



WATER WITHDRAWAL PERMIT APPLICATION

Michigan
Department of Environmental Quality

Required under Part 327 of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Failure to follow the provisions of the act may result in a civil fine up to \$1,000.

Please PRINT the following information:

I. Facility Information		Contact Information	
Facility or Company Name	City of Kalamazoo Public Water Supply System WSSN: 03520	Contact Person	James Baker, P.E. (Engineering); John P. Paquin (Water Resources)
Sub-Facility Name (if applicable)	(Proposed) Water Pumping Station 38	Mailing address	1415 N. Harrison
Facility County	Kalamazoo	City / State / Zip	Kalamazoo, MI 49007-2565
Facility Township(s)	Existing Public Water Supply System facilities are located in several jurisdictions - proposed facility to be located in Oshtemo Township.	Email address	[REDACTED]
II. Proposed Water Withdrawal Information (see instructions)			
a. Water Source and Pump Information			
1. Name of Water Source	2. Water Source Type (choose one)	3. Pump Capacity	4. Location
Alamo-Oshtemo Groundwater Reservoir (see Appendix A in Supplemental Information Report)	<input checked="" type="checkbox"/> Groundwater	2.50 Million Gallons per Day	Latitude: 42.331824N
	<input type="checkbox"/> Inland Surface Water		Longitude: -85.705386E
	<input type="checkbox"/> Great Lakes or Connecting Waterways		

b. Proposed Maximum Withdrawal		Anticipated Withdrawal Volumes in MILLIONS OF GALLONS									
January	62	February	58	March	62	April	60	May	62	June	75
July	77.5	August	77.5	September	75	October	62	November	60	December	62

c. Primary Purpose of Use (choose one)

<input type="checkbox"/> Irrigation	<input type="checkbox"/> Industrial / Manufacturing	<input type="checkbox"/> Public Water Supply	<input checked="" type="checkbox"/> Quarry / Mining / Dewatering	<input type="checkbox"/> Electric Power Generation	<input type="checkbox"/> Lake Augmentation	<input type="checkbox"/> Other
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Description: This new source is designed to meet projected peak day demands, provide a more efficient and reliable long-term source of water for its customers in the northwestern portion of Kalamazoo's water system by reducing the need of "boosting" water from water service pressure districts in lower elevations to this higher elevational district, and provide water for residents whose wells were impacted by groundwater contamination from the KL Landfill.

III. Proposed Return Flow Discharge Information

a. Name of Discharge Location	b. Receiving Water Type (choose one)	c. Location	d. Total Discharge Volume or Rate
Kalamazoo River via the Kalamazoo Wastewater Treatment Plant discharge outfall(s). Secondarily, groundwater via septic tank systems within areas outside the Kalamazoo Wastewater Collection Service Area and on-site filtration back-wash retention pond (if iron filtration is selected).	<input checked="" type="checkbox"/> Groundwater <input type="checkbox"/> Inland Surface Water <input checked="" type="checkbox"/> Great Lakes or Connecting Waterways	Latitude: 42.30826 N Longitude: -85.57217 E	See Supplemental Information <input checked="" type="checkbox"/> Millions of Gallons Per Day, or <input checked="" type="checkbox"/> Percentage of Proposed Withdrawal

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Water Resources Division

VII. Does this facility hold a permit issued under Part 31 for a cooling water intake structure?

YES Please attach a copy of the signed Part 31 discharge authorization, certificate of coverage, or other substantiating documentation.

NO

VIII. Permit Application Return and Payment

I understand that my signature constitutes a legal agreement as to the accuracy and truthfulness of the information provided in this application. Further, I certify as to compliance with the Water Conservation Measures identified in Section V of the permit application.

X *Jane J. Bul* 3/30/2016 Date
 Owner or authorized representative's signature

When completed, mail this form and a \$2,000.00 permit application fee to the address below. Please make your check payable to STATE OF MICHIGAN (do not send cash).

RETURN TO:
 MICHIGAN DEPT. OF ENVIRONMENTAL QUALITY
 CASHIER'S OFFICE - WURF
 PO BOX 30657
 LANSING, MI 48909-8157

FOR DEQ CASHIER'S OFFICE USE ONLY:
 60000-42248-9175 190

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IV. Evaluation of Existing Hydrological and Hydrogeological Conditions

Please attach documentation of existing hydrological and hydrogeological conditions, and an evaluation of the predicted effects of the proposed withdrawal.

V. Environmentally Sound and Economically Feasible Water Conservation Measures

Please attach documentation self-certifying the water use conservation measures applicable to your water use sector that are currently in place or that you intend to incorporate into operation of the proposed withdrawal. Water Use Conservation Measures are available online at <http://www.michigan.gov/wateruse>.

VI. Decision-Making Standard of the Great Lakes – St. Lawrence River Basin Water Resources Compact

Please attach documentation describing how the withdrawal will be implemented such that the following criteria are met:

1. All water withdrawn shall be returned, either naturally or after use, to the source watershed less an allowance for consumptive use;
2. The withdrawal will be implemented so as to ensure it will not result in significant individual or cumulative adverse impacts to the quantity or quality of the waters and water dependent natural resources of the source watershed and the Great Lakes;
3. The withdrawal will be implemented so as to incorporate Environmentally Sound and Economically Feasible Water Conservation Measures;
4. The withdrawal or consumptive use will be implemented so as to ensure that it is in compliance with all applicable municipal, State and federal laws as well as regional interstate and international agreements, including the Boundary Waters Treaty of 1909;
5. The proposed use is reasonable under common law principles of water law in Michigan, and based upon a consideration of the following factors:
 - a) Whether the proposed withdrawal is planned in a fashion that provides for efficient use of the water, and will avoid or minimize the waste of water;
 - b) If the proposal is for an increased withdrawal, whether efficient use is made of existing water supplies;
 - c) The balance between economic development, social development and environmental protection of the proposed withdrawal and use and other existing or planned withdrawals and water uses sharing the water source;
 - d) The supply potential of the water source, considering quantity, quality, and reliability and safe yield of hydrologically interconnected water sources;
 - e) The probable degree and duration of any adverse resource impacts caused or expected to be caused by the proposed withdrawal under foreseeable conditions, to other lawful consumptive or non-consumptive uses of water or to the quantity or quality of the waters and water dependent natural resources of the Basin, and the proposed plans and arrangements for avoidance or mitigation of such impacts; and,
 - f) Consideration as to the need for the proposal to include restoration of hydrologic conditions and functions of the source watershed.



**Supplemental Information Report for the Water Withdrawal Permit Application
City of Kalamazoo Public Water Supply System (WSSN 03520)
Water Pumping Station 38 in Ultra High Service Pressure District (Oshtemo)**

Introduction

The City of Kalamazoo, Michigan (City) is commencing the formal permitting approval process to develop a new water wellfield/water pumping station (WPS) as part of its Type I Public Water Supply System (PWSS) on approximately 28 acres located at the southeastern corner of G Avenue and 6th Street, Oshtemo Township, Kalamazoo County, Michigan (Figure 1). Since the proposed withdrawal is ≥ 2.0 Million gallons per day (MGD), it is required to obtain a water withdrawal permit prior to the withdrawal (MCL 324.32723[2]).

This project has been proposed to provide a more efficient and reliable long-term source of water for its customers in the northwestern portion of its water system; its need documented in the City's "Water Utility Management Plan" (1975), "Kalamazoo Area Water System Strategic Plan" in 2005 by Fishbeck, Thompson, Carr & Huber (FTC&H), and more recently in "Kalamazoo Area Water System Reliability Study" (FTC&H) in 2012. This new WPS will be identified as WPS 38.

Figure 2 shows a map of the City's PWSS that is segmented into eight Water Service Pressure Districts. The location for this new water source (wellfield) is in the "Ultra High Service Pressure District" just over one mile north of the 6th Street Tank. Water in this area is currently being provided by pumping (boosting) water via Booster Stations 28 and 29 from wellfields located in the High Pressure Service District and Super High Pressure Service District. However, Booster Station 28 is located within the Northwest High Pressure Service District that also does not have a source supply. Consequently, the water diverted to this district relies entirely from water that is provided via pumping from the Low Pressure Service District via Booster Station 26 and Booster Station 31, and from the High Pressure Service District via pumped water from the Booster Pump at WPS 11. Consequently, this new station would produce a similar volume of water currently being pumped and double-pumped from lower pressured districts. Thus, WPS 38 will not only allow the City's PWSS to meet projected peak day demand for this area but also provide a more energy efficient method to provide water to this district. In addition, water from this new station would be used for new customers that have had their private wells impacted by groundwater contamination from the KL Landfill Superfund site.

The property for WPS 38 was purchased in 2009 after two studies were performed, as reported in "Adverse Resource Impact (ARI) Evaluation for a Proposed Wellfield in Oshtemo Township, Michigan" prepared by FTC&H dated March 2009, and in the document "Test/Production Well 1 Aquifer Performance Test, Safe Yield Analysis and Drawdown Assessment, Kalamazoo, Michigan June 2, 2009" by Peerless-Midwest that details a hydrogeologic investigation conducted at the property. Subsequently, MDEQ received and reviewed the reports and approved three (3) million gallons per day (MGD) withdrawal via a letter dated August 4, 2009. The letter referenced and attached a MDEQ Interoffice Communication dated July 22, 2009, summarizing a letter dated June 24, 2009 validating the aquifer performance test methodology and results. Appendix A contains copies of the referenced documents and correspondence.



Supplemental Information for Permit Application

II. Proposed Water Withdrawal Information

Sections II.a.3 – Pump Capacity and II.b – Proposed Maximum Withdrawal

The proposed withdrawal rate of 2.5 million gallons a day (MGD) represents the maximum design pumping rate of the WPS. The actual water usage from this WPS will vary depending on seasonal demands and the use of the other water facilities within the City's PWSS. Based on historic water consumption in the Ultra High Service Pressure District, it is anticipated that the months of July and August will demand the most water (~2.5 MGD), while the remaining months may range between 1.5 MGD and 2.5 MGD, and averaging approximately 2.0 MGD.

Section II.a.4 – Location

Figure 1 shows the proposed wellfield/WPS location, and Figure 3 provides the locations of the existing test/monitoring well locations on the property. The well identified as "TPW-1" was designed and constructed as a 1,000 GPM production well and was used as the pumping well in the aquifer performance test for the hydrogeological study. This well is intended to be used as a future production well and is located approximately 230 feet east of 6th Street and 200 feet south of G Avenue. The GPS location of this well is: 42.33182 (North) Latitude and -85.70538 (East) Longitude.

Kalamazoo is currently evaluating an additional potential well location as part of the Part 399 permitting process. To achieve the maximum WPS design capacity of 2.5 MGD, a minimum of one 750 GPM well will be needed in addition to the existing 1,000 GPM well. Figure 4 shows the existing and proposed production well locations.

Section III. Proposed Return Flow Discharge Information

Sub-Section a. Name of Discharge Location

The City of Kalamazoo operates a Wastewater Treatment Plant (WWTP), formally designated as "Kalamazoo WWTP" under NPDES Permit M10023299. It serves the Kalamazoo Region (Figure 5) and has a design flow rate of 53.5 MGD with an average flow of approximately 26 MGD. The primary outfall is formally identified as "Outfall 001A" but is indicated as "Outfall" on Figure 6. This outfall replaced "Outfall 001" that is identified on Figure 6 as "Aux. Outfall" which still exists a few hundred feet downstream and is used as a contingency in the event that Outfall 001A is not available. Both outfalls discharge to the Kalamazoo River.

Sub-Section b. Receiving Water Type

The majority of customers that would be served by the proposed wells permitted under the Part 327 Water Withdrawal Permit live in Oshtemo Township. Approximately 42 percent of the 3,514 Oshtemo customers that currently use City water also use the City's wastewater collection service. Conversely, it is assumed that 58 percent of all Oshtemo water customers have/use private septic systems or other approved devices for their discharge water and consequently, this water discharges directly into the



groundwater. Specifically, the percentage of Oshtemo water customer categories that also use the City's sanitary service are as follows: 30 percent of the 2,752 residences; 81 percent of the 305 commercial businesses; 99 percent of the 407 apartment complexes; and the one industry. Geographically, approximately 56 percent of Oshtemo Township is located within the Kalamazoo River Watershed, and 44 percent is within the Paw Paw River Watershed (Figure 7). However, a significant majority of Oshtemo water customers live within the Kalamazoo River Watershed.

Sub-Section c. Location

The specific Latitude and Longitude coordinates of Outfall 000A at the Kalamazoo WWTP are listed in the Water Withdrawal Permit Application. The non-sewered area of Oshtemo Township that uses private septic systems (i.e. discharge to groundwater) can be interpolated by viewing Figure 5.

Sub-Section d. Total Discharge Volume or Rate

The water withdrawn by WPS 38 will vary depending on the seasonal daily demands, and the operational ability/availability of the other WPSs in the other water pressure service districts at any given period of time. It is anticipated that WPS 38 will withdraw approximately between 1.5 and 2.5 MGD. The proposed water withdrawal will return to the Kalamazoo River Watershed via the Kalamazoo River Wastewater Treatment Plant discharge from the wastewater customers, via groundwater infiltration from septic tanks outside the Kalamazoo Wastewater Treatment Service area, and recharge of iron filtration backwash water via site retention pond (if iron filtration is selected) – the only exception is for consumptive use which is estimated to be approximately 10 percent. The value for consumptive use was derived from Table 3-2 "Total water use by category for the Great Lakes Basin, by year, from the Great Lakes Commission annual reports, 1998-2002" from the document U.S. Geological Survey Scientific Investigations Report 2007-5197 "Consumptive Water-Use Coefficients for the Great Lakes Basin and Climatically Similar Areas" (Kimberly H. Shaffer and Donna L. Runkle); Appendix B provides an excerpt from the relevant portion of this document.

IV. Evaluation of Existing Hydrogeological Conditions

Details regarding the hydrogeologic conditions are contained in Appendix A and are discussed throughout the references stated below.

The following are relevant events/correspondences regarding the proposed wellfield:

- November 2007 through November 2008 – preliminary "desk-top research of aquifer characteristics and properties in subject region (e.g. Figure "Aquifer Thickness and Generalized Water Table Contours" in Appendix A). Preparation of option for property purchase based on hydrogeological field investigation results.
- December 2008 – City request to/approval from MDEQ for test drilling at proposed wellfield property.
- December 2008 – City submittal of an Adverse Resource Impact Determination Request Form to MDEQ for a 3 MGD groundwater withdrawal – subsequent approval/pass within Zone A.
- January through April 2009 - test drilling at property.



- March 2009 – City retained Fishbeck, Thompson, Carr & Huber (FTC&H) to complete an independent ARI evaluation for proposed wellfield, reported as “Adverse Resource Impact (ARI) Evaluation for a Proposed Wellfield in Oshtemo Township, Michigan, Kalamazoo, Michigan” dated March, 2009 (Appendix A).
- May 2009 – Aquifer performance testing at property.
- June 2009 – City submittal to MDEQ “Test/Production Well 1 Aquifer Performance Test, Safe Yield Analysis & Drawdown Assessment Kalamazoo, Michigan June 2, 2009” prepared by Peerless-Midwest, Inc. (Appendix A).
- July-August 2009 – Receipt of MDEQ results of their review of “Test/Production Well 1 Aquifer Performance Test, Safe Yield Analysis & Drawdown Assessment Kalamazoo, Michigan June 2, 2009” report; acknowledgement that the wellfield is capable of sustaining a 3 MGD withdrawal and deemed unlikely to cause an ARI (Appendix A).
- September 2010 – City purchased property for wellfield.
- August 2013 – Contact with MDEQ to discuss City’s desire to pursue permitting process for new WPS/wellfield; discussion of need to re-evaluate withdrawal request since the WWAT indicates an inadequate volume of available water within the Sand Creek Watershed and the N. Branch Paw Paw River Watershed (also known as Campbell Creek and Whiskey Run).
- January 2014 – Discussion between City and MDEQ regarding clarification of watershed data, new WWAT version, and general project approach.
- February 2014 – City submitted Michigan Water Withdrawal Site Specific Review request. MDEQ begins process of Index Flow Reviews, and requests more detail regarding the number of proposed wells and locations.
- March 2014 – City submitted all well logs and associated GPS coordinates, and proposed options for the number and capacity of production wells and site layout. Discussion continued regarding permitting process for progressing with project by addressing all necessary issues and clarifying index flows.
- May 2014 – MDEQ contacts City and states that revised index flow calculations result in a pass with Zone C for both watersheds of previous concerns. MDEQ advised City to proceed with Water Withdrawal Permit under the authority of the Safe Drinking Water Act, 1976 PA 399 for a withdrawal over 2.0 MGD, including information to address Part 327, Great Lakes Preservation, Natural Resources and Environmental Protection Act, Public Act 451 of 1994, as amended.
- 2015 – Discussions with MDEQ regarding options of Part 399 and Part 327 approaches/process to proceed with request for a 2.5 MGD withdrawal. Performed preliminary engineering/basis for design and associated cost estimates, and general site layout.
- January 2016 – Meeting with MDEQ to discuss City plans for new WPS 38, options for permitting (i.e. 327 and 399), and clarifications on requirements and process.
- February 2016 – MDEQ confirmed that the requested 2.5 MGD withdrawal was a portion of the 4.0 MGD used in the watershed index flow calculations that resulted in a “C” passing of the water withdrawal request.
- March 2016 – Results received from a study/groundwater flow model performed for the City by Fleis and Vandenbrink (F & V) to assess the potential risk of groundwater contamination associated with the KL Landfill (located approximately three miles south/southwest from the proposed wellfield property) on the proposed wellfield, reporting “The simulation suggests that the plume will not migrate toward the well field site, rather the particle tracking suggests contaminants from the Landfill will continue to migrate to the west-northwest.” This report is presented as Appendix C.



In summary: The aquifer was determined to have the capacity to provide a minimum safe yield of 3 MGD; the proposed withdrawal of 2.5 MDG would not result in an Adverse Resource Impact to surface waters; projected drawdowns of groundwater caused from the proposed pumping rate are not projected to adversely impact private wells since all wells within the projected radius of influence appear to have ample available drawdown (Hydrogeologic Investigation Report, Peerless-Midwest, Appendix A); and pumping should not affect known existing groundwater contamination plumes.

V. Environmentally Sound and Economically Feasible Water Conservation Measures

The City plans to continue to implement and consider new water use conservation measures for the water use sectors as presented in the “Guidelines for Generally Accepted Water Management Practices for the Public Water Supply Sector” developed by the Michigan Section American Water Works Association (MSAWWA) to the maximum extent practical and appropriate.

General strategies under control of the City’s Type I PWSS that are available and/or currently used at its existing facilities include - but are not limited to: metering; meter calibration and replacement program; system audits; full cost pricing (rates); water use restriction notices; on-line utility billing information (www.kalamazoo.org); and water efficiency and conservation strategies (www.protectyourwater.net). Strategies promoted or influenced by the utility include water efficient landscaping and sprinkling techniques, water reuse and recycling, land use planning, and regional water resources management. Also, if the City includes iron filtration, discharge the iron filtration backwash water will be directed into a site retention (infiltration) pond.

VI. Decision-Making Standard of the Great Lakes –St. Lawrence River Basin Water Resources Compact

The following information describes how the withdrawal will be implemented such that the following criteria are met:

1. All water withdrawn shall be returned, either naturally or after use, to the source watershed less an allowance for consumptive use;

As indicated in Section III.d., the vast majority of water withdrawn will be returned (minus consumptive use) to Lake Michigan, via the Kalamazoo River Watershed and the Paw Paw River Watershed, and to groundwater, based on the following information:

- The consumptive use factor is assumed to be 10 percent.
- Approximately 57 percent of Oshtemo Township is within the (source) Kalamazoo River Watershed and 43 percent is within the Paw Paw River Watershed.
- Approximately 63 percent of Oshtemo Township is served by the Kalamazoo Public Water Supply System (PWSS).
- Approximately 16 percent of Oshtemo Township is serviced by the City’s Public Wastewater System; all of this area is served by Kalamazoo’s PWSS.
- Approximately 89 percent of Oshtemo Township served by Kalamazoo’s PWSS is situated within the Kalamazoo River Watershed, and 11 percent is in the Paw Paw River Watershed. The volume of wastewater generated and infiltrated via private wastewater disposal systems within



the area serviced by Kalamazoo's PWSS that is not within the source watershed is negligible and although it is not within the Kalamazoo River Watershed, is still within the Lake Michigan Watershed Basin.

- The projected volume of backwash water from the iron removal system (if selected) will discharge to an on-site retention (infiltration) pond on site at a rate of approximately 54,688 gallons per day (38 GPM); all of this water, minus evaporation, will be returned to the source aquifer.

2. The withdrawal will be implemented so as to ensure it will not result in significant individual or cumulative adverse impacts to the quantity or quality of the waters and water dependent natural resources of the source watershed and the Great Lakes;

Both wells associated with the withdrawal will be used as part of a community public water supply permitted under Part 399. Subsequently, the wells will be designed in a manner that sustainable yields can be achieved. Additional hydrogeological analysis will be provided for the new proposed well, including pump testing of the new well as required by the Part 399 permitting process. As previously referenced, an independent ARI was performed as a pro-active measure and to help determine whether the property should be purchased at that time for the proposed use.

3. The withdrawal will be implemented so as to incorporate Environmentally Sound and Economically Feasible Water Conservation Measures;

Section V describes the proposed strategies to demonstrate the intent of the City of Kalamazoo to incorporate the water use conservation measures developed for the water sector by MSAWWA.

4. The withdrawal or consumptive use will be implemented so as to ensure that it is in compliance with all applicable municipal, State and federal laws as well as regional interstate and international agreements, including the Boundary Waters Treaty of 1909;

The City recognizes that obtaining a permit for water withdrawal does not relieve the City from having to meet any other applicable local, State, and federal regulations. All water supply wells and facility construction associated with the proposed project will be permitted under Part 399. The withdrawal will be implemented to ensure its compliance with all applicable regulations under the jurisdiction of the State of Michigan and the MDEQ Community Water Supply Program. The proposed withdrawal does not involve international agreements or boundary waters. Locally, the City will follow Oshtemo Township's site plan review process to develop the property for the intended use.

5. The proposed use is reasonable under the common law principles of water law in Michigan, and based upon a consideration of the following factors:

- a. Whether the proposed withdrawal is planned in a fashion that provides for efficient use of the water, and will avoid or minimize the waste of water;*

The proposed withdrawal will be operated under the authority of the City of Kalamazoo's Public Water Supply System (WSSN: 03520) and be used for a public water supply under Part 399.



Section V discusses the administrative strategies for minimizing unaccounted for water/maximized efficient use of water.

- b. *If the proposal for an increased withdrawal, whether efficient use is made of existing water supplies;*

This project has been proposed to meet projected peak day demands, and provide a more efficient and reliable long-term source of water for its customers in the northwestern portion of the City of Kalamazoo PWSS, documented in the City's "Water Utility Management Plan" (1975), "Kalamazoo Area Water System Strategic Plan" in 2005 by Fishbeck, Thompson, Carr & Huber (FTC&H), and more recently in "Kalamazoo Area Water System Reliability Study" (FTC&H) in 2012.

There is no groundwater source (water pumping station/wellfield) in the Ultra High Service District (see Figure 2). Consequently, it relies entirely on water pumped via Booster Stations 28 and 29. These two booster stations have a combined capacity of 4.61 MGD which is inefficient to meet projected future peak hour demands of 5.43 MGD. Some of the additional needed volumes that were previously unanticipated include water for an area of private wells affected by the groundwater contamination plume from the KL Landfill. Diurnal flow trends of this district indicate high peaking factors nearly 400% which have and will continue to burden the only available source stations that supply water to this district via boosted/pumped flow.

Furthermore, Booster Station 28 is located within the Northwest High Pressure Service District that also does not have a source supply, relying entirely from water that is provided via pumping from the Low Pressure Service District via Booster Station 26 and from Booster Station 31, and from the High Pressure Service District via pumped water from Booster Station at WPS 11. Consequently, some of the water that is provided to the Ultra High Pressure Service District is actually double-pumped – a hydraulically inefficient method of providing water.

Consequently, the proposed WPS 38 would provide the water required to meet projected peak day demands, meet previously unanticipated additional demands due to the KL Landfill contamination, provide the volume of water that is now pumped or double-pumped into the Ultra High Pressure Service District (thus providing a more energy efficient method to provide water), and provide greater overall reliability within the Ultra High Pressure Service District.

Section V discusses the administrative strategies for minimizing unaccounted for water/maximized efficient use of water.

- c. *The balance between economic development, social development and environmental protection of the proposed withdrawal and use and other existing or planned withdrawals and water uses sharing the water source;*

It is our understanding that our proposed water withdrawal passes the water withdrawal process with a "C" category associated with the relevant sub-watersheds. We recognize that there are several other entities that have groundwater withdrawal permits within the subject sub-watersheds. The justification of the City's proposed withdrawal includes: peak day reliability



needed for its PWSS customers; preparation for projected growth of the subject region; increasing its energy use efficiency (by reducing the pumping of water from lower elevation districts to higher elevation districts); and providing a safe and reliable source of water for those private well owners that have been impacted by the KL Landfill groundwater contaminant plume.

The hydrogeologic investigation performed by Peerless-Midwest and the City projected drawdowns of groundwater caused from the proposed pumping rate indicate that the proposed groundwater withdrawal should not adversely impact private wells. This assumption is based on the review of well records for the wells known to exist within the projected radius of influence that show that there is adequate amount of available drawdown. Specific information regarding projected drawdowns and private well information is contained within that report, provided in Appendix A.

- d. *The supply potential of the water source, considering quantity, quality, and reliability and safe yield of hydrologically interconnected water sources;*

Please refer to Appendix A for the report “Adverse Resource Impact (ARI) Evaluation for a Proposed Wellfield in Oshtemo Township, Michigan” prepared by FTC&H dated March 2009; the hydrogeologic investigation report “Test/Production Well 1 Aquifer Performance Test, Safe Yield Analysis and Drawdown Assessment, Kalamazoo, Michigan June 2, 2009” by Peerless-Midwest; and correspondence from MDEQ regarding the reports.

Results from the hydrogeologic investigations indicate that the subject aquifer is capable of sustaining a groundwater withdrawal of 5 MGD. MDEQ stated that the aquifer safe yield is approximately 3.0 MGD without causing an ARI. The City proposes a maximum annual daily average groundwater withdrawal of 2.5 MGD, based on results using conservative assumptions in the independent ARI evaluation study, and the revised index flows of two watersheds previously discussed.

Appendix D contains the general water quality table “Water Quality in Area of Proposed Oshtemo WPS/Wellfield” that summarizes water quality data from the Kalamazoo County on-line database for iron, hardness, nitrate, and sulfate for private wells in the nine sections at and surrounding the proposed wellfield, and from the MDEQ laboratory results for samples collected from the test pumping well located at the site after a 49-hour aquifer performance test. A copy of the laboratory data from MDEQ and the Underwriters Laboratories, Inc. is also provided in Appendix D.

There is not any known or anticipated water quality issues associated with the proposed WPS. The samples collected at the end of the aquifer performance test did not detect iron but the average iron level for Section 3 where the property is located and the eight surrounding sections was reported to be 0.32 mg/L or parts per million (ppm). Manganese was detected at 39 ug/L (parts per billion [ppb]) from the pumping well at the property. Hardness averaged approximately 300 ppm for the area and at the property. Arsenic was below the detection limit of 2 ppb in the discharge water after the aquifer performance test. There was not any detection of herbicides, pesticides, or volatile organic compounds. Parameters tested for but not previously



mentioned were either reported as non-detect or at levels significantly below Maximum Contaminant Levels (MCLs).

- e. *The probable degree and duration of any adverse resource impacts caused or expected to be caused by the proposed withdrawal under foreseeable conditions, to other lawful consumptive or non-consumptive uses of water or to the quantity or quality of the waters and water dependent natural resources of the Basin, and the proposed plans and arrangements for avoidance or mitigation of such impacts; and,*

Originally in December 2008, the City submitted an Adverse Resource Impact Determination Request Form to MDEQ for a 3 MGD groundwater withdrawal that was subsequently approved with a “Pass” within Zone A.

In 2009, the City of Kalamazoo retained the services of FTC&H in 2009 to perform an independent Adverse Resource Impact (ARI). This study used much lower index flows based on using a ratio method by comparing the West Fork of Portage Creek drainage area, a gauged stream located approximately seven miles to the south/southwest of the subject property, to the two referenced watersheds. The study validated the MDEQ’s conclusion that the proposed groundwater withdrawal of 2.5 MGD does not result in an ARI for the Sand Creek or Campbell Creek (N. Branch Paw Paw) watersheds, even by groundwater withdrawal rates up to 3 MGD if index flows from the Water Assessment Tool are used.

Also in 2009, the City submitted an aquifer performance report to MDEQ that resulted in their acknowledgement that the wellfield is capable of sustaining a 3 MGD withdrawal and deemed unlikely to cause an ARI. As part of this study, all available private well records were reviewed within a radius of 3,400 feet to determine if a 2,000 GPM (2.88 MGD) groundwater withdrawal that could produce up to 10 feet of drawdown would negatively impact any of the wells. All of the private wells within the 3,400 foot radius have a minimum of 24 feet of available drawdown. However, if any groundwater level in an existing private well is lowered to an elevation where the well breaks suction due to the pumping from the proposed WPS 38, the City will either replace the well to an adequate depth (if allowed by current local regulations) or connect the residence up to the new water supply at no installation cost to the subject private well owner.

In 2013, in response to the City’s expressed interest in pursuing wellfield development, MDEQ stated that the Water Withdrawal Assessment Tool then showed that the proposed groundwater withdrawal depletes two watersheds (Sand Creek, ID #12610 and the N. Branch Paw Paw River, ID #22367). Subsequently, City submitted a Site Specific Review request that initiated the index flow review of the two subject watersheds by MDEQ.

In 2014, MDEQ contacted the City and stated that index flow reviews resulted in a pass with Zone C for both watersheds of previous concerns.

In 2016, the MDEQ confirmed that the City’s 2.5 MGD withdrawal request was a portion of the 4.0 MGD used in the watershed index flow revised calculations that resulted in a “C” passing of the water withdrawal request. Thus, the City’s proposed groundwater withdrawal of 1,736 GPM (2.5 MGD) passes the Adverse Resource Impact (ARI) evaluation by the MDEQ with a “C” in



both Watershed 22367 (North Branch Paw Paw River) and the Home Watershed 12610 (Sand Creek) that originally showed sensitivity in the WWAT prior to the revisions of index stream flows.

As discussed previously, the City retained the services of F & V in 2016 to perform an evaluation of the potential for groundwater contamination associated with the KL Landfill on the proposed wellfield. The groundwater simulation indicates that the plume will not migrate toward the proposed wellfield under a continuous withdrawal of 2.5 MGD. This report is contained in Appendix C.

- f. Consideration as to the need for the proposal to include restoration of hydrologic conditions and functions of the source watershed.*

Restoration of the watershed(s) is not anticipated to be needed since as noted previously: it has been determined that the aquifer can safely yield 3.0 MGD; the independent conservatively-based ARI Evaluation indicates that a withdrawal of 2.5 MGD will not result in an ARI; recalculated index flows in two watersheds that previously showed depletion in the WWAT now show that a 2.5 MGD withdrawal passes under a "C" category; Part 399 requirements are intended to prevent an installation of wells that would result in problems for the source watershed; creating an adverse environmental impact to natural resources is contrary to the goals and objectives of the Kalamazoo PWSS.



Department of Environmental Quality, Water Bureau

WATER WITHDRAWAL PERMIT

Issued under Part 327

Great Lakes Preservation, Natural Resources and Environmental Protection Act
1994 PA 451, as amended

In accordance with Part 327, Great Lakes Preservation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA), authority is hereby given to withdraw water from the waters of the State of Michigan as described herein. This permit is issued and revised in reliance on information supplied in the corresponding application and other information as may have been supplied by the permit applicant in support of that application.

PERMIT NUMBER: **2016-002**

DATE ISSUED: xxxxx

Permittee Name and Address:

James Baker
City of Kalamazoo
1415 N. Harrison St.
Kalamazoo, Michigan 49007

Location of Water Withdrawal

County: Kalamazoo County
Township: Oshtemo Township
Town, Range and Section: T02S R12W, Section 3

The activity authorized by this permit is subject to the following limitations and conditions:

Section A. Authorizations and Coverage Provisions

1. Water Withdrawal is restricted to the following sources, locations, rates, and purposes:

Source	Latitude and Longitude	Withdrawal Rate	Purpose of Use
Groundwater	42.3312°, -85.7054°	2.5 million gallons per day	Public water supply

2. Approval Conditions

This permit requires the permittee to maintain compliance with all applicable local, state, and federal laws including, but not limited to, obtaining all required permits. A permit under the Safe Drinking Water Act, Act 399 PA 1976, as amended and Administrative Rules, Supplying Water to the Public, must be obtained prior to commencing with the construction of any facilities necessary to implementation of the withdrawal. The permittee must remain in compliance throughout the operation of the withdrawal with the environmentally sound and economically feasible water conservation measures developed for the public water supply sector by the Michigan Section of the American Water Works Association.

Section B. Reporting and Record Keeping

1. Environmental Impacts

The permittee is required to immediately report to the DEQ, Water Resources Division, Great Lakes Shorelands Unit (GLSU) at 517-284-5563 if an Adverse Resource Impact (ARI), as defined in Subsection 32701(1)(a)(vii) of Part 327 occurs as a result of the water withdrawal authorized by this permit.

2. Public and Private Rights Impacts

The permittee is required to immediately report to the DEQ, Water Resources Division, GLSU at 517-284-5563 if any violation of public or private rights occurs as a result of the water withdrawal authorized by this permit.

3. Water Use Report

The permittee is required to submit annual water use reports to the State of Michigan by April 1 of each year. Reports shall be filed with the DEQ Community Water Supply Program per the requirements of the Safe Drinking Water Act, Act 399 PA 1976, as amended and Administrative Rules, Supplying Water to the Public.

Section C. Liability

1. Noncompliance

Commencing the water withdrawal authorized herein confirms the permittee's acceptance and agreement to comply with all terms and conditions of this permit. Noncompliance with these terms and conditions, and/or the initiation of other regulated activities not specifically authorized by this permit, shall be cause for the modification, suspension, or revocation of this permit, in whole or in part. Further, the DEQ may initiate civil proceedings to correct deficiencies, protect natural resource values, and secure compliance with law.

2. Limitations

This permit does not authorize causing an ARI as defined in Subsection 32701(1)(a) of Part 327, Great Lakes Preservation, of the NREPA, as a result of the withdrawal.

This permit does not convey property rights in water, or other real or personal property, authorize any injury to private property or invasion of public or private rights, or waive the necessity of obtaining any other applicable federal, state or local permit or approval.

3. Indemnification

The permittee shall indemnify and hold harmless the State of Michigan and its departments, agencies, officials, employees, agents and representatives for any and all claims or causes of action arising from acts or omissions of the permittee, or employees, agents, or representatives of the permittee, undertaken in connection with this permit. This permit shall not be construed as an indemnity by the State of Michigan for the benefit of the permittee or any other person.

Keith Creagh, Director
Department of Environmental Quality

By: Diana Klemans, Chief
Surface Water Assessment Section
Water Resources Division