

Demonstration Program Quarterly Progress Report #3

**Administrative Order #R9-4171-94-08
Olin Niagara Falls Plant
Niagara Falls, New York**

Prepared for:



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ABBREVIATIONS AND ACRONYMS

Acronym	Definition
GWTS	Groundwater Treatment System
ARGC	Alundum Road-Gill Creek
NYSDEC	New York State Department of Environmental Compliance
VOC	volatile organic compound

1.0 INTRODUCTION

Olin is performing a one year Demonstration Program to evaluate effectiveness of groundwater capture within the Alundum Road-Gill Creek (ARGC) area by the Solvent pumping wells (PWs), PW-3B and PW-4B, located on Olin property.

The Demonstration Program is being performed in accordance with the November 6, 2015 *Demonstration Program Work Plan* (Amec Foster Wheeler, 2015) and the comments provided by New York Department of Environmental Conservation (NYSDEC) in their March 2, 2016 conditional approval letter.

The Demonstration Program commenced March 11, 2016 following shut-down of the Olin groundwater treatment system (GWTS). This report is the third quarterly progress report for the Demonstration Program and covers the period from September 12, 2016 through December 2, 2016. The progress report presents activities completed and data collected during the period as well as an evaluation of the data.

The Demonstration Program's third quarter results support that the Olin GWTS is redundant and that the Solvent GWTS provides hydraulic capture of A and B-Zone groundwater from the ARGC area without the Olin GWTS operating. These results are consistent with the first and second quarterly progress reports and the objectives of the Olin Consent Order and Remedial Plan.

2.0 SITE ACTIVITIES

Water quality samples were collected September 28-29, 2016 from the twelve wells listed in the *Demonstration Program Work Plan* plus the three additional wells requested by NYSDEC in their March 2, 2016 letter. Samples were collected using low flow sampling techniques. The samples were submitted to ALS Environmental Laboratory in Rochester, NY for analysis. The samples were analyzed for volatile organic compounds (VOCs), pesticides, and mercury in accordance with the monitoring requirements in the *Demonstration Work Plan* and the *Groundwater Treatment System Operation and Maintenance Plan* (AMEC, 2014).

Quarterly water level measurements were collected on October 5, 2016. Water level measurements were collected from the quarterly monitoring locations listed in the *Demonstration Work Plan*.

3.0 MONITORING RESULTS

This section presents the potentiometric surface and water quality results from this reporting period.

3.1 A-Zone

Figure 3.1a shows the A-Zone potentiometric surface for October 5, 2016, and Figure 3.1b shows the A-Zone ARGC area in closer detail. A-Zone groundwater in the ARGC area is effectively captured and drained to the B-Zone by the Passive Relief (PR) wells due to the natural downward vertical gradient that exists between the A-Zone and the B-Zone. Since potentiometric heads in the B-zone are below Gill Creek, the passive relief wells are effective in preventing A-Zone groundwater migration to Gill Creek.

The yellow highlighted areas represent areas that are estimated to be dewatered as defined by the bottom elevation of the A-Zone. The dewatered areas also show that the A-zone is being effectively drained to the B-Zone. In cases where the A-Zone was dewatered, the physical bottom of the fracture system was used in the interpreted potentiometric surface.

3.2 B-Zone

Figure 3.2a shows the B-Zone potentiometric surface map for October 5, 2016, and Figure 3.2b shows the B-Zone ARGC area in closer detail. The B-Zone potentiometric surface map shows hydraulic capture of the B-Zone on Olin property by the Solvent pumping wells located on Olin property (PW-3B and PW-4B). The drawdown observed in Solvent pumping well PW-3B creates a gradient that dominates local B-Zone groundwater flow direction on the Olin property. Additionally, groundwater elevations at PN-24B consistently show an inward gradient from across Buffalo Avenue towards the site.

3.3 Water Quality Results

Tables 3.1 through 3.4 show the monitoring results for September 2016 for the following indicator parameters in the A and B-Zones for the wells in the Demonstration Program:

- 1,2,4-Trichlorobenzene – Aromatic
- Trichloroethene – Aliphatic

- Gamma-BHC – Pesticide
- Total Mercury – Mercury

Results from the first two Demonstration Program monitoring events as well as two events prior to the Demonstration Program (June 2014 and June 2015) are included on the tables for comparison. Figures 3.3a/b through 3.6a/b show the constituent distributions for the indicator parameters in the A and B-Zones. The tables and figures show that constituent concentrations and distribution are generally consistent with conditions prior to the Demonstration Program implementation. However, it is noted that the detected concentration of 1,2,4-Trichlorobenzene increased during this event in OBA-2B. The 1,2,4-Trichlorobenzene concentration increased from 37 µg/L in June 2016 to 1,700 µg/L in September 2016. Figure 3.7 shows the 1,2,4-Trichlorobenzene trend in OBA-2B since June 1998. The current concentration is within the historical range and changes in dissolved concentrations in the ARGC area are expected as the system approaches a new equilibrium. As mentioned previously, B-Zone groundwater migration in the ARGC area is controlled and captured by the Solvent GWTS.

4.0 CONCLUSIONS

The Demonstration Program's third quarter results support that the Olin GWTS is redundant and that the Solvent GWTS provides hydraulic capture of A and B-Zone groundwater from the ARGC area without the Olin GWTS operating. These results are consistent with the objectives of the Olin Consent Order and Remedial Plan.

5.0 REFERENCES

AMEC, 2014. *Groundwater Treatment System – Operations and Maintenance Plan*. Kennesaw, GA. AMEC Environment & Infrastructure, Inc. August 15, 2014.

Amec Foster Wheeler, 2015. *Demonstration Program Work Plan*. Kennesaw, GA. Amec Foster Wheeler Environment & Infrastructure, Inc. November 6, 2015

TABLES

Table 3.1: 1,2,4-Trichlorobenzene Results

1,2,4-Trichlorobenzene Concentration - ug/L									
Date	June 2014		June 2015		April 2016		June 2016		Sep 2016
A-Zone Wells									
OBA-4A	1.0	U	1.0	U	1.0	U	1.0	U	1.0 U
OBA-24A	1.0	U	1.0	U	1.0	U	1.0	U	1.9
OBA-25A	1.0	U	1.0	U	2.9		1.0	U	1.0 U
OBA-26A	1.0	U	1.0	U	1.0	U	1.0	U	1.0 U
PN-20A	1.0	U	1.0	U	11		1.0	U	1.0 U
B-Zone Wells									
OBA-2B	180		170		230		37		1700
OBA-4B	1.0	U	1.0	U	1.5		1.6		1.0 U
OBA-5B	8100		10000		8500		8000		6500
OBA-6B	100		200		150		230		80
OBA-24B	520		840		280		310		440
OBA-25B	1.0	U	1.0	U	4		1.0	U	1.0 U
OBA-26B	1.0	U	3		5.0	U	10	U	31
PN-5B	8300		8000		8300		9300		6900
PN-20B	210		55	J	130		70		50
PN-24B	NA		NA		7.7		1.0	U	1.6

Notes:

U- constituent not detected- reporting limit shown

ug/L - micrograms per liter

NA - not applicable

Prepared By: B. Rhiner 11/28/2016

Checked By: T. Englund 11/28/2016

Table 3.2: Trichloroethene Results

Trichloroethene Concentration - ug/L					
Date	June 2014	June 2015	April 2016	June 2016	Sep 2016
A-Zone Wells					
OBA-4A	16	12	9.9	15.0	22
OBA-24A	26	20	15	20.0	24
OBA-25A	22	20	16	27	24
OBA-26A	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
PN-20A	11	16	7.3	14	21
B-Zone Wells					
OBA-2B	55	28	20	34	160
OBA-4B	1.2	1.9	1.4	2.3	1.0 U
OBA-5B	20000	20000	10000	13000	9600
OBA-6B	22	27	23	17	8.3
OBA-24B	2000	7500	7400	6500	16000
OBA-25B	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
OBA-26B	1.0 U	1.0 U	5.0 U	10 U	20 U
PN-5B	5600	8300	3400	7300	8100
PN-20B	4900	1600	3800	1700	1300
PN-24B	NA	NA	6.4	3.3	3.4

Notes:

U- constituent not detected- reporting limit shown

ug/L - micrograms per liter

NA - not applicable

Prepared By: B. Rhiner 11/28/2016
 Checked By: T. Englund 11/28/2016

Table 3.3: Gamma-BHC Results

Gamma-BHC Concentration - ug/L										
Date	June 2014		June 2015		April 2016		June 2016		Sep 2016	
A-Zone Wells										
OBA-4A	0.047	U	0.047	U	0.047	U	0.1		0.047	U
OBA-24A	0.047	U	0.047	U	0.047	U	0.047	U	0.23	
OBA-25A	0.047	U	0.047	U	0.13		0.047	U	0.047	
OBA-26A	0.047	U	0.047	U	0.047	U	0.047	U	0.047	
PN-20A	0.047	U	0.047	U	0.047	U	0.068		0.047	
B-Zone Wells										
OBA-2B	0.051		0.047	U	0.048		0.047	U	2.4	
OBA-4B	0.047	U	0.047	U	0.047	U	0.22		0.047	U
OBA-5B	630		460		200		320		290	
OBA-6B	0.047	U	0.047	U	0.047	U	0.047	U	0.047	U
OBA-24B	59		78		21		18		49	
OBA-25B	0.047	U	0.047	U	0.047	U	0.047	U	0.047	U
OBA-26B	0.047	U	0.047	U	0.047	U	0.047	U	0.047	U
PN-5B	1100		1300		1000		1700		1300	
PN-20B	0.27		0.23		0.34		0.31		0.30	
PN-24B	NA		NA		0.047	U	0.047	U	0.062	

Notes:

U- constituent not detected- reporting limit shown

ug/L - micrograms per liter

NA - not applicable

Prepared By: B. Rhiner 11/28/2016

Checked By: T. Englund 11/28/2016

Table 3.4: Total Mercury Results

Total Mercury Concentration - ug/L										
Date	June 2014		June 2015		April 2016		June 2016		Sep 2016	
A-Zone Wells										
OBA-4A	0.2	U	0.2	U	0.2	U	0.33		0.20	U
OBA-24A	0.2	U	0.2	U	0.2	U	0.2	U	0.20	U
OBA-25A	0.2	U	5.01		4.87		2.02		0.94	
OBA-26A	0.2	U	0.2	U	0.2	U	0.2	U	0.20	U
PN-20A	0.2	U	0.26		0.2	U	0.2	U	0.20	U
B-Zone Wells										
OBA-2B	0.2	U	0.2	U	0.2	U	0.2	U	0.25	
OBA-4B	0.2	U	0.2	U	0.2	U	0.2	U	0.20	U
OBA-5B	0.2	U	0.2	U	0.34		0.2	U	0.20	U
OBA-6B	3.37		1.92		0.2	U	0.2	U	0.20	U
OBA-24B	0.2	U	0	U	0.2	U	0.2	U	0.20	U
OBA-25B	0.2	U	0.2	U	0.2	U	0.2	U	0.20	U
OBA-26B	0.2	U	0.2	U	0.2	U	0.2	U	0.20	U
PN-5B	0.2	U	1.62		0.2	U	1.83		0.37	
PN-20B	0.2	U	0.2	U	0.2	U	0.2	U	0.20	U
PN-24B	NA		NA		0.2	U	0.22		0.20	U

Notes:

U- constituent not detected- reporting limit shown

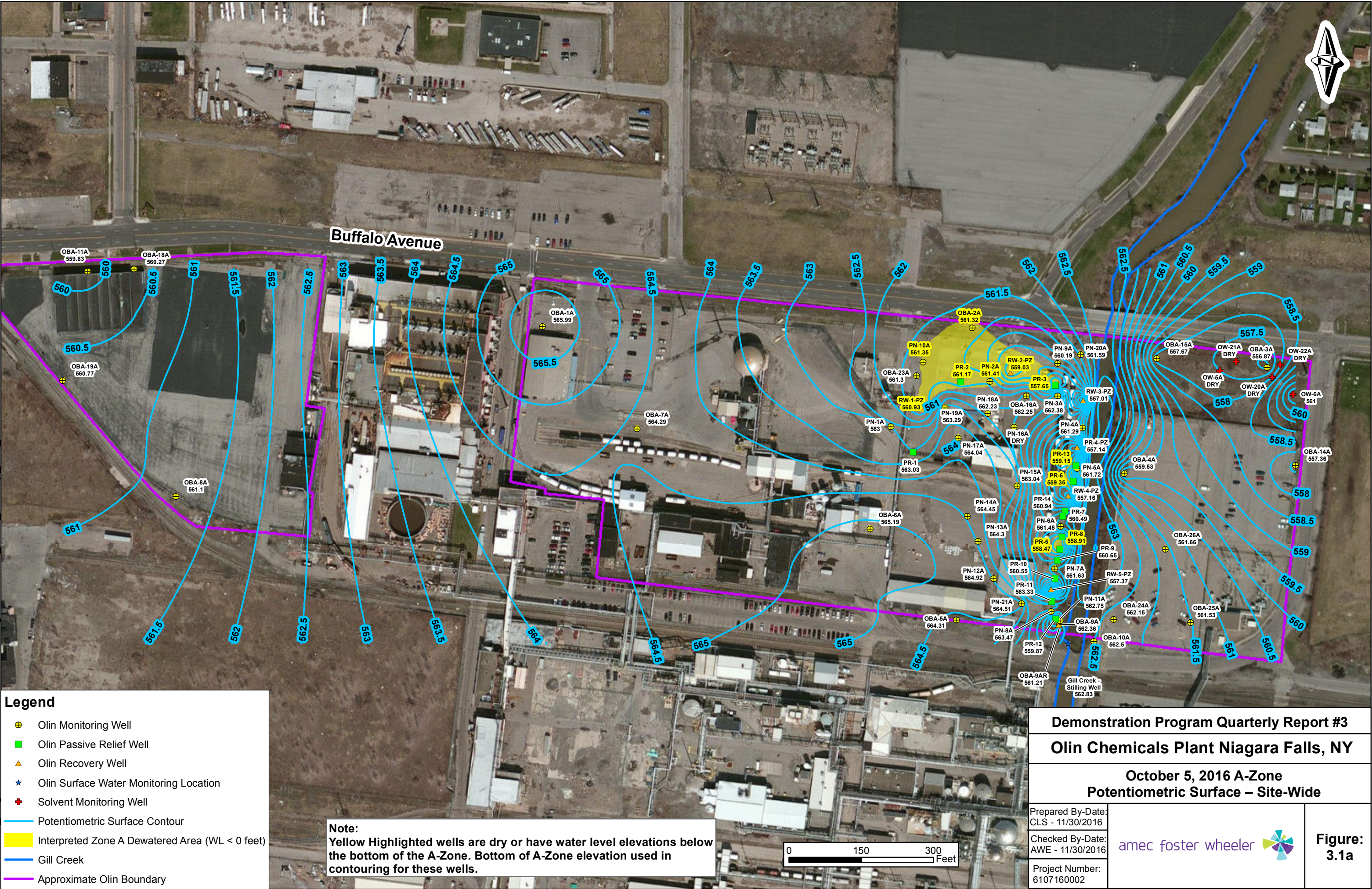
ug/L - micrograms per liter

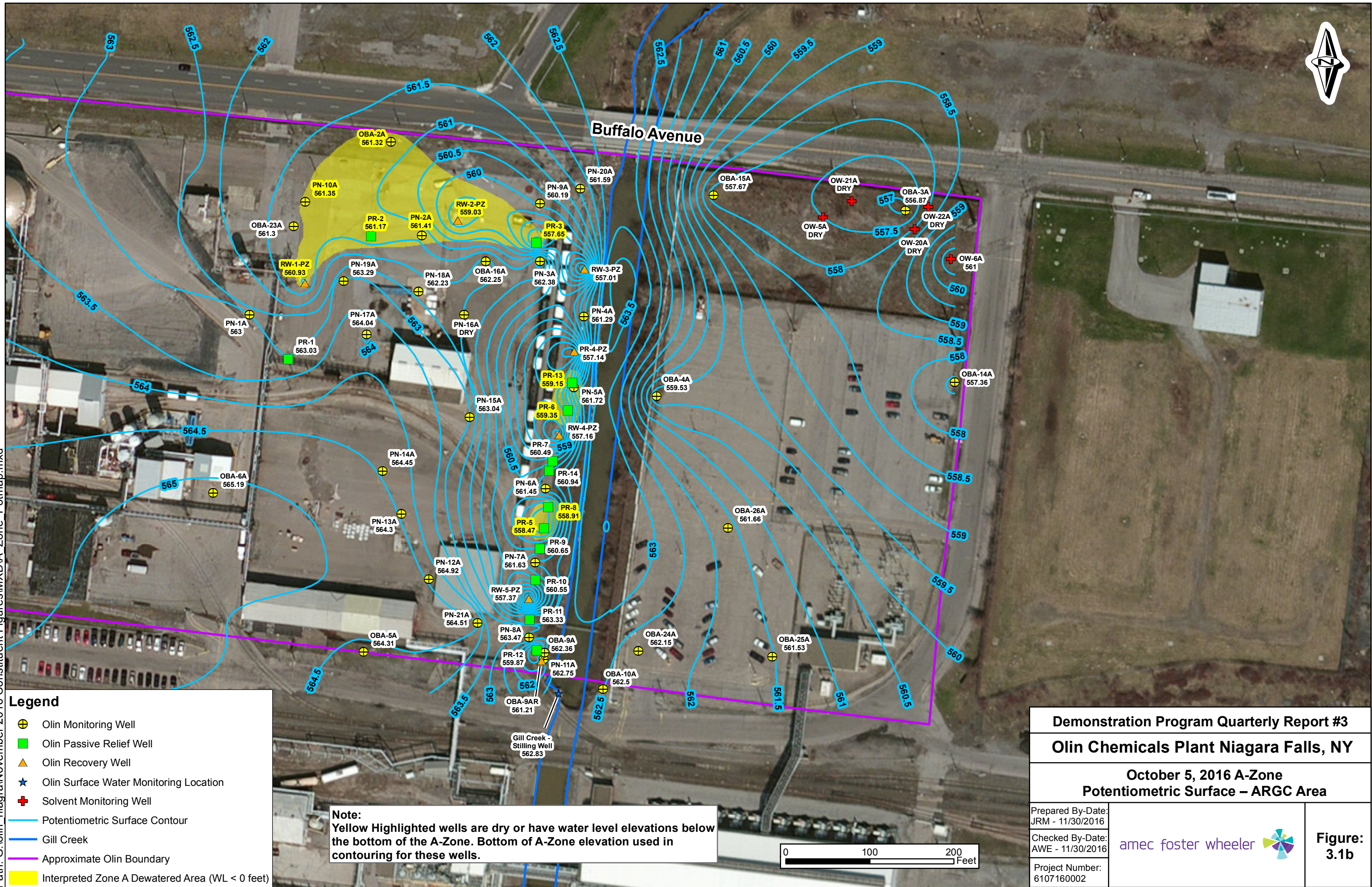
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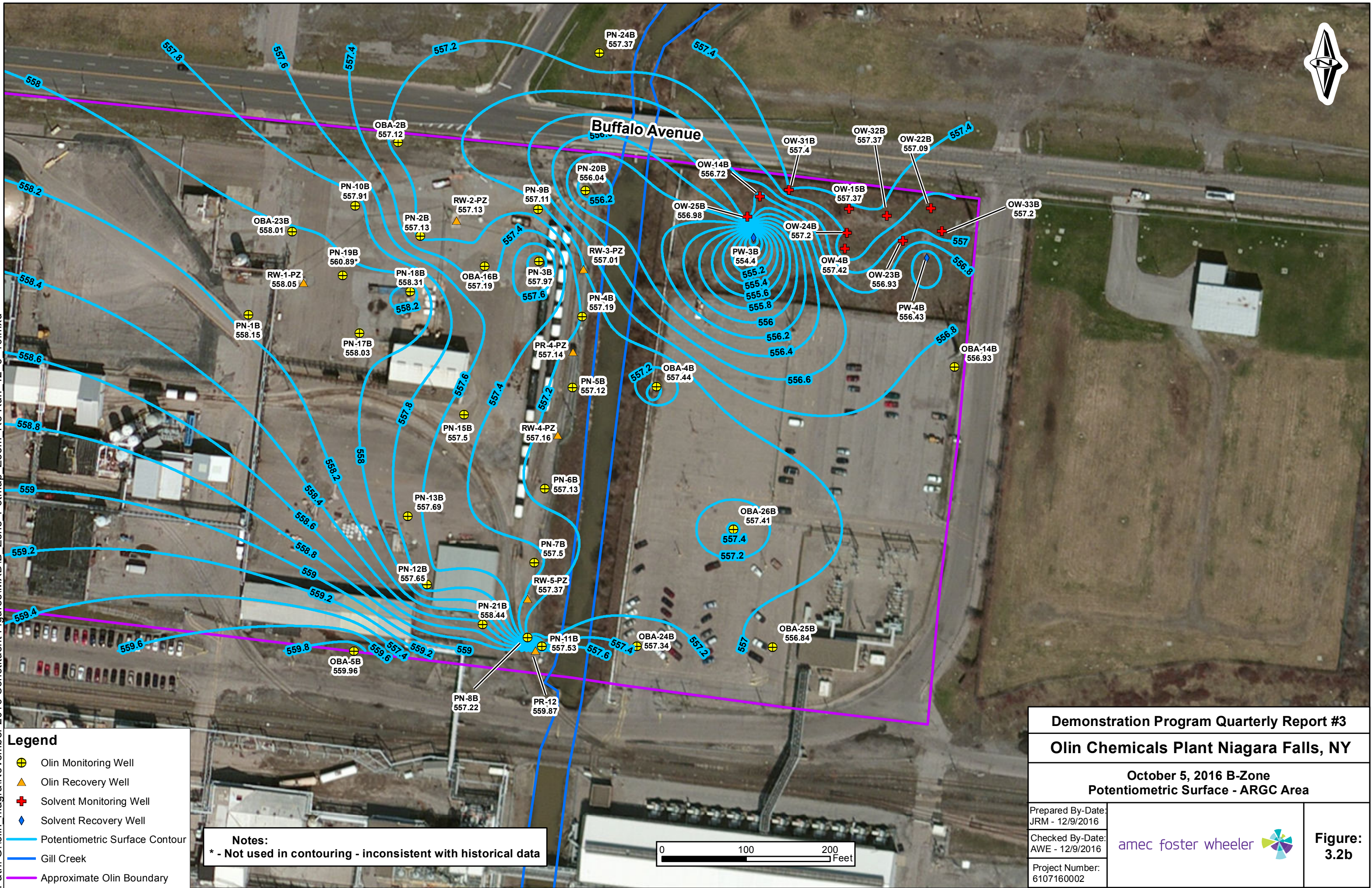
Checked By: T. Englund 11/28/2016

FIGURES

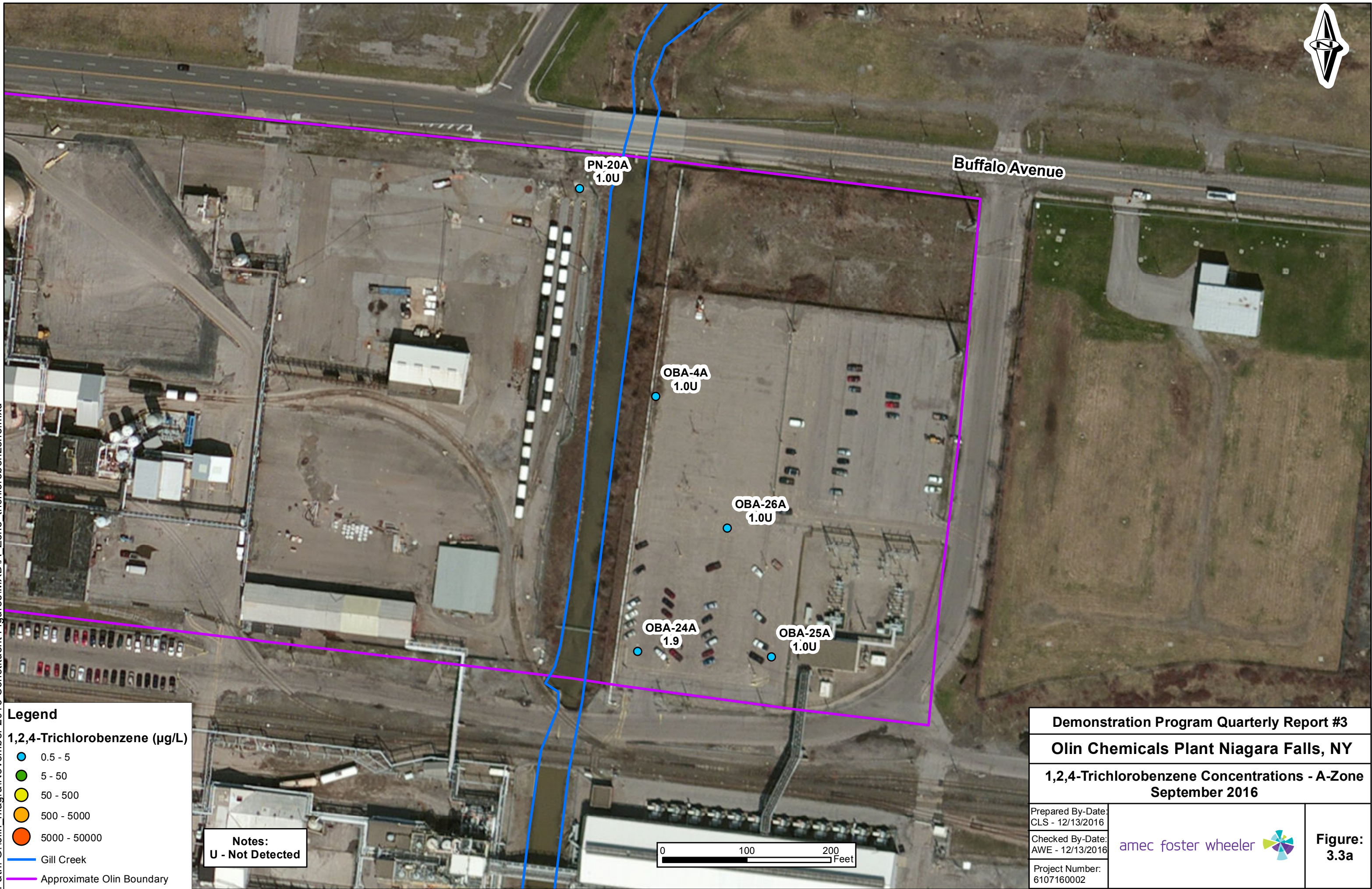




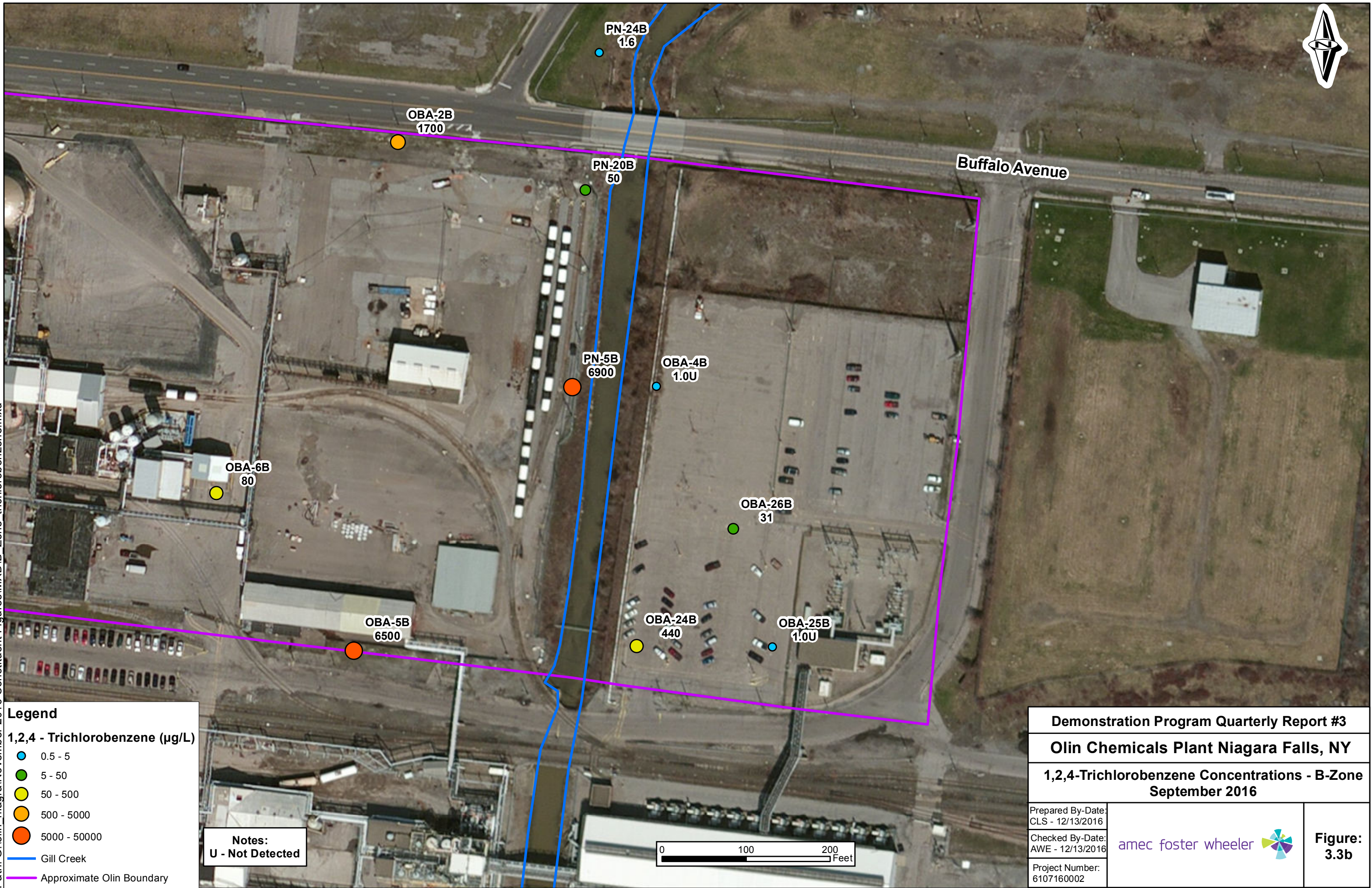
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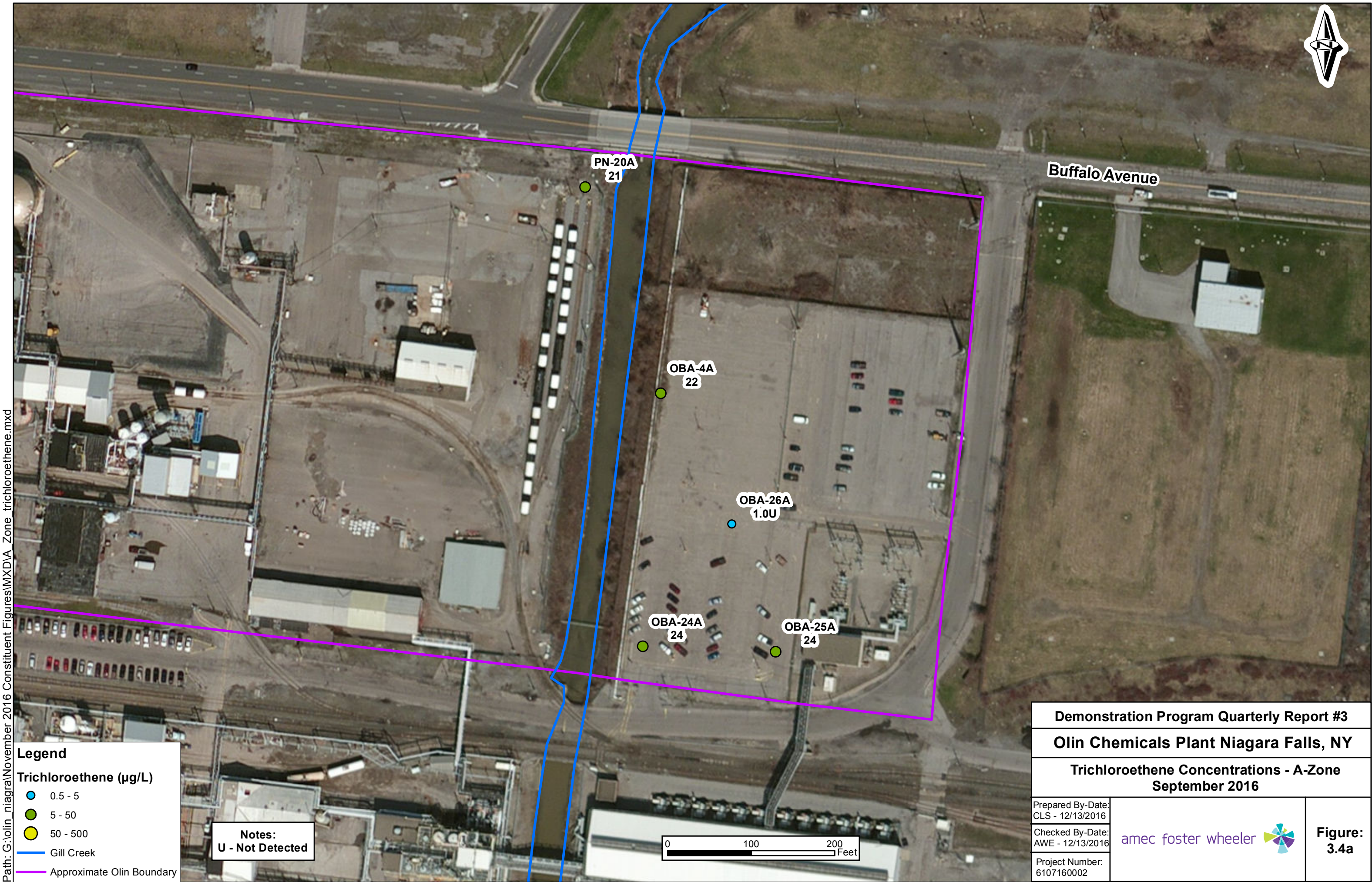


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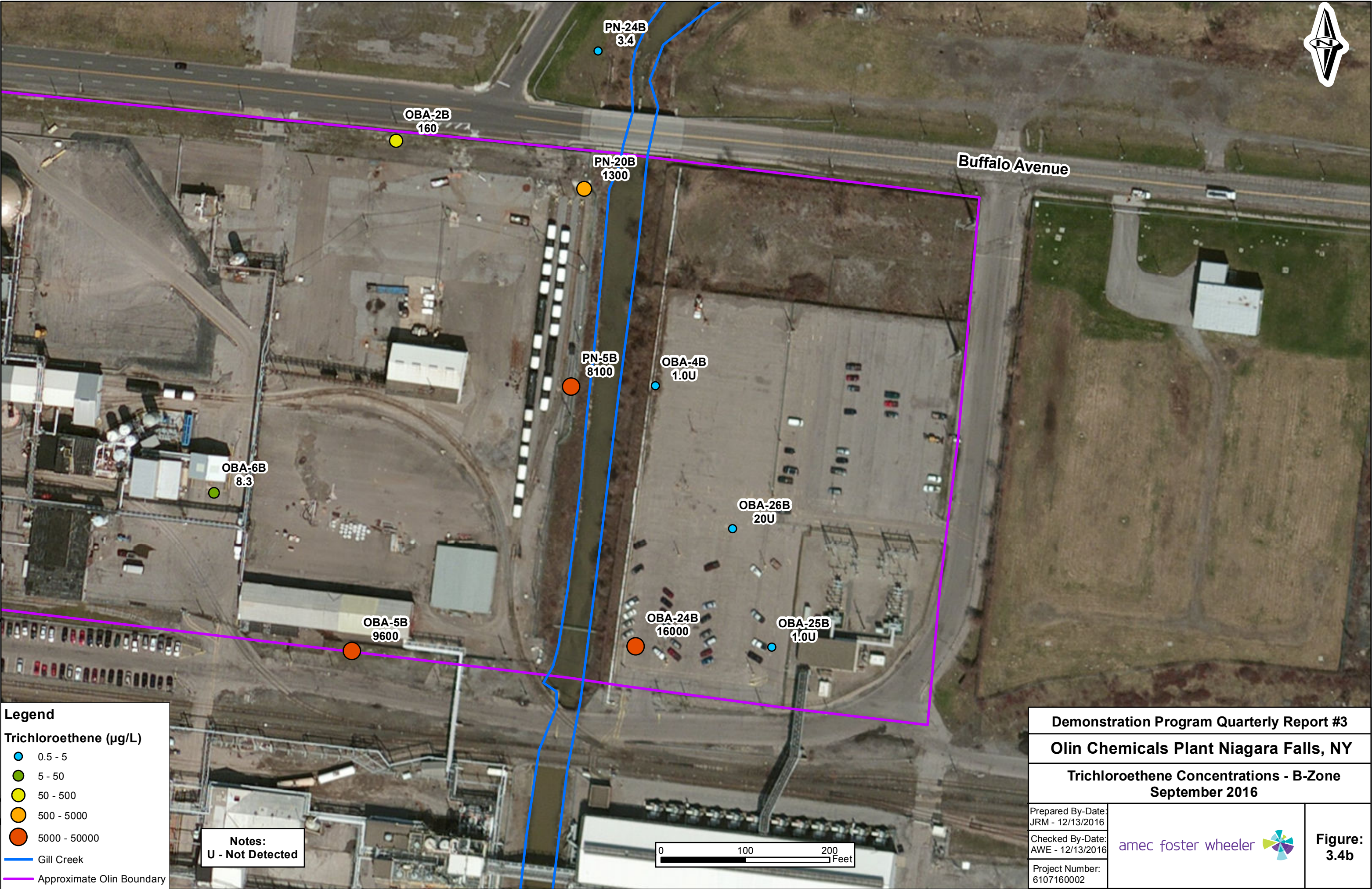




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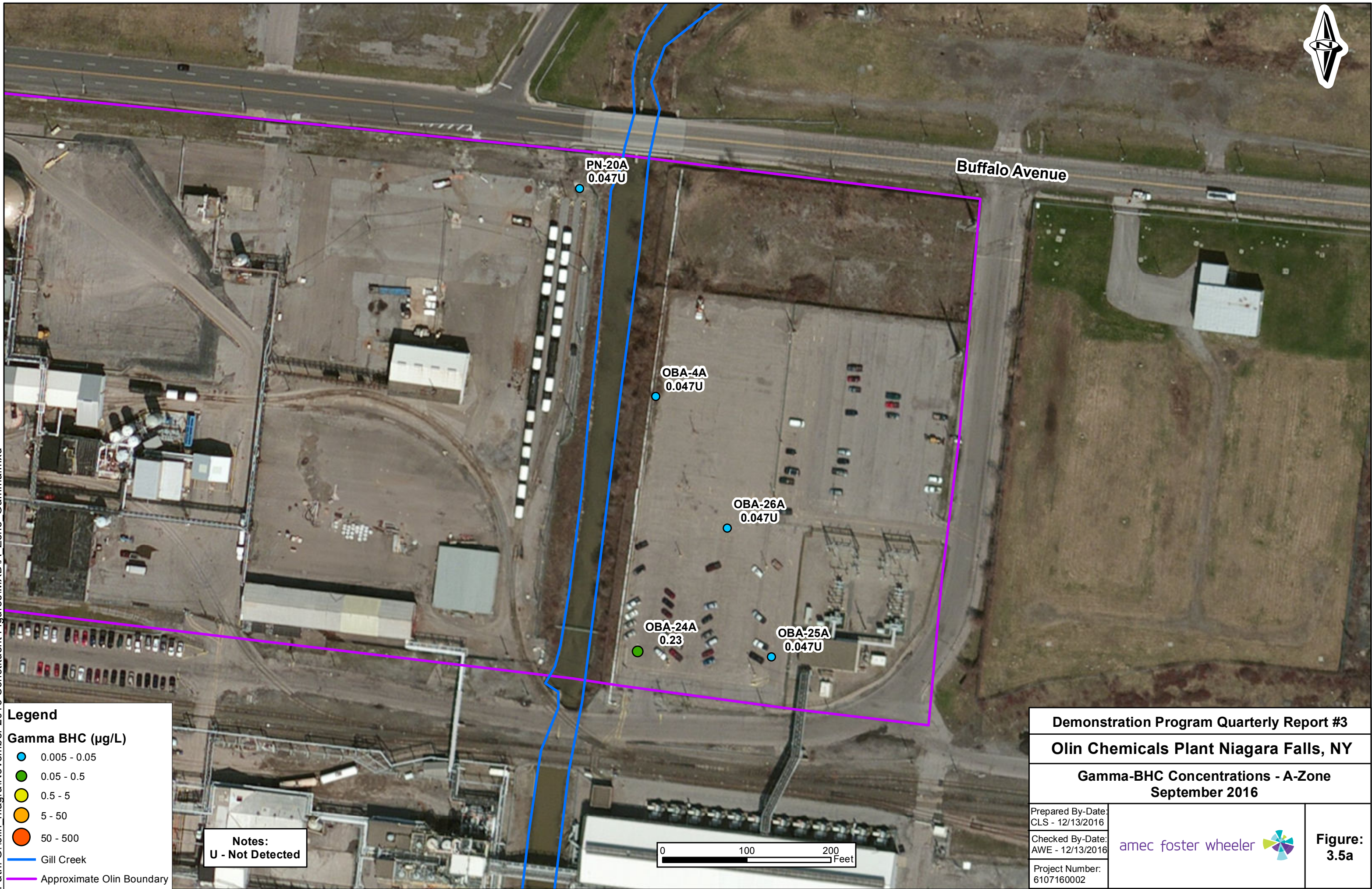


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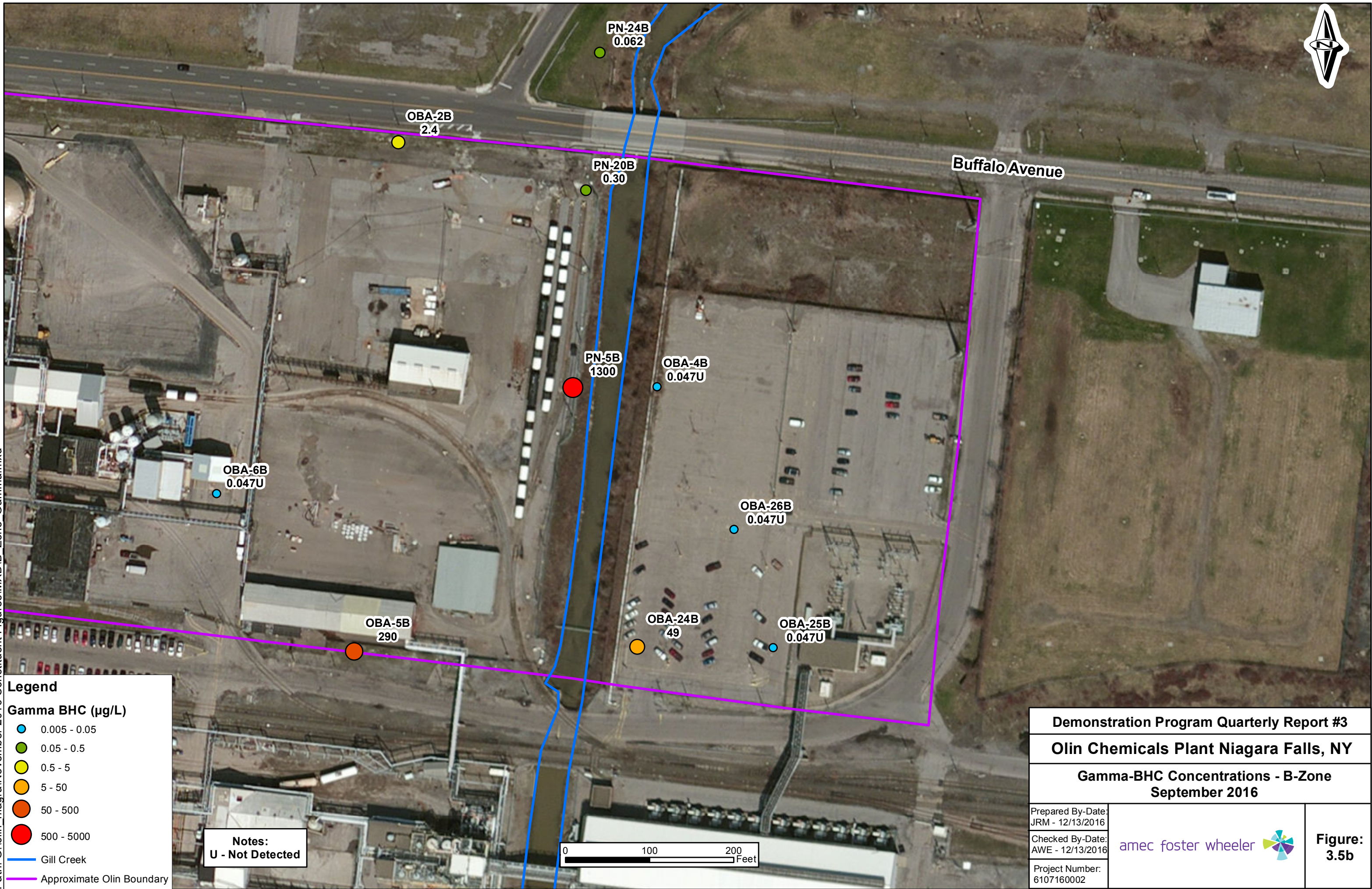
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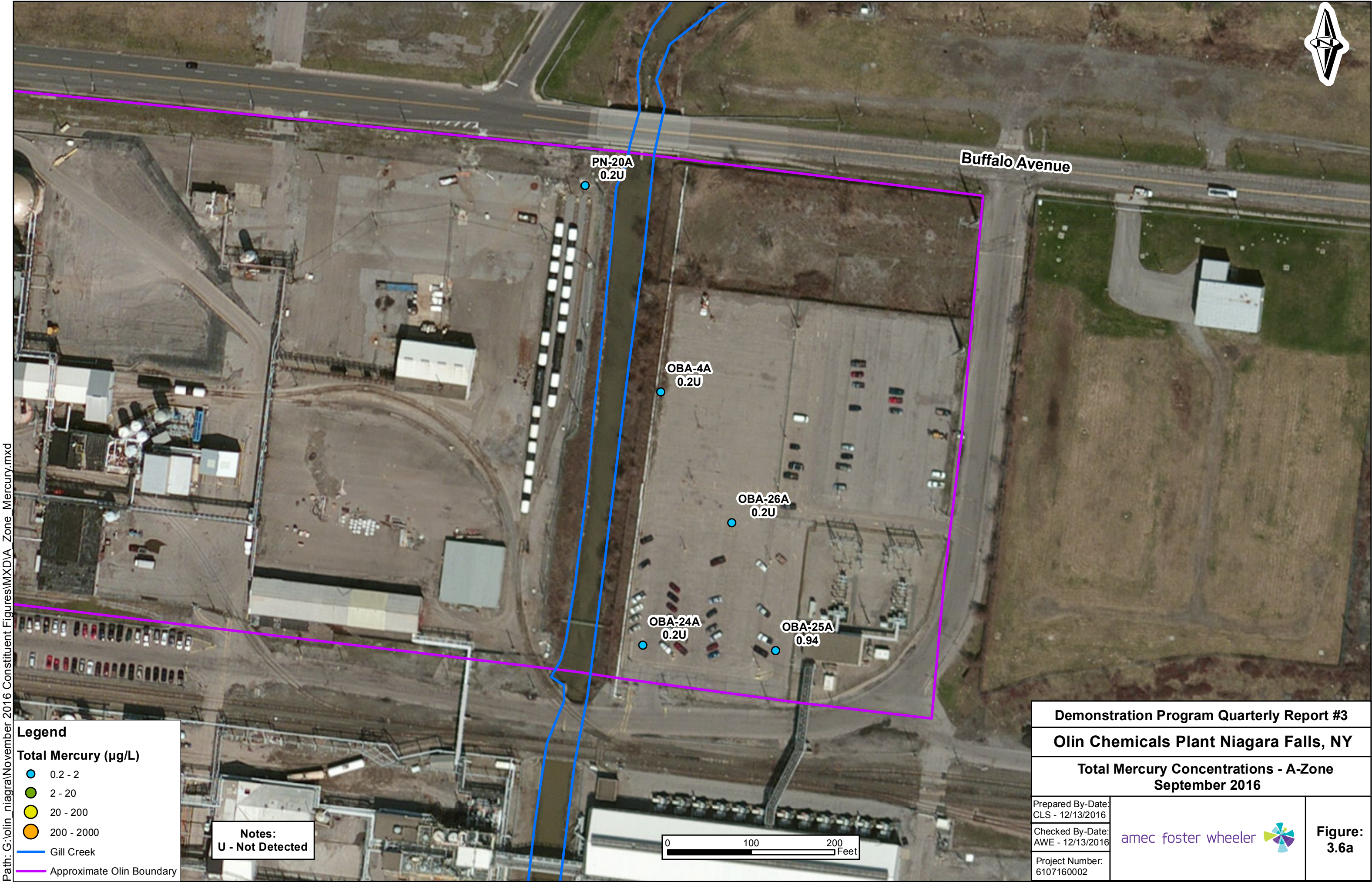
Olin Chemicals Plant Niagara Falls, NY

Gamma-BHC Concentrations - A-Zone
September 2016

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