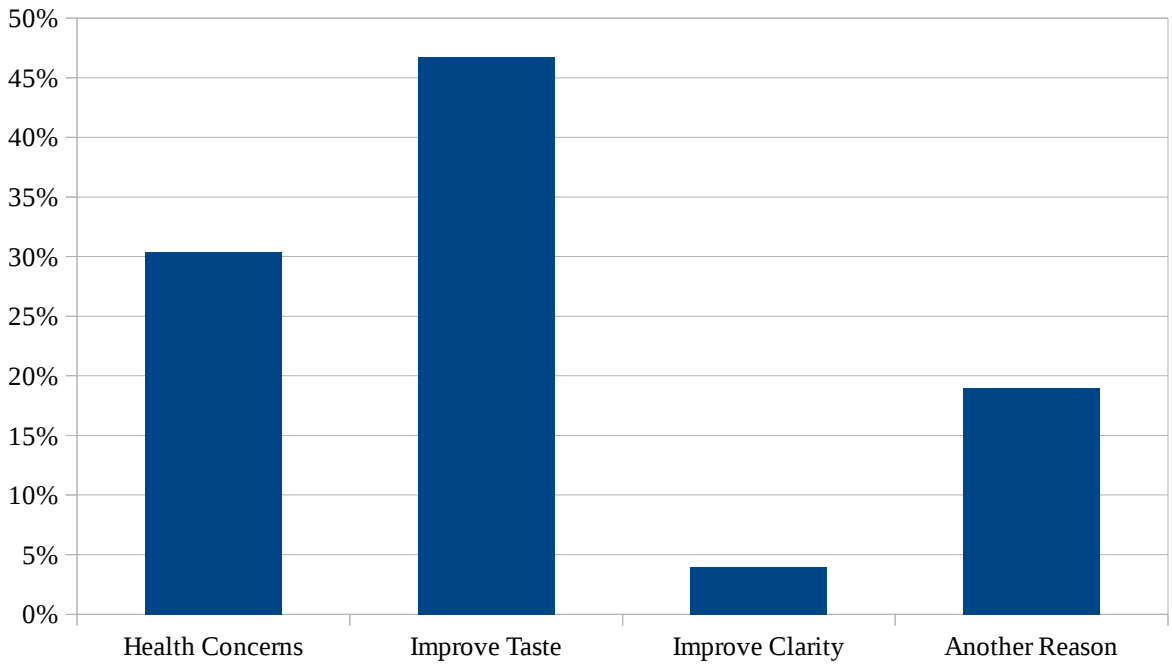


	2017		2012		2006	
	Number	Percent	Number	Percent	Number	Percent
Straight from the tap	132	44.4	198	45.1	198	51.8
Filtered tap water	120	40.4	168	38.3	117	30.6
Bottled water	45	15.2	73	16.6	67	17.5
Total	297		439		382	
Missing	11		10		5	

Year-to-year difference (2017 vs. 2012) is statistically significant (p > .05)

0

1 "

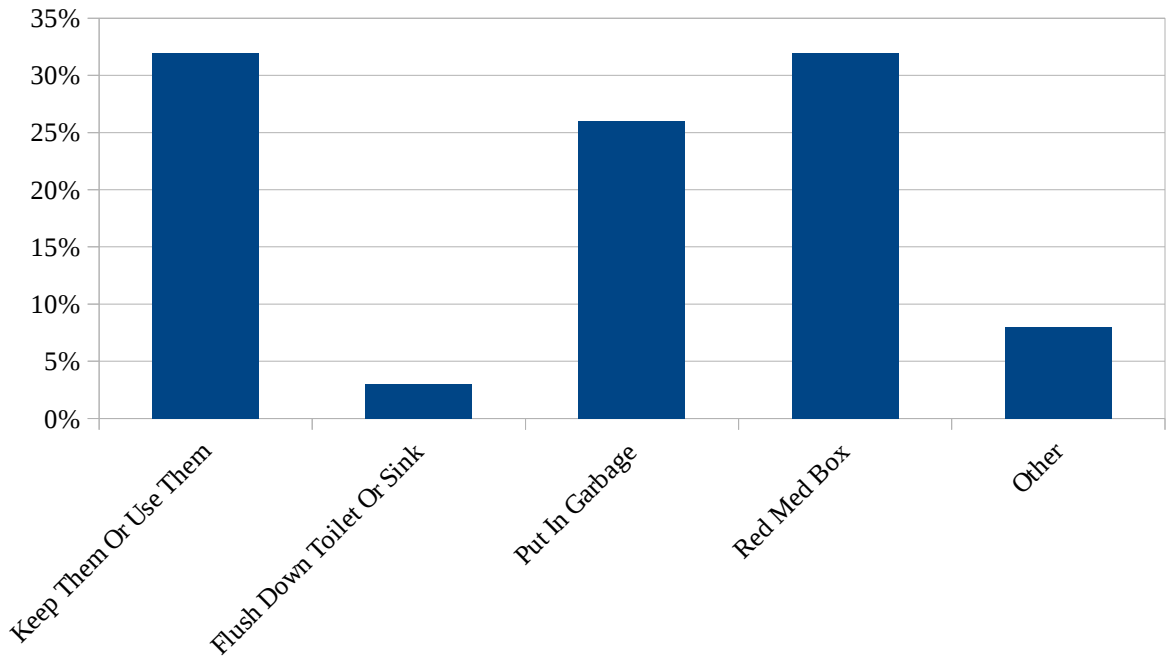


	2017		2012		2006	
	Number	Percent	Number	Percent	Number	Percent
Because of health concerns	41	30.4	67	30.0	46	22.5
To improve taste	63	46.7	99	44.4	82	40.2
To improve clarity	6	4.4	29	13.0	16	7.8
For another reason	25	18.5	28	12.6	60	29.4
Total	135		223		204	
N/A (primary water is straight from tap)	132		198			
Missing	41		28			

2 3 3 .#4 5 & 6 #4 #/ . 7 64,/

5

' & ' "

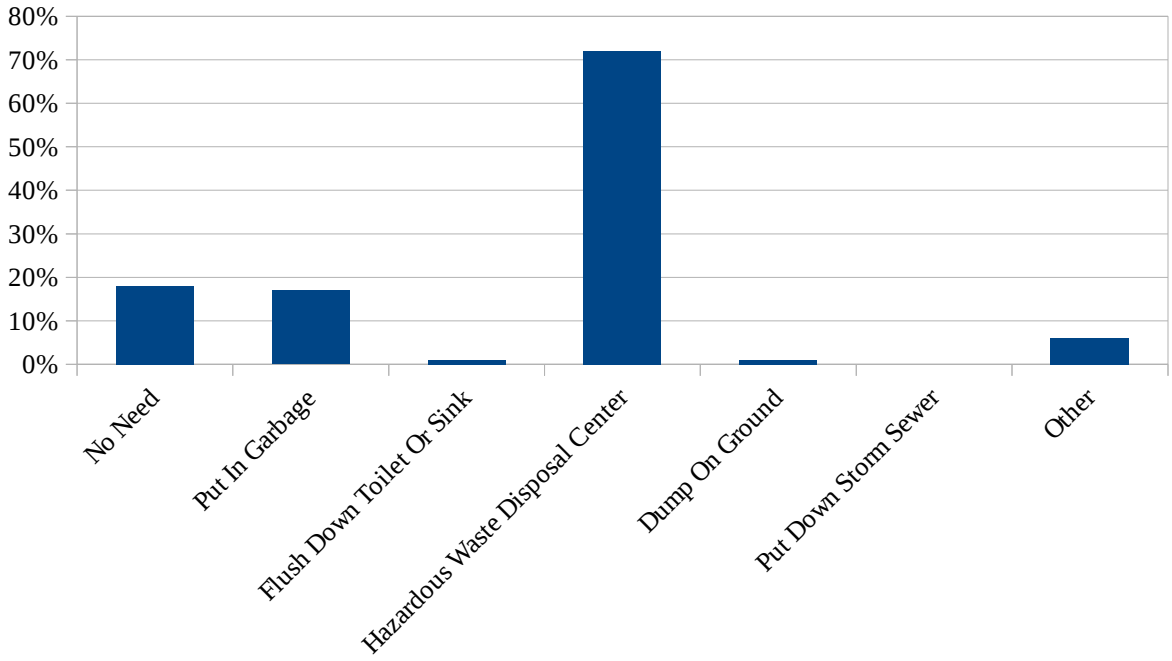


	2017		2012	
	Number	Percent	Number	Percent
Keep them or use them all	91	32.4	(Not Asked)	
Flush them down the toilet or sink	7	2.5	28	6.3
Put in garbage	73	26.0	209	46.8
Dispose of them at a Red Med Box	89	31.7	95	21.3
Other	21	7.5	118	26.4
Total	281		447	
Missing	27		2	

8

&

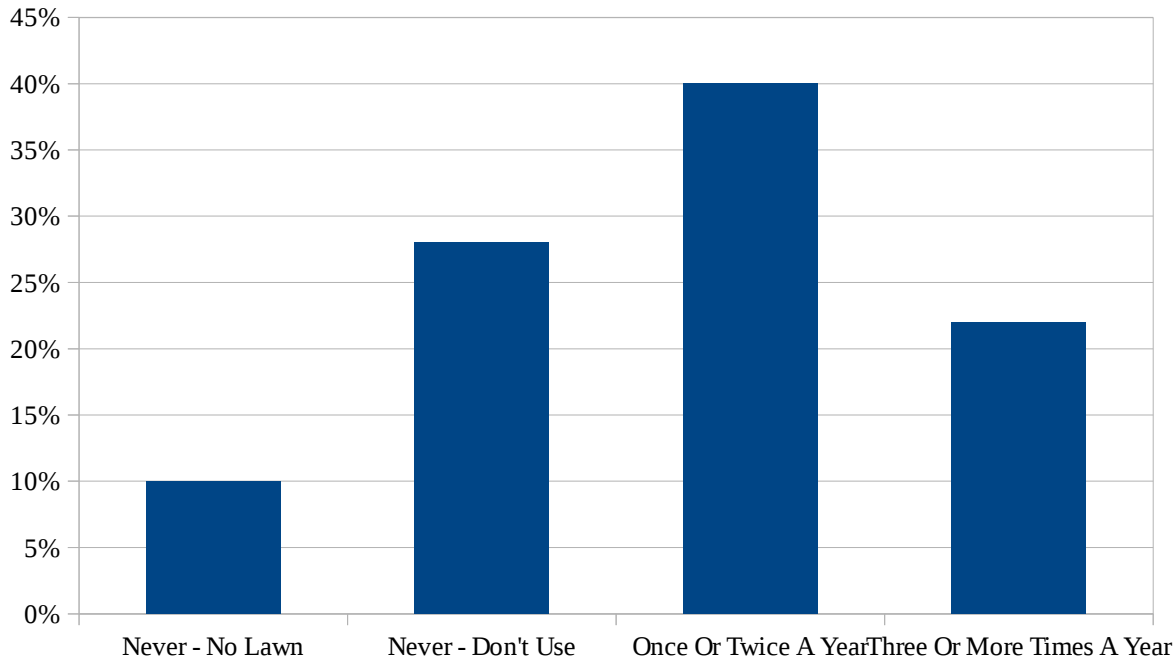
1 ' " .9 6/



	2017		2012		2006	
	Number	Percent	Number	Percent	Number	Percent
I never have a need to dispose of these products	54	17.8	150	33.8	116	29.0
Put them in the garbage	50	16.5	56	12.6	78	19.5
Flush them down the toilet or sink	2	0.7	3	0.7	7	1.8
Take them to a hazardous waste disposal center	219	72.3	(Not Asked)		(Not Asked)	
Dump them on the ground	3	1.0	3	0.7	2	0.5
Put them down the storm sewer	0	0.0	4	0.9	3	0.8
Other	17	5.6	251	56.5	214	53.5
Missing	5					

!

:
' '
; 1 . & / "



	2017		2012		2006	
	Number	Percent	Number	Percent	Number	Percent
Never—I do not have a lawn	31	10.3	124	32.4	96	27.3
Never—I do not use them	85	28.2				
Once or twice a year	119	39.5	171	44.6	153	43.6
Three or more times a year	66	21.9	88	23.0	102	29.0
Total	301		383		351	
Missing	7		66		49	

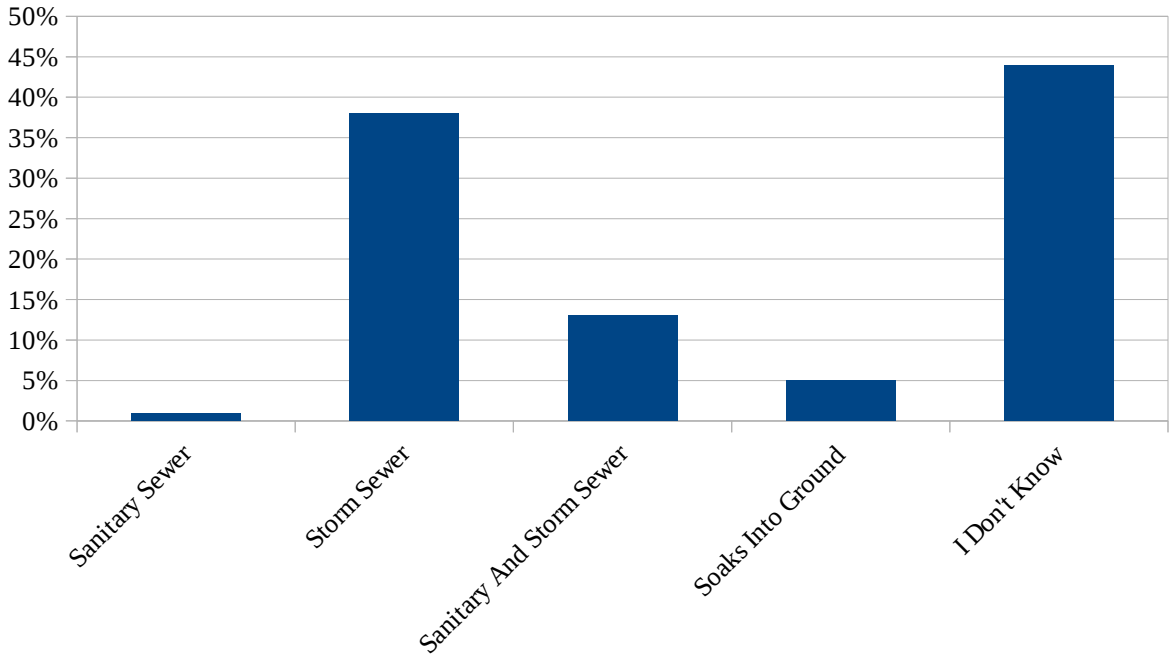
Year-to-year difference (2017 vs. 2012) is statistically significant (p > .05)

"

4

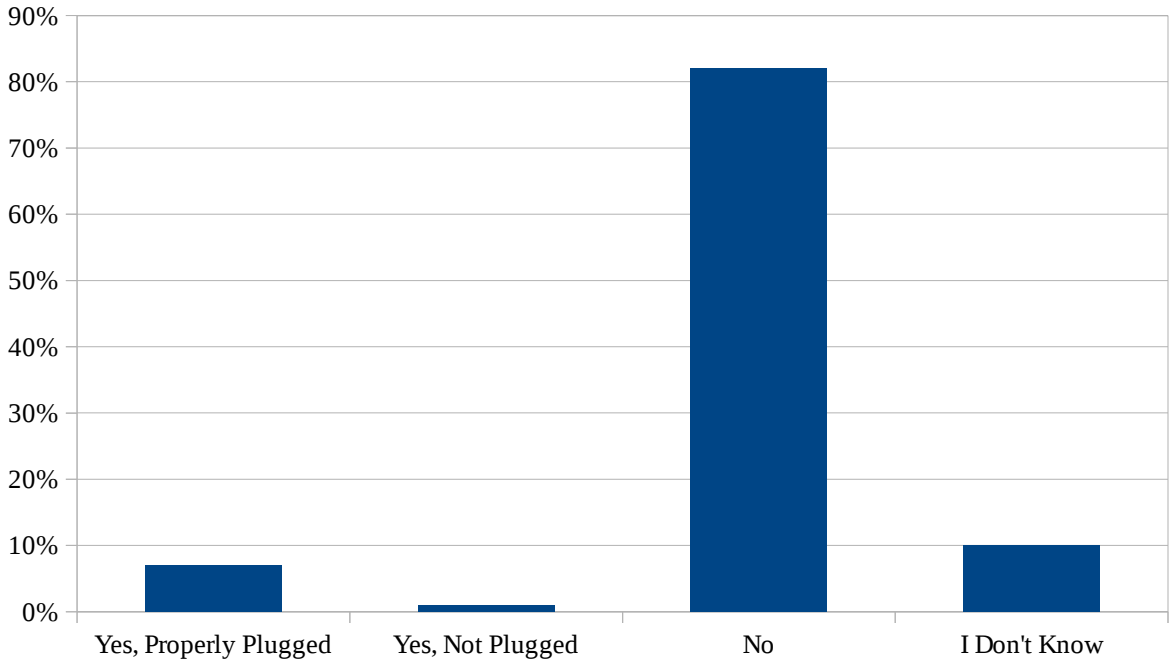
!

' & ' & "



	2017	
	Number	Percent
Sanitary sewer	2	0.7
Separate storm sewer	111	37.8
Combined sanitary and storm sewer	39	13.3
It all soaks into the ground	14	4.8
I don’t know	128	43.5
Total	294	
Missing	14	

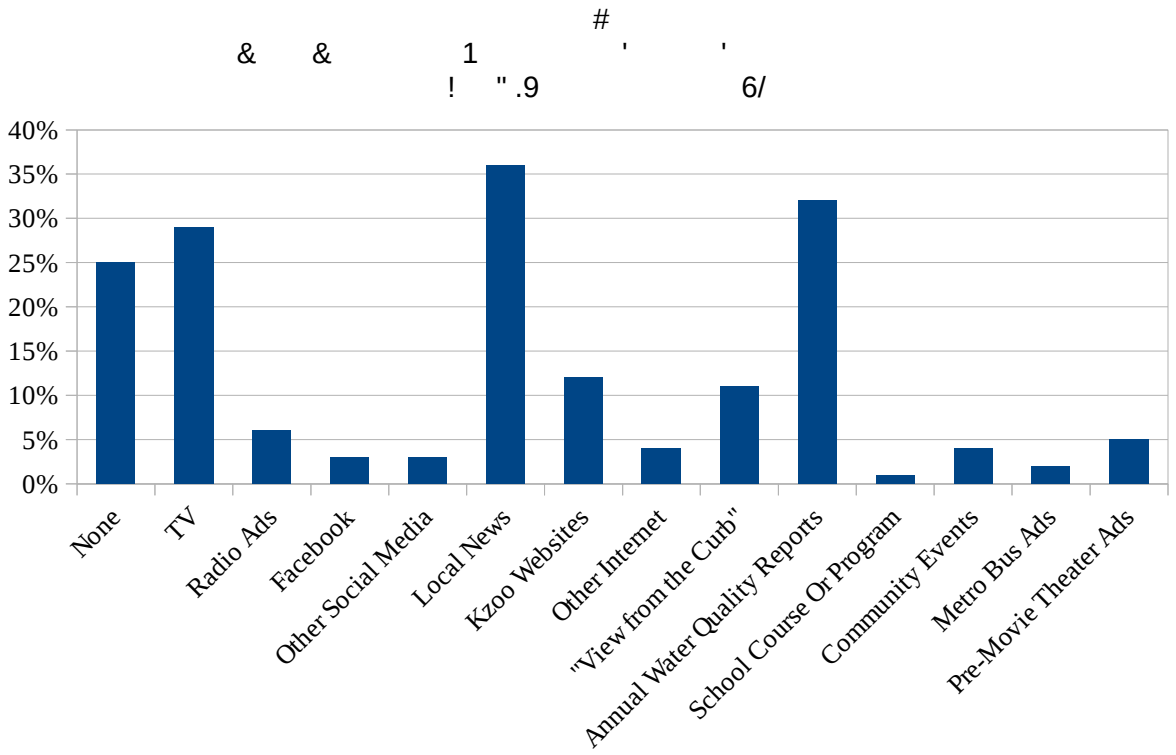
< & ; 1 . / "



	2017		2012	
	Number	Percent	Number	Percent
Yes, and it is properly plugged with bentonite/cement	22	7.4	27	6.1
Yes, but it is not plugged	3	1.0	13	2.9
No	244	81.9	346	77.9
I don’t know	29	9.7	58	13.1
Total	298		444	
Missing	10		5	

Year-to-year difference (2017 vs. 2012) is statistically significant (p > .05)

#

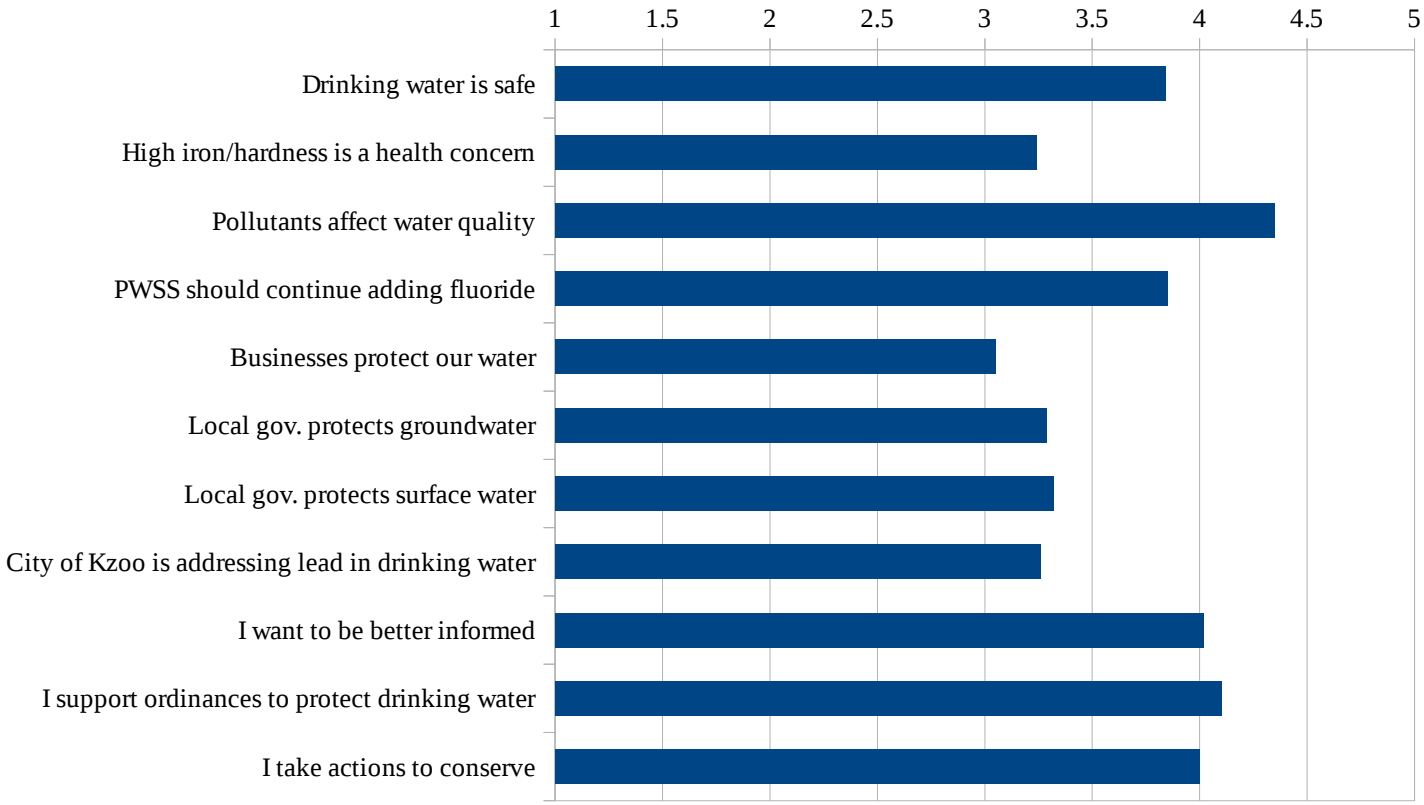


	2017		2012		2006	
	Number	Percent	Number	Percent	Number	Percent
None	76	25.4	101	22.6	67	16.8
TV	87	29.1	200	44.8	188	47.0
Radio Ads	18	6.0	(Not Asked)		(Not Asked)	
Facebook	9	3.0	(Not Asked)		(Not Asked)	
Other social media source(s)	8	2.7	(Not Asked)		(Not Asked)	
Newspaper or local news online	107	35.8	167	37.4	(Not Asked)	
Kalamazoo City or County Websites	36	12.0	49	44.0	(Not Asked)	
Other Internet source(s)	11	3.7	(Not Asked)		(Not Asked)	
“View from the Curb” Newsletter	34	11.4	(Not Asked)		(Not Asked)	
Public water supply annual water quality reports	97	32.4	153	34.3	179	44.8
School courses or programs	3	1.0	20	4.5	29	7.3
At county fairs, festivals, or other community events	13	4.3	33	7.4	37	9.3
Metro bus ads	6	2.0	7	1.6	(Not Asked)	
Pre-movie theater trailer	15	5.0	33	8.5	(Not Asked)	
Total Valid	299					
Missing	9					

$ #$

Participants were asked whether they agree or disagree with each of a series of statements. In this chart, the larger the number, the more agreement there was with the statement. See the pages that follow for the full statement wording and results.

-& . / +



$ #$.! /

	2017		2012		2006	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
13) I think that my drinking water is safe.	3.84	.999	3.80	.956	3.79	.967
14) I think that elevated iron and/or hardness in drinking water is a concern.	3.27	1.095	(Not Asked)		(Not Asked)	
15) I think pollutants (such as auto fluids, grass clippings, or leaves) from streets, parking lots, and other impervious surfaces can negatively affect the water quality of rivers, lakes, or groundwater.	4.36	.723	(Not Asked)		(Not Asked)	
16) Public Water Supply Systems should continue its practice of adding fluoride to its drinking water system for dental benefits (Kalamazoo City has added fluoride since 1951).	3.85	1.093	3.90	1.267	3.90	1.026
17) Industrial and commercial businesses in Kalamazoo County are making an acceptable effort to protect our water resources.	3.05	.847	3.11	.698	2.97	.721
18) My governments are making an acceptable effort to protect groundwater.	3.29	.902	3.33	.832	3.24	.805
19) My governments are making an acceptable effort to protect our surface water (lakes, streams and Kalamazoo River) by stormwater management, etc.	3.32	.887	3.26	.996	(Not Asked)	
20) I think the City of Kalamazoo is making an acceptable effort to address the concern of lead in drinking water.	3.26	.841	(Not Asked)		(Not Asked)	
21) I want to be better informed about water resources in Kalamazoo County.	4.02	.761	3.91	.747	3.97	.658
22) I support ordinances that continue to give government authority to protect the quality of our drinking water.	4.10	.790	4.01	.956	4.03	1.040
23) I take actions to conserve water in my daily life.	4.00	.810	4.10	.766	(Not Asked)	

$
<
"
%
6

	2017		2012		2006	
	Number	Percent	Number	Percent	Number	Percent
Strongly Agree	77	25.0	93	21.1	83	21.4
Agree	152	49.4	237	53.7	197	50.9
Neutral	43	14.0	60	13.6	60	15.5
Disagree	26	8.4	38	8.2	35	9.0
Strongly Disagree	10	3.2	15	3.4	12	3.1
Total Valid	308		441		387	
Missing	0		8		13	

Year-to-year difference (2017 vs. 2012) is statistically significant (p > .05)

(
<
"
% & ; 6

	2017	
	Number	Percent
Strongly Agree	45	14.7
Agree	86	28.0
Neutral	100	32.6
Disagree	60	19.5
Strongly Disagree	16	5.2
Total Valid	307	
Missing	1	

,
<
"
% . ' ' & / ' '
& & + & ' ' 6

	2017	
	Number	Percent
Strongly Agree	146	47.4
Agree	132	42.9
Neutral	24	7.8
Disagree	5	1.6
Strongly Disagree	1	0.3
Total Valid	308	
Missing	0	

0
<
"
9 1
1 . ! :, /6

	2017		2012		2006	
	Number	Percent	Number	Percent	Number	Percent
Strongly Agree	97	31.7	158	36.1	116	30.4
Agree	118	38.6	152	34.7	155	40.7
Neutral	55	18.0	79	18.0	79	20.7
Disagree	21	6.9	24	5.5	16	4.2
Strongly Disagree	15	4.9	25	5.7	15	3.9
Total Valid	306		438		381	
Missing	2		11		19	

Year-to-year difference (2017 vs. 2012) is statistically significant (p > .05)

5

<

"

% 1 !

1 6

	2017		2012		2006	
	Number	Percent	Number	Percent	Number	Percent
Strongly Agree	12	3.9	16	3.7	12	3.2
Agree	67	22.0	113	25.9	76	20.3
Neutral	164	53.8	218	49.9	195	52.0
Disagree	48	15.7	67	15.3	74	18.7
Strongly Disagree	14	4.6	23	5.3	18	4.8
Total Valid	305		437		375	
Missing	3		12		25	

Year-to-year difference (2017 vs. 2012) is statistically significant (p > .05)

8

<

"

= & 1 6

	2017		2012		2006	
	Number	Percent	Number	Percent	Number	Percent
Strongly Agree	21	6.9	25	5.7	20	5.3
Agree	102	33.6	181	41.5	135	35.7
Neutral	140	46.1	160	36.7	154	40.7
Disagree	26	8.6	51	11.7	55	14.6
Strongly Disagree	15	4.9	19	4.4	14	3.7
Total Valid	304		436		378	
Missing	4		13		22	

Year-to-year difference (2017 vs. 2012) is statistically significant (p > .05)

:

< "

= & 1

. ' > & / 1 ' 6

	2017		2012	
	Number	Percent	Number	Percent
Strongly Agree	19	6.3	23	5.3
Agree	114	37.5	188	43.2
Neutral	130	42.8	135	31.0
Disagree	28	9.2	58	13.3
Strongly Disagree	13	4.3	31	7.1
Total Valid	304		435	
Missing	4		14	

2 3 3 .#4 5 & 6 #4 #/ . 7 64,/

#4

< "

% ! 1

6

	2017	
	Number	Percent
Strongly Agree	18	6.0
Agree	90	30.0
Neutral	155	51.7
Disagree	26	8.7
Strongly Disagree	11	3.7
Total Valid	300	
Missing	8	

!

#

<

"

% 1 1 1 ! 6

	2017		2012		2006	
	Number	Percent	Number	Percent	Number	Percent
Strongly Agree	85	27.9	118	26.9	100	26.2
Agree	146	47.9	185	42.1	185	48.4
Neutral	70	23.0	117	26.7	84	22.0
Disagree	3	1.0	15	3.4	10	2.6
Strongly Disagree	1	0.3	4	0.9	3	0.8
Total Valid	305		439		382	
Missing	3		10		18	

Year-to-year difference (2017 vs. 2012) is statistically significant (p > .05)

##

<

"

% & &

+ 6

	2017	
	Number	Percent
Strongly Agree	97	31.8
Agree	154	50.5
Neutral	45	14.8
Disagree	6	2.0
Strongly Disagree	3	1.0
Total Valid	305	
Missing	3	

"

#$

<

"

%

&

6

	2017		2012	
	Number	Percent	Number	Percent
Strongly Agree	82	26.8	160	36.2
Agree	157	51.3	193	43.7
Neutral	55	18.0	68	15.4
Disagree	9	2.9	15	3.4
Strongly Disagree	3	1.0	6	1.4
Total Valid	306		442	
Missing	2		7	

Year-to-year difference (2017 vs. 2012) is statistically significant (p > .05)

, # ## ! #

"3? 91 63% '

"

Frequency	Response
1	North Drake Road area
1	CHY
2	Kalamazoo
1	Kalamazoo County
1	Not sure
1	AZO
5	City
2	City Kalamazoo
1	City of Galesburg
1	City of K
14	City of Kalamazoo
4	City of Kzoo
4	City of Portage
2	Comstock
1	Cork Street East
1	Don't know
1	East
35	Kalamazoo
18	Kalamazoo City
2	Kalamazoo County
1	Kalamazoo Groundwater
1	Kalamazoo Treasury
1	Kalamazoo Water Department
1	Kalamazoo/Portage
4	Kazoo
5	Kzoo
1	Kzoo City
1	Kzoo Township
2	Not sure
1	Oshtemo/Kalamazoo
1	Oshtemo/Texas Township
7	Parchment
24	Portage
2	Portage City
1	Portage City Water
1	Portage-Kalamazoo
1	Richland
1	Schoolcraft
1	Unsure
6	Vicksburg

#

After new well was dug, water was tested, treated, then approved
Aquifer is tested by municipality
Assume it's OK?
Didn't know we needed it
Don't know how
Don't know where to have tested
Had it tested around 2003 and it was fine.
I don't worry about it
I live in an apartment complex
Just moved in last year
Never thought about it
Never thought about it!
Never thought I needed to.
Out of mind
Passed 4 years ago
Rental apartment
Tested when punched well - never checked since
Was approved when well was installed 10 yrs ago

All of the above
Chilled
Convenience
Convenience
Convenience and safety
Convenience mostly and greater taste
Cooler in refrigerator
Don't use filter
Ease for sports/ [large] groups lunches (faucets [at] outdoor places questionable).
Ease of use
Excessive pesticides, maximum manure, herbicides, nitrates, nitrides, hydrogen sulfide, [illegible] and e. coli. [Names withheld], fungicides, turbidity, road spray Kzoo County
Handy - convenient to travel with
I drink more water that way
I rarely filter, but if I do it is for taste
In our area we have a lot of [lime] and rust and [iron] in water
Iron is high
It came with our house
It is colder from the [refrigerator] dispenser
It's there and is furnished by condo [associates]
My water smells like bleach
My wife buys it but I have no concerns about the city wellfield water.

No good reason
Possibility of something bad
Refrigerator comes with filter water
Refrigerator dispenses filtered water
Removal of chlorine, etc.
Remove excess minerals
Rust/particle control; two inline whole house filters, Smicron, 20 micron
Salt in water from water softener
The water is usually yellow tinted and sometimes brown even
This water is filthy
Water from tap is orange
Yellow color, smell

' & ' " 3 6
9

Ask pharmacy
At Doctor's office/medical waste
Dispose in coffee grounds and put in garbage
Do not have prescriptions, use supplements
Don't have any
Drop into paint [and] let it harden, then to hazardous waste collection
Give to VA
Have not had to do so yet
Household Waste Collection (HWC)
I don't take or accept medications
Incinerate
Keep till gone
No meds
No meds at this time
None are unused
Pharmacy for disposal
Republic Waste Service
Return for collection
Save for later
Some Med Box, some garbage
Stay in the cabinet
Use them

& ' ' 1
' " 3 6 9

Apply at desired rate. "Herbicides, fungicides"
Don't use
Donate paints
Give to others to burn in heating systems
Hazard waste disposal

I put said items that they won't take at hazardous waste facilities into garbage
I would think it's a good idea to have hazardous waste have a neighborhood pickup
If I have them I ask my friends if they need/can use them. Otherwise I call hazmat.
Kitty litter
Kitty litter → Trash
Mix [with] cat litter and put in trash
Put out for bulk [pick up]
Saving them to dispose of them properly.
Spring Clean-Up
Still have them in possession - have done nothing with them but store
Trash dumpster

& & 1 ' '
! "

[Respondent is blind]
Friend who is associated [with] water department of [Kalamazoo]
Gazette
Gull Lake Quality [Organization]
I haven't
KL landfill group?
Libraries, E.P.A., DEQ, Kalamazoo Health Department (bad, no help)
Movie theater advertisements
Oshtemo [Township] letters
People Co-op
Portage News
Texas Township newsletters
TV news reports
Walking/observing at Subo Preserve
WMU
Word of mouth
Word of mouth, other residents
Worked for COK DPW (38 yrs)
Zero water tester

1 ! "

[Scary]! What's laying at bottom of streams and rivers in Kzoo County.
[Too] many [mute?] swans continuing to drop feces in many of Kazoo County's lakes and streams.
Acceptable
Acceptable, but am unsure about how testing results are disseminated to the public. Will continue to use AquaGear to remove residual contaminants from drinking water.
Acceptable. We need county to educate the public of dangers of fluoride and discontinue putting in water. Residents could privately use if needed/wanted.

After the water concerns in Flint, I was very happy when Kalamazoo tested for lead in our water supply. I know that the Vine neighborhood has had concerns with older housing and pipes.

Always a concern

Assuming it's safe - Don't want a Flint here!

At this point our water is quite drinkable, but effort is needed to keep watch on old systems that might go afoul.

Because the water is very hard, makes stains on our houses and driveways (from sprinkler), and tastes like metal, it leads me to believe the water is unsafe.

City of Kalamazoo - good; other - don't know

City water tastes bad, but seems to be okay

Concerned

Concerned about lead exposure in drinking water and not enough resources to test for it

Concerned, mostly because it's hard to clean once it has been polluted. And it is a life sustaining substance.

Confident

Confident in the water. I do use a water softener as iron, etc. is prevalent and not wanted in my appliances, sinks, etc.

Could be better. Has improved in the 7 years I've lived in the county though.

Depends on where you are in the county

Depends upon location. Assume city water is safe? However many wells [show] high levels of N[?]. Rural areas without access to city water and close to suburban developments on septic systems are threatened.

Don't know much about it.

Don't know our well is healthy, if too hard.

Don't know.

Drinking water is BAD in Kalamazoo/Portage... Yellow!

Efforts could be better [especially] by business/industry/agriculture

Even though Milwood area has terrible water, I think it is safe. I have to rent a softener and even then water is sometimes yellow.

Fair

Fairly confident

Fairly secure

Feel fairly safe, but monthly water main cleaning leads to yellowish water. I'd like to think it is just iron oxides. Who knows?

Feel relatively safe drinking our well water. Not sure about city water. Only drink bottled water at work in city.

Feel that it is safe based on info. I've been given.

Fine

Generally excellent; requires [constant] vigilance

Generally water is safe. More needs to be done in removal of old lead pipes. I would like to see more frequent water quality reports, more information about industrial discharges and controls.

Glad you handle it differently than Flint.

Good

Good

Good

Good
Good
Good
Good
Good in my area (N.E.)
Good, acceptable safety. But never had it tested.
Good.
Great, I'll drink to that.
Have lived here a few years - not knowledge[able] enough to be certain - need info.
Have lived just in Portage, same address so don't know about rest of county.
Have not done enough research for informed opinion. Drink tap water so I guess that indicates my level of confidence in safety of drinking water...
Hope it is OK. I believe better in Portage than Kalamazoo.
Hope they are doing the best job they can to keep our water safe!
I am concerned by the amount of chlorine I can smell in our tap water, as well as what chemicals may be used in treating it.
I am leery about the safety
I am not happy with the quality of the water. It smells horrible and cringe to even brush my teeth and wash my face. We recently bought a new water heater hoping it would improve but it has not. I have contacted the city too.
I am not very aware of what programs are in place regarding KC drinking water. I do recall that the City of Kalamazoo's well heads are near the disposal sites for Kalamazoo River cleanup material and could leech into city wells.
I assume it is safe
I believe generally it is safe to drink.
I believe it is safe to drink as I also use a water treatment system. The city will need to plan and budget to upgrade, replace and maintain water and sewer system. The infrastructure is old and needs upgrading.
I believe it is safe, but there is room for improvement.
I believe it's probably OK (I have lived here most of my life) but don't know enough about the process, what is used, how often it's tested, lead content, etc. I would like to know more.
I believe it's safe.
I believe that drinking water is safe in KC but with the issues raised in Flint I think we need to take a careful look at our own processes and systems.
I cannot answer for the county. But in Vicksburg our water is quite safe.
I continue to believe it's safe, but you know FLINT!!!!
I did call about 6 [months] ago as I pour water into a tumbler to have available on counter. I thought it tasted poorly BUT now I keep it in the fridge and don't feel it tastes bad - BUT if I keep it at room temp., I do not like taste at all. My husband doesn't seem to feel that way. I just need to have it tested.
I do not drink plan[t?] water
I do not have enough information.
I don't drink it - but I hope it is safe.
I don't feel comfortable taking a bath because the water is not clear. We use filtered water for most drinking/cooking needs.

I don't have enough factual information to make a statement regarding the safety of our water; it has been a concern of mine.
I don't know.
I don't think about it often, which means I am comfortable and confident about it.
I don't think the quality of the water is very good. I will NEVER drink my water straight from the tap. For the cost of water in the area it should be much better than it is.
I doubt that it is as safe as it should be.
I feel confident about its safety. More education is needed to educate consumers that their local source is the most ecological and economic option. An educational campaign could explain that most bottled water's info on safety is less transparent and accessible to consumers than their local municipal water.
I feel it is good.
I feel it is safe
I feel it is safe
I feel it is safe for drinking.
I feel it is safe to drink
I feel it is safe to drink - However, my water is very hard from the tap.
I feel it is safe.
I feel it is very safe.
I feel it may be safe but I use a water softener and filters on the refrigerator.
I feel its unsafe - smells strongly of bleach some days, smells like sewer on others. I only drink it when I absolutely have to.
I feel like it's getting worse. The water quality in Texas Township is overwhelmed by new construction and our water is yellow.
I feel like it's okay.
I feel like the water should be tested yearly in every home, free of charge to residents because we already pay taxes to make sure our water sources are protected and managed properly. I feel like it's safer to drink well water in certain areas than to drink city water. I wouldn't give my dog city water. I don't even give my dog our well water because of the salt from the softener.
I feel my well water is safe
I feel our water systems in this area are under attack. The Kalamazoo River smells like HELL! It didn't smell like that 200 years ago.
I feel that it is safe
I feel that our water from our well is safe.
I feel that the city water is probably safe to drink, but it is on the low end of safe. Our city water at home comes out brown at times and has deposits in it. We filter our tap water before we drink it.
I feel the city water is safe. But the rural areas with a lot of farm land I feel should be more areas of concern. High nitrates with new families, especially.
I feel the water is safe. I appreciate the regular water quality information provided by the city.
I feel there are issues with the quality which is why we drink filtered or bottled water.
I have been very concerned about safe drinking water ever since I had to change from a private well in Kalamazoo County in 2006. It is hard to trust any city system since the Flint problem.
I have confidence that it is safe.

I have faith in our local government to take good care of the population of Kalamazoo/Portage

I have hard water at apartment complex that I try to filter for drinking but hate it for bathing, washing clothes. Also, I do not want to ingest fluoride and filters do not remove. Because of health issues surrounding fluoride it should be removed from the water supply. Also, the water downtown [at] work has a bad odor.

I have limited range of places I consume water, but I would say I feel safe.

I have never felt safe about drinking water out of the tap. Even when my children were babies I used bottled water to make their bottles.

I hope that the water is safe!

I imagine it is safe. I trust my local public works department to monitor. Hopefully, that will always be the case!

I know [they're] not doing a strong effort to make our drinking safer. I believe [they're] trying to make a better effort on streams and rivers.

I need to research the agendas highlighted in the questions I have just answered. I suspect most citizens are not knowledgeable due to some minor effort it takes to look up the relevant information.

I recognize Kalamazoo has a tragic history of industrial degradation to local water resources, but I am confident in the city's water utility to provide safe drinking water to its citizens.

I still think nitrates and irrigation might be a future problem. And with the lack of future federal enforcement it will be easier for states and local governments to look the other way, and will allow an increase in pollution.

I think businesses and government and the citizens could all do a better job of keeping our water safe.

I think fluoride in the drinking water is bad for your health

I think it 'should' be OK - the taste and clarity is fine.

I think it is generally safe

I think it is safe and I drink it.

I think it is safe to drink.

I think it is safe.

I think it's safe - I am a former city resident and did not experience any problems there. My biggest concern is farm run-off and the stench of the [Kalamazoo] River at Riverview and Gull.

I think it's safe and the county does a good job of protecting it.

I think more could be done about [illegible]. The lead in the water must be treated.

I think that it is okay BUT improvements can always be made

I think the water is safe to drink, but sometimes my tap water is yellow because of my pipes. So I let the water run, but won't drink yellow water because it seems dirty/unsafe.

I want safe water

I worry about it because of the toxic smells around the county (not animal farms)

I'm concerned especially after the problems in Flint.

I'm concerned since our water is orange. I no longer trust the government to properly manage our water. People in Flint are still suffering!

I'm concerned that [it?] continue to be safe.

I'm confident that it's fine.

!

I'm honestly unsure... I admit that my knowledge on the subject is lacking. My only gauge on water quality at this point is taste and I'm thankful our tapwater at home tastes good.
I'm not afraid to drink it when it is clear straight from the tap, however I feel much better [?] it as drinking bottled water.
I'm not aware of a problem so I'm OK; but in general, after your questionnaire, I feel uninformed.
I'm not sure the drinking water in Kalamazoo is safe. My water is often brown in color. I drink bottled water. If I had a choice I wouldn't bathe in the water.
I'm not totally sure Kalamazoo County drinking water is safe. Remember companies that used to pump contaminants into the ground.
I've nearly always in 32 years I've lived in Kzoo had [reverse osmosis] filter on tap since my water came from ground (own pump). Initially (first 3 years) lived in apartment and drank tap water without any issues.
If 15 ppm iron is bad in Flint, we're not far behind at 13
Important
In general it is very good, though nitrate levels can be elevated in private wells.
In general pretty good. I do believe continued scrutiny and attention by all concerned parties and users is a good and necessary thing
In our township water quality is not a priority
Is OK for now!
It has too much fluoride - [rotten?] to drink
It is at risk.
It is good as far as I know, but don't have much info about it.
It is safe to drink; no problems with it.
It is safe to drink. That's good enough for me.
It is safe unless it comes from Kzoo River, Bryant Pond, or Upjohn Pond.
It might be safe but it tastes bad in all parts of town
It seems to be safe as I have not hear of health concerns related to the water. When there are water main breaks, I'm not informed other than if I happen to catch it on the news and that concerns me. Also, I don't know the measures used by the city to keep our water safe.
It should be checked just in case there is an [existing] problem
It's fine
It's good
It's OK
It's OK but it probably could be a little better somewhere.
It's safe but not the best H2O
Just okay - somewhat concerned about lead pipes in older homes
Kalamazoo City and Portage is safe unless a lead water service feeds the home. Kalamazoo like other older cities need to remove all lead lines. Wells around farms?
Keep your testing and safety standards as high as is possible in todays technology
Know you are looking out for the residents
Little help at owner property expense from departments. Notified DEQ. Notified EPA. Notified Karr Laboratories. Notified (UL) Underwriters Laboratories. Notified Kalamazoo Health Department and MSU labs.

"

Mostly safe - but not sure as I have no idea how vulnerable the drinking supply is.
My water is disgusting - I won't drink it. Brown more than not and too much chlorine.
N/A
Neutral
No concern
No concerns
No concerns
No major concerns.
No opinion
No opinion
No problem
No problems
No reason not to trust it, but I prefer my Brita to keep water from tap filtered, cold, and better tasting. I wouldn't want to reduce our protections of our water.
Not certain - little information
Not confident
Not good - honestly.
Not good - that's why I drink bottled water.
Not great, but better than most Michigan cities.
Not safe for drinking at all.
Not so sure about the security of the water towers.
Not sure - would like more information.
Not sure about other areas in Kalamazoo. [However] the water in my area needs to be evaluated. Bath water, dish water, laundry water, all water in this apartment complex is brown [?] be at the end and beginning of the month.
O.K.
OK
OK
OK
OK
OK
OK
OK - great
OK so far I guess?
On Krom St. I have coal filter and regular filter combo and still turn orange within two months. Shut off in let connection replace and all pipes an [CPUC?] from inlet throughout home pipe inlet still old unknown when installed on update
Our water is good, not concerned about other.
Our water is terrible! Both in pressure and amount of sediment. This is of great concern to us and when we call the county... we seem to get no answers/resolution.
Overall I think they are doing a good job.
Overall safe
Overall, safe. We utilize a reverse osmosis drinking water system at our home for taste plus we have exotic fish and pets that require it.
Per annual reports, the drinking water is safe. Truthfully, I don't know what our local government is doing to protect our water, nor do I really know what Kzoo County

businesses are doing. With what is going on with the EPA currently, I hope local governments all over will take environmental issues seriously!

Portage public water is nasty. My clothing is not white without bleach. Drinking water tastes nasty and if left in a container, can get "growth" in it. It is often not clear. Why?

Pretty good

Pretty safe

Protecting the drinking water - keeping it safe needs to be top priority - always looking at quality and ways to keep it safe from pollutants and contaminants.

Questionable. I have had brown looking water, and so have my neighbors, at times. Have called about but got no response. If I use tap and filtered water for coffee and iced tea there is a film on top. Water [department] said it is safe (?). Ugh.

Really good.

Reasonably comfortable - must maintain attention and concern.

Relatively uncertain, as we've only been back in the area for about a year - coming from Chicago/Evanston. Where the lake is the water source, I'm skeptical of the groundwater system (or system of regional wells, whatever it is exactly) that provides Kzoo drinking water due to historical paper production, oil spills in the River, etc. Also, unsure of what health issues higher-than-normal Fe levels could cause in very long term to human bodies if any.

Safe

Safe

Safe

Safe at this point

Safe to drink

Safety is probably OK, but we waste a lot of water.

Seems OK

Seems OK to wash and water, do not drink!

Seems to be all right.

Sometimes is slightly orange and tastes like iron.

The chlorine is overwhelming

The county should develop and maintain environmentally sound practices that protect and improve the quality and quantity of groundwater resources. Continuous improvement should be a goal.

The Kalamazoo water utility does a good job!

The safety of drinking water should be and is a high priority in Kalamazoo County. After all, it is necessary for life and poor quality can affect your health. Contingencies for continual testing and maintenance of supply systems should be planned and in place; especially emergency supply if systems fail.

There are contaminated wells but I don't know which areas are concerned.

There needs to be a full survey and investigation. Alarmingly, people consume fish from local waterways. My apartment water is usually rust colored; especially when the hot water faucet is on in a building that is over 100 years old.

This survey reminds me that I've got to be much better informed. Thank you for doing this research.

Too much chlorine! I'd like safer water! I'd like to spend more taxes to do so!

Very concerned since we are currently having a water main run up our street due to contamination from the KL landfill.
Very good. Always drink out of the tap - never gotten sick from it. It tastes good/no bad odors or taste.
Very poor
Very questionable
We absolutely do not drink Kalamazoo tap water. We purchase our drinking water plus water used for cooking etc.
We are an EPA Blue level county!
We had to install a filter system for our water. The water had a bad smell and at time was full of brown sediment.
We need our check as often as allowed by the city or county.
We need safe and clean drinking water and need to preserve our fresh water lakes and stop taking our fresh lake water and bottling it for selling.
We need to get the fluoride out of the drinking water. There is significant research that shows it is detrimental to our health.
Where I live I have very good tasting water but I do use a Brita filter
Where I live it is safe
Worried... Kalamazoo is an old industrial town. We must have LEAD PIPES! Also, my water out of the tap smells like bleach!
You still supply city residents' water with lead pipes in some locations - That's totally [unacceptable] - I'm sure YOU wouldn't drink that!!!

1 ! '
& 1 6 9
1 6

A removal or eradication of mute swans by legitimate and legalized eradication methods. Much like the snow goose conservation act. The mute swan is an invasive species.
All water in trailer parks are yellow and not safe to drink or cook or bathe with. Make them change and test water there. Clean water for all class!!!!
As above
Best!
Can the city regulate the amount of unused paved spaces? For example, behind Maple Hill Mall, it is a huge amount of unused pavement which affects water run-off. Could some of these spaces be turned into little parks or green space for water run-off?
Check above - have had just water in church and just a sip a Sunday.
Check the water resources of Kalamazoo County; anything could happen to our water at any time.
Close line 5!
Complaints have not been rewarding.
Continue testing for lead etc.
Current regulations on septic systems are inadequate. As an example, the side setback for a septic system, from an adjacent property line is on [5"?]. Terrible! Minimum lot sizes for developments not connected to a sanitary sewer need to be established and enforced county wide.

$

Data rules!
Enbridge!
Face it, you don't have the real money or support to fix it! Best to manage it and take out the stigma of being public and truthful about how bad it is. Stuff comes unreported all the time and I would rather know!
Get rid of all lead pipes or unknown (possible) lead pipes. Seems like you're only starting to get serious about this because of the Flint situation. Inexcusable that there are still lead pipes serving some residents!!! Heads should roll - prosecutors should investigate this here in Kalamazoo.
Good luck with your research! Keep up the good work. Funding sucks but good science never does!
Great job. Keep it up. Thanks for the survey. Sorry for the pen color - using the kid's pen.
I am concerned that the number of local [pivot?] irrigation systems are upsetting natural ground water levels and quality.
I am on the fence as to why the city/county taxpayers are paying for lead pipe remediation. Should be a homeowner/landlord responsibility IF levels test above limit.
I do have a whole house filter and water softener. The water is black as it comes in! Why so gross? Tastes OK and is clear after filtering.
I don't like having to be concerned/worry to check if there is a boil water advisory.
I don't like the heavy chlorine smell and taste of unfiltered water and it is poor enough that I have to replace filter monthly instead of quarterly that is recommended by the filtration system.
I don't want Kalamazoo to be another Flint, Michigan tragedy. I want us to be the "champions" of safe drinking water!
I feel more community outreach should occur in order for people to understand how water is treated. Also, education should be provided to better understand why fluoride is added to drinking water.
I have a private well and do my own treatment of my water, iron filter, softener and a [reverse osmosis] drinking water system.
I have had serious safe drinking water problems since 1971-2017. Max manure, pesticides, herbicides, fungicides have been applied to [Names withheld]. M.D.A (admit it) (Michigan Department of Agriculture) fertilizers, manure, pesticides, herbicides, fungicides, no hazard waste containers. The Department of Agriculture is the final and total problem with water and air toxification and poor air quality in Michigan and the U.S. air, water, lakes, streams and rivers. Secondly, is industrial runoff of machinery, steels, oils, solvents and industrial hazards. OSHA watches industry closely, no one watches farming pollution; I found H2S, N, [illegible], E. coli, potassium, nitrogen, nitrides, nitrates and (CAFO) [names withheld]. Possible lead in water lines in Kalamazoo City? City zoo gone since 1950s, Milham Park.
I like the pre-movie quiz.
I like the taste of the water at home!
I love drinking water!
I realize due to my answers to 17-20 I am not adequately informed [of?] these concerns.

I simply don't know much about our water use and management in Kalamazoo. Where would I go to learn more? We are all worried about water after what happened in Flint. Are we also at risk?

I think Portage should find a water source that doesn't contain minerals.

I think there should be more outreach to the private well owners. Educating them about getting their water supply tested once a year. And, more emphasis on irrigation wells. There should be more regulations on dairy farms and irrigation wells.

I would like to know more about our drinking water and runoff water remediation.

I would like to see bi-annual flushing

I would like to see water and sewers provided throughout the county. Environmental friendly uses should be encouraged; and, if possible, incentives should be provided to encourage utilization.

I would wish I could feel safe drinking it. Buying water is an unnecessary expense for one on a limited income! Thank you!

I'm not familiar of what water resources are used for Kalamazoo County. The waters in the area seem polluted and I hope our drinking water is tested regularly and even daily to ensure safety.

If the county can get a few billion dollars, build infrastructure to pipe it in from the Big Lake. In all seriousness, continuous coverage of water safety and safety measures taken by the City and County is necessary via traditional channels (email newsletter, View from the Curb, etc.) plus better coordination with regional EPA for in-person forums and meetings.

In my area, I've experienced strong perfume and chemical smells when people do their laundry. I think we need to educate people that clothes are equally clean with less detergent as the detergent negatively affects our water system.

It would be nice if something could be done about the rust and general "hardness" of the water.

K-zoo is good. Now send this survey to Flint [residents].

Lawns should not be allowed to be watered. City Neighborhood Organization ought to be involved in discussing water issues.

Maybe have flyers/more information about the water system available at the public libraries.

Maybe offer free water testing.

More public info regarding efforts to clean the water and keep pollution out of the rivers, lakes, etc.

Move away from [I row?] to a better PUC plastics. When I cut my pipe for a new connection all the iron tracked on the bottom created an orange line on bottom of CPUC pipe.

My impression since I have been transplanted from Seattle to Michigan is one of disappointment and anger. Seattle has 100% compliance with residential/business recycling, a plastic shopping bag ban, a prohibition against gas leakage from cars (the salmon are not the only ones needing clean H2O to drink), and emissions standard. If every state in our vast country were as careful with our natural resources then I think clean water would be perceived as an entitlement and not to be overlooked. EVER. Thank you for the opportunity to answer your survey.

N/A

N/A; Keep up the good work!

Neighbor lived in this house since 1920 (well water) [and] died at 92 yrs old
Nestle should not be allowed to drain Michigan dry for their own profit!!! Sorry if this isn't applicable but it's how I feel!!!
Neutral
No additional comments.
No comments
No concerns
No concerns at this time.
None at this time. Please consider in my responses that I myself have 31 years experience in public works and my son has 5 years. Thanks.
Offer more information on getting water tested and make it very affordable too. That helps the county in getting more test results from county wide individuals wells.
Other than fluoride, I think our county stays on top of concerns with our water.
PCB contamination in the Kalamazoo River. Damage from the Enbridge oil spill.
People still buy water to drink because there is no faith in the safety of city water!!
Please evaluate the water in this area if you are concerned you will or whom ever will take the time to come and check the water. Thank you. Whitney, if you're concerned please come get a sample or talk to the residents at this apartment complex.
Please see above.
Please see my comments above
Potential pollutants should be monitored such as river oil/chemical spills, farming/livestock runoff, paper industry waste, lumber treatment waste, etc. Residents ability to check their drinking water should be convenient and low cost.
Preserve our fresh water lakes in Michigan.
Protect Great Lakes - tell Trump!
Protect groundwater from contamination.
Remove fluoride from the drinking water.
Runoff water from farms and industries; people not educated enough about our water sources
So, maybe a notification of where to take water to be tested could go out for publication in newspaper or somewhere else? Thank you for your time.
Sorry, not well enough informed.
Texas Township needs a water tower
Thank you
The city should do some public education about car washing and dumping in the city streets - commercials on radio, Facebook, billboards. Also, feel strongly that "View from the Curb" should be published in Spanish as well as English. Currently missing about [half] of my neighbors in English only format.
The cost of having my water supplied by city has increased substantially since I switched to city water. It has tripled. Why?
The Kalamazoo River is a beautiful river that desperately needs more attention - clean-up and more access for recreation. What is being done to control farm run-off? My old well tested high for nitrites - no idea who monitors this.
The people in our county were all created by God. We need to treat them the best that we can. God does! Let's follow his example. Don't cut corners and always repair our mistakes.

The rate of replacing lead lines should be [accelerated] and should not have taken the Flint crisis to more efforts to today's partially [accelerated] rate.

The water is so hard it stains my sink and shower. And I dislike that.

They [need] to make water drinking [illegible] water not so hard of water. Thank you.

This has made me realize that I need to pay more attention to this matter, as I am finding I didn't know the answers to questions asked in survey, and feel I should have.

Upgrade the pipes so our water is not constantly rusty. We can do better.

Vicksburg does not put fluoride in their water. Don't know why this is? The town isn't informed enough or they don't use the right way to let us know more. Need newsletter or something.

Water dude toys. It's for the kids

We are on a segment of pipe that does not have continuous flow. At times the water is full of iron. Driveways in area are rust colored where the water hits. More than flushing the lines a couple times a year needs to happen.

We cannot drink or cook with tap water - bad taste

We need a storm-water fee to upgrade and improve where and what is going into our storm sewers. I think most people are unaware of how they effect storm-water.

We purchase our water by the gallon at D&W Store and have done so for many years. Several years ago we were getting large amounts of yellowish water. Our laundered items were getting yellow. Now we use [illegible].

We should have more locations and advertisements for recycling.

We try not to use straight tap water for drinking and cooking. We hate the chlorinated smell, don't agree [with] fluoridated water so we use our reverse osmosis system for ingestion by us and our pets.

When the part time Hazardous Waste Center is closed we put hazardous materials in garbage.

Why is the water so hard and taste like metal? This needs fixed.

Why was my water fine (taste wise) until ~2.5 years ago and it's now so nasty we have to filter it!!

Would like ground water sampling data for my area.

- ! %' . # . # #

Note: This is not an exact replica of the questionnaire's appearance, but does present the individual questions exactly as presented on the original questionnaire.

2017 Kalamazoo Drinking Water Questionnaire

1) What do you think is the source of drinking water in Kalamazoo County?
- ○ Lakes, rivers and streams in the County
- ○ Lake Michigan
- ○ Groundwater
- ○ I don't know

2) How is the tap water in your home supplied?
- ○ By a Public Water Supply System. If yes, which one? _____
- ○ By a private well
- ○ I don't know

3) If your tap water comes from a private well, how often do you have it tested?
- ○ I don't have a well (skip to number 5)
- ○ Never (if never, please answer question 4)
- ○ Every few years (skip to number 5)
- ○ At least once a year (skip to number 5)

4) If you answered "never" in question 3, why have you never had your well sampled?
- ○ Cost of samples
- ○ Have safe water – not necessary
- ○ Not convenient – too much trouble
- ○ Concerned about results and consequences
- ○ Other. Please specify: _____

5) At home, my primary source of drinking water is (select one)
- ○ Straight from the tap (if from the tap, please skip to question 7)
- ○ Filtered tap water
- ○ Bottled water

6) Which of the following is <u>the main</u> reason why you use filtered tap water or bottled water in your home?
- ○ Because of health concerns
- ○ To improve taste
- ○ To improve clarity
- ○ For another reason. Please specify: _____

7) What do you do with your unused medicines, vitamins, and other health supplements?
- ○ Keep them or use them all
- ○ Flush down the toilet or sink
- ○ Put in the garbage
- ○ Dispose at a "Red Med Box" location
- ○ Other. Please specify: _____

8) What do you do with leftover household chemicals such as paints, thinners, herbicides and pesticides, and used oil or coolants? / # 01

- ☐ I never have a need to dispose of these products
- ☐ Put in the garbage
- ☐ Flush down the toilet or sink
- ☐ Take to hazardous waste disposal center
- ☐ Dump on the ground
- ☐ Put down the storm sewer
- ☐ Other. Please specify: _____

9) How often do you apply fertilizer, pesticides, and/or herbicides (or have them applied) to your lawn?

- ○ Never – I do not have a lawn
- ○ Never – I do not use them
- ○ Once or twice a year
- ○ Three or more times a year

10) What type of system does the City of Kalamazoo use to handle rain and melting snow from roads, pavements, and other impervious surfaces?

- ○ Sanitary sewer
- ○ Separate storm sewer
- ○ Combined sanitary and storm sewer
- ○ It all soaks into the ground
- ○ I don't know

11) Do you have an unused/abandoned well(s) on your property?

- ○ Yes, and it is properly plugged with bentonite/cement
- ○ Yes, but it is not plugged
- ○ No
- ○ I don't know

12) Where you have received information about drinking water, groundwater, or other water resource matters in Kalamazoo County? / # 01

- ☐ None
- ☐ TV
- ☐ Radio Ads
- ☐ Facebook
- ☐ Other social media source(s)
- ☐ Newspaper or local news online
- ☐ Kalamazoo City or County websites (e.g., protectyourwater.net)
- ☐ Other Internet source(s)
- ☐ "View from the Curb" Newsletter
- ☐ Public Water Supply Annual Water Quality Reports
- ☐ School courses or programs
- ☐ At County fairs, festivals, or other community events
- ☐ Metro Bus Ads
- ☐ Pre-Movie Theater Trailer Ads
- ☐ Other. Please specify: _____

) # _____. In this section, we are interested in your opinions on water resource concerns. There are no right or wrong answers. Please circle the number that indicates how you truly feel about these matters, on a scale from strongly agree to strongly disagree. If you feel strongly about one or more of these issues or have further thoughts to share, please provide comments on the next page.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
13) I think that my drinking water is safe.	○	○	○	○	○
14) I think that elevated iron and/or hardness in drinking water is a concern.	○	○	○	○	○
15) I think pollutants (such as auto fluids, grass clippings, or leaves) from streets, parking lots, and other impervious surfaces can negatively affect the water quality of rivers, lakes, or groundwater.	○	○	○	○	○
16) Public Water Supply Systems should continue its practice of adding fluoride to its drinking water system for dental benefits (Kalamazoo City has added fluoride since 1951).	○	○	○	○	○
17) Industrial and commercial businesses in Kalamazoo County are making an acceptable effort to protect our water resources.	○	○	○	○	○
18) My governments are making an acceptable effort to protect groundwater.	○	○	○	○	○
19) My governments are making an acceptable effort to protect our surface water (lakes, streams and Kalamazoo River) by stormwater management, etc.	○	○	○	○	○
20) I think the City of Kalamazoo is making an acceptable effort to address the concern of lead in drinking water.	○	○	○	○	○
21) I want to be better informed about water resources in Kalamazoo County.	○	○	○	○	○
22) I support ordinances that continue to give government authority to protect the quality of our drinking water.	○	○	○	○	○
23) I take actions to conserve water in my daily life.	○	○	○	○	○

"

_____#_____. The following questions will help us be certain we have a representative sample of people in the county.

24) What is your Zip Code? _____

25) What is your age?

- 18-24
- 25-34
- 35-49
- 50-64
- 65 or older

26) What is the highest level of education that you have completed?

- Less than high school
- High school diploma or GED
- Some college, vocational training, or Associate Degree
- Four-year college degree (e.g., B.A., B.S.)
- Master's, doctoral, or professional degree (e.g., M.A., M.D., J.D., Ph.D.)

27) How do you feel about the safety of the drinking water in Kalamazoo County?

_____
_____
_____
_____

28) We welcome your comments and suggestions about the water resources of Kalamazoo County, including any concerns that you might have about the drinking water. Please write them in the space below.

_____
_____
_____
_____