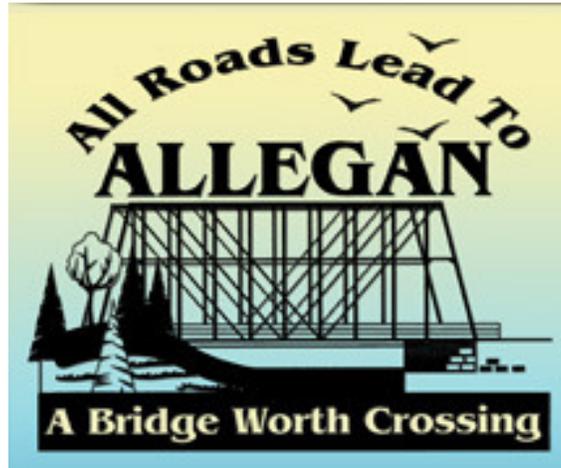


**CITY OF ALLEGAN
ALLEGAN COUNTY, MICHIGAN**



***Wellhead Protection
Program Plan***

2015 Renewal

(Original WHPP: 2000)

#3433



**CITY OF ALLEGAN
WELLHEAD PROTECTION PROGRAM PLAN
2015 RENEWAL**

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FIGURES (attached)

Figure 1 Wellhead Protection Area

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- Attachment A** Wellhead Protection Team
Attachment B Categories of Potential Sources of Groundwater Contamination and Public Participation/Education
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CITY OF ALLEGAN WELLHEAD PROTECTION PROGRAM PLAN 2015 RENEWAL

EXECUTIVE SUMMARY

Throughout the State of Michigan, areas of polluted groundwater are present in almost every urbanized area. When contamination in groundwater becomes significant, human health and economic activities may be affected. As a result, communities have recognized the need for a systematic approach to groundwater quality management. A Wellhead Protection Program (WHPP) is one approach that develops long-term strategies to protect a community's drinking water supply. The long-term management of groundwater quality is endorsed at both the federal and the state level. Specifically, the Federal Safe Drinking Water Act was amended in 1986 to include wellhead protection. Additionally, the State of Michigan provides financial and technical resources for wellhead protection program communities. The City of Allegan's Wellhead Protection Plan (Plan) is a "living" document that details action being taken to ensure the long-term integrity of the City's water supply system.

The City of Allegan is located in Allegan County, west-central lower Michigan. The City's water system is composed of three production wells, one emergency use well, and a distribution system. The City's Department of Public Works operates and maintains the entire system. The City relies on three wells: well numbers 1, 2 and 5. These are presently the only production wells in service. The wells have a total capacity of 3,050 gallons per minute (gpm) and a firm capacity (capacity with largest production well off-line) of 2,000 gpm. Well number 4 is an emergency use well. The City provides water to a population of approximately 4,998.

In the past, the City of Allegan recognized the importance of protecting the wells that supply drinking water to the community. In 1999, the City selected Fleis & VandenBrink Engineering, Inc. (F&V) to assist in developing a formal Wellhead Protection Program based on guidelines provided by the Michigan Department of Environmental Quality (MDEQ). Recently, MDEQ has requested that Plans be updated in six year intervals. In 2015, the City reviewed and revised their WHPP based on the MDEQ document "Checklist for Wellhead Protection Program Renewal".

Development of the City's Wellhead Protection Program and subsequent MDEQ Program Renewals included public meetings which were held periodically and as needed from 1999 to 2015. These meetings provided an opportunity for City residents and elected officials to discuss elements of the WHPP.

The overall goals of the City's program are included in this WHPP. Previous reports detail the collection of available information on the hydrogeology of the Allegan area, including the interpretation of numerous depth-to-water measurements and results from aquifer performance testing. The collected information was used to develop a groundwater model that delineated the 10-year groundwater contribution zone for the City's wellfield. This area is known as the Wellhead Protection Area (WHPA). Detailed explanations of the WHPA delineation and specific options in developing and implementing management strategies were discussed at public meetings during the development and the renewal of the City's WHPP.

This plan also identifies sites of environmental contamination listed on state and federal databases and located within the WHPA. Documenting these sites is important for several reasons, including identifying immediate risk to drinking water. This documentation is referred to as a Contaminant Source Inventory. Collected information will be used by MDEQ to analyze the "sensitivity" and determine the "susceptibility" of the City's drinking water wells to potential sources of contamination.

Based on the City's goals, and on the delineated WHPA, the City reviewed numerous options to manage the WHPA and surrounding areas. Options reviewed included both regulatory (e.g., ordinances, site review criteria, existing programs) and non-regulatory options (e.g., public education). Options that were considered effective and practical have been implemented or will be considered for future implementation.

CITY OF ALLEGAN WELLHEAD PROTECTION PROGRAM PLAN 2015 RENEWAL

I. PURPOSE AND SCOPE

The purpose of the City of Allegan's Wellhead Protection Program (WHPP) is to protect the City's public water supply system from contamination. This protection is provided by determining the groundwater areas that contribute to the existing municipal wells. This area is called the wellhead protection area (WHPA). Once the WHPA is defined, existing and potential sources of groundwater contamination within the area are identified. Finally, methods to manage the WHPA and minimize the threat to existing and future private and municipal water supply wells are considered and implemented, if appropriate.

The MDEQ's WHPP was developed in response to the 1986 Amendments to the Federal Safe Drinking Water Act. Portions of this WHPP are voluntary and are implemented on a local level through coordination of a Wellhead Protection Team (Team) consisting of local, county and state representatives.

Guidelines have been established for the WHPP by the Water Resources Division of the MDEQ. The 2000 WHPP developed for the City of Allegan was based on MDEQ guidelines in effect at that time.

Current MDEQ WHPP Renewal guidelines include the following major elements, which are further detailed in this written WHPP Plan (Plan):

- Introduction
- Roles and Responsibilities
- Wellhead Protection Area Delineation
- Contaminant Source Inventory
- WHPA Management Approaches
- Water Supply Emergency Contingency Plan
- Plan for New Wells
- Public Participation and Outreach/Education

The lead agency for the WHPP is the City of Allegan. The City has been actively pursuing wellhead protection activities since 1999, when a formal wellhead protection program was initiated by completing an investigation of its existing municipal wellfields, compiling data which described hydrogeologic conditions and groundwater flow directions, and identifying existing and potential sources of contamination upgradient of its existing wellfield location. In 2000, the City completed the delineation of the four wells located at two wellfields.

The location of the four Allegan municipal wells and the Wellhead Protection Areas are illustrated in Figure 1. The WHPA for wells 1, 2 and 5 originates in Section 28 of Allegan Township and extends east into Sections 22, 23, 24, 25, 26, and 27 of Allegan Township and Section 19 of Watson Township. The WHPA for well 4 originates in Section 28 and extends southwest into Sections 29, 31, 32 and 33 of Allegan Township, Section 6 of Trowbridge Township, and Sections 1 and 12 of Cheshire Township. A map of the WHPA is located at the MDEQ Water Division, Wellhead Protection Unit website (www.michigan.gov/deq and search for "Wellhead Protection Maps").

This written Plan also identifies several known and potential sources of contamination within and near the WHPA. Since the 10-year delineated wellhead protection area is primarily located in Allegan Township, the implementation and long-term success of the program will depend on the inter-governmental cooperation of the City and Allegan Township, and on the voluntary assistance of land owners within the WHPA.

II. INTRODUCTION

The purpose of this section includes updating basic information about the public water supply system (PWSS) and the community. The City is located approximately 25 miles northwest of Kalamazoo on State Route 89, Allegan Township, Allegan County. According to City records, the 2010 census population of the City is 4,998. The City operates four Type I wells, including one well for emergency use only. The wells have a total capacity of 3,050 gallons per minute (gpm) and a firm capacity (capacity with largest production well off-line) of 2,000 gpm.

This section also identifies the goals for the City's WHPP. These goals and objectives are intended to develop a successful long-term program to protect Allegan's drinking water wellfield and to prevent groundwater pollution in the wellhead protection areas through public education and cooperative management by local government agencies.

Goal #1 To protect the public drinking water supply by preventing the pollution of surface and groundwater within the WHPA.

Objective is to maintain a safe drinking water supply and protect the City's water infrastructure investment by preventing pollution from entering groundwater.

- Methods:
- Define the Wellhead Protection Area (WHPA)
 - Inventory actual and potential contamination within the WHPA
 - Ensure historical wells have been properly abandoned
 - Coordinate WHP activities with county and state agencies

Goal #2 To instill a sense of ownership of the wellfields and encourage the local community to recognize that wellhead protection is both worthwhile and necessary.

Objective is to develop local awareness and support for wellhead protection.

- Methods:
- Develop educational strategies
 - Notify property owners located near the wellfields

Goal #3 To clarify the roles and duties of agencies and individuals involved in wellhead protection.

Objective is to develop an effective WHP program.

- Methods:
- Assign municipal staff
 - Identify volunteers to assist with various aspects of the program

Goal #4 To promote inter-governmental and intra-governmental cooperation to assure protection of the water resources within the WHPA.

Objective is to address groundwater protection on a regional basis.

Goal #5 To promote the speedy and thorough cleanup of existing contamination within the WHPA.

Objective is to reduce the likelihood of contaminants migrating into the municipal water supply.

- Methods:
- Document known sites of contamination
 - Work with MDEQ to promote cleanup of sites

Goal #6 To plan and prepare for water supply emergencies.

Objective is to plan to respond to potential natural and man-made events including hazardous material spills, vandalism, power loss, etc.

- Methods:
- Develop program with local municipal leaders
 - Define program in a written contingency plan

III. ROLES AND RESPONSIBILITIES

The long-term success of the City's WHPP depends largely on the effectiveness of the Team and the continuing education and awareness of groundwater issues within the local community. Most communities, including Allegan, have interested citizens and uniquely qualified individuals who have lived in the area for years and can contribute greatly to the long-term success of the WHPP.

Allegan's Team represents the "stakeholders" of the community. Members of the Team have provided input and guidance throughout the WHPP Renewal process. The Team also reflects the reality that the groundwater reaching the existing municipal wells does not recognize municipal boundaries, and a cooperative effort with other communities in the area is necessary to effectively manage land use and development within the wellhead delineation areas.

Current Team members and their representation are listed in Attachment A. A previous WHPP was prepared in 2000. Since then, new organizations or agencies have not become involved. Additional intergovernmental agreements or memoranda have not been implemented or updated.

The City of Allegan Plan is a written compilation of numerous concepts which, when implemented, are designed to protect the integrity of the City's wellfield and distribution system. While several strategies have already been implemented, the development of this Plan has provided additional strategies that are discussed throughout this written Plan. Individual Team members have committed to the following Roles and Responsibilities. Schedules for reporting and completion are included in the Plan. Some items will require future approval of the City Manager and/or the City Council.

The Water Operator will:

- ✓ Consider contingency procedures specific for the WHPA in the event of a water system or water supply emergency.
- ✓ Provide school tours of the water plant during Water Week.
- ✓ Monitor and report to the Team the quality of the Township's drinking water supplies.
- ✓ Search for funding sources for Wellhead Protection Program activities at the federal, state and local level.
- ✓ Serve as custodian of the Wellhead Protection Program Plan.
- ✓ Maintain the local Wellhead Protection Program and review of the program with the Wellhead Team.
- ✓ Schedule and attend Wellhead Protection Team meetings.
- ✓ Look for opportunities for public education regarding Wellhead Protection. This will include discussing the Township's Wellhead Protection Program at meetings with the Allegan Chamber of Commerce and the Allegan Downtown Development Authority.
- ✓ Look for opportunities to discuss with owners of hazardous materials located within the WHPA the importance of storage that is protective with groundwater.
- ✓ Present a groundwater model to elementary and high school students.
- ✓ Annual contact with the County Health Department Sanitarian to confirm permitting approach within the WHPA.
- ✓ Annually work with County Road Commission and MDOT to encourage their consideration of road salt and sand application within the City, and especially within the WHPA.

- ✓ Communicate Wellhead Protection information in upcoming Consumer Confidence Reports.
- ✓ Communicate Wellhead Protection information in upcoming City Newsletters.
- ✓ Communicate Wellhead Protection information on the City website.
- ✓ Review with the Fire Department options to incorporate the Michigan Fire Fighter Right to Know laws into the WHPP.
- ✓ Purchase and install "Wellhead Protection Area" road signs.
- ✓ Manage Wellhead Protection Program updates and report status to MDEQ as part of a 6 year Plan Renewal Approval request.

The City Planning representative will:

- ✓ Consider best alternatives for future planning and zoning within the WHPA.
- ✓ Promote "best" wellhead management practices within both the WHPA and within the City.
- ✓ Look for opportunities to discuss with owners of hazardous materials located within the WHPA the importance of storage that is protective of groundwater.
- ✓ Assist inspectors, builders, and earth moving contractors generating awareness of environmentally incompatible land activities or materials handling practices.

The at-large City representative will:

- ✓ Attend Wellhead Protection Team meetings.
- ✓ Look for opportunities to discuss with owners of hazardous materials located within the WHPA the importance of storage that is protective with groundwater.
- ✓ Promote "best" wellhead management practices within both the WHPA and within the City.

The Public Health Representative will:

- ✓ Attend Wellhead Protection Team meetings.
- ✓ Look for opportunities for public education regarding Wellhead Protection.
- ✓ Coordinate annual hazardous materials collection with City of Wayland.
- ✓ Look for opportunities to discuss with owners of hazardous materials located within the WHPA the importance of storage that is protective with groundwater.

The Adjoining Local Unit of Government representative will:

- ✓ Attend Wellhead Protection Team meetings.
- ✓ Present groundwater and Wellhead Protection Program at a Community event.
- ✓ Review with the Fire Department options to incorporate the Michigan Fire Fighter Right to Know laws into the WHPP.
- ✓ Work with County Road Commission and MDOT to encourage their consideration of road salt and sand application within the City/Township, and especially within the WHPA.

- ✓ Determine best alternatives for future planning and zoning within the WHPA.
- ✓ Promote “best” wellhead management practices within both the WHPA and within the City/Township.
- ✓ Assist inspectors, builders, and earth moving contractors generating awareness of environmentally incompatible land activities or materials handling practices.
- ✓ Look for opportunities to discuss with owners of hazardous materials located within the WHPA the importance of storage that is protective with groundwater.

The Business & Industry representative will:

- ✓ Attend Wellhead Protection Team meetings.
- ✓ Look for opportunities to discuss with owners of hazardous materials located within the WHPA the importance of storage that is protective with groundwater.

The Wastewater Operator will:

- ✓ Attend Wellhead Protection Team meetings.
- ✓ Look for opportunities to promote with agriculture industry partners “best” wellhead management practices within both the WHPA and within the City.

The Education representative will:

- ✓ Attend Wellhead Protection Team meetings.
- ✓ Look for opportunities to provide K-12 discussions on groundwater resource protection.
- ✓ Look for opportunities to provide civil groups and clubs with discussions on groundwater and tours of the water plant.

IV. WELLHEAD PROTECTION AREA DELINEATION

The purpose of this section is to update information about the WHPA. The Federal Safe Drinking Water Act defines a WHPA as “...*the surface and subsurface area surrounding a water well or wellfield, supplying a public water system, through which contaminants are reasonably likely to move towards and reach such water well or wellfield*”. The entire WHPP is based on the results of this key element.

In 1999, the City of Allegan completed a hydrogeological study to identify groundwater areas that move towards and reach the City’s water supply wells. The study included reviewing existing background information on the regional geologic formations, surveying groundwater elevations to determine groundwater gradients and directions of flow and conducting an aquifer pump test and analysis. Computerized groundwater flow modeling and particle tracking was used to delineate the groundwater area surrounding the municipal wellfield through which contaminants could reasonably move towards and reach the municipal wellfields.

Since 2000, new geological data that will have a material impact on the current delineation has not been identified. Changes in well usage or flow rates in the current WHPA that would have a material impact on the WHPA have not been identified (e.g., well abandonment, new wells, etc.)

The MDEQ Guidelines for establishing a wellhead protection area are based on a groundwater time of travel of 10 years. This means that the area delineated for the WHPP needs to encompass groundwater areas which contribute to the City’s wellfields at a distance of 10 years’ groundwater travel time. A 10-year time of travel is used to provide a reasonable length of time for addressing environmental problems

within the wellhead protection area, while limiting the size to an area which can be reasonably managed by the City's existing water operations, land planning and zoning ordinances.

The 10-year WHPA delineation for Allegan is illustrated in Figure 1. This is unchanged from 2000. The previously completed Delineation Report includes the methodology used to develop the WHPA including maps, figures, and geological cross-sections used for the modeling. Since the original delineation, one production well (PW-3; rated 1,000 gpm) was replaced with a nearby production well (PW-5; rated 1,050 gpm). This change is not significant to the previously established WHPA. Other wells have not been added to the City's water system.

V. CONTAMINANT SOURCE INVENTORY

The goal of this element is to identify existing and potential sources of contamination within the previously determined WHPA. Contamination has several possible pathways to reach groundwater including direct spills, interior floor drains which discharge into the ground, septic systems, leaking underground storage tanks, storm water runoff, or dry and abandoned wells. In certain hydrogeologic settings, even very small amounts of a hazardous substance can contaminate large areas of groundwater.

The Federal Safe Drinking Water Act also requires that a WHPP "...will identify within each wellhead protection area all potential anthropogenic sources of contaminants which may have any adverse effect on the health of persons". An anthropogenic source is any activity performed by or caused by human actions that is, or potentially could be, a source of contamination to groundwater, including human actions affecting natural contaminants. The releases can be either from *point* sources, such as leaking tanks or impoundments, or from *non-point* sources, such as the application of agricultural chemicals or releases from areas containing septic tank/leach field systems.

A contaminant is defined in this WHPP as an organic, inorganic or microbiological substance that is regulated under federal, state or local environmental programs.

Applicable federal and state-related environmental laws and hazardous material regulations to control the use of potential contaminants generally include the Resource Conservation and Recovery Act (RCRA), Comprehensive Environmental Response Compensation and Liability Act (CERCLA or "Superfund"), Safe Drinking Water Act (SDWA), Clean Water Act (CWA), Toxic Substances Control Act (TSCA) and the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). Although these regulations have imposed controls on a wide range of industries and hazardous material treatment, storage and disposal practices, they tend to focus primarily on the larger manufacturing industries which manage the majority of hazardous wastes and hazardous materials in this country. Other smaller industries and businesses are not as stringently controlled (if controlled at all) due to the focus on industries that manage wastes or materials above a threshold amount or because the materials managed by the smaller industries are not considered "hazardous". As a result, materials and wastes that are not generally regarded or regulated as "hazardous" still have the potential to contaminate groundwater supplies.

Identifying the location and types of potential sources of contamination is essential in the development and implementation of effective management and public education strategies within the local WHPP.

A. CATEGORIES OF POTENTIAL CONTAMINATION SOURCES

As part of this WHPP, categories of sources or activities having the potential to contaminate groundwater are provided in Attachment B. The table is intended to provide a general overview of environmental risks associated with various activities. The categories have been grouped according to the type of activity (e.g., agricultural, residential, governmental, commercial and industrial) with which the source is commonly associated. The type(s) of contaminant(s) commonly associated with the various types of sources and the relative risk to groundwater quality are also provided.

B. CONTAMINANT SOURCE INVENTORY PROCESS

An initial inventory was completed in 2000. The purpose of this inventory was to develop and confirm a list of existing and potential sources of contamination within the WHPA.

The inventory was further developed in Spring of 2015. The identification of existing sources of contamination has been compiled using information from various agencies including those listed below:

- Sites of Environmental Contamination (201 sites), Remediation and Redevelopment Division (RRD), MDEQ (Part 201 of Act 451)
- Underground Storage Tank List, Waste and Hazardous Materials Division, MDEQ (Part 213 of Act 451)
- Leaking Underground Storage Tank Sites, Remediation and Redevelopment Division, MDEQ (Part 213 of Act 451)
- Oil & Gas Contamination Sites, Geological and Land Management Division, MDEQ (Act 61)
- Hazardous Waste Generators, Waste and Hazardous Materials Division, MDEQ (Part 111 of Act 451)
- Groundwater Discharge Permits, Water Bureau, MDEQ (Part 31 of Act 451)
- Landfill/Solid Waste Disposal Site List, Waste and Hazardous Materials Division, MDEQ (Part 115 of Act 451)
- Federal National Priorities List EPA, Region 5 (CERCLA and Superfund)
- Other sites of concern identified by the Team

For this WHPP, '*existing*' sources are those which are known to have caused or threaten to cause groundwater contamination; regulatory agencies may have information pertaining to existing sources. '*Potential*' sources are those which may or may not have caused groundwater contamination but have the potential to do so; regulatory agencies may or may not have knowledge and/or information available relating to potential sources. F&V used the services of Environmental Data Resources (EDR) to search various databases for environmental information for the WHPA. F&V reviewed the information with the Team to check for discrepancies and obtain local information about the sites identified by EDR. A copy of information used for the inventory and identified sites are included in Attachment C.

C. TRANSPORTATION ROUTES

Transportation routes represent areas with the potential for transient hazardous substances. Interstate highways, which are often primary routes for the transportation of hazardous substances, are not present within the City's WHPA. The Wellhead Protection Team recognizes that groundwater quality degradation may occur as the result of significant and sudden releases or spills of hazardous or polluting materials during transit within the City. The Fire Department has representation and actively participates on the Wellhead Protection Team and understands the importance of transportation spills within the WHPA being addressed promptly.

The City's WHPA is located along the east-west state highway 222 (formerly known as state highway 118), the northwest-southeast state highway 89, the north-south state highway 40 and is also traversed by four reported railroad lines. Other roads in the City are secondary. That said, there is a relatively high density of roads in the WHPA. Any transportation spill within the WHPA should be addressed promptly.

D. SURFACE WATER SOURCES

The City is located in the Kalamazoo watershed, with several communities located upstream including Plainwell, Kalamazoo and Battle Creek. The Kalamazoo River separates the two sections of the WHPA and also runs through the eastern section of the WHPA. Creeks connected to the Kalamazoo River run through both sections of the WHPA, and Little John Lake is present in the southwestern section.

Surface water quality degradation can occur through both non-point and point source discharges. Groundwater quality degradation may occur when surface water of lesser quality recharges the aquifer by means of infiltration through the streambed.

With point source discharges, the contaminant threat is dependent on the volume of the release, chemical/physical properties of the contaminant and surface water velocity.

Non-point source contaminants are usually seasonally derived, resulting from the release of fertilizer and pesticide applications in agricultural portions of the watershed and/or storm water runoff from urban areas.

It is important to note that groundwater/surface water interactions in lake and river/creek systems are often complex and are transient in nature. Because these two resources are connected, groundwater can be impacted by contaminants released to surface water and vice versa.

E. ABANDONED WELLS

Abandoned wells can pose a threat to groundwater. Wells which are not properly closed can provide a direct conduit for surface run-off and contaminants to easily reach the groundwater. Abandoned wells may be from oil and gas drilling, water wells, irrigation wells, or dry wells.

As part of the Contaminant Source Inventory completed for the City's Wellhead Protection Program, MDEQ Geological Survey Division was contacted for records of contaminated oil and gas well sites located within the Allegan WHPA. MDEQ reported no contamination sites have been identified within the City's WHPA.

F. HAZARDOUS PIPELINES

Hazardous pipeline failures have resulted in surface and groundwater becoming contaminated in several states, including Michigan.

Based on records publicly available through the U.S. Department of Transportation's Pipeline and Hazardous Material Safety Administration natural gas, petroleum, and other hazardous material pipelines in the City's WHPA were not identified with the exception of a natural gas pipeline that traverses the PW-4 WHPA. Natural gas is generally not considered a risk to groundwater contamination.

G. SENSITIVITY ANALYSIS

The 1996 amendments to the Federal Safe Drinking Water Act requires that states analyze the "sensitivity" and determine "susceptibility" of a community's source of drinking water to potential sources of contamination.

Sensitivity is determined from the natural setting of the source water (raw water to the City's wells), and indicates natural protection afforded the source water. MDEQ has not reported a current analysis for the City.

H. SUSCEPTIBILITY DETERMINATION

Susceptibility identifies factors within the community's WHPA that may pose a risk to the water supply. Categories of susceptibility determination are "moderately susceptible", "highly susceptible" or "very highly susceptible". The susceptibility determination provides indications of which statewide WHPAs should be given greater priority and oversight in implementing a WHPP. MDEQ has not reported a current analysis for the City.

When considering sensitivity and susceptibility, it is important to understand that a system can have low sensitivity relative to some conditions (e.g., wells located a significant distance from potential contamination sources) and high susceptibility because of other conditions (e.g., the type of contaminant).

I. CONTAMINANT SOURCE INVENTORY MAINTENANCE

All data management systems require periodic maintenance. Data maintenance for the City's Contaminant Source Inventory was initiated when the preliminary list of sites was compiled. Specifically, the preliminary site names and mapped locations were confirmed by members of the Team.

VI. WELLHEAD PROTECTION AREA MANAGEMENT

The goal of this element is to provide mechanisms which will prevent existing and potential sources of contamination from reaching the community drinking water supply wells. The WHPP Plan Renewal included review of the initial management strategies and discussion of their effectiveness. Additionally, the Plan Renewal included review of additional management activities identified by MDEQ in their WHPP Renewal guidance or otherwise presented to the WHP Team by F&V.

In developing the initial management strategies for the original WHPP, it was acknowledged that it is highly improbable that all risks within the WHPA can be eliminated but, by applying one or more management tools, the likelihood of groundwater contamination impacting the municipal water supply in the future can be reduced. Some management strategies to protect the drinking water supply that are required under Michigan law are not described in this WHPP.

Several management options practiced in the early 2000s were reviewed by the Team in 2000 as part of the initial WHPP. The Team was assigned the lead responsibility to recommend what specific WHPA management options, if any, should be presented to the City Planning Commission and City Council for further consideration.

In 2014/15, the Team reviewed and reconsidered management strategies that were selected in the past. Past strategies that are no longer being implemented are not included in this Plan update per the request of the MDEQ. The 2014/15 review included current concepts, thoughts and experiences from both Michigan and other nearby states and communities. The Team also acknowledges that the City will continue to rely on a historically and proven reliable system of mandatory federal, state and county groundwater and well operation requirements. Going forward, the Team has attempted to develop management strategies that can be both effective and measured.

Wellhead Protection Area Management Schedule

Management Activity	Objective	Goal	Measure of Accomplishment	Timeline
Wellhead / planning commission meeting	Keep the Wellhead members and Planning Commission members in contact and aware of the wellhead protection plan Especially the management options such as the Environmental Permit Checklist	Hold an annual joint meeting with the Wellhead Protection members and the Planning Commission	Meeting minutes, activities and information discussed	By 12/31/16 and then Annually
Water plant staff to review the wellhead protection plan annually	To keep the wellhead protection plan up to date with information and contacts	Wellhead protection plan current and up to date	Annual report form added to the wellhead protection plan listing date of review and changes or updates added to the plan	By 12/31/16 and then Annually

Water plant staff to review the Emergency Response Plan annually	Keep the Emergency Response Plan information and contacts up to date	Emergency Response Plan up to date and to keep staff aware of procedures and contacts	Annual report added to the emergency response plan listing date of review and changes or updates to the plan	By 12/31/16 and then Annually
Annually contact the Health Sanitarian, Township and County WHPP members	Update each other on ordinances, contaminated sites, cleanup events and wells as they pertain to the WHPP	Keep Interagency Partners up to date with activities and events occurring in the wellhead protection areas	Meeting minutes, activities and information discussed	By 12/31/16 and then Annually

VII. WATER SUPPLY EMERGENCY CONTINGENCY PLAN

The goal of this element of the Plan is to provide both short-term and long-term protection of the City's water supply system by identification of personnel, testing equipment, procedures, and materials which can be used for rapid correction or elimination of environmental accidents which might constitute a water supply emergency. The contingency plan also addresses response protocols, notification procedures and methods of containment.

The existing contingency plan outlines the program for the rapid correction or mitigation of water supply emergencies. It contains an inventory of necessary stand-by personnel, equipment, chemicals, and other materials readily available for the correction of water supply problems, including emergency measures in the event of contamination of the municipal wells from an emergency spill within the wellhead protection area. The means of notification of customers affected by an emergency is also provided, along with a description of the precautions and measures to be taken to protect the health of the affected system's water customers.

City leaders understand that response to contaminated wells is not limited to technical measures. Indeed, when a municipal well becomes contaminated, it becomes a technical problem requiring professional knowledge of hydrogeology, engineering and other disciplines. Additionally, financial, legal, public relations and risk assessment problems often occur. Often, the initial public questions include:

- What is the current water quality?
- What is the source of the contaminants?
- What are the effects of past water usage?
- What action is being taken?

When municipal wells become contaminated, it is usually a surprise. This is especially true for wells located in a Wellhead Protection community. While it is unlikely that any plan will prevent an adverse response from the City's water customers, this Wellhead Protection Plan suggests:

- Inform residents the truth as soon as it is known.
- Inform residents immediately upon confirmation of contaminants in the water supply.
- Continue to inform residents of activities being undertaken.

If the wells become contaminated, the MDEQ would likely require that the City immediately initiate activities to provide either a treated water system or a new water supply. Once contamination is discovered, action may need to be taken before bonds or loans become available to address infrastructure needs.

If the wells become contaminated, an invaluable resource would include a previously established, consistent and strong public education program. Such a program would likely provide City officials with

the “benefit of the doubt” when explaining cleanup concentrations goals, how clean is clean, projected schedules, costs and funding.

New full-time DPW employees hired by the City have received training on the emergency response protocol.

Since the Plan was last updated (Record of Revisions included as Attachment D), the City has encountered water supply emergencies. Those emergencies have been discussed at the Team meetings and include:

- Response to trespassing at a water storage tank

VIII. PLAN FOR NEW WELLS

The goal of this element is to provide a mechanism for incorporating new wells or wellfields into the WHP program. In the future, the City may find it necessary, as a result of existing or projected increased water demand. Aging wells/infrastructure, or as the result of a contamination threat, to explore the development of additional groundwater sources for drinking water. Wellhead protection provides a mechanism that can be used to help select the best site and to identify areas that should be protected now so they will be able to provide quality drinking water in the future when they are needed. Additionally, it should be realized that the development of a new groundwater source in the vicinity of existing sources may modify the movement of groundwater in the subsurface, perhaps changing the shape and orientation of the existing WHPA. Evaluation of the significance of those changes is necessary in order to ensure that the management strategy in place will continue to protect the community's drinking water supply.

A new groundwater source is defined as either an additional groundwater source, or an existing groundwater source that has been modified in a manner to increase its capacity or discharge to the system. When the City begins planning the development of a new groundwater source, several steps should be followed. First of all, the City should conduct a “draft” delineation and preliminary potential contaminant source inventory for each site being considered. “Draft” delineation is defined as applying the existing WHPA delineation to the considered additional well sites.

If the “draft” delineation and potential contaminant source inventory indicate that the considered well site is favorable, the City would determine the WHPA for the new well using current MDEQ delineation guidance. This may include obtaining sufficient information from existing data sources or from field measurements to complete the delineation using an MDEQ accepted analytical or numerical groundwater modeling method.

If more than one potential site is available for a new source, the City should proceed in its evaluation of those sites according to the discussions above. If the City develops a new well, or increases the capacity of an existing well that is within an already delineated WHPA, it is likely that the new or modified source will have a significant impact on the existing WHPA. In all cases, the effect of the new well on the existing WHPA geometry and orientation should be evaluated.

The groundwater models that were used to delineate the WHPA for the existing municipal production wells may also be used to develop a WHPA for a new well. Any new or adjusted WHPA boundaries should be compared to the existing WHPA boundaries. If significant differences are observed, the City should consider modifying the existing Wellhead Protection Plan to encompass the new delineation.

In summary, the following specific WHP program tasks would be completed when considering a new well location:

- A “draft” WHPA delineation and contaminant source inventory would be completed using existing information.
- If the location is favorable, based on review of the “draft” information, a complete MDEQ WHPA delineation would be completed based on current MDEQ guidance.
- A contaminant source inventory of existing and potential sources of contamination within the WHPA would be completed.

- The processes, procedures and requirements set forth in existing MDEQ guidance and regulations must be applied in the location, selection, well design and system implementation of any new wells.

Currently, the City does not anticipate an expansion of the public water supply system. However, it is recognized that the City maintains supply wells that may be reaching their maximum life expectancy (PW-4, 1948).

IX. PUBLIC PARTICIPATION, OUTREACH AND EDUCATION

The goal of this element is to provide mechanisms for public participation, outreach and education regarding the Village's WHPP. The WHPP Plan Renewal included review of the initial strategies and discussion of their effectiveness. Additionally, the Plan Renewal included review of additional outreach and education activities identified by MDEQ in their WHPP Renewal guidance or otherwise presented to the WHP Team by F&V.

In developing the initial strategies for the original WHPP, an emphasis was placed on selecting strategies that would raise awareness of the area groundwater resources and also reduce the likelihood of existing and potential sources of contamination from reaching the community's drinking water supply wells. Some outreach strategies to protect the drinking water supply that are required under Michigan law are not described in this WHPP.

Several strategies practiced in the early 2000s were reviewed by the Team in 2000 as part of the initial WHPP. The Team was assigned the lead responsibility to recommend what specific strategies, if any, should be presented to the Village Council for further consideration.

In 2014/15, the Team reviewed and reconsidered strategies to reflect current concepts, thoughts and experiences from both Michigan other nearby states and communities. Additionally, the Team reviewed and reconsidered strategies that were selected in the past. Past strategies, per the request of the MDEQ, are not included in this Plan update.

Public Participation, Outreach and Education Schedule

Educational Activity	Objective	Goal	Measure of Accomplishment	Timeline
Post and maintain WHPP signs along major roads entering or crossing the wellhead protection zones	Inform transporters as to the location of the wellhead protection area in case of a spill or major accident. Create local awareness of the WHPA	Protect the wellhead plume area from spills of materials transported on roads or leaked from vehicles involved in accidents	Signs posted on major roads in the WHP zone	Install by 1/1/17 and then maintain annually
Informational Publications available at City Buildings	Have publications that discuss wellhead protect available to the public at City Hall	Educate the public on the importance of wellhead protection	Annual report added to the wellhead protection plan listing the publications put on display for the year and the number of publications distributed	By 12/31/16 and then Annually
Discussion of water quality,	Open discussion on the WHPP at public forums	Educate the public and governmental	Annual report added to the wellhead	By 12/31/16

quantity and wellhead protection in public forums	such as city council meetings and committee meetings	bodies on the wellhead protection plan, the city water quality and quantity	protection plan listing the public form date(s) and estimated attendance at which the WHPP was discussed	and then Annually
Wellhead information posted on the City web site	Distribute information about wellhead protection	Inform the general public visiting the City web site of the wellhead protection plan	Currently there is no hit counter on the city web site. Accomplishment to be measured by the presence of the WHPP information on the web site at the beginning of each calendar year	By 12/31/16 and then Annually
Newsletter and/or Newspaper publication	Distribute information on the WHPP to the local residents	Publish, at least once per year, in the city newsletter and/or the city newspaper that the City has a wellhead protection plan and that information on WHPP	A copy of the publication will be included in the wellhead protection file	By 12/31/16 and then Annually
Consumer Confidence Report	Inform the consumers on the water system as to the quality and quantity of water supplied	Educate the water consumers on the water they use including wellhead protection for the system	Include a CCR from each year in the wellhead protection file	By 12/31/16 and then Annually
Drinking Water Week proclamation and activities	Make residents aware of our water resources, treatment plant and water we produce through a city council proclamation and activities at the water plant during that week.	Educate the general public on water resources, information about our water system and wellhead protection	Include a copy of the proclamation each year in the WHPP file and a list of activities	By 12/31/16 and then Annually

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Glossary of Terms

Aquifer

Permeable geologic material, such as rock, sand, or gravel, which contains water in sufficient quantities to supply a well.

Confined Aquifer

1) An aquifer overlain and underlain by impermeable layers, such as clay; or 2) an aquifer in which the groundwater is under pressure greater than atmospheric pressure and which will rise in a well above the point at which it is first encountered.

Critical Materials

Substances that are listed in Michigan's "Critical Materials Register". The Register is a list of chemicals of high environmental concern. Facilities that store critical materials on site must submit a pollution incident prevention plan to the State, and they must provide secondary containment for the materials.

Groundwater Impact/Contamination

The result of the spillage or discharge of hazardous substances or polluting materials into an aquifer.

Delineation

The mapping out of the area through which groundwater moves to reach a drinking water supply well(s).

Environmental Regulations

State environmental laws have been codified into one Act, the Natural Resources and Environmental Protection Act (Act 451 of 1994) (NREPA). The following "parts" deal directly with groundwater protection:

Part 201 of NREPA, Environmental Remediation Section

The State's own "Superfund" law, this section oversees the cleanup of contaminated sites in Michigan. The section also provides for the listing and prioritization of contaminated sites.

Part 111 of NREPA, Hazardous Waste Management

Regulates the storage, treatment, and disposal of hazardous waste. Requires permits for facilities which store, treat, or dispose of hazardous waste. Those that generate more than 1000 kilograms/month of hazardous waste are termed "large quantity generators" (LQG). These generators must report their waste generation to the State and to the EPA, provide secondary containment for liquid wastes, and prepare emergency plans. Those generating between 100 and 1000 kilograms/month are termed "small quantity generators" (SQG). These generators must report their waste generation to the State and the EPA. Those generating under 100 kilograms/month are "conditionally-exempt small quantity generators." They must keep records of their operations.

Part 111 also regulates the siting and operation of hazardous waste landfills.

Part 115 of NREPA, Solid Waste Management

Regulates the siting and operation of solid waste landfills.

Part 31 of NREPA, Water Resources Protection

Mandates the protection and conservation of the water resources of the State, including groundwater. Regulates discharges of pollution to ground and surface water. Requires facilities handling "critical materials" to prepare spill response plans and to provide secondary containment. Requires facilities discharging polluting materials to the

groundwater (through floor drains or otherwise) to obtain a groundwater discharge permit. Regulates sanitary wastewater discharges of over 10,000 gallons per day.

Part 615 of NREPA, Supervisor of Wells

Regulates the drilling and operation of oil and gas wells, and the disposal of wastes created from such operations. Well drilling, operation, closure, and waste disposal must be carried out so that damage of fresh water supplies is prevented.

Part 211 of NREPA, Underground Storage Tank Regulations

Requires annual registration of underground storage tanks and compliance with leak detection requirements. Regulates response to discovered leaking tanks.

Part 83 of NREPA, Pesticide Control

Regulates the use of pesticides for agricultural uses.

State laws not codified into NREPA:

Public Health Code (Act 368 of 1978)

Regulates construction of private water wells. Part 127 requires that wells that are abandoned be properly plugged to prevent contamination.

Michigan Safe Drinking Water Act (Act 399)

Provides for the supervision and control of public water supplies and public health protection.

Relevant Federal laws:

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

Often called the "Superfund Act," it oversees and funds cleanup of contaminated sites.

Underground Injection Control Program

Regulates the underground injection of toxic waste. Hazardous waste operators injecting waste into wells must obtain a permit from the EPA.

Safe Drinking Water Act (SDWA)

A federal Act designed to protect drinking water. 1986 amendments require states to develop wellhead protection plans "to protect wellhead areas within their jurisdiction from contaminants which may have any adverse effects on the health of persons."

Superfund Amendments and Reauthorization Act (SARA), Title III, Community Right-to-Know

Requires facilities using certain amounts of hazardous substances to report their usage to the EPA and to the State. Facilities meeting certain criteria must also prepare emergency response plans.

Fire Fighter Right to Know Program

Requires Fire Fighters to survey and inspect all facilities in their community that handle hazardous substances.

Freedom of Information Act

States that all information gathered by public agencies must be made available to the public upon request.

Groundwater

Freshwater that fills the spaces between sand, gravel, and clay underground.

Hazardous Substance

A chemical or other material which is or may become injurious to the public health, safety, or welfare, or to the environment. You can find hazardous substances in small and large businesses, farms, and households.

Household Hazardous Waste

Products used in the household or home garage that, when used, stored, or disposed of improperly, may pose a threat of contamination to the environment.

Hydrogeology

The study of water and geology, and how the two interact.

Hydrogeologist

A person who studies hydrogeology.

Leaky Confined Aquifer

An aquifer that has a confining layer of clay over it that is noncontiguous, allowing for some recharge ("leakage") from the surface.

Secondary Containment

Providing a kind of structure around a storage tank or container so that, if there is a spill, the substance will be contained.

Site of Environmental Contamination

Sites where leakage, spillage, or other discharge of hazardous substances has contaminated the groundwater or soil; and that the State has placed on its list of contaminated sites, under the Environmental Remediation Section (Part 201) of the Natural Resources Environmental Protection Act, PA 451.

Superfund Site

A site listed as contaminated under the Federal Superfund law.

Topographic Maps

Maps produced by the U.S. Geological Survey that show roads, lakes, streams, wetlands, developed areas, municipal boundaries, elevation contours, and other features at a scale of 1:24,000.

Tritium

An isotope of water (a water molecule that has three hydrogen atoms instead of two). Atmospheric testing of nuclear weapons in the 1950's caused tritium levels in water supplies to increase. (Don't worry! Tritium is a harmless substance). Hydrogeologists test the level of tritium in water to measure the age of the water.

Unconfined Aquifer

An aquifer with the water table as its upper boundary. Because the aquifer is not under pressure, the water level in a well is the same as the water table outside the well.

Underground Injection Wells

Wells into which treated water and/or other wastes are injected for disposal.

Underground Storage Tanks

Tanks under the surface of the ground in which gasoline, fuel oil, and other substances are stored.

Water Table

The top of an unconfined aquifer where water pressure is equal to atmospheric pressure. The water table depth fluctuates with climate conditions on the land surface above and is usually gently curved, following a subdued version of the land surface topography.

Well Logs

Records that well drillers complete when they drill a residential or public drinking water well. Well logs contain information such as depth to water table, lithology, the type of well constructed, and the depth of the well.

Wellhead

The physical structure at the land surface through which groundwater is withdrawn from an aquifer.

Wellhead Protection Area (WHPA)

The surface and subsurface area surrounding a water well or wellfield through which contaminants are reasonably likely to move toward and reach such well or wellfield. The WHPA is the "catchment area" of concern for public water supplies dependent on groundwater.

Wellhead Protection Plan (WHPP)

A plan developed by a community operating a public well water supply system that details how the community will work to protect their wells from contamination.

Adopted from: "*Wellhead Protection Community Guide*" Huron River Watershed Council, February, 1997 pg. 171 - 176.