REPORT

I/I and Interceptor Sewer Rehabilitation Study

Prepared for: City of Wausau, Wisconsin

Prepared by: Clark Dietz, Inc.

Date: January 2020

Professional Consulting and Design Services

Clark Dietz

Engineering Quality of Life™

Table of Contents

SECTION **PAGE**

1.0 INTRODUCTION 1
1.1 Project Summary 1
1.2 Purpose 1

2.0 SEWER SYSTEM DESCRIPTION 2
2.1 Study Location 2
2.2 Wastewater Sampling 2
2.2.1 Sampling Locations 2
2.2.2 Sampling Procedure 2
2.2.3 Sampling Results 2
2.3 Groundwater Levels 2
2.4 I/I and PCP in Sewer System 3

3.0 IMPROVEMENT RECOMMENDATIONS 4
3.1 Rehabilitation Options 4
3.2 Cost Estimates 5
3.3 Recommendations 6

4.0 CONCLUSION 7
4.1 Future Investigation 7
4.2 System Improvements 7

TABLES
Table 3-1 Comparison of Trenchless Sewer Rehabilitation Methods 5
Table 3-2 Trenchless Sewer Rehabilitation Methods Estimates of Probable Cost 6

APPENDICES
A Location Map
B Wastewater Sampling Locations
C Wastewater Sampling Results
D Locations of Monitoring Wells
E Recorded Groundwater Levels
F Detected PCP in Manholes
G Groundwater Elevation in Study Area

1.0 Introduction

1.1 Project Summary

The City of Wausau requested an Infiltration and Inflow (I/I) Assessment and Interceptor Sewer Rehabilitation Study for a small section of their sanitary sewer collection system located in the near southwest side of the City from Riverside Park south to the wastewater treatment facility (WWTF). There is a Wisconsin Department of Natural Resources (WDNR)-regulated cleanup site in this area due to groundwater contamination. The owner of the site treats the groundwater to remove Pentachlorophenol (PCP) and then discharges the treated groundwater water to the City's sanitary sewer.

An Infiltration and Inflow (I/I) Assessment and Interceptor Sewer Rehabilitation Study has been completed for the City of Wausau, Wisconsin. This report provides a condition assessment for a small section of the City of Wausau's sanitary sewer system located in the near southwest side of the City from Riverside Park south to the WWTF. This report evaluates suspected deficiencies within this area and recommends possible improvements. The evaluation includes a summary of recent wastewater sampling and groundwater monitoring data which was provided by the City of Wausau.

1.2 Purpose

The purpose of this study is to determine if the interceptors in the area are experiencing I/I. The provided sampling results show a presence of PCP in the sanitary sewer collection system downstream of the regulated site sanitary sewer discharge. It correlates that if a pollutant is present downstream in the sewers, which wasn't present at the discharge "source", it must be entering the sewers via I/I. The chemical pentachlorophenol (PCP) is known to exist in soils in this area. The study will examine if and where PCP has been detected in this part of the sewer system and attempt to determine the area(s) it may be entering the sewer system.

If I/I is occurring in the area, steps should be taken to prevent it in the future. The study includes recommendations for replacement or rehabilitation of the existing sewer system. Recommendations are based on compliance with all applicable federal, state, and local codes and standards. The study includes a preliminary cost estimate for these improvements.

2.0 Sewer System Description

2.1 Study Location

The study examined portions of two interceptor sewers located in the center of the City of Wausau near the wastewater treatment facility (WWTF). The study location is shown on the map in Appendix A. The map, and all others in this report, were prepared by City staff using Wausau's current GIS system.

One section of the interceptor is located in Thomas Street and flows from the west to the east. At Cleveland Avenue the sewer increases in diameter from 18-inch to 20-inch. At McCleary Street near the Thomas Street Bridge the 20-inch sewer turns south and decreases back to 18-inch diameter. A separate 30-inch interceptor sewer flows from the north through Riverside Park on the west side of the river. At River Street this sewer increases in size to 36-inch diameter. At Adrian Street the interceptor turns to the east and takes in the 18-inch interceptor at McCleary Street. The 36-inch interceptor then continues to flow to the east toward the WWTF.

2.2 Wastewater Sampling

2.2.1 Sampling Locations

Wastewater was sampled in a total of eight manholes along the interceptor sewers identified in Section 2.1. The sampling locations were selected with assistance from WDNR staff and are shown on the map in Appendix B. The sampling locations were chosen to test wastewater both upstream of and downstream of the treated groundwater discharge point as well as within the area known to contain PCP. Multiple samples were taken from the same manholes on different days to confirm/verify information and data. Samples were taken in manholes located above and below the normal groundwater levels. The sampling manholes vary in depth from approximately 8.7 feet to 17.4 feet.

2.2.2 Sampling Procedures

Wastewater grab samples were collected by Wausau Water Works staff on January 8, 2019, March 26, 2019, June 10, 2019, and June 12, 2019. The samples were analyzed by Badger Labs and Synergy Environmental Lab, Inc.

2.2.3 Sampling Results

The sampling results are included in Appendix C. On January 8th, five of the seven samples collected showed the presence of PCP. In the March sampling effort, five of the eight samples collected contained PCP. On June 10th and 12th, two of the three samples collected showed the presence of PCP. In all the other samples, the level of PCP was below the limit of detection (LOD, 1.84 µg/L).

2.3 Groundwater Levels

Groundwater elevations in the study area have been monitored for many years in monitoring wells located on or near the Wauleco industrial site. TRC Companies, Inc., the firm that conducted the groundwater monitoring, supplied the City with ten years' worth of groundwater elevations from wells located near the interceptor sewer. A map showing the monitoring wells is included in Appendix D.

The groundwater sampling results are included in a table in Appendix E. Two level outliers were removed from the calculation of the normal average groundwater elevations. The first is a high water level that occurred in the summer of 2011 which resulted from a water main break. The second is the lowering of Lake Wausau in fall of 2016 that resulted in abnormally low levels.

2.4 I/I and PCP in Sewer System

The map in Appendix F shows the PCP sample results, the dates the samples were taken, and the locations of the manholes sampled. It should be noted that there are two separate interceptor sewer lines that run through this area. These two lines intersect at MH5 at the intersection of McCleary and Adrian Streets. The interceptor line from the west connects on the north side of MH5 and the interceptor line from the north connects on the west side of MH5. For the January and March sample events, there were two samples taken from MH5: one from the north inlet and one from the west inlet, each representing a different interceptor sewer.

January Sample Event

In the January 8th sampling event, PCP was sampled on the interceptor line that runs west to east. Samples along this west to east interceptor were taken from MH7, MH6, and MH5. The farthest west sample location, which is upstream of the treated groundwater discharge point, is MH7 and the result was below the LOD. The sample taken at MH6, which is downstream of the treated groundwater discharge point, showed detection of PCP. The next sample downstream was from MH5, which showed PCP detection significantly less than that from MH 6.

During the January 8th sampling event, PCP was also sampled on the interceptor line that runs north to south. Samples along this north to south interceptor were taken from MH162, MH53, and MH 5. The sample taken from MH162, north of the study area, was below the LOD. The sample taken from MH53 showed detection of PCP and the sample from the downstream MH5 showed a higher detection level of PCP. Both of these lines connect at MH5.

March Sample Event

In the March 26th sampling event, PCP was again sampled on the two interceptor lines that run west to east and north to south. Samples on the west to east interceptor were taken at MH6, MH5, and MH2, upstream to downstream respectively. MH6 was below the LOD, MH5 was below the LOD, and in MH2 PCP was detected. MH2 is downstream of MH5 where the two interceptors connect.

On the interceptor line running north to south samples were taken at MH162, MH53, MH54 and MH5, upstream to downstream respectively. MH162 was below the LOD, MH53 detected PCP, MH54 detected PCP slightly higher than MH 53, and MH5 detected PCP slightly higher than MH54. Again, MH2 detection was slightly less than MH5. Both interceptors connect upstream in MH5 and dilution could reduce the detected concentration.

June Sample Event

In the June 10th and 12th sampling event the north to south interceptor was the only line tested. Samples were taken from MH 51, MH52, and MH53. The sample at MH51 was below the LOD and the MH52 and MH53 samples both detected PCP at a very similar level.

General Observations

PCP concentrations did not increase steadily in either the east- or south-flowing interceptor. The level varied somewhat from one location to another. The volume of wastewater in the system increases as it moves toward the WWTF, and the PCP concentration will vary in the water entering the system. Mixing also occurs in the sewer system. All these factors will affect the overall concentration of the chemical.

The map/graph in Appendix G shows the observed groundwater elevations in relation to PCP found in the wastewater samples. The map shows that manholes below the typical groundwater level are more likely to contain PCP in the wastewater. This indicates that PCP is first entering the groundwater and then entering the wastewater system.

Since PCP was not detected in the wastewater manholes located farthest to the north and west of the study area, it appears that contamination is not entering the system from these areas. It is instead occurring directly within the study area. Further narrowing down the area of influence or most likely possibilities for PCP I/I, it appears the north-south interceptor has I/I issues for groundwater containing PCP.

3.0 Improvement Recommendations

The results of the wastewater sampling and groundwater monitoring discussed in the previous section indicated that I/I is occurring in the study area. I/I occurs in almost all sewer systems, and especially in older systems or those that have been degraded by the type and volume of flow. In this case, repairs are recommended to prevent PCP from continuing to enter the sewer system.

3.1 Rehabilitation Options

Sanitary sewers can be replaced or rehabilitated by conventional open cut construction or different types of trenchless rehabilitation. The type of construction will depend on other aspects of the project. When the primary purpose of the project is to perform a complete pavement replacement, new sewers will likely be installed via open cut methods, since the road will already be demolished. This is especially true if the cost of the project is being shared between various funding sources, so that the sewer utility is not covering the entire cost of the project.

If pavement replacement is not planned, trenchless rehabilitation technologies may be a better option. These rehabilitation methods are long-term solutions that can be applied to many sewer defects, such as cracks and offset joints. Large breaks and cave-ins will likely require spot excavation and pipe section replacement.

In this case, significant environmental costs may be incurred if open cut methods are utilized. Contaminated soils may have to be removed from the site and remediated or disposed of. This type of determination, however, is outside the scope of this study.

The cost of trenchless rehabilitation varies depending on the size and length of sewer. Using sewer lining as an example, for a 12-inch sewer, the cost of lining is approximately $60 per linear foot. For comparison, the cost of 12-inch sewer replacement is approximately $220 per linear foot when it includes pavement restoration. With lining and other trenchless technologies, the construction cost per foot increases as pipe size increases and the total length of pipe to be rehabilitated decreases.

These sections of the interceptor sewers are subject to I/I but are likely not in need of full replacement. City staff have used Wausau's camera equipment to inspect some of the sewers in the area and found no major leaks or deficiencies. City staff has not indicated that there are immediate plans for road replacements in the study area. These conditions warrant the use of trenchless rehabilitation to reduce I/I and therefore PCP in the sewers. Rehabilitation will also increase the life of the pipe. Several methods of rehabilitation are available, including pipe bursting, slip lining, spray-in-place pipe, and cured-in-place pipe.

The table below outlines the advantages and disadvantages of different trenchless rehabilitation methods. Costs for each method were obtained from contractors with trenchless rehabilitation experience. They are based on rehabilitation of 36-inch pipe. The costs are associated with pipe-only rehabilitation and do not include incidental costs such as bypass pumping, traffic control, and erosion control. Cured-in-place pipe stands out as the most economical and least impactful to the project area.

Table 3-1
Comparison of Trenchless Sewer Rehabilitation Methods

METHOD	DESCRIPTION	COST (Pipe Only)	ADVANTAGES	DISADVANTAGES
PIPE BURSTING	New pipe pulled through a fragmented old pipe.	$550-650/LF	Completely new pipe	Bypassing required, cannot pipe burst RCP, not recommended if host pipe is within 5 feet of other utilities, excavation required at each penetration/lateral
SLIP LINING	Smaller diameter, smoother, new pipe pushed inside of remaining old pipe.	$250-350/LF	Can be done without bypassing, brand new pipe	Cost, excavation pit required for every 1000 feet, excavation required at each penetration/lateral
SPRAY-IN-PLACE PIPE	Geo-Polymer coating applied to the inside of the existing pipe.	$400-500/LF	No excavation required, lining is structural after curing	Cost, all infiltration will require grouting prior to application, bypassing required
CURED-IN-PLACE PIPE	Inverted resin impregnated felt liner, inflated and cured to the inside of the existing pipe.	$150-250/LF	Lower cost, no excavation required, liner is structural after curing	Bypassing required, long curing times requiring overnight engines, heavy infiltration requires grouting prior to lining

Source: Mequon-Thiensville Interceptor Rehab Memo, Clark Dietz, Inc., August 16, 2019

3.2 Cost Estimates

Wastewater sampling indicated that PCP enters the sewer system directly within the study area. Pipe rehabilitation is therefore recommended to start at the intersection of Thomas Street and First Avenue and continue to the treatment facility. The map in Appendix A shows the interceptor sewers in the study area, which includes approximately 4900 feet of pipe. The table below shows high-level preliminary planning cost estimates for the various types of pipe rehabilitation. Since the sewer varies in size from 18-inch to 36-inch, estimates at the lower end of the cost spectrum were used to calculate the total project cost.

Table 3-2
Trenchless Sewer Rehabilitation Methods
Estimates of Probable Cost

Item	Pipe Bursting	Slip Lining	Spray-in-Place Pipe	Cured-in-Place Pipe
Estimated cost per foot of rehabilitated sewer [1]	$550	$250	$400	$150
Preliminary cost estimate [2]	$2,695,000	$1,225,000	$1,960,000	$735,000
20% construction contingency	$539,000	$245,000	$392,000	$147,000
Estimated construction cost	$3,234,000	$1,470,000	$2,352,000	$882,000
Legal, Engineering, and Design (10%)	$323,400	$147,000	$235,200	$88,200
Total Estimated Cost	**$3,557,400**	**$1,617,000**	**$2,587,200**	**$970,200**

[1] *Based on Mequon-Thiensville Interceptor Rehab Memo, Clark Dietz, Inc., August 16, 2019.*

[2] *Based on 4,900 feet of sewer rehabilitation, 18-inch to 36-inch diameter.*

The interceptor sewers are located under street pavement along most of their length. Open cut sewer replacement would require removal of the existing pavement and excavation of the existing sewer, necessitating a complete reconstruction of the affected streets. The cost of open cut sewer replacement and street reconstruction can be expected to be at least double the cost of CIPP lining. Potential hauling and remediation of the soils excavated from the project site will also increase the cost of open cut construction.

3.3 Recommendations

After considering the four trenchless pipe rehabilitation methods, cured-in-place pipe lining appears to be the best option for remediation of the sanitary sewer interceptor. CIPP lining has the lowest cost and will be the least intrusive to the project area. CIPP lining is a widely accepted process for pipe rehabilitation and there are several qualified contractors in Wisconsin with extensive CIPP installation experience.

Prior to beginning a CIPP remediation project, it will be necessary to determine and specify the thickness of the liner to be used in the interceptor. The condition and shape of the pipe as well as the type of curing resin to be used will affect the liner thickness. The contractor should be required to submit a cured liner sample to the City prior to starting the work.

Cured-in-place pipe lining requires all flow to be bypassed around the rehabilitated pipe while the liner cures. This is typically a 12- to 24-hour process. Past rehabilitation projects have shown that bypass pumping is an expensive operation for contractors and variability in bypassing costs is common. The rehabilitation contractor should be required to submit a bypass plan prior to starting construction, and City staff should offer options for disposal of the bypassed sewage.

4.0 Conclusion

Wastewater sampling and groundwater monitoring in the study area show that PCP is present in the interceptor sewer near the treatment facility. The interceptor sewer that appears to have the most significant I/I is the north to south interceptor. In the samples upstream of the study area, no PCP was detected. PCP was detected regularly in the downstream samples of the north to south interceptor. PCP is not normally present in sewage, indicating that it is entering the sewer system along the interceptor. It is likely that PCP is entering the system through groundwater infiltration.

4.1 Future Investigation

Further data about the interceptor sewer will be required in order to verify if groundwater is entering the sewer. The sewer should first be inspected by televising along the route where PCP has been detected. The inspection will show the sewer's problem areas, and whether groundwater I/I is actually occurring in the study area. The inspection will also help to verify the project limits. Plans can then be made for future repairs and upgrades. The inspection results should be reviewed soon after they are completed, as conditions can change quickly. Televising of the interceptor may show that lining is recommended at least along certain lengths of the sewers. If leaking joints and cracks are common, lining could potentially reduce I/I. The inspection will also show whether there are large breaks or significant defects that require spot excavations.

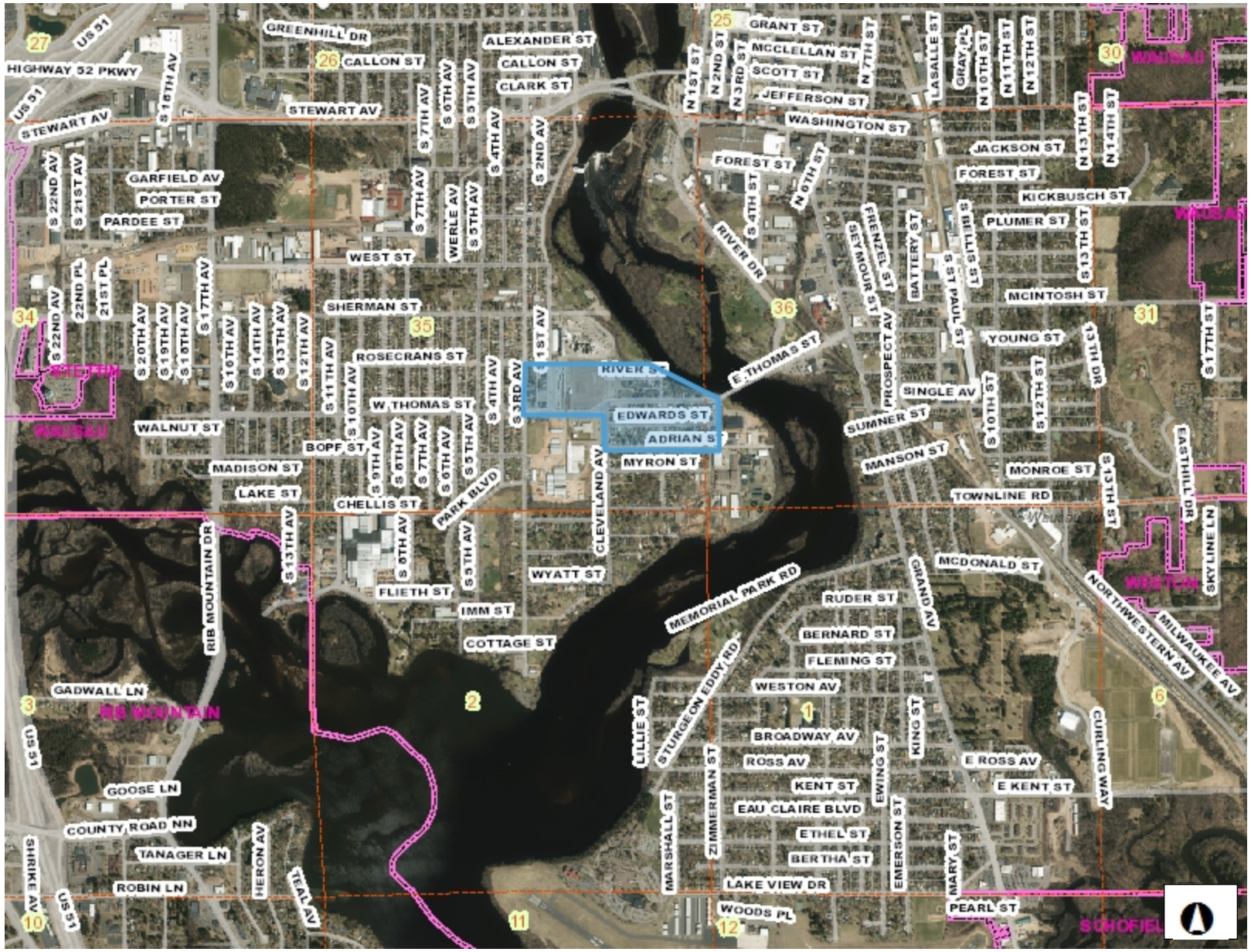
Manhole inspections should also be a part of the sewer televising contract. The manhole condition and potential problem areas will be noted in the inspection reports. Repairs, lining, and rehabilitation of manholes in poor condition should be combined into the sewer rehabilitation/lining work for the best bid pricing. Many lining contractors also perform manhole rehabilitation.

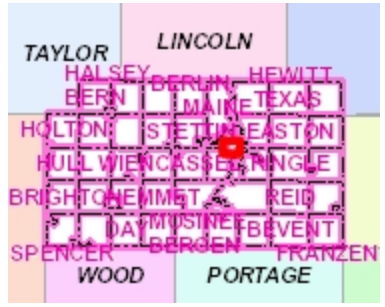
4.2 System Improvements

If the sewer and manhole investigations show that contaminated groundwater is entering the sewer system, plans should be made for system rehabilitation. The repairs can include the entire interceptor length as shown in Chapter 3, or only the worst areas of the system. The contract documents should include a map showing the sections to be rehabilitated and detailed specifications for the repair work.

Appendix A – Location Map

Land Information Mapping System





Legend

- Section Lines/Numbers
- Right Of Ways
- Municipalities
- 2015 Orthos
  - Red: Band_1
  - Green: Band_2
  - Blue: Band_3
- Surrounding_Counties
  - CLARK
  - LANGLADE
  - LINCOLN
  - PORTAGE
  - SHAWANO
  - TAYLOR
  - WAUPACA
  - WOOD

992.57 0 992.57 Feet

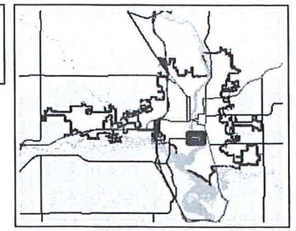
NAD_1983_HARN_WISCRS_Marathon_County_Feet

DISCLAIMER: The information and depictions herein are for informational purposes and Marathon County-City of Wausau specifically disclaims accuracy in this reproduction and specifically admonishes and advises that if specific and precise accuracy is required, the same should be determined by procurement of certified maps, surveys, plats, Flood Insurance Studies, or other official means. Marathon County-City of Wausau will not be responsible for any damages which result from third party use of the information and depictions herein or for use which ignores this warning.
THIS MAP IS NOT TO BE USED FOR NAVIGATION

Notes

Appendix B – Wastewater Sampling Locations

DPW Mapping System



Legend

- Parcels
- Section Lines/Numbers
- Right Of Ways
- Manhole
- Gravity Main
  - Collector
  - Interceptor
- Force Main
- Liftstation
- Abandoned Gravity Main

Map Created: 1/21/2019

111.42 0 111.42 Feet

NAD_1983_HARN_WISCRS_Marathon_County_Feet

Notes

Appendix C – Wastewater Sampling Results

BADGER LABS
ANALYTICAL LABORATORY & ENVIRONMENTAL SERVICES
est. 1966

Analytical Report

501 West Bell Street
Neenah, WI 54956-4868
P: 920.729.1100 | T: 1.800.776.7196
F: 920.729.4945

WAUSAU WATER WORKS
407 GRANT STREET
WAUSAU, WI 54401

Attn: DAVE ERICKSON/KEVIN FABEL

Project Number: 19001453
Report Date: 1/21/2019
Sampled By: CLIENT

Samples: 7 WASTEWATER

Sample Number: 49003143
Sample ID: MH #7 THOMAS ST
Sample Date: 1/8/2019
Date Received: 1/8/2019

Parameter	Results	Units	LOD	LOQ	Dil.	Method	Analyzed	Codes
PENTACHLOROPHENOL	<1.9	ug/l	1.9	6.03	1	8270C	01/15/19	7*

Sample Number: 49003144
Sample ID: MH #6 THOMAS ST
Sample Date: 1/8/2019
Date Received: 1/8/2019

Parameter	Results	Units	LOD	LOQ	Dil.	Method	Analyzed	Codes
PENTACHLOROPHENOL	17.8	ug/l	1.9	6.03	1	8270C	01/15/19	7*

Sample Number: 49003145
Sample ID: MH #162
Sample Date: 1/8/2019
Date Received: 1/8/2019

Parameter	Results	Units	LOD	LOQ	Dil.	Method	Analyzed	Codes
PENTACHLOROPHENOL	<1.9	ug/l	1.9	6.03	1	8270C	01/15/19	7*

Sample Number: 49003146
Sample ID: MH #53 EMTER ST
Sample Date: 1/8/2019
Date Received: 1/8/2019

Parameter	Results	Units	LOD	LOQ	Dil.	Method	Analyzed	Codes
PENTACHLOROPHENOL	6.0	ug/l	1.9	6.03	1	8270C	01/15/19	7,J,K1*

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Sample Number: 49003147
Sample ID: MH #5 MCCLEARY
Sample Date: 1/8/2019
Date Received: 1/8/2019

Parameter	Results	Units	LOD	LOQ	Dil.	Method	Analyzed	Codes
PENTACHLOROPHENOL	8.9	ug/l	1.9	6.03	1	8270C	01/15/19	7*

Sample Number: 49003148
Sample ID: MH #5 ADRIAN ST
Sample Date: 1/8/2019
Date Received: 1/8/2019

Parameter	Results	Units	LOD	LOQ	Dil.	Method	Analyzed	Codes
PENTACHLOROPHENOL	22.4	ug/l	1.9	6.03	1	8270C	01/15/19	7*

Sample Number: 49003149
Sample ID: RAW INFLUENT
Sample Date: 1/8/2019
Date Received: 1/8/2019

Parameter	Results	Units	LOD	LOQ	Dil.	Method	Analyzed	Codes
PENTACHLOROPHENOL	3.4	ug/l	1.9	6.03	1	8270C	01/15/19	7,J,K1*

*Quality Assurance Code(s):
7. Analyzed by sub contracted lab: Certification #445037560
J. Insufficient sample size to complete analysis.
K1. Analyte detected between the LOD and LOQ.
All LOD/LOQs adjusted for dilution and/or solids content.

BADGER LABORATORIES, INC.
WDNR Certified Lab #445023150
Approved By:

Amanda Vodus

BLE:gr
CC: KEN BLOOM – WAUSAU WWTF

SAMPLE REQUEST & CHAIN OF CUSTODY FORM

1900/453

BADGER LABS
Neenah: 501 W. Bell St. Neenah, WI 54956
Green Bay: 2150 Memorial Drive Suite 106 Green Bay, WI 54303

CLIENT NAME / ADDRESS
Wausau WWTF
435 Adrian Street, Wausau, WI 54401

BILLING ADDRESS/ EMAIL
407 Grant Street, Wausau, WI 54403

REPORT TO: Dave Erickson / Ken Bloom
PO NUMBER:

EMAIL: Ken.Bloom@ci.wausau.wi.us

PHONE: 715-261-6940
FAX:

PROJECT NAME/ SITE: PCP Sampling-Collection System

TURN AROUND TIME
STANDARD 10 DAY: ✓
RUSH (200% UPCHARGE):
DATE NEEDED:

MATRIX
DW = DRINKING WATER
WW = WASTEWATER
GW = GROUNDWATER
CW = COOLING WATER
S = SOLID/SLUDGE
P = PAPER
F = FUEL
OTHER:

ANALYTICAL REQUESTS

Certifications
WI DNR Cert. Lab #445023150
WI DATCP Cert. #105-205
GB-WI DNR Cert. Lab #405222620
GB-WI DATCP Cert. #105-450

SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	PRESERVATIVE (SEE BELOW)	MATRIX (SEE ABOVE)	GRAB or COMPOSITE	PCP's	LAB USE ONLY PROJECT #	LAB USE ONLY SAMPLE #
MH#7 Thomas St.	1/8/19	8:25AM	NP	WW	Grab	X	1453	3143
MH#6 Thomas St.	1/8/19	8:32AM	NP	WW	Grab	X		44
MH#Ke2	1/8/19	7:55AM	NP	WW	Grab	X		45
MH#53 Enter St.	1/8/19	7:40AM	NP	WW	Grab	X		46
MH#5 McCleary	1/8/19	7:30AM	NP	WW	Grab	X		47
MH#5 Adrian St.	1/8/19	7:30AM	NP	WW	Grab	X		48
Raw Influent	1/8/19	8:52AM	NP	WW	Grab	X		49
Raw Influent	1/8/19	8:52AM	NP	WW	Grab	X		L
Raw Influent	1/8/19	8:52AM	NP	WW	Grab	X		

PRESERVATIVE: NP=NO PRESERVATIVE; H2SO4=SULFURIC ACID; HNO3=NITRIC ACID; HCL=HYDROCHLORIC ACID; NAOH=SODIUM HYDROXIDE; ZA=ZINC ACETATE

CHAIN OF CUSTODY RECORD

FILLED IN BY CLIENT
SAMPLED BY: Ken Bloom
DATE/TIME SAMPLED: 1-8-19 7:30AM - 9:00AM
RELINQUISHED BY: Ken Bloom
DELIVERY METHOD: Badger Lab Pick-up

FILLED IN BY BADGER LABS
RECEIVED BY: JT
DATE/TIME RECEIVED: 1/8/19 10:20
LOGGED IN: DJD
ICE?: Y/N:

ADDITIONAL COMMENTS:

BADGER LABS
ANALYTICAL LABORATORY & ENVIRONMENTAL SERVICES
est. 1966

Analytical Report

501 West Bell Street
Neenah, WI 54956-4868
P: 920.729.1100 | T: 1.800.776.7196
F: 920.729.4945

WAUSAU WATER WORKS
407 GRANT STREET
WAUSAU, WI 54401

Project Number: 19004457
Report Date: 4/12/2019
Sampled By: CLIENT

Attn: DAVE ERICKSON/KEVIN FABEL/KEN BLOOM

Samples: 8 WASTEWATER

Sample Number: 49009609
Sample ID: MH #2 ADRAIN ST
Sample Date: 3/26/2019
Date Received: 3/26/2019

Parameter	Results	Units	LOD	LOQ	Dil.	Method	Analyzed	Codes
PENTACHLOROPHENOL	- SEE ATTACHED SYNERGY REPORT REPORT -							7*

Sample Number: 49009610
Sample ID: MH #13
Sample Date: 3/26/2019
Date Received: 3/26/2019

Parameter	Results	Units	LOD	LOQ	Dil.	Method	Analyzed	Codes
PENTACHLOROPHENOL	- SEE ATTACHED SYNERGY REPORT -							7*

Sample Number: 49009611
Sample ID: MH #53
Sample Date: 3/26/2019
Date Received: 3/26/2019

Parameter	Results	Units	LOD	LOQ	Dil.	Method	Analyzed	Codes
PENTACHLOROPHENOL	- SEE ATTACHED SYNERGY REPORT -							7*

Sample Number: 49009612
Sample ID: MH #54
Sample Date: 3/26/2019
Date Received: 3/26/2019

Parameter	Results	Units	LOD	LOQ	Dil.	Method	Analyzed	Codes
PENTACHLOROPHENOL	- SEE ATTACHED SYNERGY REPORT -							7*

501 West Bell Street
Neenah, WI 54956-4868
P: 920.729.1100 | T: 1.800.776.7196
F: 920.729.4945

Sample Number: 49009613
Sample ID: MH #11
Sample Date: 3/26/2019
Date Received: 3/26/2019

Parameter	Results	Units	LOD	LOQ	Dil.	Method	Analyzed	Codes
PENTACHLOROPHENOL	- SEE ATTACHED SYNERGY REPORT -							7*

Sample Number: 49009614
Sample ID: MH #6
Sample Date: 3/26/2019
Date Received: 3/26/2019

Parameter	Results	Units	LOD	LOQ	Dil.	Method	Analyzed	Codes
PENTACHLOROPHENOL	- SEE ATTACHED SYNERGY REPORT -							7*

Sample Number: 49009615
Sample ID: MH #5 NORTH CLEARY
Sample Date: 3/26/2019
Date Received: 3/26/2019

Parameter	Results	Units	LOD	LOQ	Dil.	Method	Analyzed	Codes
PENTACHLOROPHENOL	- SEE ATTACHED SYNERGY REPORT -							7*

Sample Number: 49009616
Sample ID: MH #5 WEST ADRIAN
Sample Date: 3/26/2019
Date Received: 3/26/2019

Parameter	Results	Units	LOD	LOQ	Dil.	Method	Analyzed	Codes
PENTACHLOROPHENOL	- SEE ATTACHED SYNERGY REPORT -							7*

*Quality Assurance Code(s):
7. Analyzed by sub contracted lab: Certification #445037560
All LOD/LOQs adjusted for dilution and/or solids content.

BADGER LABORATORIES, INC.
WDNR Certified Lab #445023150
Approved By:

Amanda Vodus

BLE:gr

Synergy Environmental Lab, INC

1990 Prospect Ct., Appleton, WI 54914 *P 920-830-2455 * F 920-733-0631

JOHN LARSON
BADGER LABORATORIES & ENGINEERING
501 W BELL STREET
NEENAH WI 54956

Report Date *11-Apr-19*

Project Name
Project #

Invoice # E35935

Lab Code 5035935A
Sample ID 9609
Sample Matrix Water
Sample Date 3/26/2019

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
Semi Volatiles										
Pentachlorophenol (PCP)	22.9	ug/l	1.84	5.85	1	8270C	3/28/2019	4/4/2019	MJR	1
2-Fluorobiphenyl-surrogate	85	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
2-Fluorophenol-surrogate	24.1	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
Nitrobenzene-d5-surrogate	79	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
Phenol-d6-surrogate	19.7	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
p-Terphenyl-d14-surrogate	99	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
2,4,6-Tribromophenol-surrogate	98	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1

Lab Code 5035935B
Sample ID 9610
Sample Matrix Water
Sample Date 3/26/2019

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
Semi Volatiles										
Pentachlorophenol (PCP)	< 1.84	ug/l	1.84	5.85	1	8270C	3/28/2019	4/4/2019	MJR	1
2-Fluorobiphenyl-surrogate	22.7	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
2-Fluorophenol-surrogate	11.1	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
Nitrobenzene-d5-surrogate	21.4	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
Phenol-d6-surrogate	8.6	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
p-Terphenyl-d14-surrogate	22.4	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
2,4,6-Tribromophenol-surrogate	24.4	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1

Project Name **Invoice #** E35935
Project #

Lab Code 5035935C
Sample ID 9611
Sample Matrix Water
Sample Date 3/26/2019

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
Semi Volatiles										
Pentachlorophenol (PCP)	21.7	ug/l	1.84	5.85	1	8270C	3/28/2019	4/4/2019	MJR	1
2-Fluorobiphenyl-surrogate	76	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
2-Fluorophenol-surrogate	23.3	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
Nitrobenzene-d5-surrogate	68	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
Phenol-d6-surrogate	16.1	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
p-Terphenyl-d14-surrogate	78	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
2,4,6-Tribromophenol-surrogate	86	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1

Lab Code 5035935D
Sample ID 9612
Sample Matrix Water
Sample Date 3/26/2019

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
Semi Volatiles										
Pentachlorophenol (PCP)	19.3	ug/l	1.84	5.85	1	8270C	3/28/2019	4/4/2019	MJR	1
2-Fluorobiphenyl-surrogate	71	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
2-Fluorophenol-surrogate	18.7	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
Nitrobenzene-d5-surrogate	64	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
Phenol-d6-surrogate	12.9	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
p-Terphenyl-d14-surrogate	69	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
2,4,6-Tribromophenol-surrogate	81	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1

Lab Code 5035935E
Sample ID 9613
Sample Matrix Water
Sample Date 3/26/2019

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
Semi Volatiles										
Pentachlorophenol (PCP)	20.9	ug/l	1.84	5.85	1	8270C	3/28/2019	4/4/2019	MJR	1
2-Fluorobiphenyl-surrogate	79	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
2-Fluorophenol-surrogate	20.6	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
Nitrobenzene-d5-surrogate	72	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
Phenol-d6-surrogate	< 1	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
p-Terphenyl-d14-surrogate	72	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
2,4,6-Tribromophenol-surrogate	90	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1

Project Name
Project #

Invoice # E35935

Lab Code 5035935F
Sample ID 9614
Sample Matrix Water
Sample Date 3/26/2019

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
Semi Volatiles										
Pentachlorophenol (PCP)	< 1.84	ug/l	1.84	5.85	1	8270C	3/28/2019	4/4/2019	MJR	1
2-Fluorobiphenyl-surrogate	85	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
2-Fluorophenol-surrogate	29.2	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
Nitrobenzene-d5-surrogate	79	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
Phenol-d6-surrogate	17.6	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
p-Terphenyl-d14-surrogate	84	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
2,4,6-Tribromophenol-surrogate	97	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1

Lab Code 5035935G
Sample ID 9615
Sample Matrix Water
Sample Date 3/26/2019

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
Semi Volatiles										
Pentachlorophenol (PCP)	< 1.84	ug/l	1.84	5.85	1	8270C	3/28/2019	4/4/2019	MJR	1
2-Fluorobiphenyl-surrogate	81	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
2-Fluorophenol-surrogate	28.1	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
Nitrobenzene-d5-surrogate	71	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
Phenol-d6-surrogate	18.8	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
p-Terphenyl-d14-surrogate	85	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
2,4,6-Tribromophenol-surrogate	96	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1

Lab Code 5035935H
Sample ID 9616
Sample Matrix Water
Sample Date 3/26/2019

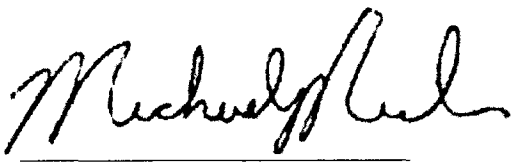
	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
Semi Volatiles										
Pentachlorophenol (PCP)	29.3	ug/l	1.84	5.85	1	8270C	3/28/2019	4/4/2019	MJR	1
2-Fluorobiphenyl-surrogate	74	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
2-Fluorophenol-surrogate	24.7	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
Nitrobenzene-d5-surrogate	66	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
Phenol-d6-surrogate	16.2	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
p-Terphenyl-d14-surrogate	75	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1
2,4,6-Tribromophenol-surrogate	87	REC %			1	8270C	3/28/2019	4/4/2019	MJR	1

"J" Flag: Analyte detected between LOD and LOQ LOD Limit of Detection LOQ Limit of Quantitation

Code	*Comment*
1	Laboratory QC within limits.

All solid sample results reported on a dry weight basis unless otherwise indicated. All LOD's and LOQ's are adjusted for dilutions but not dry weight. Subcontracted results are denoted by SUB in the analyst field.

Authorized Signature



CHAIN OF CUSTODY RECORD

Synergy Environmental Lab, Inc.

1990 Prospect Ct. • Appleton, WI 54914
920-830-2455 • FAX 920-733-0631

Chain # No 3276

Page ____ of ____

Sample Handling Request
____ Rush Analysis Date Required ____
(Rushes accepted only with prior authorization)
Y Normal Turn Around

Lab I.D. #	
Account No. :	Quote No.:
Project #:	
Sampler: (signature)	

Project (Name / Location):	
Reports To: Badger Labs	Invoice To:
Company	Company
Address	Address
City State Zip	City State Zip
Phone	Phone
FAX	FAX

Lab I.D.	Sample I.D.	Collection Date	Collection Time	Comp	Grab	Filtered Y/N	No. of Containers	Sample Type (Matrix)*	Preservation	DRO (Mod DRO Sep 95)	GRO (Mod GRO Sep 95)	LEAD	NITRATE/NITRITE	OIL & GREASE	PAH (EPA 8270)	PCB	PVOC (EPA 8021)	PVOC + NAPHTHALENE	SULFATE	TOTAL SUSPENDED SOLIDS	VOC DW (EPA 524.2)	VOC (EPA 8260)	8-RCRA METALS	Methylphenol							PID/ FID
S035935A	9699	3-26			Y	N	1	WW	NP															Y							
B	10						1																								
C	11						3																								
D	12						1																								
E	13						1																								
F	14						1																								
G	15						1																								
H	16						1																								

Analysis Requested **Other Analysis**

Comments/Special Instructions (*Specify groundwater "GW", Drinking Water "DW", Waste Water "WW", Soil "S", Air "A", Oil, Sludge etc.)

Sample Integrity - To be completed by receiving lab.
Method of Shipment: Client
Temp. of Temp. Blank ____ °C On Ice: X
Cooler seal intact upon receipt: X Yes ____ No

Relinquished By: (sign)	Time	Date	Received By: (sign)	Time	Date
AM	1500	3/26/19			

Received in Laboratory By: CLR Time: 1130 Date: 3/27/19

1900457

SAMPLE REQUEST & CHAIN OF CUSTODY FORM

BADGER LABS

Neenah: 501 W. Bell St. Neenah, WI 54956
Green Bay: 2150 Memorial Drive Suite 106 Green Bay, WI 54303

CLIENT NAME / ADDRESS: Wausau WWTF
435 Adrian St. Wausau, WI 54401

BILLING ADDRESS/ EMAIL: 407 Grant Street, Wausau, WI 54403

REPORT TO: Dave Erickson / Ken Bloom

PO NUMBER:

EMAIL: Ken.Bloom@ci.wausau.wi.us

PHONE: 715-261-6940

FAX:

PROJECT NAME/ SITE: PCP Sampling - Collection System

TURN AROUND TIME

STANDARD 10 DAY: ☑

RUSH (200% UPCHARGE): ☐

DATE NEEDED: _____

MATRIX

DW = DRINKING WATER
WW = WASTEWATER
GW = GROUNDWATER
CW = COOLING WATER
S = SOLID/SLUDGE
P = PAPER
F = FUEL
OTHER: _____

ANALYTICAL REQUESTS

Certifications
WI DNR Cert. Lab #445023150
WI DATCP Cert. #105-205
GB-WI DNR Cert. Lab #405222620
GB-WI DATCP Cert. #105-450

SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	PRESERVATIVE (SEE BELOW)	MATRIX (SEE ABOVE)	GRAB or COMPOSITE	PCP's	LAB USE ONLY PROJECT #	LAB USE ONLY SAMPLE #
MH#2 Adrian St.	3/26/19	8:26AM	NP	WW	Grab	X	457	9609
MH#13	3/26/19	8:38AM	NP	WW	Grab	X		10
MH#53	3/26/19	8:59AM	NP	WW	Grab	X		11
MH#53	3/26/19	8:59AM	NP	WW	Grab	X		12
MH#53	3/26/19	8:59AM	NP	WW	Grab	X		"
MH#54	3/26/19	9:17AM	NP	WW	Grab	X		9612
MH#11	3/26/19	9:21AM	NP	WW	Grab	X		13
MH#6	3/26/19	9:33AM	NP	WW	Grab	X		14
MH#5 (North-McCleary)	3/26/19	9:47AM	NP	WW	Grab	X		15
MH#5 (West-Adrian)	3/26/19	9:50AM	NP	WW	Grab	X		16

PRESERVATIVE: NP=NO PRESERVATIVE; H2SO4=SULFURIC ACID; HNO3=NITRIC ACID; HCL=HYDROCHLORIC ACID; NAOH=SODIUM HYDROXIDE; ZA=ZINC ACETATE

CHAIN OF CUSTODY RECORD

FILLED IN BY CLIENT	FILLED IN BY BADGER LABS	ADDITIONAL COMMENTS:
SAMPLED BY: Ken Bloom	RECEIVED BY: JT	
DATE/TIME SAMPLED: 3-26-19 8:26AM - 9:50AM	DATE/TIME RECEIVED: 3/26/19 11:50	
RELINQUISHED BY: Ken Bloom	LOGGED IN:	
DELIVERY METHOD: Badger Lab Pick-Up	ICE?: Y/N:	

BADGER LABS
ANALYTICAL LABORATORY & ENVIRONMENTAL SERVICES
est. 1966

Analytical Report

501 West Bell Street
Neenah, WI 54956-4868
P: 920.729.1100 | T: 1.800.776.7196
F: 920.729.4945

WAUSAU WATER WORKS
407 GRANT STREET
WAUSAU, WI 54401

Project Number: 19007842
Report Date: 6/25/2019
Sampled By: CLIENT

Attn: DAVE ERICKSON/KEVIN FABEL/KEN BLOOM

Samples: 2 WASTEWATER

Sample Number: 49016919
Sample ID: MANHOLE #52
Sample Date: 6/10/2019
Date Received: 6/11/2019

Parameter	Results	Units	LOD	LOQ	Dil.	Method	Analyzed	Codes
PENTACHLOROPHENOL	SEE ATTACHED SYNERGY LAB REPORT							

Sample Number: 49016920
Sample ID: MANHOLE #53
Sample Date: 6/10/2019
Date Received: 6/11/2019

Parameter	Results	Units	LOD	LOQ	Dil.	Method	Analyzed	Codes
PENTACHLOROPHENOL	SEE ATTACHED SYNERGY LAB REPORT							

All LOD/LOQs adjusted for dilution and/or solids content.

BADGER LABORATORIES, INC.
WDNR Certified Lab #445023150
Approved By:

Amanda Vodus

BLE:gr

BADGER LABS
ANALYTICAL LABORATORY & ENVIRONMENTAL SERVICES
est. 1966

Analytical Report

501 West Bell Street
Neenah, WI 54956-4868
P: 920.729.1100 | T: 1.800.776.7196
F: 920.729.4945

WAUSAU WATER WORKS
407 GRANT STREET
WAUSAU, WI 54401

Project Number: 19007967
Report Date: 6/25/2019
Sampled By: CLIENT

Attn: DAVE ERICKSON,KEVIN FABEL, KEN BLOOM

Samples: 1

Sample Number: 49017233
Sample ID: MANHOLE #51
Sample Date: 6/12/2019
Date Received: 6/13/2019

Parameter	Results	Units	LOD	LOQ	Dil.	Method	Analyzed	Codes
PENTACHLOROPHENOL	SEE ATTACHED SYNERGY LAB REPORT							

All LOD/LOQs adjusted for dilution and/or solids content.

BADGER LABORATORIES, INC.
WDNR Certified Lab #445023150
Approved By:

Amanda Vodus

BLE:gr

Synergy Environmental Lab, INC

1990 Prospect Ct., Appleton, WI 54914 *P 920-830-2455 * F 920-733-0631

JOHN LARSON
BADGER LABORATORIES & ENGINEERING
501 W BELL STREET
NEENAH WI 54956

Report Date *21-Jun-19*

Project Name
Project #

Invoice # E36334

Lab Code 5036334A
Sample ID 16919
Sample Matrix Water
Sample Date 6/10/2019

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
Semi Volatiles										
Pentachlorophenol (PCP)	11.6	ug/l	1.84	5.85	1	8270C	6/17/2019	6/17/2019	MJR	1
2-Fluorobiphenyl-surrogate	62	REC %			1	8270C	6/17/2019	6/17/2019	MJR	1
2-Fluorophenol-surrogate	20	REC %			1	8270C	6/17/2019	6/17/2019	MJR	1
Nitrobenzene-d5-surrogate	57	REC %			1	8270C	6/17/2019	6/17/2019	MJR	1
Phenol-d6-surrogate	11.5	REC %			1	8270C	6/17/2019	6/17/2019	MJR	1
p-Terphenyl-d14-surrogate	79	REC %			1	8270C	6/17/2019	6/17/2019	MJR	1
2,4,6-Tribromophenol-surrogate	79	REC %			1	8270C	6/17/2019	6/17/2019	MJR	1

Lab Code 5036334B
Sample ID 16920
Sample Matrix Water
Sample Date 6/10/2019

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
Semi Volatiles										
Pentachlorophenol (PCP)	11.8	ug/l	1.84	5.85	1	8270C	6/17/2019	6/17/2019	MJR	1
2-Fluorobiphenyl-surrogate	66	REC %			1	8270C	6/17/2019	6/17/2019	MJR	1
2-Fluorophenol-surrogate	23	REC %			1	8270C	6/17/2019	6/17/2019	MJR	1
Nitrobenzene-d5-surrogate	59	REC %			1	8270C	6/17/2019	6/17/2019	MJR	1
Phenol-d6-surrogate	13.6	REC %			1	8270C	6/17/2019	6/17/2019	MJR	1
p-Terphenyl-d14-surrogate	79	REC %			1	8270C	6/17/2019	6/17/2019	MJR	1
2,4,6-Tribromophenol-surrogate	87	REC %			1	8270C	6/17/2019	6/17/2019	MJR	1

Project Name
Project #

Invoice # E36334

Lab Code 5036334C
Sample ID 17233
Sample Matrix Water
Sample Date 6/12/2019

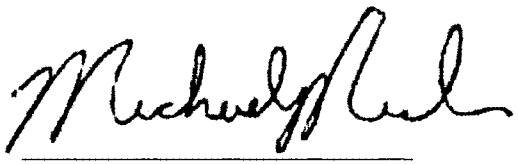
	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
Semi Volatiles										
Pentachlorophenol (PCP)	< 1.84	ug/l	1.84	5.85	1	8270C	6/17/2019	6/17/2019	MJR	1
2-Fluorobiphenyl-surrogate	60	REC %			1	8270C	6/17/2019	6/17/2019	MJR	1
2-Fluorophenol-surrogate	18	REC %			1	8270C	6/17/2019	6/17/2019	MJR	1
Nitrobenzene-d5-surrogate	52	REC %			1	8270C	6/17/2019	6/17/2019	MJR	1
Phenol-d6-surrogate	8.8	REC %			1	8270C	6/17/2019	6/17/2019	MJR	1
p-Terphenyl-d14-surrogate	85	REC %			1	8270C	6/17/2019	6/17/2019	MJR	1
2,4,6-Tribromophenol-surrogate	88	REC %			1	8270C	6/17/2019	6/17/2019	MJR	1

"J" Flag: Analyte detected between LOD and LOQ LOD Limit of Detection LOQ Limit of Quantitation

Code	*Comment*
1	Laboratory QC within limits.

All solid sample results reported on a dry weight basis unless otherwise indicated. All LOD's and LOQ's are adjusted for dilutions but not dry weight. Subcontracted results are denoted by SUB in the analyst field.

Authorized Signature



CHAIN OF CUSTODY RECORD

Synergy

Environmental Lab, Inc.

1990 Prospect Ct. • Appleton, WI 54914
920-830-2455 • FAX 920-733-0631

Chain # Nº 327

Page 1 of 1

Sample Handling Request
____ Rush Analysis Date Required ____
(Rushes accepted only with prior authorization)
✓ Normal Turn Around

Lab I.D. #

Account No. :

Quote No.:

Project #:

Sampler: (signature)

Project (Name / Location):

Reports To:	Invoice To:
Company Badger Labs	Company
Address	Address
City State Zip	City State Zip
Phone	Phone
FAX	FAX

Analysis Requested | **Other Analysis**

Lab I.D.	Sample I.D.	Collection Date	Collection Time	Comp	Grab	Filtered Y/N	No. of Containers	Sample Type (Matrix)*	Preservation	DRO (Mod DRO Sep 95)	GRO (Mod GRO Sep 95)	LEAD	NITRATE/NITRITE	OIL & GREASE	PAH (EPA 8270)	PCB	PVOC (EPA 8021)	PVOC + NAPHTHALENE	SULFATE	TOTAL SUSPENDED SOLIDS	VOC DW (EPA 524.2)	VOC (EPA 8260)	8-RCRA METALS	Atrazine/Lawsonel							PID/ FID
1	16919	4/10			Y	N	3	WW	HP															1-4							
2	16920	1			1	1	1	1	1																						
3	17233	GRN			1	1	1	1	1																						

Comments/Special Instructions (*Specify groundwater "GW", Drinking Water "DW", Waste Water "WW", Soil "S", Air "A", Oil, Sludge etc.)

Method of Shipment: [illegible]

Temp of Cooler: [illegible] °C On Ice: [illegible]

Cooler seal intact upon receipt: ✓ Yes ____ No

Relinquished By: (sign)	Time	Date	Received By: (sign)	Time	Date
DA	17w	4/13/19			

Received in Laboratory By: [signature] Time: 9:20 Date: 4/14/19

19007842

SAMPLE REQUEST & CHAIN OF CUSTODY FORM

BADGER LABS

Neenah: 501 W. Bell St. Neenah, WI 54956
Green Bay: 2150 Memorial Drive Suite 106 Green Bay, WI 54303

CLIENT NAME / ADDRESS
Wausau WWTF
435 Adrian St. Wausau, WI 54401

BILLING ADDRESS/ EMAIL
407 Grant Street Wausau, WI 54403

REPORT TO: Dave Erickson/Ken Bloom
PO NUMBER:

EMAIL: Ken.Bloom@ci.wausau.wi.us

PHONE: 715-261-6940
FAX:

PROJECT NAME/ SITE: PCP Sampling - Collection System

TURN AROUND TIME
STANDARD 10 DAY: ✓
RUSH (200% UPCHARGE):
DATE NEEDED:

MATRIX
DW = DRINKING WATER
WW = WASTEWATER
GW = GROUNDWATER
CW = COOLING WATER
S = SOLID/SLUDGE
P = PAPER
F = FUEL
OTHER:

ANALYTICAL REQUESTS

Certifications
WI DNR Cert. Lab #445023150
WI DATCP Cert. #105-205
GB-WI DNR Cert. Lab #405222020
GB-WI DATCP Cert. #105-450

SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	PRESERVATIVE (SEE BELOW)	MATRIX (SEE ABOVE)	GRAB or COMPOSITE	PCP's	LAB USE ONLY PROJECT #	LAB USE ONLY SAMPLE #
Manhole #52	6/10/19	12:55PM	NP	WW	Grab	X	7842	16969
Manhole #52	6/10/19	12:55PM	NP	WW	Grab	X		
Manhole #52	6/10/19	12:55PM	NP	WW	Grab	X		
Manhole #53	6/10/19	1:04PM	NP	WW	Grab	X		16970

PRESERVATIVE: NP=NO PRESERVATIVE; H2SO4=SULFURIC ACID; HNO3=NITRIC ACID; HCL=HYDROCHLORIC ACID; NAOH=SODIUM HYDROXIDE; ZA=ZINC ACETATE

CHAIN OF CUSTODY RECORD

FILLED IN BY CLIENT
SAMPLED BY: Ken Bloom
DATE/TIME SAMPLED: 6/10/19 12:55-1:04 PM
RELINQUISHED BY: Ken Bloom
DELIVERY METHOD: Pick-Up

FILLED IN BY BADGER LABS
RECEIVED BY:
DATE/TIME RECEIVED: (JM) 6/11/19
LOGGED IN:
ICE?: Y/N:

ADDITIONAL COMMENTS:

19007967

SAMPLE REQUEST & CHAIN OF CUSTODY FORM

BADGER LABS

Neenah: 501 W. Bell St. Neenah, WI 54956
Green Bay: 2150 Memorial Drive Suite 106 Green Bay, WI 54303

CLIENT NAME / ADDRESS: Wausau WWTF 435 Adrian St. Wausau, WI

BILLING ADDRESS/ EMAIL: 407 Grant St. Wausau, WI 54403

REPORT TO: Dave Erickson/Ken Bloom

PO NUMBER:

EMAIL: Ken.Bloom@ci.wausau.wi.us

PHONE: 715-261-6940

FAX:

PROJECT NAME/ SITE: PCP Sampling - Collection System

TURN AROUND TIME

STANDARD 10 DAY: ☑

RUSH (200% UPCHARGE): ☐

DATE NEEDED: _____

MATRIX

DW = DRINKING WATER
WW = WASTEWATER
GW = GROUNDWATER
CW = COOLING WATER
S = SOLID/SLUDGE
P = PAPER
F = FUEL
OTHER: _____

ANALYTICAL REQUESTS

PCP's

Certifications
WI DNR Cert. Lab #445023150
WI DATCP Cert. #105-205
GB-WI DNR Cert. Lab #405222620
GB-WI DATCP Cert. #105-450

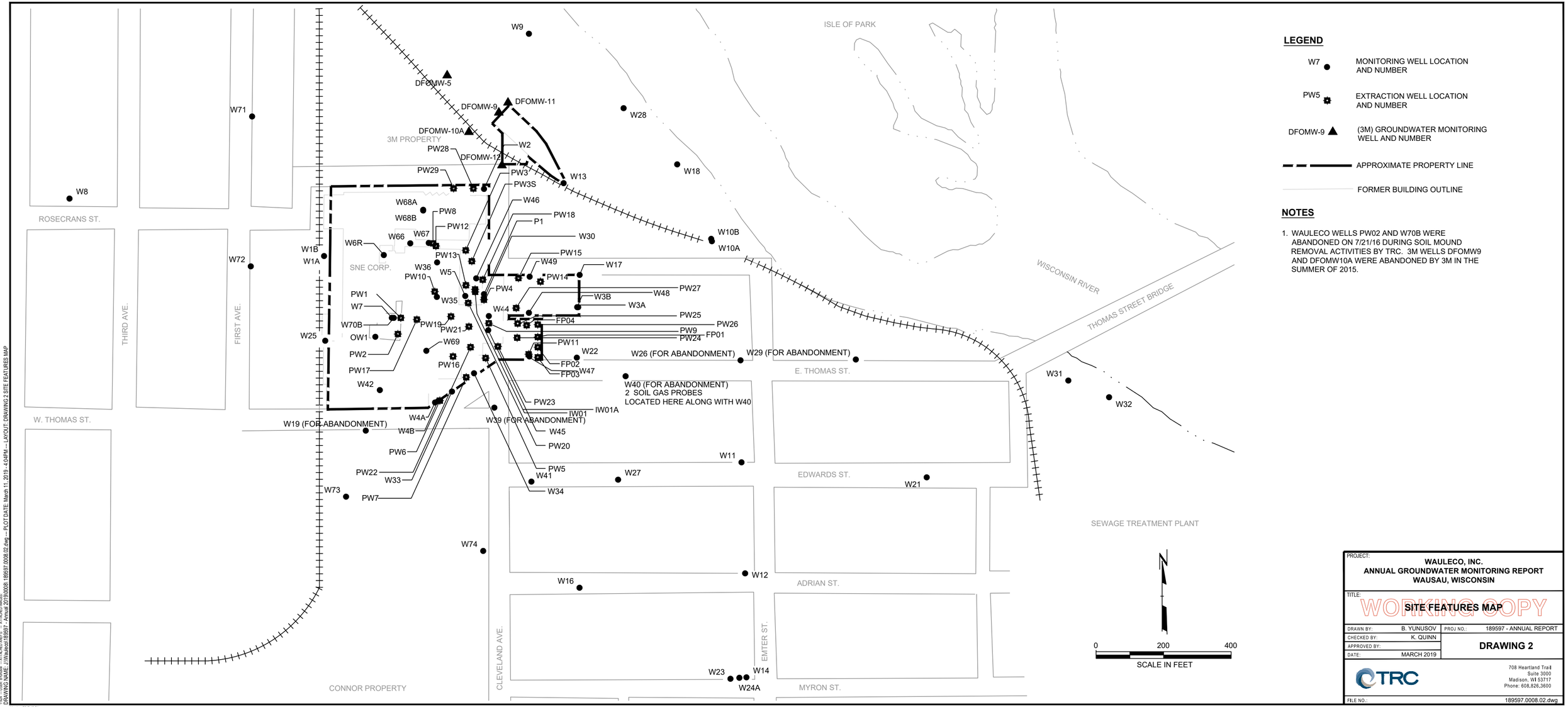
SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	PRESERVATIVE (SEE BELOW)	MATRIX (SEE ABOVE)	GRAB or COMPOSITE	PCP's	LAB USE ONLY PROJECT #	LAB USE ONLY SAMPLE #
Manhole #51	6/12/19	12:27PM	NP	WW	Grab	X	7967	17233

PRESERVATIVE: NP=NO PRESERVATIVE; H2SO4=SULFURIC ACID; HNO3=NITRIC ACID; HCL=HYDROCHLORIC ACID; NAOH=SODIUM HYDROXIDE; ZA=ZINC ACETATE

CHAIN OF CUSTODY RECORD

FILLED IN BY CLIENT	FILLED IN BY BADGER LABS	ADDITIONAL COMMENTS:
SAMPLED BY: Ken Bloom	RECEIVED BY:	
DATE/TIME SAMPLED: 6/12/19 12:27 PM	DATE/TIME RECEIVED: DSD 6-13-19	
RELINQUISHED BY: Ken Bloom	LOGGED IN:	
DELIVERY METHOD: Pick-Up	ICE?: Y/N:	

Appendix D – Locations of Monitoring Wells



LEGEND

- W7 ● — MONITORING WELL LOCATION AND NUMBER
- PW5 ✿ — EXTRACTION WELL LOCATION AND NUMBER
- DFOMW-9 ▲ — (3M) GROUNDWATER MONITORING WELL AND NUMBER
- APPROXIMATE PROPERTY LINE
- FORMER BUILDING OUTLINE

NOTES

1. WAULECO WELLS PW02 AND W70B WERE ABANDONED ON 7/21/16 DURING SOIL MOUND REMOVAL ACTIVITIES BY TRC. 3M WELLS DFOMW9 AND DFOMW10A WERE ABANDONED BY 3M IN THE SUMMER OF 2015.

0 200 400
SCALE IN FEET

PROJECT:
WAULECO, INC.
ANNUAL GROUNDWATER MONITORING REPORT
WAUSAU, WISCONSIN

TITLE:
WORKING COPY
SITE FEATURES MAP

DRAWN BY:	B. YUNUSOV	PROJ NO.:	189597 - ANNUAL REPORT
CHECKED BY:	K. QUINN		
APPROVED BY:			**DRAWING 2**
DATE:	MARCH 2019		

TRC
708 Heartland Trail
Suite 3000
Madison, WI 53717
Phone: 608.826.3600

FILE NO.: 189597.0008.02.dwg

Appendix E – Recorded Groundwater Levels

10 Years of Groundwater Elevation Data in Area of Thomas Street
Wauleco Project Site
7/2/2019

	Monitoring Well								
Date	W10A	W11	W12	W18	W21	W26	W29	W31	W40
1/20/09	1160.84	1160.66	1160.38	1160.74	1160.63	1160.84	1160.72	1160.76	1160.75
4/24/09	1160.95	1160.87	1160.57	1160.87	1160.76	1160.95	1160.80	1160.79	1160.74
7/28/09	1160.82	1160.70	1160.40	1160.73	1160.63	1160.85	1160.68	1160.72	1160.44
10/20/09	1160.71	1160.70	1160.43	1160.74	1160.65	1160.69	1160.68	1160.73	1160.57
11/18/09									1161.41
12/17/09									1161.32
1/13/10	1160.83	1160.75	1160.46	1160.88	1160.67	1160.77	1160.75	1160.80	1161.17
4/22/10	1160.79	1160.76	1160.50	1160.80	1160.67	1160.76	1160.71	1160.75	1161.18
7/12/10	1161.01	1160.92	1160.61	1160.99	1160.73	1160.94	1160.79	1160.77	1162.07
10/8/10	1161.43	1161.43	1161.00	1161.07	1160.93	1161.34	1160.94	1160.76	1163.12
1/12/11	1161.06	1160.90	1160.53	1161.13	1160.78	1160.97	1160.89	1160.92	1161.44
2/24/11									
3/15/11	1161.11		1160.56	1161.13		1161.01			1162.30
4/5/11	1161.49	1161.42	1161.01	1161.39	1161.17	1161.39	1161.20	1161.08	1163.15
5/26/11	1161.57		1161.00	1161.32		1161.45			1164.59
6/23/11									
7/26/11	1161.01	1161.12	1160.74	1161.07	1160.77	1161.07	1160.79	1160.76	1162.41
8/31/11	1161.06	1161.02	1160.65	1161.01		1161.01			1162.23
9/28/11	1161.09	1161.08	1160.73	1161.13		1161.07			1162.63
10/24/11	1160.92	1160.92	1160.60	1160.94	1160.77	1160.92	1160.80	1160.79	1161.45
11/21/11	1160.77	1160.79	1160.49	1160.83		1160.80			1161.12
12/19/11	1160.80	1160.82	1160.52	1160.85		1160.83			1161.00
1/16/12	1160.77	1160.75	1160.45	1160.80	1160.67	1160.78	1160.72	1160.74	1160.85
2/16/12	1160.72	1160.70	1160.41	1160.79		1160.73			1160.68
3/15/12	1161.73	1161.29	1160.93	1162.18		1161.33			1160.97
4/27/12	1160.85	1160.85	1160.55	1160.87	1160.74	1160.84	1160.77	1160.79	1161.02
5/24/12	1160.83	1160.83	1160.52	1160.83		1160.83			1161.24
6/19/12	1161.11	1160.96	1160.65	1161.38		1160.97			1161.24
7/24/12	1160.91	1160.85	1160.55	1160.99	1160.76	1160.88	1160.81	1160.82	1161.32
8/17/12	1160.91	1160.84	1160.54	1160.98		1160.88			1161.15
9/25/12	1160.87	1160.81	1160.50	1160.98		1160.86			1160.96
10/17/12	1160.85	1160.88	1160.58	1160.93	1160.83	1160.90	1160.97	1160.85	1160.91
11/15/12	1160.94	1160.95	1160.65	1160.94		1160.95			1161.29
12/18/12	1160.85	1160.85	1160.58	1160.89		1160.86			1161.05
1/15/13	1160.77	1160.78	1160.53	1160.79	1160.73	1160.79	1160.75	1160.76	1160.82
2/25/13	1160.75		1160.47	1160.83		1160.76			1160.63
3/29/13	1160.80		1160.54	1160.92		1160.79			
4/24/13	1162.17	1161.80	1161.36	1162.47	1161.72	1161.81	1162.08	1161.87	1162.32
5/21/13	1161.34		1160.96	1161.18		1161.27			1162.20
6/13/13	1161.63	1161.54	1161.14	1161.38		1161.53			1162.48
7/15/13	1161.29	1161.23	1160.86	1161.18	1160.95	1161.24	1160.96	1160.84	1162.37
8/27/13	1161.01		1160.65	1161.08		1160.99			1161.39
9/20/13	1160.92		1160.58	1160.98		1160.90			1161.27
10/22/13	1160.99	1160.94	1160.63	1161.01	1160.83	1160.95	1160.84	1160.82	1161.49
11/19/13	1160.95		1160.62	1160.92		1160.94			1161.37
12/19/13	1160.93		1160.57	1161.02		1160.90			1161.21
1/20/14	1160.93	1160.86	1160.59	1160.98	1160.75	1160.88	1160.83	1160.85	1161.13

	Monitoring Well								
Date	W10A	W11	W12	W18	W21	W26	W29	W31	W40
2/18/14	1160.93		1160.59	1160.99		1160.89			1161.09
3/20/14	1160.99		1160.66	1161.09		1160.97			1161.12
4/25/14	1162.00	1161.68	1161.19	1162.04	1161.49	1161.69	1161.64	1161.60	1162.38
5/21/14	1161.90		1161.13	1161.87		1161.66			1162.68
6/19/14	1161.22		1160.76	1161.10		1161.14			1162.29
7/17/14	1161.08	1161.03	1160.66	1161.05	1160.83	1161.08	1160.87	1160.82	1161.97
8/15/14	1160.91		1160.53	1160.95		1160.89			1161.51
9/25/14	1161.32		1160.86	1161.16		1161.28			1162.67
10/20/14	1161.42	1161.36	1160.98	1161.33	1161.07	1161.33	1161.11	1160.99	1162.46
11/25/14	1161.67		1160.83	1162.09		1161.32			1161.87
12/22/14	1161.66		1160.96	1161.68		1161.48			1162.05
1/21/15	1161.55	1161.26	1160.81	1161.61	1161.19	1161.36	1161.32	1161.32	1161.83
4/27/15	1161.16	1161.13	1160.76	1161.07	1160.96	1161.14	1160.99	1160.94	1161.65
7/14/15	1161.14	1161.09	1160.72	1161.14	1160.95	1161.11	1160.98	1160.91	1161.93
10/30/15	1160.97	1160.93	1160.61	1161.07	1160.89	1160.96	1160.93	1160.94	1161.25
1/25/16	1161.34	1161.15	1160.75	1161.43	1161.08	1161.21	1161.13	1161.15	1161.79
4/26/16	1161.70	1161.39	1160.94	1162.01	1161.27	1161.45	1161.49	1161.59	1162.33
7/19/16	1160.98	1160.94	1160.58	1160.98	1160.78	1160.98	1160.81	1160.79	1161.63
9/8/16		1161.07	1160.70		1161.06				
9/27/16		1160.90	1160.60		1160.52				
9/30/16									
10/3/16									
10/6/16									
10/10/16									
10/14/16									
10/17/16									
10/21/16									
10/25/16									
10/28/16									
11/1/16									
11/4/16									
11/7/16									
11/10/16									
11/14/16									
11/18/16									
11/21/16									
11/23/16									
11/28/16									
12/2/16	1161.00	1160.50	1160.14		1160.86		1161.01		
12/5/16	1160.95	1160.64	1160.26		1160.81		1160.92		
12/9/16	1160.90	1160.67	1160.30		1160.80		1160.89		
12/20/16	1161.19	1160.81	1160.40		1160.98		1161.14		
1/9/17	1161.23	1160.83	1160.43	1161.47	1160.93	1161.11	1161.12	1161.28	1160.95
4/24/17	1162.38	1161.93	1161.30	1162.19	1161.66	1161.96	1161.80	1161.63	1162.74
7/7/17	1161.46	1161.36	1160.91	1161.36	1161.12	1161.49	1161.13	1161.04	1162.57
10/12/17	1161.15	1161.12	1160.73	1161.22	1160.99	1161.15	1161.03	1160.98	1161.63
1/8/18	1161.25	1161.05	1160.65	1161.41	1161.04	1161.14	1161.17	1161.22	1161.18
4/20/18	1161.35	1161.27	1160.86	1161.46	1161.26	1161.32	1161.32	1161.32	1161.34
7/9/18	1161.23	1161.15	1160.71	1161.21	1160.95	1161.27	1160.99	1160.99	1161.67
10/18/18	1161.90	1161.81	1161.30	1161.79	1161.42	1161.81	1161.46	1161.32	1163.22
1/4/19	1161.34	1161.23	1160.84	1161.31	1161.10	1161.27	1161.16	1161.12	1161.75

Date	Monitoring Well								
	W10A	W11	W12	W18	W21	W26	W29	W31	W40
4/24/19	1163.52	1162.66	1161.92	1163.51	1162.36			1162.62	
5/10/19	1162.51	1162.06	1161.49	1162.77	1161.81			1162.05	
Average	1161.20	1161.08	1160.71	1161.24	1160.99	1161.10	1161.02	1161.06	1161.66
Low	1160.71	1160.50	1160.14	1160.73	1160.52	1160.69	1160.68	1160.72	1160.44
High	1163.52	1162.66	1161.92	1163.51	1162.36	1161.96	1162.08	1162.62	1164.59

Notes:

[1] Test results from 6/23/2011 were removed. Results were abnormally high due to water main break.

[2] Test results from 9/30/16 - 11/28/16 were removed. Results were abnormally low due to lowering of Lake Wausau.

Appendix F – Detected PCP in Manholes

DPW Mapping System

1-8-19; PCP <LOD
3-26-19; PCP <LOD
MH 162

6-12-19; PCP <LOD
MH 51

1-8-19; PCP <LOD
MH7

1-8-19; PCP 17.8ppb
3-26-19; PCP <LOD
MH6

6-10-19; PCP 11.6ppb
MH 52

3-26-19; PCP 22.9ppb
MH2

1-8-19; PCP 6ppb
3-26-19; PCP 21.7ppb
6-10-19; PCP 11.8ppb
MH53

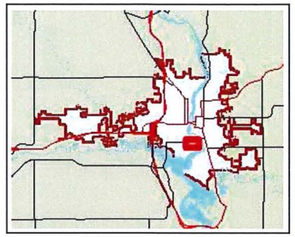
3-26-19; PCP 19.3ppb
MH54

1-8-19 (flow from North); PCP 8.9ppb
1-8-19 (flow from west); PCP 22.4ppb
3-26-19 (flow from North); PCP <LOD
3-26-19 (flow from west); PCP 29.3ppb
MH5

3-26-19; PCP <LOD
MH13

Thomas St
Edwards St
Adrian St
Myron St

CITY OF
WAUSAU



Legend

- Parcels
- Section Lines/Numbers
- Right Of Ways
- Manhole
- Gravity Main
  - Collector
  - Interceptor
- Force Main
- Liftstation
- Abandoned Gravity Main
- Railroad

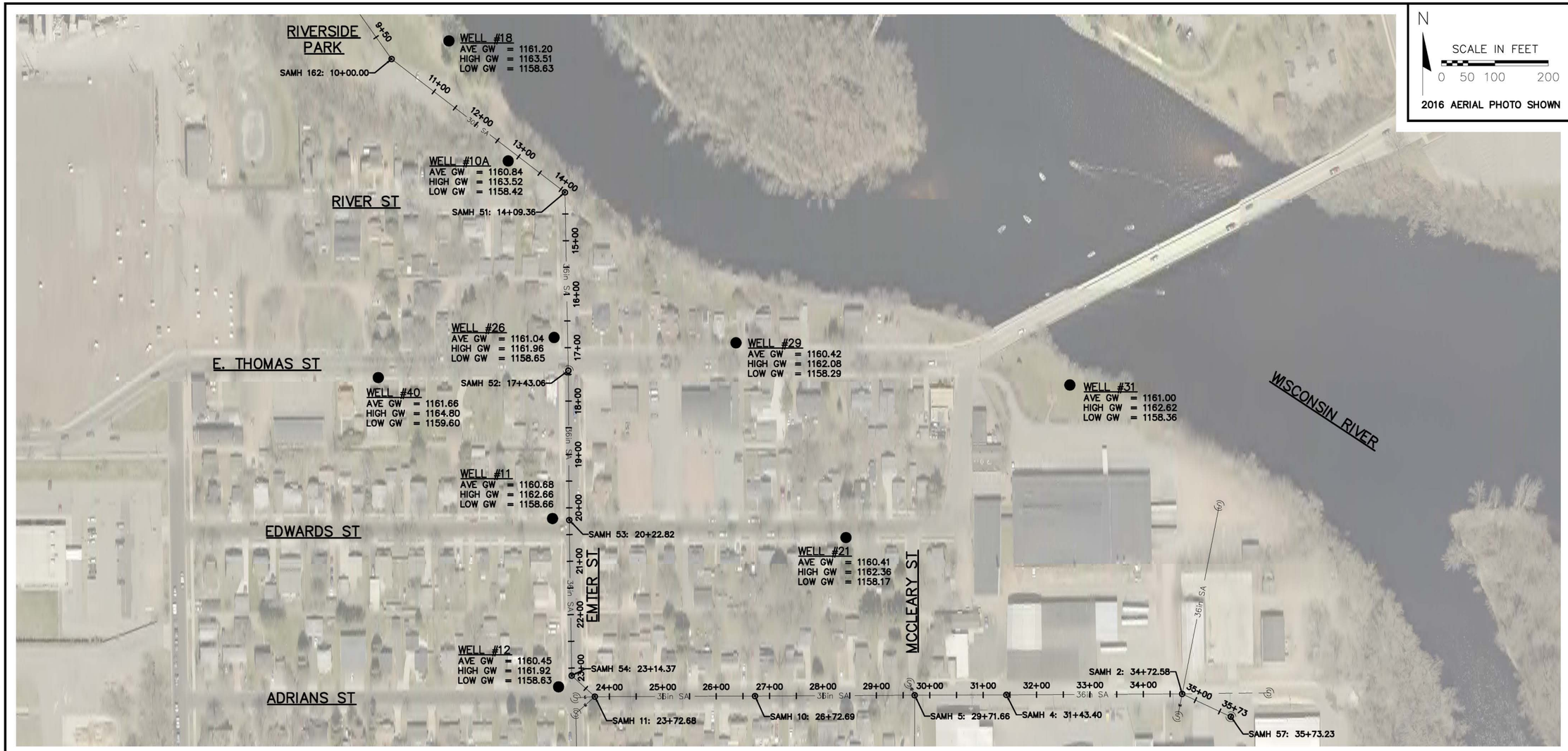
Map Created: 5/8/2019

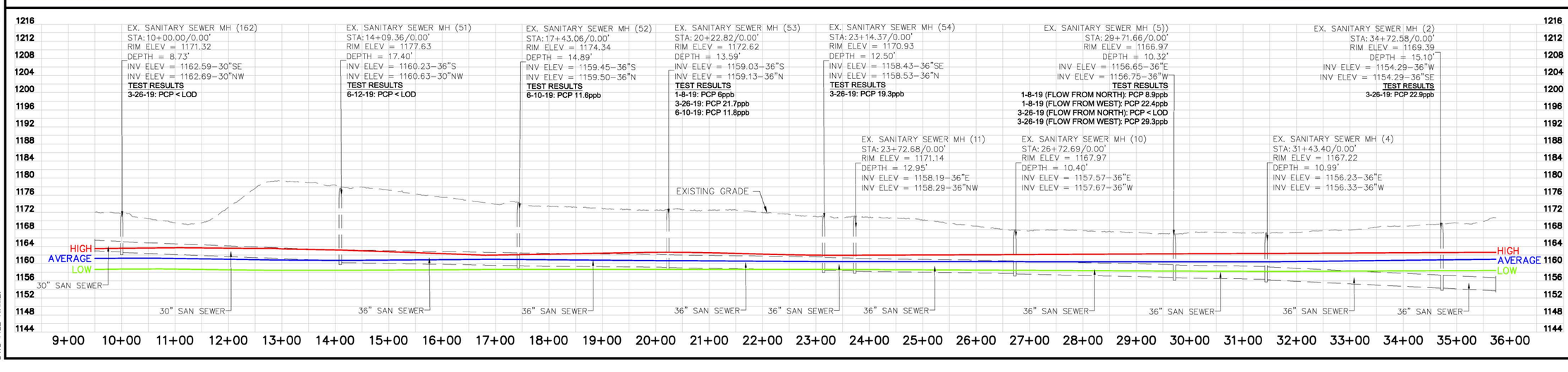
100.00 0 100.00 Feet

NAD_1983_HARN_WISCRS_Marathon_County_Feet

Notes

Appendix G – Groundwater Elevation in Study Area





DWG FILE NAME:

CITY OF WAUSAU
Engineering Department
407 GRANT STREET WAUSAU, WI. 54403-4783
(715) 261-6740 FAX (715) 261-6759

SURVEYED BY: ENG. DEPT.
FIELD BOOK NO. PG.
DESIGNED BY:
DRAWN BY: J.D.VANBOXEL
APPROVED BY:
POINT FILE:

REVISIONS	DATE
J.D.VANBOXEL	07/09/2019

ISSUED FOR
■ PRELIMINARY
□ REVIEW/APPROVAL
□ BIDDING/CONST.
□ REC. REF. DWG.
□ OFFICE USE

GROUNDWATER ELEVATIONS
RIVERSIDE PARK TO WWTP
INTERCEPTOR SEWER PLAN AND PROFILE

SHEET NO.
1
OF 1 SHEETS
FILE NUMBER
19–08–29

Clark Dietz, Inc.
500 North 3rd Street, Suite 703
Wausau, WI 54403

p 715.845.1333

clarkdietz.com

Clark Dietz

Engineering Quality of Life™