

Wellhead Protection Report

Prepared for
Village of Baldwin, Michigan

Project No. 181752
September 18, 2019



Fishbeck, Thompson, Carr & Huber, Inc.
engineers | scientists | architects | constructors

ftc&h



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List of Abbreviations/Acronyms

ADD	Average Day Demand
amsl	above mean sea level
bgs	below ground surface
BMPs	Best Management Practices
CSI	Contaminant Source Inventory
EDR	Environmental Data Resources, Inc.
EGLE	Michigan Department of Environment, Great Lakes, and Energy
ERNS	Emergency Release Notification System
FTCH	Fishbeck, Thompson, Carr & Huber, Inc.
GIS	Geographic Information System
gpm	gallons per minute
HAZMAT	Hazardous Materials
MDD	Maximum Day Demand
MDEQ	Michigan Department of Environmental Quality (now EGLE)
MG	Million Gallons
mgd	million gallons per day
PWSS	Public Water Supply System
Village	Village of Baldwin
WHPA	Wellhead Protection Area
WHPP	Wellhead Protection Plan

1.0 Introduction

This document and accompanying information comprise the Wellhead Protection Plan (WHPP) for the Village of Baldwin (Village), Michigan. Although the preparation of the WHPP is voluntary, the Michigan Department of Environment, Great Lakes, and Energy (EGLE), Drinking Water and Environmental Health Division strongly encourages public water suppliers to prepare such a plan. This WHPP was prepared in accordance with guidance documents available from EGLE. Funding for the WHPP was provided by the Village and the State through EGLE's Wellhead Protection Grant program. This WHPP reflects the Village's continued commitment to the protection of its community water resources, the public health of its citizens, and the natural environment.

The WHPP serves to protect the Village's groundwater supplies from contamination. The Village currently has four active wells that provide water to 406 service connections in the Village limits. The village census population in 2017 was reported to be 1,192. The WHPP outlines how to keep residents of the Village safe from drinking water contamination and provides:

- Background information about the Village's water supply system.
- A summary of each of the seven "elements" of the Village's WHPP.
- Recommended procedures for maintaining the WHPP.
- An implementation schedule for management and education activities.

This WHPP is intended to be a working document and updated at least once every 6 years or as changes in the plan require. The Village's goals for the preparation of this plan are as follows:

- To educate the local population on the importance of the program.
- To communicate that water is an invaluable life sustaining resource that needs to be protected.
- To foster community participation in the implementation of the plan.
- To establish management practices that help protect the water supply.

For the WHPP to achieve its goals, this document needs to be reviewed frequently and updated when necessary. The Village will likely be relying on this water supply for the foreseeable future; therefore, protection of the community's water source is highly important. Updated copies of this WHPP will be available at the Village Hall.

2.0 Description of Area and Water Supply Wells

2.1 Physical Setting

The Village is located in the southwest portion of Lake County, T17 and 18N, R13W (see Figure 1). The topography in the vicinity of Baldwin is relatively flat with an elevation of approximately 850 feet above mean sea level (amsl) on the northwest side of the Village to an elevation of approximately 815 feet amsl near the Baldwin River, which runs along the southeast side of the Village. As shown on Figure 1, the area is populated with numerous small (less than 30 acre) lakes, particularly north and northwest of the Village. The surface elevations of the lakes range from 826 to 835 feet amsl. The Baldwin River is joined by Sanborn Creek on the Southeast side of the Village and subsequently flows southwest to join the Pere Marquette River at an elevation of 770 feet amsl, approximately 2.5 miles southwest of Baldwin.

2.2 Regional Geology

According to the Hydrogeologic Atlas of Michigan (Western Michigan University, 1981), the Baldwin area is underlain by 400 to 600 feet of glacial drift deposits. As one proceeds east, these deposits are interpreted to reduce to a thickness of 200 to 400 feet. The map of the Quaternary Geology of Southern Michigan (Farrand, 1982) indicates these near-surface glacial sediments consist primarily of sand and gravel deposits. These deposits are often interbedded with finer textured clay and/or silts and are interpreted to originate from glacial outwash processes and incorporate postglacial alluvium. The glacial drift is underlain by bedrock of the Michigan Formation, which consists of dark shales, micaceous sandstone, gypsum and anhydrite, and dolomitic limestone at the base of the formation.

2.3 Local Geology

Two geologic cross sections were prepared and included in the *Wellhead Protection Area Delineation Report Village of Baldwin Well No. 5* (FTCH, October 2003). The cross-section locations are shown on Figure 2. Currently, the Village has four active production wells (PWs) referred to as PW-2 through PW-5 located as shown on Figure 2. The production well logs along with several residential well logs were used to generate the geologic cross sections, which are shown as Figures 3 and 4. Copies of the Village production well logs are presented in Appendix 1.

A review of cross-sections A-A' and B-B' (Figures 3 and 4, respectively) indicates that clay-rich deposits are more prevalent in the southern and western portions of the study area. The area of PW-2 and PW-5 is close to the eastern margin of the clay-rich deposits. In this area, clay lenses of varying thickness are generally encountered between 20 and 70 feet below ground surface (bgs). Alternating layers of silts, sands, gravels, and clays are encountered below the uppermost clay at depths from 60 to 120 feet bgs. This is in contrast to northern and northeastern areas (the area of PW-3, PW-4, and beyond) that generally have sand with varying amounts of gravel present from the ground surface to depths greater than 100 bgs.

A review of the geologic conditions in the study area suggests that groundwater is present in both confined and unconfined (water table) conditions. Confined aquifers are generally more prevalent in the southern and western portions of the study area (south half of Sections 4 and 5, Sections 9 and 15 [T17N/R13E]), while

unconfined conditions are dominant in the northern and eastern areas (north-half of Section 4 and 5, Sections 3 and 10 [T17N/R13E]). The confined aquifers are often associated with confining clay lenses that are of limited extent, causing them to transition into semiconfined and unconfined conditions toward the northeastern portion of the area.

Groundwater from the confined and semiconfined aquifers is generally found from 60 to 120 feet bgs in the north half of Sections 4 and 5 (T17N/R13E) and from 70 to 160 feet bgs in the more southern sections. Groundwater from the unconfined aquifers in the northern and eastern portions of the study area generally occurs between 10 and 20 feet bgs in Section 3 (T17N/R13W) and 20 to 40 feet bgs in Sections 34 and 35 (T18N/R13W).

2.4 Observed Groundwater Elevations and Hydrogeology

Two Wellhead Protection Area (WHPA) delineation studies were completed for the Village of Baldwin production wells. The initial WHPA delineation study was completed in 2000 to determine the WHPA for PW-1 through PW-4. A report titled *Wellhead Protection Area Delineation Report for the Village of Baldwin, Michigan* was prepared (FTCH, October 2000) and provided to the former MDEQ. A second WHPA delineation study was completed in 2003 for PW-5. To confirm groundwater flow direction in the area of PW-1 through PW-4, 22 static water levels were measured in surrounding residential wells and surface water bodies in 2000. To confirm the groundwater flow direction in the area of PW-5, 9 water levels were measured in surrounding wells in 2003 to supplement the data collected in 2000. The observed Potentiometric Surface Contour Map from the 2003 report is included as Figure 5. The contour map shows groundwater flow in both the unconfined and confined/semi-confined aquifers to the south-southwest at a gradient of approximately 3.5×10^{-3} feet per foot (ft/ft). Groundwater most likely discharges locally to the Baldwin River; however, the regional groundwater flow is likely controlled by the Pere Marquette River located approximately 2.5 miles southwest of Baldwin.

Additional detailed information about the geology and hydrogeology of the area can be found in the report titled *Wellhead Protection Area Delineation Report for the Village of Baldwin, Michigan* (FTCH, October 2000), the report titled *Hydrogeological Study for a Type I Public Water Supply*, (FTCH, June 2003), and report titled *Wellhead Protection Area Delineation Report Village of Baldwin Well No. 5* (FTCH, October 2003).

2.5 Water Supply Wells

Currently, the Village has four active PWs referred to as PW-2 through PW-5 located as shown on Figure 5. Use of the former PW-1 (installed in 1938) was discontinued in 2011 and was properly abandoned in 2015.

The Village's system of wells is spread out over an approximate area of 1 square mile. The construction details of each of the Village's production wells is included in Appendix 1.

As shown in Figure 5, production wells PW-2 and PW-5 are located on the southwest side of the Village and production wells PW-3 and PW-4 are located in the central portion of the Village. The current PW-2 was originally named PW-3 at the time of its installation and the current PW-3, located near PW-4, was originally named PW-2. The permitted capacities of the Village's wells are shown in Table 1.

Table 1 – Well Capacities

Well ID	Permitted Capacity, gpm
PW-2	800
PW-3	200
PW-4	500
PW-5	350
Total Capacity	1,850
Firm Capacity (largest well out of service)	1,050

The four wells currently in service are completed at depths ranging from 140 feet to 185 feet. Table 2 below shows the 2018 pumping data and the average day demand and maximum day demands for that year.

Table 2 – 2018 Demand Data (Millions of Gallons)

Month	PW-1	PW-2	PW-3	PW-4	PW-5	Total
January		1.96	2.98	0.28	0.00	5.21
February		1.65	2.71	0.00	0.00	4.36
March		1.82	3.02	0.00	0.00	4.85
April		2.37	2.91	0.00	0.00	5.28
May		2.35	2.61	1.42	0.00	6.38
June		2.52	2.70	2.40	0.00	7.63
July		2.80	2.04	2.92	0.00	7.76
August		1.93	2.15	2.03	0.35	6.46
September			0.89	1.71	1.69	1.07
October			1.36	2.25	1.86	1.06
November			0.68	0.24	2.60	0.86
December			0.68	1.77	1.24	0.84
Annual Total	0.00	21.02	27.09	16.44	4.17	68.72

Average Day Demand (ADD) 0.188 mgd

Maximum Day Demand (MDD) 0.330 mgd

Projected Maximum Day Demand from 2018 Water System Reliability Study (MDD) 0.540 mgd

The Village performs no treatment on the groundwater prior to distribution. The water system has approximately 406 services.

The Village monitors the water quality of its water supply according to state and federal regulations. Water quality data indicates that the water system's quality meets all applicable federal and state drinking water health standards. A copy of the Village's 2018 Water Quality Report is included in Appendix 2.

3.0 Elements of the Wellhead Protection Plan

EGLE has identified seven elements that are to be included in a WHPP. These elements are:

- Element 1 – Establishing Roles and Responsibilities
- Element 2 – Performing a WHPA Delineation
- Element 3 – Conducting a Contaminant Source Inventory
- Element 4 – Developing Management Strategies
- Element 5 – Contingency Planning
- Element 6 – Planning for the Siting of New Wells
- Element 7 – Developing an Education and Community Participation Plan

4.0 Element 1 – Roles and Responsibilities

This element is intended to identify individuals responsible for development and implementation of the WHPP.

4.1 Local Wellhead Protection Team

Prospective local team members were initially identified and listed in the WHPP grant application. The diverse nature of the team allowed for a high score on the application and helped the Village to obtain the grant. The team members identified in the grant application are as follows:

Mr. Chuck Gardner	Public Water System Superintendent – Infrastructure Alternatives, Inc.
Mr. James Truxton	Village President
Mr. Jeremy Anderson	Village of Baldwin Fire Department
Ms. Darci Maldonado	Local Business Community – Pandora’s Box
Ms. Susan McConnel	General Public
Mr. Steve Leonard	Lake County Road Commission

Two additional members were added at the first meeting as follows:

Mr. Sierra Brown	Public Works – Infrastructure Alternatives, Inc.
Mr. Robert Toland	Village Planning Consultant

Four meetings of the WHPP team were held at the Baldwin Village Hall on the following dates:

Initial team kickoff meeting – February 18, 2019.

Progress meeting – May 6, 2019

Progress meeting – July 29, 2019

Final meeting – August 26, 2019

Meeting minutes were prepared for each meeting and distributed to the team members for review and comment. The progress meeting minutes are included in Appendix 3. Progress reports were submitted to the EGLE WHPP Administrator, Jason Berndt, which included a basic discussion of the progress and the meeting minutes.

4.2 Village Staff Responsibilities

As required by the grant application process, team members must include the Public Water Supply System (PWSS) superintendent and representation from the municipality as owner of the PWSS.

Mr. Jim Truxton, or the current Village President, is the Village’s representative as the owner of the PWSS and considered the primary contact person for the WHPP. Mr. Truxton, or the current Village President, will have overall responsibility for the periodic updates of the WHPP. At a minimum, the WHPP will be updated every 6 years. Mr. Truxton, along with the Village Council, directs the efforts of the Village Planning Commission and has overall responsibility for communicating to the public the wellhead protection efforts being undertaken by the Village.

The Village Council is responsible for ordinance enforcement, public education, outreach programs, and maintaining budgets associated with wellhead protection activities. At the direction of the Village Council, the Village Planning Commission will be assigned the responsibility of implementing many of the WHPP recommendations.

Mr. Chuck Gardner, or the current water system operator, is responsible for maintenance and operation of the overall water supply and distribution system. Mr. Gardner will be an important contact for WHPP concerns because of his knowledge and understanding of the water system. Mr. Gardner's other important responsibilities, in connection with the WHPP, include maintaining and updating the contingency or emergency plans when necessary.

5.0 Element 2 – Wellhead Protection Area Delineation

EGLE defines a wellhead protection area as “the surface and subsurface areas surrounding a water well, or well field, which supplies a public water system, and through which contaminants are reasonably likely to move toward and reach the water well, or well field within a 10-year time of travel.”

In 2000, the Village began its wellhead protection efforts by initiating a delineation of its WHPA for PW-1 through PW-4. Well PW-5 was installed in April 2003 and a delineation of its WHPA was completed in October 2003. The delineation efforts reports were documented and submitted to the former MDEQ, Drinking Water and Radiological Protection Division in the following reports:

- *Wellhead Protection Area Delineation Report for the Village of Baldwin, Michigan*, (FTCH, October 2000).
- *Addendum to Wellhead Protection Area Delineation Report for the Village of Baldwin*, FTCH letter to MDEQ, September 19, 2001.
- *Wellhead Protection Area Delineation Report Village of Baldwin Well No. 5*, (FTCH, October 2003).

These reports are not included in this WHPP and are available at the Village offices. Figures of both the existing and revised WHPAs are referenced later in this section.

For PW-1 through PW-4, the analytical element model (*WinTran*, Environmental Simulations, Inc. 1995) was initially used to simulate groundwater flow and transport in the vicinity of the Village wells. The delineation for PW-2 was accepted by the former MDEQ, but the delineations for PW-1, PW-3, and PW-4 were refined using U.S. EPA’s WHPA model, *A Modular Semi-Analytical Model for the Delineation of Wellhead Protection Areas* (Blandford, T.N., and Huyakorn, P.S., 1991). The WHPA model was used to delineate the Baldwin WHPAs for PW-1, PW-3, and PW-4 using reverse particle tracking for a 10-year time-of-travel on the observed potentiometric surface as measured in area water wells.

For PW-5, an analytical element model (*WinFlow*, Version 1.07, Environmental Simulations, Inc. 1995) was again used to simulate groundwater flow and 10-year transport in the vicinity of PW-5.

Pumping rates used in the original WHPA delineations in 2000 were based on the average flow rates of the peak month in accordance with EGLE requirements. Based on pumping records at that time, the modeled flow rates were:

PW-1	108,000 gpd (60 gpm)
PW-2	164,160 gpd (114 gpm)
PW-3	21,600 gpd (15 gpm)
PW-4	21,600 gpd (15 gpm)

It is important to note that the former MDEQ, in approving the delineations, added a large safety factor or buffer zone for PW-1, PW-3, and PW-4 by connecting their respective individually-delineated WHPAs into one large WHPA to account for uncertainty in the delineations (see Figure 6).

Table 3 compares the 1999 peak month average flow rates used in the original delineations with the 2018 peak month average flow rates.

Table 3 – Comparison of Average Flow Rates

Well	1999 Average Peak Month Flow Rate (gpm)	2018 Average Peak Month Flow Rate (gpm)
PW-1	60	0 (abandoned)
PW-2	114	65
PW-3	15	68
PW-4	15	69
PW-5	-	24

PW-5 had not been activated at the time of the original 2000 delineation, but had a planned capacity of 350 gpm. In lieu of having actual operating data for the well, Fishbeck assumed 350 gpm as a flow rate that conservatively represents the maximum expected pumpage out of the well. This pumping rate resulted in a conservatively large WHPA for PW-5 in the 2003 delineation.

As shown in the table and indicated in the previous paragraph, the current flow rates for PW-2 and PW-5 are less than the original flow rates used to delineate these two wells. Although the resulting WHPAs are larger than necessary, the Village plans to use the conservative estimates to account for potential future pumping increases.

A more substantial change has occurred with respect to PW-1, PW-3, and PW-4. PW-1 was properly abandoned in 2015. Accordingly, the WHPA that previously captured PW-1, PW-3, and PW-4 has been shifted to PW-3 and PW-4, as shown on Figure 7. Due to the extremely large safety factor previously applied to these wells by the former MDEQ, as noted above, using this same capture zone width and centering it on PW-3 and PW-4 is likewise considered conservatively large.

For comparison, the following analytical flow equation (Todd, David K, and Larry W Mays, *Groundwater and Well Hydraulics*. Groundwater Hydrology, 3rd ed., John Wiley & Sons, Inc., 1980, pp. 162) was used to calculate the width of the capture zone for the combined flow rates of PW-3 and PW-4:

$$\pm Y_L = \frac{Q}{2Kbi} \quad \text{Where,}$$

$\pm Y_L$ = width of the capture zone from the axis to the outer edge (feet)

Q = pumping rate = 23,370 ft³/day

K = hydraulic conductivity (ft/day)

b = aquifer thickness (150 feet)

i = hydraulic gradient = 0.00185 ft/ft

The resulting capture zone width estimate is 518 feet. As shown on Figure 7, the WHPA delineation for PW-3 and PW-4 is nearly four times wider, confirming this delineation is conservatively large.

In summary, the revised delineation of the WHPA is based on previous model data that can be conservatively applied to present day well pumping demands and operation. The WHPA is a planning tool that will be continually assessed and reviewed as pumping demand or well condition changes.

6.0 Element 3 – Contaminant Source Inventory

The purpose of the Contaminant Source Inventory (CSI) was to identify existing and potential threats to the WHPAs. The full CSI report is presented in Appendix 4.

The CSI was completed by querying relevant data bases for information regarding existing and potential contamination. The data base search was conducted by Environmental Data Resources, Inc. (EDR). In addition to the data bases queried by EDR, additional information sources not covered by the EDR report were reviewed. Additional sources reviewed included:

- Oil & Gas Contamination sites (<http://ww2.deq.state.mi.us/Geowebface>).
- Groundwater Discharge Permits (<https://miwaters.deq.state.mi.us/miwaters/external/home>).
- MDEQ's Environmental Mapper (<http://www.mcgi.state.mi.us/environmentalmapper/>).

These data sources identified one additional site that was not already identified by the EDR report. Additionally, these sources elaborated on two sites that were previously identified.

Identified sites fall into one of three categories:

- Category 1 sites are sites of known contamination. These sites represent the greatest risk to the WHPAs. Sites where a documented cleanup has occurred and where the former MDEQ has issued some notice of closure are excluded from this category.
- Category 2 sites are locations where significant use of hazardous substances is known or suspected. These include commercial or industrial establishments.
- Category 3 sites are where the significant use of hazardous materials is not expected.

The Lake County Courthouse and Sheriffs Office and the Lake County Road Commission are classified as Category 1 sites due to previous contamination from leaking underground storage tanks that resulted in future land use restrictions at these locations. The remaining sites can all be classified as Category 2. The table of identified sites is included in Appendix 4 at the end of the CSI report. Details regarding the CSI sites and the data bases queried by EDR are also included in Appendix 4. Due to its large size, only the executive summary and portions of the EDR report that deal with the listed Category 2 sites are included in Appendix 4. The full EDR report is available at the Village Hall.

Previous or potential contamination sources identified by the CSI within the well recharge areas, or in close proximity, included the following:

- USTs and ASTs
- LUSTs
- Former users, manufacturers, and generators of hazardous materials
- Spill and leak sites

Other potential contamination sources that were not necessarily identified by the CSI, but could be located in the WHPA include private sewage disposal systems, floor drains to septic systems, and cisterns.

Much discussion on potential sites of contamination occurred at team meetings 2 and 3. While potential threats exist for most groundwater sources, the CSI helps to determine if existing sources like salt storage and oil, and gasoline storage are properly contained. The team's local knowledge of the area was leveraged in determining the accuracy of some of the EDR data and vetting the information in general. Many of the former sites of contamination as identified in the EDR report were known locations by the team and additional detail could be provided as a result. Some of the EDR data was inconclusive in terms of the results of remedial efforts and further data on these sites will be pursued.

Team members were encouraged to pay close attention when driving in the WHPA and look for sites of potential contamination and the condition of tanks and secondary containment.

7.0 Element 4 – Management Strategies

Local management strategies help form the basis for programs that identify, incorporate, and utilize systematic approaches in wellhead protection practices. Detailed management strategies are fundamental in preserving and protecting the natural resources of a community.

A primary goal of the management plan of the Village WHPP is to specify how existing and potential sources of contamination found in WHPAs will be managed to prevent the sources from impacting the supply wells. This section describes management strategies that will be implemented and further refined by the Village to proactively protect the water supply wells.

7.1 Management Strategy

In 2000, the Village put together plans for both Management Strategies and Public Outreach. These plans have had varying degrees of implementation, but the existence of both plans had provided additional points in securing a WHPP grant.

The Management Strategies document entitled *Wellhead Protection Policy and Management Issues -Proposed Master Plan Component*, is included as Appendix 5. This document provided a basis for further development of both Regulatory and Non-Regulatory strategies as discussed in the WHP team meetings.

The meeting minutes document the WHPA management discussions and decisions made and modifications to the current plan. Management strategies discussed included the following areas:

- Regulatory Strategies
 - Master Planning and Land use planning.
 - Zoning Restrictions.
 - Stormwater Management Guidelines.
 - Site Plan Review Process.
 - Planning Commission responsibilities.
- Non-Regulatory Strategies
 - Institute an Abandoned Well Program.
 - Coordination with adjacent Municipalities.

A WHPA management strategy can utilize a broad range of tools including land use regulations, site development policies, Best Management Practices (BMPs), zoning options, and public education. The proposed management strategies are intended to minimize or eliminate land use activities that pose a significant threat to the source water for the Villages wells. They are also intended to motivate landowners within the WHPAs to take appropriate steps to reduce threats to the public water supply.

7.2 Community Master Plan Components

A master plan can generally be described as a policy document that guides the physical development of a community, while zoning ordinances are laws that help carry out the master planning efforts. Comprehensive planning or land use planning are sometimes synonymous with master planning.

The Village's current Master Plan and land use strategies do not specifically restrict types of land uses within the WHPA. However, it has been proposed that industrial development be restricted to a new industrial area west of the Village limits and outside the western limit of the WHPA. Aside from the Lake County Road Commission property, there had previously been only one industrial property within the WHPA, the currently closed Pallett Factory. That use was discontinued several years ago and is now vacant land with one dilapidated building remaining. While the current zoning of this parcel is industrial, the proposed planned use is under consideration by virtue of the Planning Commission's current efforts at updating the Village Master Plan. Land uses within the majority of the WHPA are planned and used primarily for residential or low impact commercial purposes. While there is currently little industrial development in the Village or in the WHPA, limiting future industrial development within the WHPA removes a potential threat to groundwater in the Village.

The team agreed that future land use planning and written land use documents should directly state that wellhead protection measures are in effect and will be a priority in future planning efforts.

A map of the WHPA, laid over maps of land use and other important features, becomes a useful tool for making future land-use decisions. Water supply and distribution will be an obvious consideration in all land use planning. The Village has a GIS system where all water system and sanitary sewer system utilities are mapped. The final WHPA delineation will be imported to the GIS system and be used for planning purposes. The Village of Baldwin is continually building a larger GIS database. The team agreed that the Village should incorporate all zoning and planning maps as an overlay in the database.

Currently, Webber Township (to the north of the Village), has its own water supply wells and elevated tank. The WHPA for Webber's wells does not overlap the 10-year time of travel WHPA for the Village. However, because they are directly upgradient of the WHPA that is established for the Village, it was agreed that initiating a mutual planning effort with Webber Township would be beneficial. While Pleasant Plains Township does not have its own water supply system, the WHPA does overlap the township limits and should also be identified in any planning documents for Pleasant Plains Township. A WHPA for the Village water supply wells also protects private wells in the WHPA. The team anticipates that adjacent townships will want to participate based on that reality alone.

The team agreed that an invitation to the adjacent townships should be extended to discuss the WHPA and mutual concerns for protection of the area groundwater.

7.3 Regulatory Management Strategies

7.3.1 Zoning Strategies

As previously discussed, zoning ordinances are the local laws that enforce the master planning efforts and were the primary regulatory management strategies discussed by the team.

As mentioned, the Village is considering industrial zoning changes that support protection of the WHPA. The team discussed the potential for further restricting specific developments or commercial businesses in the WHPA, but determined that it wasn't necessary at this time. Other types of regulatory approaches discussed included a site plan review checklist that can be used by the building official to use during the site plan review process.

7.3.1.1 Stormwater Design Criteria

Currently, the Village does not have a stormwater ordinance outlining stormwater controls for runoff and runoff water quality discharged to aquifer recharge areas and protected lakes and streams. Potential contaminants of concern in stormwater runoff include Sodium and Chlorides from road deicing and Total Suspended Solids and other larger solids that could plug aquifer recharge areas. Other potential contaminants that may result from stormwater include Oil and Grease from restaurants or food processors and oil and gasoline spills from vehicles or tanker trucks.

The need for a stormwater ordinance had recently surfaced because a national franchise had submitted for site plan review and the Village had asked their engineer to review the stormwater design. While best engineering judgement was used in the review, it was clear that guidelines specific to the Village would be helpful. Most larger communities have a stormwater ordinance, but the Village does not have enough site plan review requests to warrant one, nor are they required by federal stormwater regulations to establish a stormwater ordinance.

While a complete stormwater ordinance may make more sense in the future, the team consensus was to revise the current site plan review criteria and checklist to include stormwater design related items.

7.3.1.2 Site Plan Review Checklist

Most municipalities have a checklist that can be given to applicants to help them understand the documents required for site plan submittal and to also be used by the reviewing agency as a checklist. The Village currently has a basic checklist for these purposes. The team concurred that, at a minimum, both stormwater design criteria and WHPA overlay should be considerations in the site plan review process.

Specific modifications to the checklist criteria were not discussed in the team meetings. However, all members concurred that the Village should draft a new checklist to be implemented under the current zoning ordinance.

Items to be added to the checklist include the following:

1. Applicant to provide a stormwater management plan.
2. Applicant to use BMPs for stormwater treatment such as treatment swales, vortex grit removal, and oil and grease removal.
3. Overlay WHPA onto submitted site plan drawing.
4. Provide locations and a listing of all hazardous wastes generated and chemicals used and stored onsite.
5. Provide details of all SESC measures to be used on the site.
6. List secondary containment where hazardous materials are stored in operational processes.
7. Floor drains allowed only when the business or entity agrees to connect them to the Village's wastewater treatment system, onsite holding tanks, or other type of system approved by the Village.
8. Design Parking areas to reduce nonpoint discharge of runoff and contain sediment traps to prevent contaminants from reaching groundwater.
9. Identify all storage areas for chemicals, liquids, and underground facilities.

7.3.1.3 Other Regulatory Strategies

The team discussed that management strategies do not necessarily need to be limited to the 10-year time of travel. Choosing a longer time frame may result in the WHPAs for Webber and the Village to overlap. This strategy results in the protection of the public water supply beyond the 10-year time of travel, or protecting resources that may never be essential to the public water supply. The team concluded that this approach doesn't provide any additional benefit to the Village and was removed as a possible regulatory strategy.

Aside from zoning regulations, no other regulatory strategies were recommended at this time.

7.4 Nonregulatory Management Strategies

Besides the above described regulatory options, the team has determined that nonregulatory tools are also important management strategies. Among these, the elimination of abandoned wells is a high priority.

7.4.1 Local Government Programs and Activities

Both the Village and Townships can coordinate activities to assist in the implementation of the WHPP. Some activities that were considered by the team included:

- Community sponsored hazardous material collections.
- Assistance to businesses in organizing hazardous waste and recycling pickups.
- Reduction or elimination of hazardous substances used by local agencies.
- Purchase of development rights.
- Acquisition of land.
- Increased frequency of street sweeping.
- Inspection of private wells and submittal for grant money to plug abandoned wells.

7.4.1.1 Abandoned Well Program

Team discussions marked the importance of locating abandoned wells and plugging them.

Abandoned wells include those previously used for water, oil or gas. The State of Michigan Statute, 1978 PA 368, Groundwater Quality Control Act, Part 127, defines an abandoned water well as a well that:

- Has its use permanently discontinued.
- Is in such disrepair that its continued use for obtaining groundwater is impractical.
- Has been left incomplete.
- Is a threat to groundwater resources.
- Is, or may be, a health or safety hazard.

There are many reasons for properly plugging unused water wells. The most important of these include:

- Abandoned water wells can act as conduits for contaminants to move from the surface into deeper aquifers.
- Abandoned water wells are a safety hazard and an unnecessary liability for property owners.
- Deteriorated water well casings or open, uncased boreholes allow movement of water between previously separated aquifers.
- Abandoned water wells may have been used for illegal waste disposal.

Following are examples of abandoned wells that should be plugged:

- Water wells that are not operational.
- Water wells disconnected and taken out of service at the time connection is made to a municipal water system.
- Any inoperable or abandoned water well that is not properly sealed which can be a safety or environmental hazard.

In Michigan, the plugging of water wells is regulated under the authority of The State of Michigan Statute, 1978 PA 368, Groundwater Quality Control Act, Part 127. The Act authorizes promulgation of the rules contained within the Michigan Water Well Construction and Pump Installation Code.

A typical Well Abandonment Program consists of the following components:

1. **Well Location and Identification.** Abandoned water wells are often difficult to locate. Methods used to locate abandoned water wells include talking to individuals, looking for physical evidence, and doing a record search. The Village has considered sending out a questionnaire asking the residents if they are aware of abandoned water wells in the area. It was concluded that incentives would be needed to get a good response. The team discussed that even if the Village offered to pay for the well abandonment, that may not be enough incentive for residents to respond. Further discussion is needed to best determine the way to get the residents involved and comfortable enough to notify the Village of a potential well to properly abandon.
2. **Prioritization of Wells for Abandonment.** The priority for water well abandonment would be as follows:
 - a. High—Commercial or industrial properties within the WHPAs
 - b. Medium—Residential/Agricultural properties within the WHPAs
 - c. Low—Wells outside the WHPAs
3. **Plugging Assistance.** The Village cannot plug abandoned water wells that it does not own. The Village recognizes that owners of abandoned water wells are often uninformed about their responsibility regarding the water wells or may be unable to pay for proper plugging of their water well. As such, the team concluded that the Village will help make both educational and financial resources available for well owners to properly plug their water wells. The Village will work with organizations such as EGLE and District Health Department No. 10 to help in several ways:
 - a. Increase public awareness of the problem of abandoned wells.
 - b. Provide educational materials to the public.
 - c. Enforce well plugging regulations.
 - d. Follow up on well plugging at replacement water well sites.
 - e. Secure available funding that can offset the cost of well plugging.

7.4.1.2 Purchase of Land or Development Rights

Purchase of land can be effective in protecting specific high hazard areas, such as aquifer recharge areas, from development and potential contamination. The Village currently owns two properties that could be used in the future for a new public water supply well, or at the very least, used as a buffer from other properties.

Purchase of development rights or conservation easements can also be effective in protecting specific high hazard areas from potential contamination. At a minimum, it is recommended that the Village attempt to purchase lands in advance for new wells in locations separated from existing wells (see “Siting New Wells” section in this document).

7.4.2 Other Nonregulatory Strategies

Other nonregulatory efforts may also be of interest. Additional effective techniques or options include:

- Public education programs to raise awareness about the need for groundwater protection (see Section 10.0.)
- Reduction or elimination of hazardous substances used by state and county agencies.
- Conservation easements to control land uses in highly vulnerable areas.
- Mutual planning efforts with adjacent townships.

As mentioned earlier, the Village’s WHPA extends into neighboring Pleasant Plains and Webber Townships. While most of the neighboring areas within the WHPAs are not currently being served by the Village water system, they may someday have access to Village water. It is assumed that neighboring municipalities will have the same interest in protecting the watershed and groundwater producing aquifer(s).

7.5 Implementation Schedule

The Village plans to implement the following management strategies over the next three years:

First Year:

- Prepare the Preliminary Checklist for Site Plan Review.
- Reach out to Webber and Pleasant Plains Townships to discuss mutual planning efforts.

Second Year:

- Formulate an abandoned well program.

Third Year:

- Initiate the abandoned well program.

8.0 Element 5 – Contingency Plan

8.1 Existing Plans

Contingency plans for water systems are required to document what must be done if an incident occurs that could impact the Village's wells and water distribution system.

Contingency planning has long been a requirement for Michigan's public water systems under Act 399. As a result of the events of September 11, 2001, the Federal government required water systems to prepare both a Vulnerability Assessment (VA) and an Emergency Response Plan (ERP) under the Bioterrorism Act of 2002. The requirements of the Act for ERPs were very similar to the contingency planning requirements under Act 399 and would later suffice for meeting both requirements. Currently, the American Water Infrastructure Act (AWIA) of 2018 has required that a Risk and Resilience assessment be performed which essentially requires municipalities to update their VAs and ERPs and now include natural disasters in addition to malevolent threats. The Village serves less than 3,300 persons and therefore is not required to formally prepare a VA or ERP, but does have an updated Emergency Response Plan. As indicated by the varied legislation mentioned above, PWSSs are very aware of the need for contingency planning and written response procedures in the event of a water emergency. The Village's current ERP has Action Plans for Well Supply Emergency Scenarios. The ERP is included as Appendix 6.

8.2 Assessment of Existing Well Supply Vulnerability

Considering which wells are most vulnerable to serious contamination and which contaminants pose threats to each well is useful in planning for emergencies. Table 4 lists the most likely potential contaminants each well could be exposed to based on its location in the Village, as well as a ranking of the vulnerability of each well from most vulnerable to least vulnerable.

Table 4 – Well Vulnerability Rank

Well ID	Potential Contaminants	Most Vulnerable Well Rank
PW-1	--	--
PW-2	Railroad, Chemical Spills, Bus Depot, Fuel Storage	1
PW-3	Gasoline, Courthouse, Road Commission	4
PW-4	Gasoline, Courthouse, Road Commission	3
PW-5	Railroad, Chemical Spills	2

The vulnerability ranking in the table above is a cursory assessment of the susceptibility to contamination based on known potential threats as identified in the CSI. For this report, wells PW-2 and PW-5 were deemed the most vulnerable to contamination as these wells are closest to the train corridor. Chemical cargo trains pass through Baldwin multiple times per day on the way to and from Ludington and Manistee and represent a consistent threat to contamination of the WHPA associated with wells PW-2 and PW-5.

Using the capacity data from Table 1, the well system can be analyzed for the loss of its two most vulnerable wells and determine the remaining capacity versus the ADD and MDD.

- PW-2 out of service: Total capacity = 1,050 gpm. The Village can meet ADD and MDD.
- PW-5 out of service: Total capacity = 1550 gpm. The Village can meet ADD and MDD.
- PW-2 and PW-5 out of service: Total capacity = 700 gpm. The village can meet ADD and MDD.

In a power outage only PW-2 and PW-5 have standby power and therefore the capacity of the system is 1,150 gpm. The standby capacity of the well system with PW-2 is 800 gpm and PW-5 only is 350 gpm. Even with only PW-5 operating the Village can meet the ADD. The Village is currently in the process of adding standby power to serve PW-3 and PW-4.

In summary, the Village has much redundancy in its well field system and can accommodate a number of wells being out of service and still maintain the ADD.

9.0 Element 6 – New Wells

The Village's 2018 Water System Reliability Study indicates that no additional wells will be needed in the near future due to no anticipated increase in population or industrial activity. However, if new wells are needed due to a failure of one or more wells, this section provides information regarding existing supplies and potential future needs. Tables 1 and 2 show the current supply well total capacity, firm capacity, and the actual and projected system MDD. Based on this information, it appears that the system MDD will not exceed the supply well firm capacity for the foreseeable future.

It is expected that the production from a new well will be at least equivalent to the lowest capacity of the current wells. However, the pump capacity named for each well is not necessarily a good indicator of the well capacity. The specific capacity of the well better identifies the potential well capacity. From the pumping test information available for PW-4, the specific capacity was 5.9 gpm per foot of drawdown. Assuming similar drawdown, it is expected that a well in the vicinity of PW-3 and PW-4 may again produce a minimum of 350 gpm.

If one or more of the existing wells becomes unusable, a hydrogeologic investigation should be performed to locate and evaluate potential sites for the future supply wells. The study should first investigate PW-3/PW-4 and PW-2/PW-5 well field areas to determine whether the aquifer characteristics will allow additional wells to be installed in these areas. If the increased supply well capacity can be developed at the existing well field areas this would be the best alternative. If the additional capacity is not available at these sites, it is important to identify a new groundwater source and secure property for a new future well field. Existing hydrogeological data indicate that finding alternative well sites in the Baldwin area is favorable.

The Village will incorporate all new wells into the WHPP. This will involve completing a WHPA delineation for the new well(s), preparing a contaminant source inventory for the new WHPA, and updating other elements in the WHPP to include the new wells.

10.0 Element 7 – Public Outreach and Community Education Effort

As mentioned earlier in this report, a plan to implement a Public Outreach and Community Education Program was prepared by the Village in 2000. This plan enabled the Village to obtain a higher ranking in the grant application process and ultimately obtain a grant to complete the WHPP effort.

The plan is included in Appendix 7 and was the basis for discussions on this topic in the wellhead protection meetings.

The Plan identifies individual outreach and education plans for three basic groups: The general public, industry/agriculture, and students.

The basic theme of the outreach and education program is to better inform the groups on the following topics:

- What is groundwater?
- How is groundwater distributed?
- How can groundwater become contaminated?
- What measures can be taken to ensure that our water supply is safe (including the wellhead protection area)?
- What can you as an individual, company, group, etc., do to prevent groundwater contamination?

10.1 General Public Outreach and Education

Discussions of public education included first making sure that the planning commission understands the intent of the WHPP. The team concluded that the Planning Commission should coordinate all public outreach and education programs.

In addition to items mentioned in the plan, specific items discussed by the team were as follows:

- The Village's engineering consultant will initially assist with audio/video material preparation and likely make a presentation to the Village Council or Planning Commission on the WHPP.
- The Planning Commission could hold a WHPA informational open house.
- An informational postcard or questionnaire will be sent out to educate residents on the WHPP.
- The Village's website is currently being revamped and could be a great place to post the plan or at least the WHPA and a basic informational page on the WHPP.
- An overview of the WHPP can be shared with local news/media.
- Signs delineating the WHPA boundaries should be purchased and placed at the limits of the WHPA.
- EGLE and other WHPP resources will be made available on the Village's upgraded website.
- EGLE and other WHPP resources will be researched to obtain other outreach ideas.

10.2 Industry/Business Outreach and Education

While the original plan called for a specific plan for Industry and Agriculture, few industrial or agricultural businesses exist in the WHPA. Private businesses, restaurants and institutional facilities make up most of the

sites in the WHPA. Sites of greater concern may include known sites of oil and gas storage or road deicing material storage. The CSI will be used to tailor an outreach and education plan to sites within the WHPA.

The strategy may involve personal contact with some business representatives, presenting materials describing the importance of groundwater protection. A more general program, similar to the general public outreach and education approach, will likely be employed for lower risk businesses.

10.3 Student Outreach and Education

The plan identifies outreach and education of student age community members extremely important to the long-term success of the WHPP. The entire extent of the WHPA is within the jurisdiction of the Public School District.

The plan for student outreach and education identifies three strategies:

- Working with schools and teacher organizations to integrate groundwater related issues into the curriculum.
- Providing demonstrations and materials to students relative to groundwater and groundwater protection.
- Encouraging students and teachers to embark upon individual or class projects concerning wellhead protection.

10.4 Implementation Schedule

Upon completion and EGLE approval of this plan, the team plans to meet at least annually or as needed if issues involving the WHPP arise. Meetings will be posted by the Village such that residents can attend the meeting. Any questions regarding the WHPP should be directed towards Baldwin Village Hall (231-745-3587).

The Village plans to implement the following outreach and education items over the next 3 years.

First Year:

- Post the WHPP to the Village's updated website.
- Present the WHPP to the Village Council.
- Send an informational postcard or questionnaire out to educate residents on the WHPP.
- Post a discussion of the importance of plugging abandoned wells to the updated website.

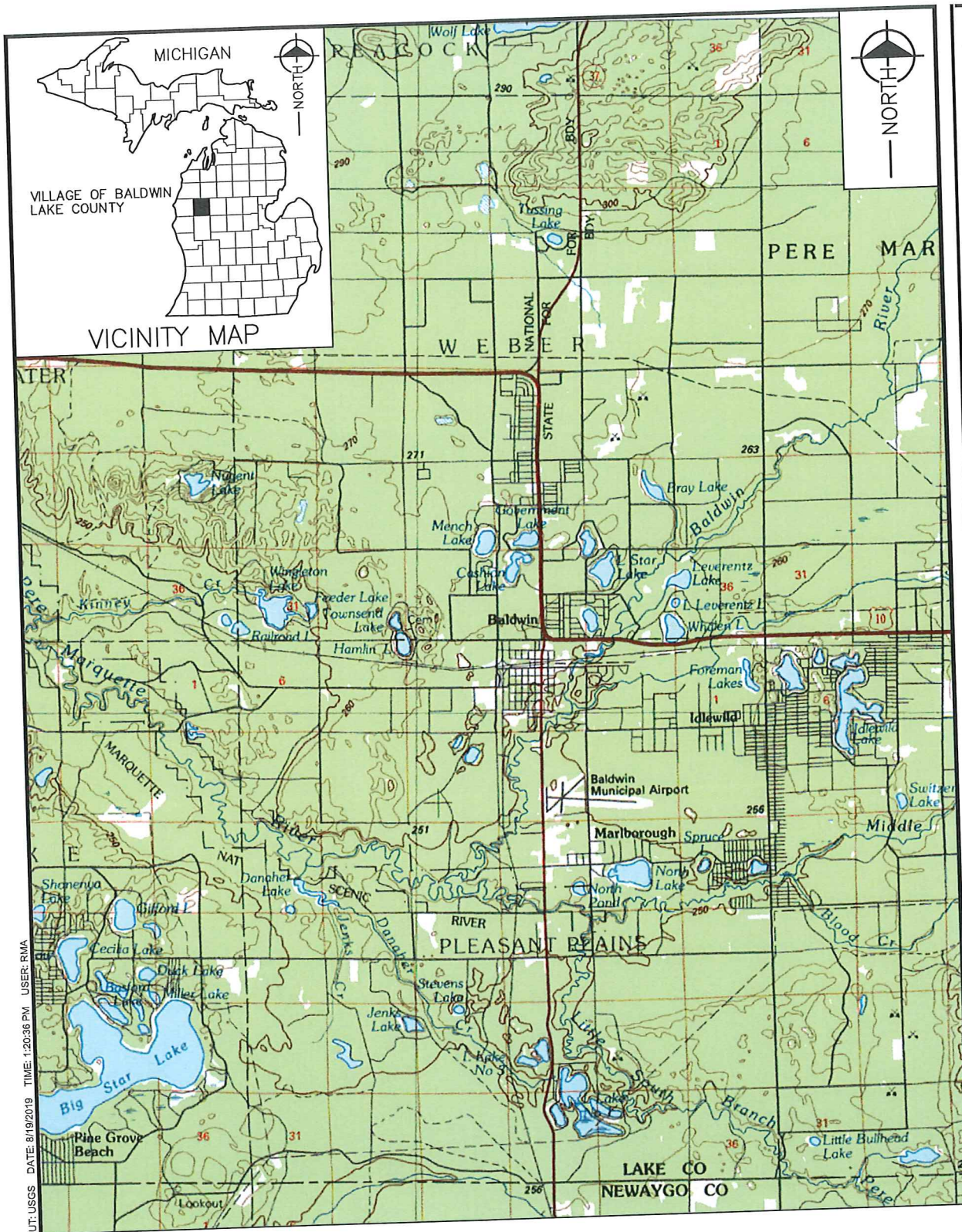
Second Year:

- Provide an overview of the WHPP with local news/media.
- Reach out to students by scheduling WHPP presentations with the local schools.
- Install WHPA signs at the limits of the WHPA.

Third Year:

- Contact larger businesses and known storage facilities and review the WHPP with them.
- Provide EGLE and other WHPP resources on the Village's upgraded website.
- The Planning Commission will hold a WHPA informational open house.

Figures



PLOT INFO: 21/01/18/181752/CAD/CDS/USGS.DWG LAYOUT: USGS DATE: 8/19/2019 TIME: 1:20:36 PM USER: RMA

REFERENCE:
BIG RAPIDS, MI QUADRANGLE
30 X 60 MINUTE SERIES
DATED: 1991
SCALE: 1:100,000

LOCATION MAP

ftch

engineers

scientists

architects

constructors

fishbeck, thompson,
carr & huber, inc.
www.ftch.com

Hard copy is
intended to be
8.5"x11" when
plotted. Scale(s)
indicated and
graphic quality may
not be accurate for
any other size.

Village of Baldwin
Baldwin, Lake County, Michigan

Wellhead Protection Program

PROJECT NO.

181752

FIGURE NO.

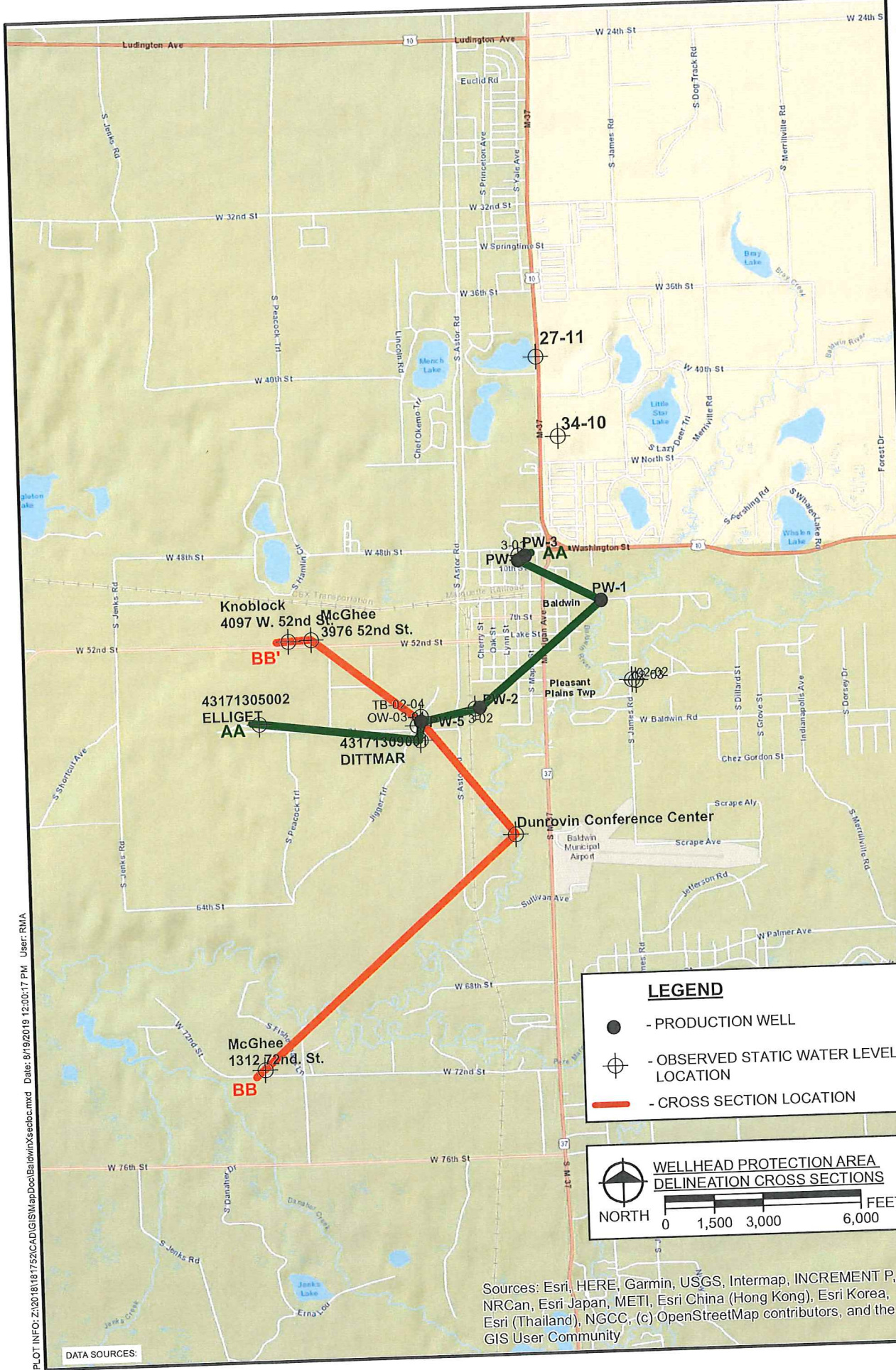
1

Village of Baldwin

Baldwin, Lake County, Michigan

Wellhead Protection Program

PLOT INFO: Z:\2019\181752\CAD\GIS\MapDoc\BaldwinXsecloc.mxd Date: 8/19/2019 12:00:17 PM User: RMA



LEGEND

- - PRODUCTION WELL
- ⊕ - OBSERVED STATIC WATER LEVEL LOCATION
- - CROSS SECTION LOCATION



WELLHEAD PROTECTION AREA DELINEATION CROSS SECTIONS

0 1,500 3,000 6,000 FEET

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

DATA SOURCES:

PROJECT NO.
181752

FIGURE NO.

2

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AA'
EAST

PW-3
(12/65)

PW-4

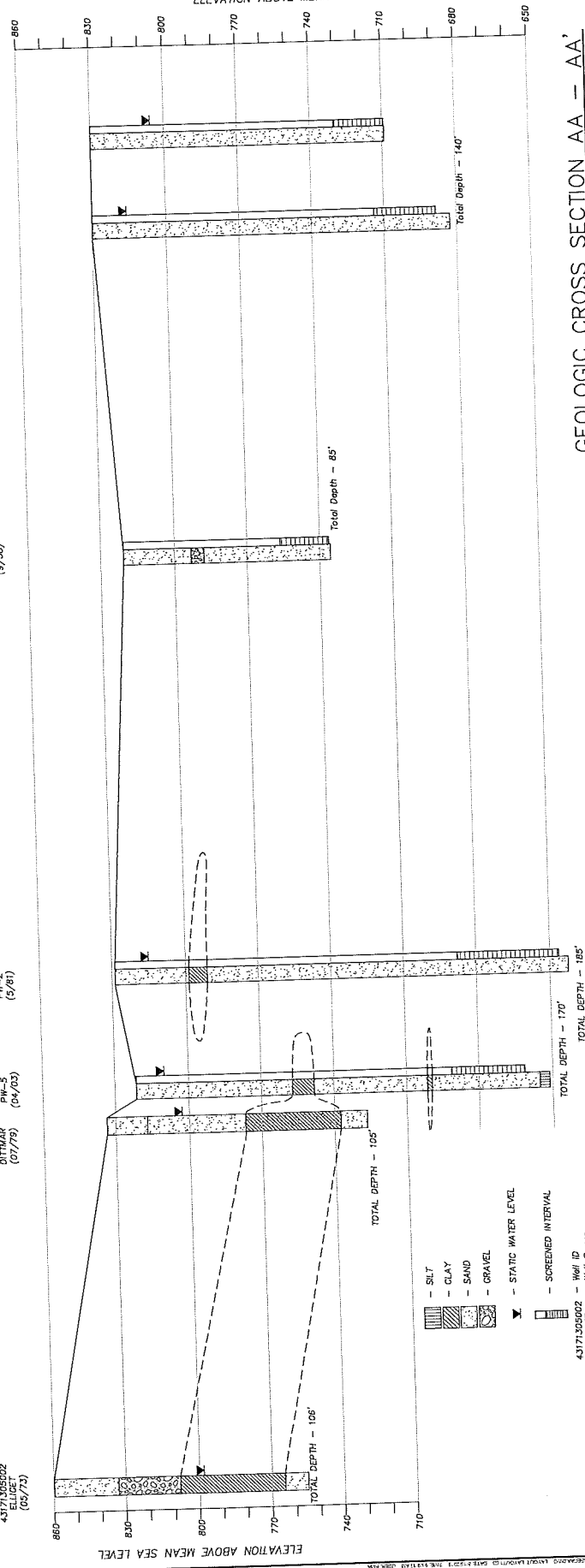
PW-1
(9/78)

PW-2
(5/81)

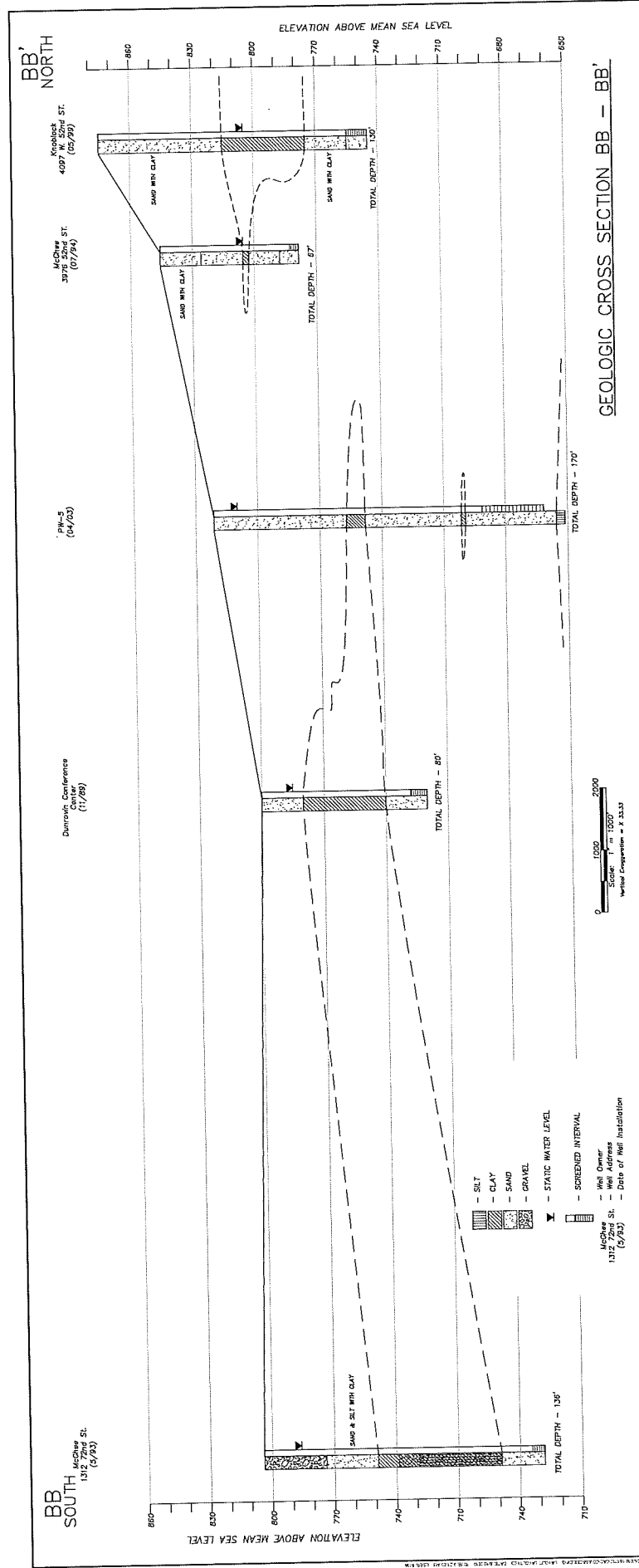
PW-5
(04/03)

43171305001
DITMAR
(07/79)

43171305002
ELLIGET
(05/73)

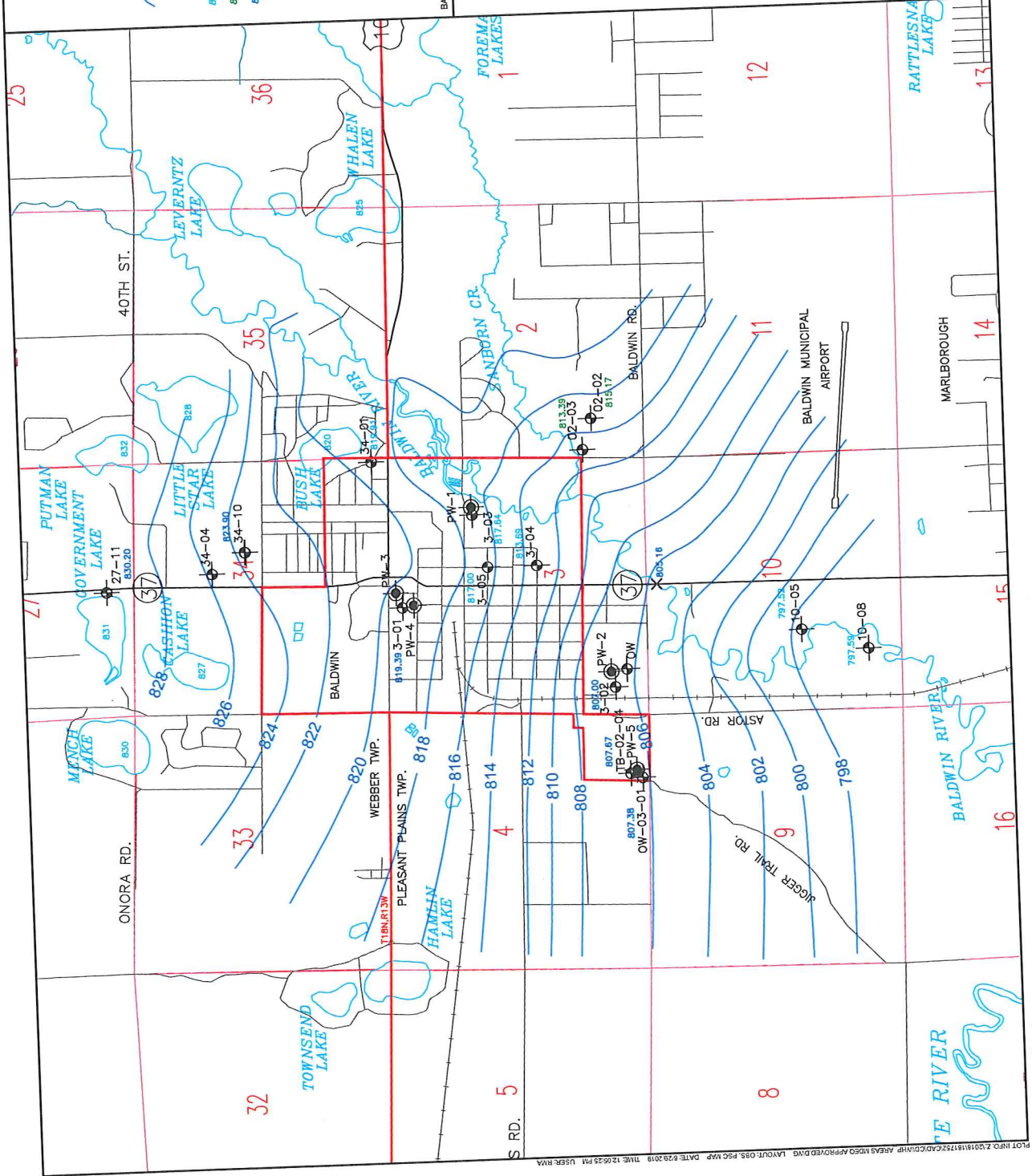


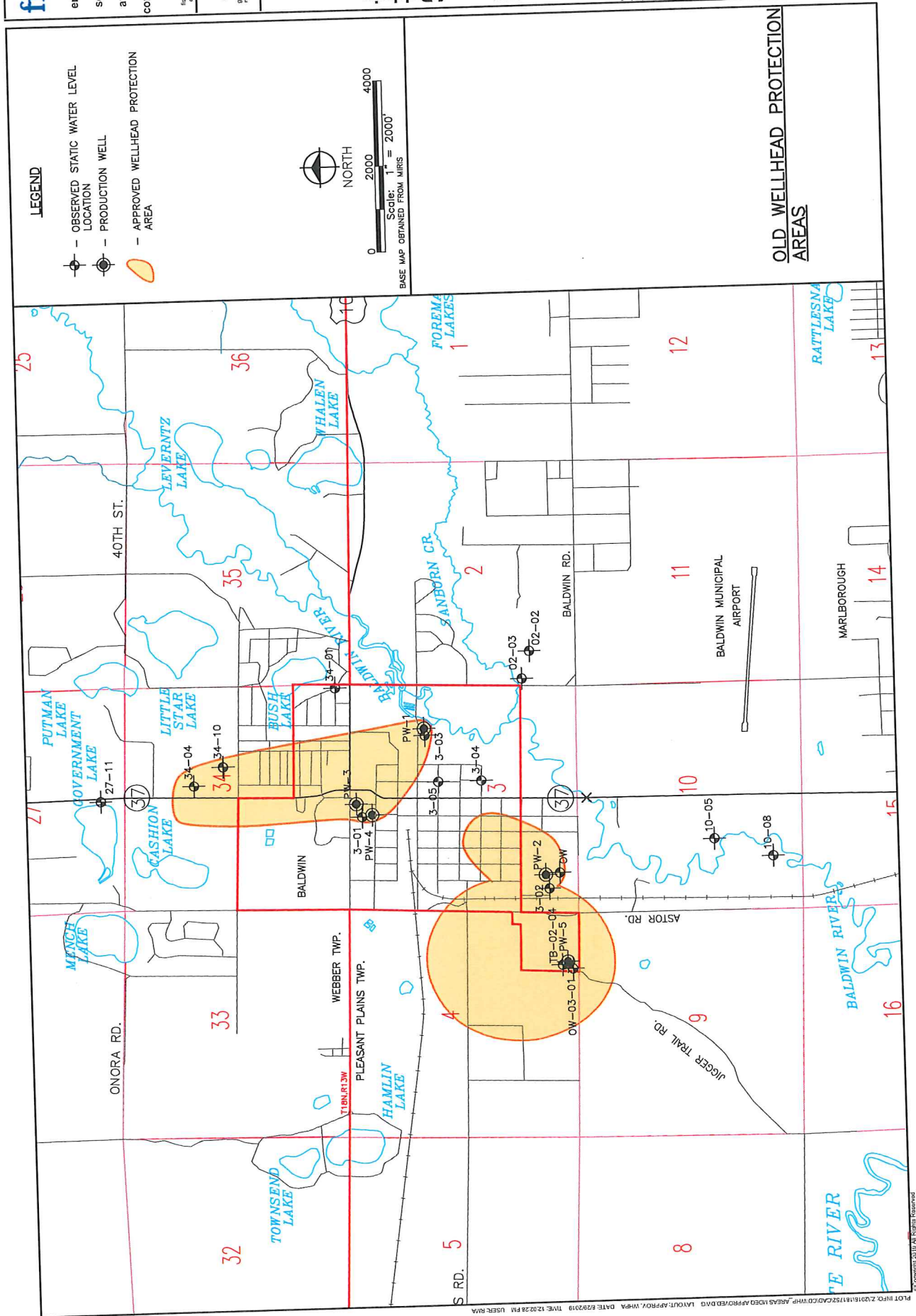
GEOLOGIC CROSS SECTION AA' - AA'

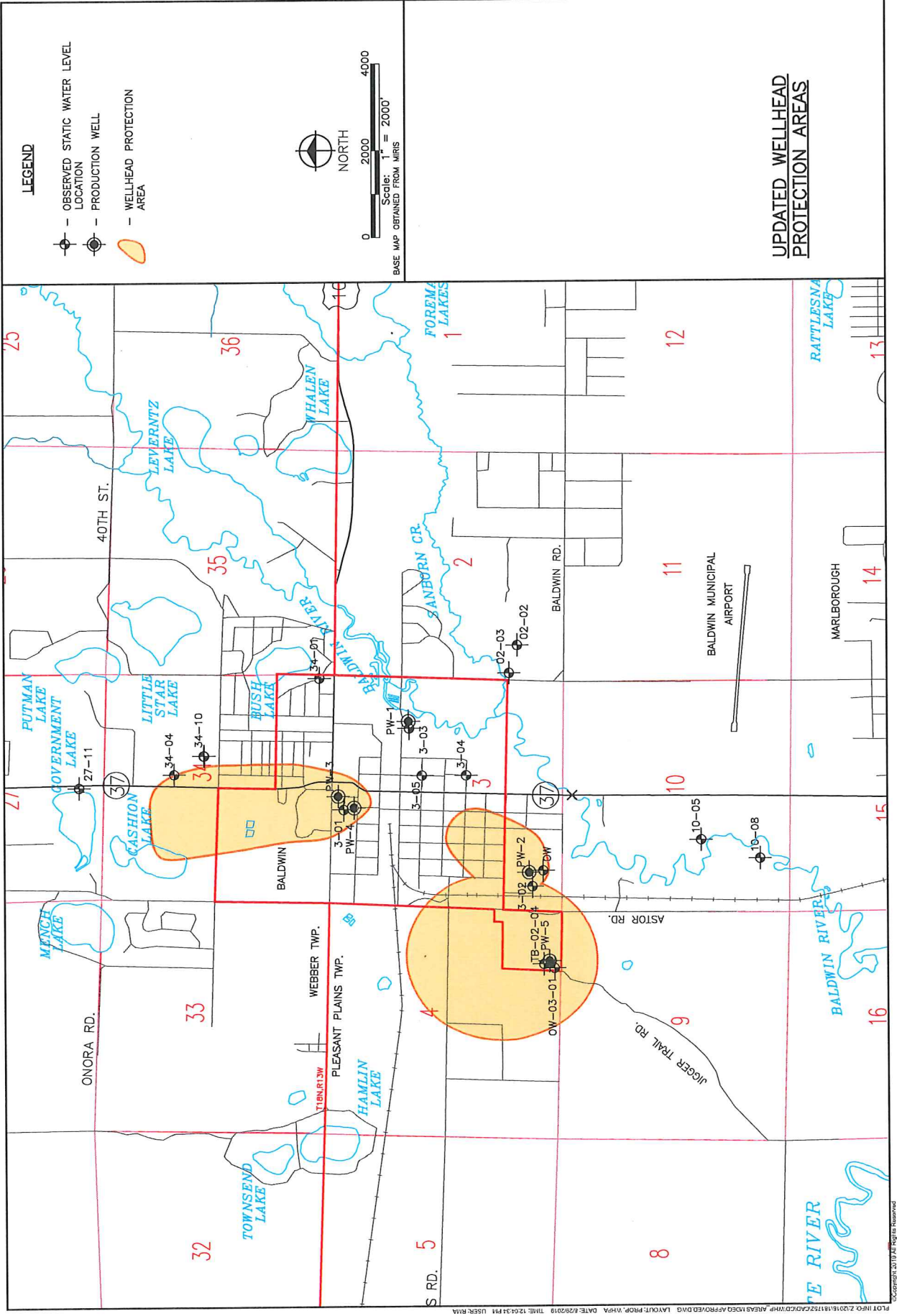


- LEGEND**
- OBSERVED STATIC WATER LEVEL LOCATION
 - PRODUCTION WELL
 - POTENTIOMETRIC SURFACE CONTOUR
AUG. 2000, NOV. 2002
& AUG. 2003 DATA
(FEET ABOVE MEAN SEA LEVEL)
 - 825 — STATIC WATER LEVEL (SEPT. 2000)
 - 813.39 — STATIC WATER LEVEL (NOV. 2003)
 - 805.16 — STATIC WATER LEVEL (SEPT. 2003)
- Scale: 1" = 2000'
0 2000 4000
BASE MAP OBTAINED FROM MIRS
- NORTH

**OBSERVED
POTENTIOMETRIC
SURFACE CONTOUR MAP**







Appendix 5

Village of Baldwin

Wellhead Protection Policy and Management Issues Proposed Master Plan Component

The Village of Baldwin (Village) will incorporate wellhead protection policy and management issues into the Village's planning tools. The Village has a Master (land use) Plan that currently has no references to groundwater protection.

We will use the opportunity to include more extensive documentation concerning wellhead protection and information on current and proposed water supply. The recently appointed local team will assist the Village Council in integrating groundwater protection language into the Village Master Plan when it is updated. To the extent that the wellhead protection area may fall outside of current Village limits, we will work with the township to adopt similar provisions.

The Village's complete GIS program will be used to integrate wellhead protection information and make it compatible with other information in the system.

The following language will be considered for any plan updates:

The goal of our wellhead protection program (WHPP) is to provide a mechanism to prevent existing and potential sources of contamination from reaching the public water supply or well field. Intelligent land use decisions regarding development can be much more effective with the incorporation of the wellhead protection concept into the Village's Master Plan. Incorporating wellhead protection policies and management issues into the Village's Master Plan helps community leaders recognize the extent of the Wellhead Protection Area (WPA) and the importance of wellhead protection. Planning elements provide guidance in the development of land use and land protection measures supporting wellhead protection.

The establishment of local goals and objectives for community development in areas that might affect the public water supply provides a mechanism for the effective implementation of local regulations in support of wellhead protection. Local regulations can include the development of local standards for operation and maintenance of both public and private facilities found within the WPA.

Baldwin intends to develop management strategies that will be unique to our area and specific to the contaminant source inventory developed for our Wellhead Protection Area. Master Plan components may entail a broad range of issues including land use regulations, site development policies, best management practices, zoning options, and public education. The Master Plan components (strategies) should serve to generate community support and provide a basis for regulatory procedures and bring attention to the need for Wellhead Protection. The proposed Wellhead Protection Policies and Management Issues should minimize (eliminate if possible) land use activities which pose a significant threat to the public water supply systems and motivate landowners within the Wellhead Protection Area to take appropriate steps to reduce threats to the public water supply. The goal of land use strategies should also be to educate residents, businesses and industries found within the Wellhead Protection Area and to emphasize their role in making wellhead protection work.

Zoning options identified in the plan could include:

- Overlay wellhead protection area zoning districts
- Identification of prohibited uses

Special Land Use permits for certain uses

Large lot zoning

Development of performance standards and best management practices

Growth Management Control such as phased development or utility service areas

Requiring additional information about hazardous material handling and onsite management practices through the site plan review process

Transfer of development rights

Once appropriate specific options are determined for our situation, we will provide definition to those options.

Special site considerations regulated by site plan review in the zoning ordinance can control potential hazards. However, zoning regulations are not retroactive and do not remedy existing conditions. An ordinance requiring retrofitting of items such as floor drains, storage areas, and best management practices, for each type of business should be adopted as part of a broader wellhead protection ordinance once the Village council has approved the management plan.

Purchase of land can be effective to protect specific high hazard areas from all development or potential contamination such as recharge areas. Purchase of development rights or conservation easements can also be effective in protecting specific high hazard areas from potential contamination. At the minimum it is recommended that the Village attempt to purchase in advance lands for new well fields in location separated from existing fields.

The planning commission will consider the following process for incorporating wellhead protection policy and management issues into the Master Plan:

1. Meet with the local team to discuss the issues and develop a process and structure for initiating all required elements of the wellhead protection plan and to assign tasks among the membership to work on the issues that affect the future of the community's water supply.
2. Allow time for research and to obtain the opinions of experts such as a consulting engineer, water department staff, health department staff, fire chief, planning staff, tec.
3. Review wellhead protection policy statements with the local team.
4. Describe in detail the following wellhead protection planning issues:
 - a. The types of land use that might affect groundwater.
 - b. The delineation of the WHPAs.
5. Complete a land use inventory including an inventory of potential contamination sources.
6. Coordinate land use and contamination sources inventory with the GIS inventory and include mapped information in the master plan.
7. Describe advantages and disadvantages of specific tools and management strategies and programs to control contaminant sources or inappropriate land use.

8. Identify possible solutions to prevent the release of potential contaminations (substances) through land use controls, site development standards and zoning alternatives.
9. Coordinate issues with neighboring townships, Village council, and local team.
10. Identify issues that may affect community reviews of site plans for wellhead protection areas including:

Secondary containment for areas where businesses, industry and government agencies store, handles, or use hazardous materials in operational processes.

Allow floor drains only when the business or entity agrees to connect them to a publicly approves wastewater treatment system, on-site holding tanks, or other type of system approved by the State.

Closely supervise of the installation of underground storage tanks.

Require Stormwater Management plans that incorporate effective containment measures.

11. Monitor growth corridors to ensure consistency with wellhead protection policies.
12. Indicate how public participation strategies in a wellhead protection program will be implemented.
13. Prepare final documentation on wellhead protection policy for inclusion in the Master Plan.
14. Hold a formal advertised public hearing on the plan amendment.
15. Prepare a written plan for a continuing public participation program.

Procedures for planning commission action on wellhead protection policies.

(1) Issue identification

Discuss the basic philosophy and issues involved in wellhead protection at open meetings of the planning commission.

Present and explain the seven step DEQ wellhead protection program.

Public participation meetings.

Public Hearings

Appendix 6

EMERGENCY RESPONSE PLAN

Village of Baldwin Water Supply System

Date: August, 2019

In case of emergency, contact the Michigan Department of Environmental Quality as soon as possible.
Considerations: Loss of pressure, inadequate quantities of water available, contamination

Water Department Contacts

<u>Name</u>	<u>Position</u>	<u>Phone #</u>
24 Hour Response	IAI On Call Personnel	231-250-1487
Charles Gardner	IAI Operations Specialist	231-729-0900
Adam Philipp	IAI Operations Specialist	989-750-6051
Rodney TenHave	IAI Operations Specialist	231-721-5471
Sierra Brown	IAI Area Manager	517-242-7131

EGLE Drinking Water Contacts

<u>Name</u>	<u>Title</u>	<u>Phone</u>
24 Hour Emergency	After Hours Emergency	1-800-292-4706
Scott Conradson	EGLE District Engineer	231-876-4461
EGLE District Supervisor	District Supervisor	231-590-3430
Amy Vail	Environmental Quality Analyst	231-876-4481
Krista Robinson	Environmental Quality Analyst	517-599-8655

Local Officials

<u>Name</u>	<u>Title</u>	<u>Phone</u>
James Truxton	Village President	231-590-5504
Health Department		231-745-4663
Jim Padden	Department of Agriculture	231-590-0899

Emergency Response

<u>Name</u>	<u>Type</u>	<u>Phone</u>
Lake County Sherriff	Police	911 / 231-745-2711
Local Fire Department	Fire	911 / 231-745-2711
Life EMS	Ambulance	911 / 231-745-2711

Media

<u>Name</u>	<u>Type</u>	<u>Phone</u>
9&10 News	Television	1-800-782-7910
TV 7&4	Television	1-800-968-7770
WTCM	Radio	231-947-7675
94 K-Rock	Radio	231-843-0941
WYBR	Radio	231-796-7000
Lake County Star	Newspaper	231-745-4365

Neighboring Water Systems

<u>Name</u>	<u>Phone</u>
Webber Township	Sam Philipp (OIC) 231-729-1896
Reed City Water	231-832-2245
Ludington Water	231-843-8830

EMERGENCY RESPONSE PLAN

Village of Baldwin Water Supply System

Water Laboratories

Name

Big Rapids Water Treatment
State Drinking Water Lab

Phone

231-796-6231
517-335-8184

Contractors

Type

Excavator
Well Drillers

Name

H&H Excavating
Peerless Midwest (Suez)
Northern Pump
FHC
Shoemaker Electric
Oudbier Instruments
Ringler Plumbing

Phone

231-745-8501
616-527-0050
877-477-1757
616-538-3231
231-832-9503
269-792-4404
231-832-9951

Suppliers

Type

Chemical
Pumps

Name

Alexander Chemical
Peerless Midwest
Northern Pump & Well
FHC

Phone

800-348-8827
616-527-0500
877-477-1757
616-538-3231

Critical Customers

Name

Fresenius Medical Care
Lake County Jail
Lake County Residential Re-entry Program
Grand Oaks Nursing Center
Oakwood Manor
Baldwin Community Schools

Address

1101 Washington
1153 Michigan Ave
5565 S M-37
600 Denmark St
401 Washington St
425 4th St

Phone

231-745-2020
231-745-2712
231-745-2330
231-745-4648
231-745-2582
231-745-4791

- Method of delivering water
 - Purchase of bottled water from grocery stores
 - Procure bottled water from Ice Mountain in Stanwood (231-823-8100)

COMMUNICATIONS

- Methods of communication during power outage
 - Radio – Radios are installed in the vehicles and handheld radios are available. The Tower these broadcast from has a backup generator
 - Cell Phone – All staff have cell phones and the cell towers have backup power generators
- Communication with users
 - Local Media will be kept up to date with current information to be broadcast to customers
 - City-watch is an emergency based communication system used by local dispatch that will contact customers via telephone with a customized message
 - Personnel will go door to door, depending on the nature and severity of the problem

EMERGENCY RESPONSE PLAN

Village of Baldwin Water Supply System

PLANS & AGREEMENTS

- General Layout
 - General Plan
 - WWTP (7514 Grove St.)
 - Valve & Hydrant Map
 - Prints located at WWTP (7514 Grove St)
 - Electronic Water Maps (WWTP – 7514 Grove St)
 - Baldwin Fire Department (620 Washington St)

PERSONNEL SAFETY

- Personal Protective Equipment
 - Vests and gloves are located in each vehicle
 - Other PPE Locations
 - WWTP (7514 Grove St)
- MSDS Location
 - WWTP (7514 Grove St)
 - Village Office (620 Washington St)

EMERGENCY SAMPLING

- Water Sampling
 - Bacteriological Sampling
 - Sample Bottles and forms located at WWTP (7514 Grove St)
 - Laboratory is Big Rapids Water Treatment Plant (231-796-6231)
 - Volatile Organic Compounds (V.O.C.s) & Other Samples
 - Sample Bottles and forms located at WWTP (7514 Grove St)
 - Laboratory is State Drinking Water Lab (517-335-8184)
- Emergency Supplies and Equipment
 - Vehicles
 - Pickup Trucks (DPW Building – 620 Washington St)
 - Loaders & Heavy Equipment (Cold Storage - 630 Washington)
 - WWTP – 7514 Grove St
 - Repair Parts
 - Meters (Well #1 Building – 8th St)
 - Other Parts for Mains (Cold Storage – 630 Washington)
 - P.P.E. & Other Equipment
 - Park Building – 685 Washington
 - Cold Storage – 630 Washington
 - WWTP – 7514 Grove St
 - Prints
 - Electronic – 620 Washington
 - Physical – 7514 Grove St
 - Other Parts
 - Refer to contacts section

SOURCE

Groundwater & Master Meter Information

Well Number	Diameter (inches)	Depth (feet)	Capacity (gpm)	Location	Treatment Type
2	20"	143'	800	243 4 th St – Behind School	Chlorine Tap
3	8"	100'	180	690 10 th St – East Hollister Park	Chlorine Tap
4	12"	115'	400	610 10 th St – West Hollister Park	Chlorine Tap
5	12"	130'	435	3208 W 36 th St	Chlorine Tap

EMERGENCY RESPONSE PLAN

Village of Baldwin Water Supply System

STORAGE

- School Tower (243 4th St)
 - Elevated Spheroid
 - 100,000 Gallon Capacity
 - Located Behind School
- Norway St Tower (1085 Norway St)
 - Elevated Spheroid
 - 300,000 Gallon Capacity
 - Located on the Corner of Norway St. and 10th St

WELL OPERATION

- Normal Operation
 - All wells are operated by computer located in Well Houses #4 & #5
 - Wells operate automatically via Human Interface Device
- Auxiliary Power Operation
 - Auxiliary Power Sources
 - Well #2
 - Diesel Motor In Well House
 - Portable generator located in well house provides power to control panel
 - Well #3
 - No Backup Power
 - Well #4
 - No Backup Power
 - Well #5
 - Propane Generator
 - Behind Well House
 - Operation During Power Outage
 - Well #2
 - Manually Disconnect Power from Grid by Pulling Main Breaker
 - Start Tractor Motor via Key Switch
 - Engage PTO by pulling lever
 - Run until pressure gauge reads desired pressure
 - Well #5
 - The generator will provide power to facility automatically
 - Set Well #5 to hand on the control panel (not the computerized panel)
 - Run until pressure gauge reads desired pressure

TREATMENT

- Treatment Methods
 - All wells are equipped with a chlorine tap
- Auxiliary Treatment
 - Chlorine tap at Well #5 is powered via generator
 - Chlorine tap at Well #2 can be powered via portable generator located at Well #2

EMERGENCY RESPONSE PLAN

Village of Baldwin Water Supply System

WELL FIELD EMERGENCY RESPONSE PLAN

Action Plans:

Four action plans for the following emergency situations are outlined below:

1. Routine monitoring discloses unexpected contamination in the well field.
2. Discovery of a release of a contaminant from a fixed site in the WHPA.
3. A transportation accident or other event causes a chemical spill in the WHPA.
4. Complete failure of the water system.

The following sections identify general procedures to follow in these emergencies. In reality, there are numerous variables that will determine how a given emergency situation will develop and be handled. The ultimate response to an emergency situation must be evaluated on a case by case basis given the severity of the emergency and the potential risks. As such, deviations from the following procedures may be appropriate.

The following actions are recommended to mitigate these water supply emergencies:

Action Plan No. 1:

Routine Monitoring Discloses Unexpected Contamination in the Well Field

If contamination is discovered in groundwater samples from one or more of the Village supply wells, the following general procedure will be followed:

1. Shut down the well unless it is impossible to maintain adequate service without the well in question.
2. If the well must be maintained in service, minimize its use.
 - a. Consider pumping the well as surface waste to protect the remaining wells.
 - b. Make a decision as to the best short term solution to protect the well field.
3. Notify EGLE. The source must be identified and the contaminant remediated as soon as possible.

EGLE Drinking Water Contacts		
Name	Title	Phone
24 Hour Emergency	After Hours Emergency	1-800-292-4706
Scott Conradson	EGLE District Engineer	231-876-4461
EGLE District Supervisor	District Supervisor	231-590-3430
Amy Vail	Environmental Quality Analyst	231-876-4481
Krista Robinson	Environmental Quality Analyst	517-599-8655

4. Review the situation with District Health Department No. 10 and the local medical community regarding the seriousness of the contaminant(s).
5. Notify the public and major water users of the situation and any necessary precautions.
6. Initiate an investigation into the source of the contamination.
7. Determine whether the problem can be corrected or controlled in the near term, or if correction is expected to be long term. Can a well at the up gradient end of the well field be pumped to surface waste to protect the remaining wells?
8. Map out a strategy to potentially get the well back on line; replace with a new well or treat the water from the contaminated well.

EMERGENCY RESPONSE PLAN

Village of Baldwin Water Supply System

Action Plan No. 2:

Discovery of Release of a Contaminant from a Fixed Site in the WHPA.

1. Notify EGLE and advise them of the need to clean up the spill as soon as possible.

EGLE Drinking Water and Environment Health Division:

EGLE Drinking Water Contacts		
Name	Title	Phone
24 Hour Emergency	After Hours Emergency	1-800-292-4706
Cadillac District Office	EGLE District Office	231-775-3960
Scott Conradson	EGLE District Engineer	231-876-4461
EGLE District Supervisor	District Supervisor	231-590-3430
Amy Vail	Environmental Quality Analyst	231-876-4481
Krista Robinson	Environmental Quality Analyst	517-599-8655

2. Estimate the likelihood of contaminants reaching the well field and the travel time to the well field.
3. As appropriate, review the situation with the District Health Department No. 10 and the local medical community as to the seriousness of the contaminant(s).
4. Stay in contact with EGLE and the local health department/medical community as to any changes in the situation.
5. Advocate to EGLE for responsive remedial actions.
6. Keep the public and major water users informed of the status of the situation.

Action Plan No. 3:

Transportation Accident Causes a Chemical Spill in the Vicinity of the WHPA

The Village has a Hazardous Materials (HAZMAT) Spill Response Plan that should be followed for chemical releases. Besides the procedures noted in the Spill Response Plan, the following should also be considered:

1. Contact an environmental consultant to get advice regarding the potential impacts of the release.
2. Do not wash (hose) contaminant into the aquifer.
3. Notify EGLE and advocate for immediate response activities.

EGLE Drinking Water Contacts

<u>Name</u>	<u>Title</u>	<u>Phone</u>
24 Hour Emergency	After Hours Emergency	1-800-292-4706
Cadillac District Office	EGLE District Office	231-775-3960
Scott Conradson	EGLE District Engineer	231-876-4461
EGLE District Supervisor	District Supervisor	231-590-3430
Amy Vail	Environmental Quality Analyst	231-876-4481
Krista Robinson	Environmental Quality Analyst	517-599-8655

4. As appropriate, review the situation with the District Health Department No. 10 and the local medical community to determine the seriousness of the contaminant(s) to public health.

EMERGENCY RESPONSE PLAN

Village of Baldwin Water Supply System

5. If there is likelihood that the release will affect the well field, notify the public and major water users of the situation. Include the status of the well(s), the cleanup of the spill, and the potential seriousness of the contaminant(s) relative to the safety of the drinking water.
6. Officially notify EGLE of the need for remediation of the release.
7. Continually determine the status of the problem.
8. Notify the public throughout of the status of the situation and final solution.

Action Plan No. 4:

Complete Failure of the Water System

In case of a complete failure of the water system, the Village would need an alternate water supply. Either of the following responses may be pursued.

- 1) The Village does not have an agreement with Webber Township allowing the two systems to beconnected; however, they could be connected via hydrants in close proximity at the north end of the water system. The Village water system does not have a permanent emergency interconnection with another water supplier.
- 2) The Village could have water delivered by truck. The available water haulers are:

<u>Name</u>	<u>Address</u>	<u>Phone #</u>	<u>Water Type</u>
Ice Mountain	Stanwood, MI	231-823-8100	Potable
Local Fire Departments	Baldwin, MI	231-745-2711	Non-potable
Michigan Army National Guard			

Appendix 7

Village of Baldwin

Plan to Implement a Public Outreach and Education Program

Introduction

Successful implementation of Baldwin's Wellhead Protection Program (WHPP) will require public involvement. This public involvement and public awareness is important both in the development and implementation of the WHPP. It is our hope that public involvement will also foster leadership for implementing WHPP. This plan outlines a framework upon which our community intends to implement a three-year program of public outreach and education to accomplish these tasks. Identifying and implementing specific program details will be assigned to the local wellhead protection team and presented in the completed WHPP report.

The public outreach and education program will focus on three groups: the general public, industry/agriculture, and students. The basic theme of the outreach and education program is to better inform the groups of the following topics:

- What is groundwater? ;
- How is groundwater distributed? ;
- What measures can be taken to ensure that our water supply is safe (including the wellhead protection area)? ;
- What can you as an (individual, company, group, etc.) do to prevent groundwater contamination?

Plan for General Public Outreach and Education

The plan for general public outreach and education will involve a process of:

- 1) Identifying and making use of abundant resources regarding groundwater protection. Such materials include but are not limited to materials available through professional organizations, regional and national non profits, and federal/state agencies.
- 2) Identifying target audiences for disseminating relevant information.
- 3) Using proven and practical methods to distribute written, audio, and visual information to community members and organizations.
- 4) Incorporating public education with the community master planning process. The Township Planning Commission meetings are held monthly. When wellhead protection issues are part of their agenda special notices will be distributed in an effort to increase public participation.
- 5) Initiate an abandoned well awareness program.
- 6) Use the Village's GIS capabilities to create high quality maps and visual aids. This also demonstrates and reinforces the Village's commitment to wellhead protection.

Plan for Industry/Agriculture Outreach and Education

The industry/agricultural community plays a vital role in protecting groundwater. Often, these groups use significant amounts of groundwater for manufacturing and/or agricultural purposes. Thus, protection of their water source is important to the economic vitality of their operations.

The plan for outreach and education of the business/agricultural community will focus on those businesses/agricultural sites within identified Wellhead Protection Areas (WHPA's), however, the plan will not be limited to this group. The contaminant source inventory will be used to prioritize the outreach and education plan. A more aggressive outreach and education strategy will be promoted to business/agricultural sites that pose a greater risk to the groundwater. Such a strategy may involve personal contact with some business representatives, during which materials are presented describing the importance of groundwater and groundwater protection. A more general program, similar to the general public outreach and education approach, will likely be employed for lower risk businesses.

Plan for Student Outreach and Education

The Village of Baldwin considers outreach and education of student age community members extremely important to the long-term success of the WHPP. The plan for student outreach and education will involve two strategies:

- 1) Working with schools and teacher organizations to integrate groundwater related issues into the curriculum, and;
- 2) Providing demonstrations and materials to students relative to groundwater and groundwater protection.
- 3) Encouraging students and teachers to embark upon individual or class projects concerning wellhead protection.

Public Participation Effort

Including Service Clubs can be excellent way of expanding the level of public involvement. They can be brought on board by offering to be guest speakers at their regular meetings or by assembling a group of their leadership such as current presidents and chairpersons to listen to the message and report back to their respective groups with their own version of the WHPP story along with brochures or some other form of written printed material.

Other agencies or organizations such as watershed councils, agricultural extension offices, drain commissioners, etc., can also be effective in education the public and contributing to the overall effort.

The local team member will be playing a lead role in this respect. They will be responsible for the actual development of written materials, brochures, etc. for distribution. The local team will establish a local newspaper contact that would publish news releases from time to time. They will use the consultant and Township staff to provide technical support.

This simple bar chart portrays out proposed target audiences and efforts.

