

May 8, 2017

Mr. Tauren Beggs
Hydrogeologist
Wisconsin Department of Natural Resources
2984 Shawano Avenue
Green Bay, WI 54313-6727

Ms. JaNelle Merry
Private Water Supply Specialist
Wisconsin Department of Natural Resources
2984 Shawano Avenue
Green Bay, WI 54313-6727

Subject: **Five Year Potable Well Monitoring Work Plan
Former Town of Newton Gravel Pit
3130 Hecker Road, Manitowoc, Wisconsin
WDNR BRRTS No. 02-36-000268
WDNR FID No. 436104020**

Dear Mr. Beggs & Ms. Merry,

On behalf of the City of Manitowoc (City), AECOM Technical Services, Inc. (AECOM) is submitting a five year potable well monitoring work plan for continued monitoring of private potable wells near the Former Town of Newton Gravel Pit (Site). The purpose of the monitoring is to continue the evaluation of the extent of cis-1,2-dichloroethene (cis-1,2-DCE) and vinyl chloride (VC) as contaminants of concern (COCs) over the course of five years beginning in May 2017.

These sampling efforts are in response to requests from the Wisconsin Department of Natural Resources (WDNR).

Presented below are background information, a proposed sampling schedule, sampling methods, reporting, and a summary of ongoing activities related to the potable well sampling.

Background Information

Previous potable well sampling plans include the initial 2014 *Potable Well Monitoring Work Plan*¹ and the 2015 to 2016 *Semi-Annual Potable Well Monitoring Work Plan*². Information presented in these plans provide historical context to the project and explanations for the presented sampling schedules.

Potable well monitoring results have been published in numerous letter reports. The most recent report, *October 2016 Semi-Annual Potable Well Monitoring Letter Report*³ provides the current sampling results as-well-as summary data tables of historical results.

Potable Well Sampling Zones & Sampling Schedule

For the five year sampling plan the potable well sampling zones are categorized as follows:

- Target Zone Wells
- Target Zone Sentinel Wells

¹ Potable Well Monitoring Work Plan, BRRTS No. 02-36-000268, AECOM, April 10, 2014.

² 2015 to 2016 Semi-Annual Potable Well Monitoring Work Plan, BRRTS No. 02-36-000268, AECOM, September 22, 2015.

³ 2016 Semi-Annual Potable Well Monitoring Letter Report, BRRTS No. 02-36-000268, AECOM, March 6, 2017.

- Sentinel Zone 3-Year Wells
- Sentinel Zone 5-Year Wells
- Replacement Wells
- Upgradient and Historically Sampled Wells
- Former Potable Wells Now Connected to City Water

A detailed description of each sampling zone, the proposed zone specific sampling schedule, and an explanation of the proposed changes as compared to the last sampling plan are presented below. This information is also summarized on Table 1 and presented on Figure 1.

Target Zone Wells – color code symbol: ●

Target Zone Wells are wells with detectable contaminants of concern (COCs). These wells will be sampled on a semi-annual basis for five years. Currently this includes a total of 12 wells.

Target Zone Sentinel Wells – color code symbol: ●

These wells are located within the Target Zone but they do not have detectable COCs. The wells will be sampled on an annual basis. Note that the well at 3320 Hecker Road was previously a Sentinel Zone Well that has been reclassified as a Target Zone Sentinel Well.

Sentinel Zone 3-Year Wells – color code symbol: ●

Sentinel Zone 3-Year Wells will be sampled on a rotating schedule where each well will be sampled once every three years based on its last sampling date. Note that:

- The well at 2717 CTH CR (4141 Viebahn St.) is a former potable well that has been retained as a non-potable monitoring well location. We have retained the blue color code symbol for the well to indicate that it's impacted with COCs.
- The following wells were previously classified as Historically Sampled Wells. The wells will be sampled during the spring 2017 sampling event then reclassified to Sentinel Zone 3-Year Wells:
 - 3904 CTH CR
 - A shared well serving three properties at 4212, 4220, and 4236 Silver Creek Road.
 - 4314 Silver Creek Road

Sentinel Zone 5-Year Wells – color code symbol: ●

Sentinel Zone 5-Year Wells will be sampled on a rotating schedule where each well will be sampled once every five years based on its last sampling date. Note that:

- The following wells were previously classified as Sentinel Zone Wells and they have been reclassified to Sentinel Zone 5-Year Wells:
 - 4219 Viebahn Street
 - 2706 CTH CR
 - 3318 Orchard Lane
 - 3420 Orchard Lane
 - 3524 Orchard Lane
 - 3121 Hecker Road
 - 3720 Hecker Road

- The following wells were previously classified as Historically Sampled Wells. They will be sampled during the spring 2017 sampling event and be reclassified to Sentinel Zone 5-Year Wells:
 - 4315 Silver Creek Road
 - 3627 Hecker Road
- The following wells have not been previously sampled. They will be sampled during the spring 2017 sampling event and then be classified to Sentinel Zone 5-Year Wells:
 - 3710 Silver Creek Road
 - 3780 Silver Creek Road
 - 3802 Silver Creek Road
 - 4125 CTH CR

Replacement Wells– color code symbol: ●

Replacement Wells sampled to date have not had detections of COCs. Therefore, existing Replacement Wells will be sampled once every five years based on the last sampling date.

The sampling schedule for new Replacement Wells will be as follows; initial sample within one week of installation, second sample at approximately one month post-installation, and a third sample approximately two months post-installation to confirm the new well is not impacted by COCs. The well will then be sampled every five years.

During May 2017 two new replacement wells are being installed (4005 and 4010 Thunder Ridge Road). Once these wells are installed, there will be eleven Replacement Wells as follows:

- | | |
|--------------------|---------------------------|
| • 3518 Hecker Road | • 3023 CTH CR |
| • 3515 Hecker Road | • 3303 Hecker Road |
| • 3609 Hecker Road | • 3504 CTH CR |
| • 3120 CTH CR | • 4002 Thunder Ridge Road |
| • 3403 CTH CR | • 4005 Thunder Ridge Road |
| | • 4010 Thunder Ridge Road |

Historically Sampled Wells – color code symbol: ▲

These potable wells are typically located up-gradient or side-gradient from our groundwater plume. Initial sampling results indicate that the wells have no detections of COCs. These wells will not be sampled during the five year sample plan.

Former Potable Wells Now Connected to City Water – color code symbol: ○

Nine potable wells located along Viebahn Street and CTH CR were replaced with connections to the City of Manitowoc public water supply. These addresses will no longer require potable well sampling.

- | | |
|-------------------------------------|-----------------------|
| • 2717 CTH CR (4141 Viebahn Street) | • 3701 Viebahn Street |
| • 2734 (2804) CTH CR | • 3815 Viebahn Street |
| • 2916 CTH CR | • 4025 Viebahn Street |
| • 2917 CTH CR | • 4101 Viebahn Street |
| • 3617 (3621) Viebahn Street | |

Note that the potable well located at 2717 CTH CR (4141 Viebahn Street) was left in-place and will be used as a non-potable groundwater monitoring well classified as a Sentinel Zone 3-Year Well.

Re-Classifying Sampling Zones

If future sampling results indicate that a well is impacted by COCs, the data will be used to reclassify the well's sampling zone. The sampling frequency of the newly impacted well will be adjusted to match the reclassified sampling zone schedule.

Sampling Methodology

Potable well owners will be notified by the City that their well is scheduled to be sampled. The City will then work with AECOM and the owners to schedule an appointment for AECOM field technicians to sample the well.

Samples will be collected following purging from a cold water tap or spigot as near to the well as possible, preferably prior to any storage/pressure tanks or physical/chemical treatment system that might be present. The system will be purged for at least 10 minutes immediately prior to sampling. Samples for VOCs will be collected in 40-ml glass vials with Teflon septa. The vials will be filled to the top, leaving no headspace or bubbles and quickly capped. While filling sample containers, water flow will be reduced to a low level to minimize sample disturbance. The samples will be placed on ice in a cooler and picked-up by the laboratory analyzing the vials. The samples will be accompanied with a chain of custody (COC) for each sample.

Potable well water samples for quality control will also be collected. The quality control samples will include field duplicate and matrix spike/matrix spike duplicate (MS/MSD) samples. The quality control samples will be determined by AECOM field personnel. Laboratory provided trip blanks will accompany the sample containers to evaluate the potential for analytical artifacts associated with container handling in the field and laboratory.

Water samples will be submitted to a Wisconsin Administrative Code (WAC) Chapter NR 149 certified laboratory for analyses of VOCs (EPA Method SW 8260B). The groundwater analytical results will be compared to the WAC Ch. NR 140.10, Table 1, Public Health Groundwater Quality Standards.

Reporting

Reporting of laboratory analytical results will be made to the City, WDNR, and individual potable well owners.

A semi-annual potable well sampling letter report will be submitted to the WDNR. The letter report will include a written summary of the sampling event(s), summarized laboratory results in tabular form, a figure showing the results, and copies of laboratory reports.

Well owner reporting of analytical results will include a cover letter explaining the results with an attached copy of the laboratory report. The WDNR will be copied on the well owner reporting.

Ongoing Activities

Currently locations with potable wells that have VOC compounds above drinking water standards are receiving bottled water provided by the City (e.g. 4005 and 4010 Thunder Ridge Road). It is anticipated that both of these wells will be replaced during May 2017.

At this time we are proceeding with scheduling the May 2017 sampling event. If you have any questions regarding the work plan, please contact Dave Henderson at 414.944.6190 or dave.henderson@aecom.com.

Yours sincerely,

AECOM Technical Services, Inc.



David Henderson, P.E.
Senior Project Manager

Cc: Kathleen M. McDaniel, City Attorney, City of Manitowoc
Dan Koski, Director of Public Infrastructure, City of Manitowoc

Attachments: Table 1, Summary of Five Year Potable Well Sampling Plan
Figure 1, Potable Well Sampling Locations

Tables:

Table 1: Summary of Five Year Potable Well Sampling Plan

**TABLE 1
SUMMARY OF FIVE YEAR POTABLE WELL SAMPLING PLAN
FORMER TOWN OF NEWTON GRAVEL PIT
MANITOWOC, WISCONSIN**

Well Address	Map Color Code	Date of Previous Sampling Event	2017		2018		2019		2020		2021	
			May	October	May	October	May	October	May	October	May	October
Target Zone Wells (semi-annual sampling)												
3817 Viebahn St	●	Oct 2016	1	1	1	1	1	1	1	1	1	1
3327 Hecker Rd	●	Oct 2016	1	1	1	1	1	1	1	1	1	1
3461(3417) Hecker Rd	●	Oct 2016	1	1	1	1	1	1	1	1	1	1
3702 Hecker Rd	●	Oct 2016	1	1	1	1	1	1	1	1	1	1
3618 CTH CR	●	Oct 2016	1	1	1	1	1	1	1	1	1	1
4027 Thunder Ridge Rd	●	Oct 2016	1	1	1	1	1	1	1	1	1	1
4101 Thunder Ridge Rd	●	Oct 2016	1	1	1	1	1	1	1	1	1	1
4111 Thunder Ridge Rd	●	Oct 2016	1	1	1	1	1	1	1	1	1	1
3911 Blackhawk Ct	●	Oct 2016	1	1	1	1	1	1	1	1	1	1
3921 Black Hawk Ct	●	Oct 2016	1	1	1	1	1	1	1	1	1	1
4159 Silver Creek Rd	●	Oct 2016	1	1	1	1	1	1	1	1	1	1
3027 Orchard Ln	●	Oct 2016	1	1	1	1	1	1	1	1	1	1
Target Zone Sentinel Wells (sample annually)												
3320 Hecker Rd	●	Oct 2016		1		1		1		1		1
3825 Viebahn St	●	Oct 2016		1		1		1		1		1
2832 (2904) CTH CR	●	Oct 2016		1		1		1		1		1
2911 CTH CR	●	Oct 2016		1		1		1		1		1
3224 CTH CR	●	Oct 2016		1		1		1		1		1
3312 CTH CR	●	Oct 2016		1		1		1		1		1
3322 CTH CR	●	Oct 2016		1		1		1		1		1
3412 CTH CR	●	Oct 2016		1		1		1		1		1
3422 CTH CR	●	Oct 2016		1		1		1		1		1
3523 CTH CR	●	Oct 2016		1		1		1		1		1
3533 CTH CR	●	Oct 2016		1		1		1		1		1
3611 CTH CR	●	Oct 2016		1		1		1		1		1
3626(3626B) CTH CR	●	Oct 2016		1		1		1		1		1
3627 CTH CR	●	Oct 2016		1		1		1		1		1
Sentinel Zone 3-Year Wells (sample every 3rd year)												
3625 Hecker Rd	●	Oct 2016						1				Oct 2022
2717 CTH CR (4141 Viebahn St) non-potable well	●	Oct 2016						1				Oct 2022
2716 CTH CR	●	Oct 2015			1							1
3904 CTH CR	●	May 2014	1						1			
4024 CTH CR	●	Oct 2016						1				Oct 2022
4101 CTH CR	●	Oct 2015			1							1
4127 Thunder Ridge Rd	●	March 2016					1					May 2022
3128 Orchard Ln	●	Oct 2015				1						1
4212 Silver Creek Rd	●											
4220 Silver Creek Rd (3 Properties Share Well)	●	May 2014	1						1			
4236 Silver Creek Rd	●											
4314 Silver Creek Rd	●	June 2014	1						1			
Sentinel Zone 5-Year Wells (sample every 5th year)												
4219 Viebahn St	●	Oct 2015								1		
3121 Hecker Rd	●	Oct 2015								1		
3720 Hecker Rd	●	March 2016									1	
3627 Hecker Rd	●	May 2014	1									May 2022
2706 CTH CR	●	Oct 2016										1
4125 CTH CR	●	not sampled yet	1									May 2022
3318 Orchard Ln.	●	Oct 2016										1
3420 Orchard Ln.	●	Oct 2016										1
3524 Orchard Ln.	●	Oct 2015							1			
3710 Silver Creek Rd	●	not sampled yet	1									May 2022
3780 Silver Creek Rd	●	not sampled yet	1									May 2022
3802 Silver Creek Rd	●	not sampled yet	1									May 2022
3812 Silver Creek Rd	●	January 2016									1	
3902 Silver Creek Rd	●	Oct 2016										1
4004 Silver Creek Rd	●	Oct 2015							1			
4156 Silver Creek Rd	●	March 2016									1	
4315 Silver Creek Rd	●	June 2014	1									May 2022
Replacement Wells (sample every 5th year)												
3303 Hecker Rd	●	Oct 2016										1
3515 Hecker Rd	●	Oct 2016										1
3518 Hecker Rd	●	Oct 2016										1
3609 Hecker Rd	●	Oct 2016										1
3023 CTH CR	●	Oct 2016										1
3120 CTH CR	●	Oct 2016										1
3403 CTH CR	●	Oct 2016										1
3504 CTH CR	●	Oct 2016										1
4002 Thunder Ridge Rd	●	Oct 2016										1
4005 Thunder Ridge Rd	●	Oct 2016										Oct 2022
4010 Thunder Ridge Rd	●	Oct 2016	1									Oct 2022

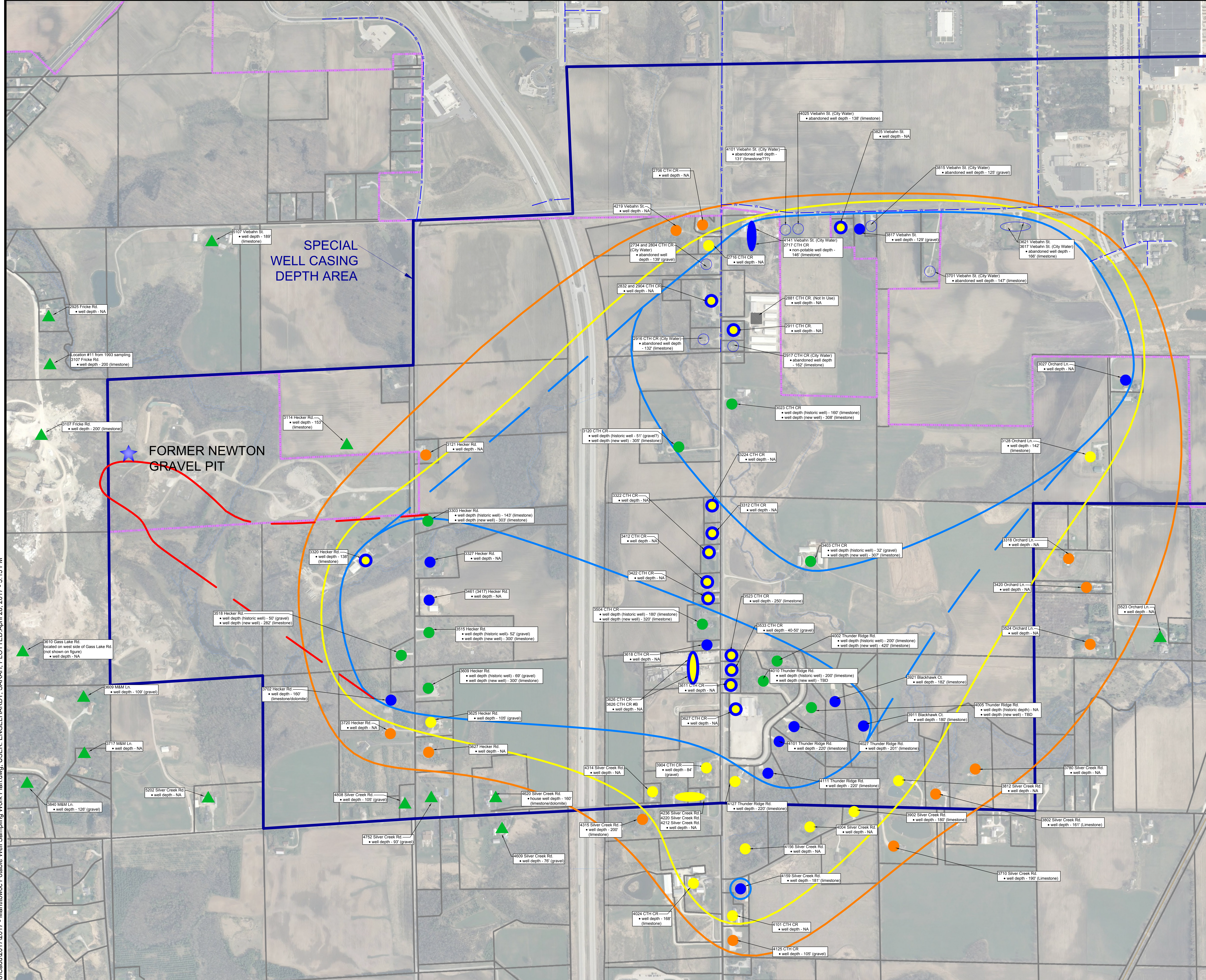
**TABLE 1
SUMMARY OF FIVE YEAR POTABLE WELL SAMPLING PLAN
FORMER TOWN OF NEWTON GRAVEL PIT
MANITOWOC, WISCONSIN**

Well Address	Map Color Code	Date of Previous Sampling Event	2017		2018		2019		2020		2021	
			May	October	May	October	May	October	May	October	May	October
Historically Sampled Wells												
5107 Veibahn St	▲	December 2013	Wells are typically up-gradient or side gradient - no additional sampling anticipated									
2925 Fricke Rd	▲	Feb 1993										
3107 Fricke Rd	▲	December 2013										
3610 Gass Lake Rd	▲	Feb 1993										
3609 M&M Ln	▲	December 2013										
3717 M&M Ln	▲	Feb 1993										
3840 M&M Ln	▲	Feb 1993										
3114 Hecker Rd	▲	May 2014										
2881 CTH CR	▲	Well Out of Service										
4314 Silver Creek Rd	▲	June 2014										
4315 Silver Creek Rd	▲	June 2014										
4609 Silver Creek Rd	▲	June 2014										
4620 Silver Creek Rd (two wells)	▲	May 2014										
4752 Silver Creek Rd	▲	June 2014										
4808 Silver Creek Rd	▲	May 2014										
5202 Silver Creek Rd	▲	December 2013										
3523 Orchard Ln	▲	May 2014										
Former Potable Wells Now Connected to City Water												
3617(3621) Viebahn St	○	March 2016	City Water Provided - No Potable Well Sampling Required									
3701 Viebahn St	○	Oct 2015										
3815 Viebahn St	○	Oct 2015										
4025 Viebahn St	○	Oct 2015										
4101 Viebahn St	○	Oct 2015										
2716 CTH CR (4141 Viebahn St)	○	Oct 2015										
2734(2804) CTH CR	○	Oct 2015										
2916 CTH CR	○	Oct 2015										
2917 CTH CR	○	Oct 2015										
Wells Sampled per Event			23	26	12	29	13	29	15	30	15	42

Figures:

Figure 1: Potable Well Sampling Locations

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- LEGEND:**
- PROPERTY BOUNDARY
 - - - PROPERTY BOUNDARY - CITY LIMITS
 - W — UTILITIES: -POTABLE WATER SUPPLY (from City of Manitowoc)
 - POTABLE WELL SAMPLE LOCATIONS
 - -WITHIN TARGET ZONE
 - -WITHIN TARGET ZONE WITH NO DETECTS
 - -WITHIN SENTINEL ZONE-3 YEAR

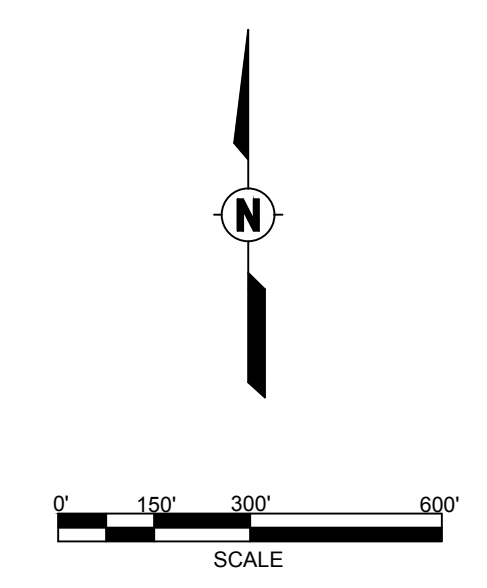
- POTABLE WELL SAMPLE LOCATIONS (CONTINUED)**
- -WITHIN SENTINEL ZONE-5 YEAR
 - -REPLACEMENT WELL WITHIN TARGET ZONE
 - ▲ -UPGRADIENT AND HISTORICALLY SAMPLED WELLS
 - -FORMER TARGET ZONE WELL, NOW ON CITY WATER
 - -WELL OUT OF SERVICE

- SAMPLING ZONES**
- TARGET ZONE
 - SENTINEL ZONE-3 YEAR
 - SENTINEL ZONE-5 YEAR
 - FORMER GRAVEL PIT ZONE

NOTES:

NA - NOT AVAILABLE

TBD - TO BE DETERMINED



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FORMER NEWTON GRAVEL PIT

**POTABLE WELL SAMPLING LOCATIONS
 FIVE YEAR POTABLE WELL SAMPLING PLAN**

Project Number: 60311767	Drawn By: SAE/ANS	Date: 4/28/2017	Figure No. 1
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