NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

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April 27, 2023

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RE: Occidental Chemical Corp., Buffalo Avenue Plant
EPA ID NYD000824482, NYSDEC Site No. 932019
Niagara Falls (C), Niagara County
2022 Annual Performance Evaluation Report

Dear Joseph Branch:

The New York State Department of Environmental Conservation (the Department) has received the "*Corrective Measures Implementation Annual Performance Evaluation January through December 2022*" [April 2022] as prepared by GHD on behalf of Glenn Springs Holdings, Inc. (GSH). The overall conclusions of the report are acceptable to the Department, however we do have the following comments:

1) <u>Section 5.1.1, WW1 and WW2</u>: it was reported to the Department on December 22, 2022 that WW1 and WW2 would be down due to electrical work on a nearby building affecting their power supply. The total downtime extended into 2023, but should still have been mentioned in the annual report for 2022; and

2) <u>Section 9.3, Flow Zone 1</u>: the Department provided comments on the *Flow Zone 1 Remedial System Assessment* after the submission of this annual report, which may impact some of the recommendations in that assessment. Any changes to the Flow Zone 1 system should be confirmed with the Department prior to implementation.

The above comments do not require modification of the submitted annual report. If you wish to discuss this matter in more detail feel free to contact me at 716-851-7220 or benjamin.mcpherson@dec.ny.gov.

Sincerely,

DN: cn=Benjamin McPherson, o=NYSDEC, ou=DER, email=benjamin.mcpherson@dec.ny.gov, c=US
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Corrective Measures Implementation Annual Performance Evaluation January through December 2022

Occidental Chemical Corporation
Buffalo Avenue Plant
Niagara Falls, New York

Glenn Springs Holdings, Inc.

April 01, 2023

→ **The Power of Commitment**

Executive summary

A Corrective Action Program (CAP) has been implemented at Occidental Chemical Corporation's (OxyChem's) Buffalo Avenue Plant (Plant) pursuant to the Plant's Resource Conservation and Recovery Act (RCRA)/Part 373 Permit. Glenn Springs Holdings, Inc. (GSH), an affiliate of OxyChem, is responsible for this remediation project, including the implementation of this CAP. The CAP addresses the operation, monitoring, and maintenance of Corrective Measures at the Plant for groundwater, soils, and off-Site areas. A long-term Performance Monitoring Program has been implemented to ensure that the Corrective Measures continue to achieve remedial goals. The purpose of this report is to present an evaluation of the performance of the remedial systems in 2022, along with recommendations for changes to the long-term monitoring program. The monitoring data, submitted previously in quarterly reports, is also summarized.

It should be noted that the Plant ceased chemical production operations in August 2021.

Performance

The Bedrock Groundwater System was effective in maintaining hydraulic containment in the three bedrock zones when pumping the 13 extraction wells at target rates. The total organic Site-Specific Indicator (SSI) concentrations in the bedrock groundwater have continued to fluctuate compared to the previous sampling events. All three zones are showing a general decrease. The groundwater extraction system has been effective in removing chemicals present in the bedrock groundwater flow system. The Falls Street Tunnel (FST) was closed on April 30, 2012. As a result of closure, chemicals that have migrated from the Plant in the D-Zone groundwater can no longer infiltrate into the FST. Therefore, there is no chemical loading to the FST. The Iroquois Street Sanitary Sewer (ISSS) was repaired in the fourth quarter of 2014 by the Niagara Falls Water Board (NFWB) to eliminate groundwater infiltration and since then, groundwater elevations in the bedrock D-Zone have risen in the vicinity of the ISSS. This rise in elevation off-Site has reversed the hydraulic gradient and groundwater flow direction in the vicinity of the ISSS back toward the Plant and as such, has improved containment along the north Plant boundary.

Operation of the Flow Zone 1 system, located along the south and west boundaries of the Plant, achieved containment when operational. Drawdown was achieved in the western portion (CMH1 - WW1 and MHA - MHF) in 2022. The Flow Zone 3 Overburden Groundwater System, located along the north boundary of the Plant, continued to provide a hydraulic barrier when operational. The Flow Zone 1, Flow Zone 3, Abandoned Outfall 005, and Abandoned D-Area Sanitary Sewer collection systems have been effective in removing chemicals in the overburden groundwater flow system when operational.

The Corrective Measures have been effective in removing chemicals and non-aqueous phase liquid (NAPL) from the bedrock and overburden units with an average of 22.1 pounds per day recovered in 2022. The following table summarizes the estimated annual and cumulative removal of chemicals and NAPL since the beginning of the programs based on amount of NAPL collected, average flow rates, and analytical data.

Unit	2022 (lbs.)	Cumulative Removal (lbs.)
Bedrock		
Groundwater	5,687	278,576
NAPL	151	76,870
Overburden		
Groundwater	2,214	114,865
NAPL	19	74,213
Total	**8,071**	**544,254**

Surface cover materials in various areas of the Plant were inspected, repaired if necessary, and found to be adequate for the intended purpose (prevent exposure to underlying soils). Mercury was detected in the overburden groundwater at concentrations that are consistent with pre-remedial conditions in the former Mercury Cell Area.

Recommendations

Based on the evaluation of the 2022 data, it is recommended that the Performance Monitoring Program continue for the next year of the Corrective Action Program as follows:

i. The bedrock groundwater remedial program should continue without modification.

ii. The bedrock NAPL remedial program should continue without modification.

iii. The overburden groundwater remedial program should continue without modification.

iv. The overburden NAPL remedial program should continue without modification.

v. Monitoring of surface cover materials should continue without modification.

vi. The Mercury Cell Area monitoring program should continue without modification.

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1. Introduction

A Corrective Action Program (CAP) has been implemented at Occidental Chemical Corporation's (OxyChem's) Buffalo Avenue Plant (Plant) pursuant to the Plant's Resource Conservation and Recovery Act (RCRA)/Part 373 Permit. Glenn Springs Holdings, Inc. (GSH), an affiliate of OxyChem, is responsible for this remediation project, including the implementation of this CAP. The final RCRA Facility Investigation (RFI) was completed in February 1995. The RCRA/Part 373 Permit stated that the CAP for the Plant would be implemented in four separate phases as Interim Corrective Measures (ICMs) addressing the following:

- Bedrock groundwater flow regime
- Overburden groundwater flow regime
- Overburden soils
- Off-Site areas

The ICMs implemented for each of the four phases, as presented in the document entitled "Final Corrective Measures Study", dated November 1998 (Final CMS), were as follows:

Bedrock Groundwater

- Extraction wells along the downgradient west and northwest Plant property boundaries in the D-, C-, and B-Zones
- On-Site groundwater treatment system
- Hydraulic monitoring program to monitor the effectiveness of the hydraulic containment system
- Chemical monitoring program to verify long-term changes
- Non-aqueous phase liquid (NAPL) collection from on-Site bedrock wells
- Treatment of NAPL

Overburden Groundwater

- Flow Zone 1 – Stages 1, 3, and 4 groundwater collection systems and on-Site treatment system
- Flow Zone 3 – Energy Boulevard Drain Tile System (EBDTS)
- Hydraulic monitoring program to monitor the effectiveness of the hydraulic containment systems
- Chemical monitoring program to verify long term changes
- Collection of groundwater via sanitary sewers and treatment at the Niagara Falls Water Board (NFWB) Wastewater Treatment Plant (WWTP)
- Monitoring groundwater infiltration into the outfall sewers as required by State Pollution Discharge Elimination System (SPDES) Permit (and reduction where necessary)

Overburden Soil

- Maintenance of overburden groundwater ICM components
- Deed restrictions
- Institutional controls
- Maintenance of Plant perimeter fence
- Perimeter overburden NAPL monitoring
- NAPL recovery (when sufficient quantity is encountered) and treatment of recovered NAPL
- Maintenance of capped dioxin and elemental phosphorus areas and surface drainage control
- Maintenance of capped and existing hard surfaced areas

Off-Site Areas

– Collection of off-Site groundwater via the existing bedrock groundwater extraction system which will continue to draw chemicals back toward the Plant and prevent further off-Site chemical migration.
– Collection of off-Site groundwater via the Falls Street Tunnel (FST) which collected D-Zone groundwater until April 30, 2012. All dry weather flow in the FST up until closure was treated by the NFWB WWTP.
– Monitored natural attenuation. Monitoring of off-Site bedrock groundwater quality is already performed as part of the on-Site bedrock groundwater corrective measures.

A long-term performance monitoring program has been implemented to ensure that the Corrective Measures continue to achieve remedial goals. The long-term monitoring requirements include the following:

Bedrock Systems

– Bedrock groundwater hydraulic monitoring
– Bedrock groundwater chemical monitoring
– Bedrock groundwater treatment system effluent monitoring
– Bedrock NAPL monitoring and collection

Overburden Systems

– Overburden groundwater hydraulic monitoring
– Overburden groundwater chemical monitoring
– Overburden groundwater treatment system effluent monitoring
– Sanitary and outfall sewer effluent monitoring
– Overburden NAPL monitoring and collection
– Overburden soil cover material monitoring

The purpose of this report is to present the following:

– A discussion of the monitoring data collected in 2022
– An evaluation of the performance of the remedial systems
– Recommendations for changes to the long-term monitoring program

The analytical data were presented in the four quarterly reports for 2022. These data are not repeated in this report. The location of the data within the quarterly reports is referenced where appropriate.

The performance monitoring for 2022 was performed in accordance with the requirements of the Corrective Action Module contained in the RCRA/Part 373 Permit effective September 29, 2008 and September 15, 2022 which replaced the 2008 version. This report was prepared to be consistent with the RCRA/Part 373 Permit.

It should be noted that the Plant ceased chemical production operations in August 2021.

2. Corrective Measure Overview

A detailed description of all the Corrective Measures implemented at the Plant is presented in the Final CMS. An overview of the implemented Corrective Measures that require performance monitoring is presented in the following sections.

2.1 Bedrock Corrective Measures

A summary of the bedrock remedial program is presented in the following sections. The components of the bedrock remedial system are shown on Figure 2.1.

2.1.1 Bedrock Groundwater

The remedial system that was selected for the bedrock groundwater flow regime involved hydraulic containment, treatment, and monitoring of the chemical plume in the bedrock groundwater beneath the Plant. The remedial system commenced operation in April 1996 and consisted of the following components:

- A groundwater extraction system of 19 extraction wells capable of creating a hydraulic barrier in the D-, C-, and B-Zones of the bedrock along the northwestern and western Plant property boundaries
- An on-Site groundwater treatment system composed of an air stripper, thermal oxidation unit, and carbon vessels designed to treat 1,200 gallons per minute (gpm) located in the F-Area of the Plant (F-Area treatment system)
- A hydraulic monitoring program to monitor the effectiveness of the hydraulic containment system
- A chemical monitoring program to verify long term changes

As a result of evaluations performed by GSH, only 13 extraction wells are currently operational. C-Zone extraction wells BEW701C, BEW702C, and BEW703C were shut down on May 22, 2007 with NYSDEC approval and D-Zone extraction wells BEW701D, BEW702D, and BEW703D were shut down on October 9, 2008 with NYSDEC approval. Pumping from these extraction wells is no longer required to achieve hydraulic containment in the D- and C-Zones.

The bedrock groundwater remedial system components collect and treat bedrock groundwater from each of the three zones within the bedrock along the north and west (downgradient) boundaries of the Plant except the east portion of the north Plant boundary (east of OW408). Concentrations of Site-related chemicals in the bedrock groundwater in the eastern downgradient area are low and have been decreasing over time and consequently, a remedial system was not required in this area. The upper zone of the bedrock (D-Zone) is located from 0 to 45 ft below the top of rock (BTOR). The middle zone (C-Zone) is located from 55 to 85 ft BTOR. The lower zone (B-Zone) is located from 85 to 150 ft BTOR.

2.1.2 Bedrock NAPL

During investigations conducted as part of the RFI, some bedrock wells were observed to contain collectable quantities of NAPL. To address the NAPL presence in the bedrock, an ICM was implemented in 1992. The ICM consisted of the following components:

- NAPL collection from on-Site bedrock wells where substantial quantities of NAPL could be recovered
- Treatment of collected NAPL
- Monitoring all A-zone wells for NAPL presence and any B-Zone wells where NAPL is found in the corresponding A-well

There are currently only fourteen bedrock wells that exhibit collectable quantities of NAPL: OW402A, OW413A, OW417A, OW401B, OW229, OW243, OW618, OW619, OW620, OW621, OW634, OW638, OW635, and OW643. Extracted NAPL is treated off Site at an approved facility.

2.2 Overburden Corrective Measures

A summary of the overburden remedial program is presented in the following sections. The components of the overburden remedial system are shown on Figure 2.2.

2.2.1 Overburden Groundwater

Corrective measures for overburden groundwater were implemented in the following areas:

Perimeter Areas	Flow Zone 1 Flow Zone 3 Abandoned Outfall 005
Interior Areas	Sanitary Sewer System Outfall Sewer System

The ICMs implemented for each of these areas are described below.

2.2.1.1 Perimeter Areas

The remedial concept for the identified perimeter areas of the Plant was to establish hydraulic containment along the Plant boundary to restrict off-Site chemical migration via overburden groundwater flow in Flow Zone 1 and Flow Zone 3. The two flow zones were addressed as described below.

2.2.1.1.1 Flow Zone 1

The corrective measures for Flow Zone 1 were designed to intercept over 98 percent of the off-Site chemical loading leaving the Plant via the overburden groundwater flow regime. The remedial system for Flow Zone 1 was implemented in four stages. The final stage was completed in the fall of 1998. The Flow Zone 1 remedial system consists of the following components:

– A 1,500-foot-long groundwater collector that extends from MHA to MHF along the south boundary of the Plant and consists of the abandoned Outfall 002 and a new 6-inch diameter collection pipe installed immediately on top of Outfall 002
– A 740-foot-long groundwater collector installed along the southwest corner of the Plant that extends from CMH2 to MHA and drains to two wet wells (WW1 and WW2)
– A forcemain to connect WW1 and WW2 to BEW700B such that the groundwater is treated at the existing F-Area carbon treatment system
– An in-line carbon dioxide pH adjustment system at WW1, WW2, MHB, and MHC
– A hydraulic monitoring program to monitor the effectiveness of the hydraulic containment system
– A chemical monitoring program to verify long term changes

On December 11, 2008, a forcemain was completed to connect the Flow Zone 1 collection system (WW1 and WW2) to the F-Area treatment system via bedrock extraction well BEW700B. As of that date, all Flow Zone 1 remedial groundwater is treated by the F-Area treatment system.

2.2.1.1.2 Flow Zone 3

In 1979, a stormwater collection system was installed beneath Energy Boulevard as part of road and access improvements. The Energy Boulevard storm sewer system discharges to an off-Site section of Outfall 004 immediately north of the northern Plant boundary at 47th Street. Historic SPDES sampling showed elevated organic chemical presence in this storm system as a result of groundwater infiltration. The EBDTS was installed in 1980 parallel to and at an elevation below the invert of the storm sewer system to prevent infiltration of overburden groundwater and NAPL into the sewer. The location of the EBDTS is shown on Figure 2.2.

The EBDTS intercepts off-Site chemical loading from Flow Zone 3 identified during the RFI and consists of the following components:

– Approximately 500 ft of perforated collection tile
– A first-stage wet well where NAPL is collected and removed
– A second-stage wet well where groundwater is collected and removed

– An overhead forcemain that discharges groundwater to the Iroquois Street sanitary sewer
– A hydraulic monitoring program to monitor the effectiveness of the hydraulic containment system
– A chemical monitoring program to verify long-term changes

Although not part of the CAP, OxyChem voluntarily implemented upgrades in 2003 to the EBDTS that include the following:

– Installation of a forcemain that connects WWB of the EBDTS to extraction well BEW706C such that collected groundwater is treated at the F-Area treatment system instead of being discharged to the sanitary sewer
– Abandonment of a 360-foot section of sanitary sewer in the northern D-Area parallel to the north Plant boundary, and conversion of the abandoned sewer to a groundwater collection system that discharges to WWB of the EBDTS

The upgrades to the EBDTS are monitored and reported in accordance with the permitted overburden groundwater collection systems. The upgraded system commenced operation in the first quarter of 2004. The location of the abandoned D-Area sanitary sewer is shown on Figure 2.2.

2.2.1.1.3 Abandoned Outfall 005

Although not part of the CAP, OxyChem has voluntarily implemented an additional groundwater collection system. On November 29, 2002, the abandoned section of Outfall 005 in the F-Area of the Plant was tied into the F-Area groundwater treatment system via a pumping/forcemain system from MH159L. This system collects groundwater that infiltrates into the 925-foot-long section of abandoned gravity sewer. Full-scale pumping from MH159L commenced on December 21, 2002. This system is monitored and reported in accordance with the permitted overburden groundwater collection systems. The location of the Abandoned Outfall 005 system is shown on Figure 2.2.

2.2.1.2 Interior Areas

2.2.1.2.1 Groundwater Infiltration to Sanitary Sewer System

Historic sewer installations at the Plant did not use watertight construction materials and methods. Consequently, groundwater infiltration into the sanitary sewer system occurred. Throughout the late 1970s and to the present, OxyChem has been upgrading the sewers to improve the quality of the water leaving the Plant.

OxyChem is not planning further corrective measures on the sanitary sewer system at the Plant at present. Discharge to the sanitary sewer system is regulated under permit with the Niagara Falls Water Board (NFWB) (Significant Industrial User Wastewater Discharge Permit No. 22). The sanitary sewers currently operate within the discharge limit established by the NFWB permit (and the WWTP SPDES Permit). These systems provide an essential component of groundwater collection within the Plant area and at the Plant boundary. As conditions currently exist, the overburden flow, which discharges to the sanitary sewer, is treated prior to discharge to the Niagara River.

2.2.1.2.2 Groundwater Infiltration to Outfall Sewer System

OxyChem has conducted various investigations and made numerous modifications to the outfall sewer network beneath the Plant to significantly reduce chemical loadings to the Niagara River. Modifications have included abandoning sewer sections in demolished areas of the Plant, replacing sewers with watertight piping, lining existing sewer pipes, repairing and purging manholes, and cleaning of sewers.

Outfall sewer modifications have reduced the total loading of chlorinated compounds and benzene and toluene to the Niagara River from the outfall sewers from approximately 119 pounds per day in 1984 to 8 pounds per day in 1990 for the sum of the Outfalls. With the elimination of Outfall 001 in July 2006, the current loading to the river from the outfall sewers is less than 0.1 pounds per day based on SPDES Permit monitoring data.

Each of the Outfalls operates under permit with the State (SPDES Permit No. NY0003336) and the flow is regularly monitored to verify that the off-Site flow meets the discharge criteria as specified in each respective permit. The off-Site flow through the Outfalls consistently meets the discharge criteria established, but additional corrective measures will be implemented, if required, to continue to meet the discharge criteria.

2.2.1.2.3 Overburden NAPL

An ongoing NAPL collection program has been implemented at the Plant. NAPL is currently monitored, and collected if necessary, from the Outfall 003 NAPL Collection Trench; the EBDTS; monitoring wells OW306, OW313, OW317, OW320, OW358, OW523, OW537, OW562, OW563, OW572, TW-7, and OW577; three abandoned sewer manholes; and two NAPL collection sumps in the V-Area. The locations of these collection points are presented on Figure 2.2. Well OW354, MH773, and the N-Area north and south NAPL sumps were removed from the NAPL collection program in 2013 with approval from NYSDEC. MH773 and the N-Area sumps were abandoned in 2013 with approval from NYSDEC.

Mobile NAPL that is detected during future construction activities will be extracted using either extraction wells or an extraction trench. The most suitable extraction method will be chosen depending on local conditions such as underground utility congestion, soil porosity, and quantity of mobile NAPL available for extraction. Extracted NAPL will be treated off Site at an approved facility. NAPL encountered in sewers during future maintenance or construction activities will be extracted and treated.

2.2.1.2.4 Overburden Soil

To address chemical presence in overburden soils, ICMs were implemented to address surficial exposure to NAPL, dioxin, elemental phosphorus, and mercury, and to address the subsurface presence of mercury in the vicinity of the former Mercury Cell Area (former Building U-75).

The ICM to address surface exposure involved capping specific areas of the Plant. The areas capped and type of cover materials used is summarized below.

Area	Chemical Group	Cap Material
C/D-Area	NAPL and dioxin	Asphalt, gravel
F-Area	NAPL and dioxin	Asphalt, gravel
T-Area	NAPL	Asphalt
U-Area	NAPL dioxin mercury	Asphalt, gravel Asphalt Asphalt
N-Area	NAPL	Asphalt, gravel, soil/grass
X-Area	dioxin	Soil/grass
V-Area	elemental phosphorus	Asphalt

It should be noted that both the U-Area and N-Area also have concrete cover materials resulting from demolition of buildings (concrete building slabs were left in place). Demolition debris (crushed concrete and bricks) was also placed in these areas as a result of building demolition.

The ICM for the Mercury Cell Area involved the recovery of more than 33 tons of mercury from the soils/foundation beneath Building U-75. Remaining trace amounts of mercury are contained within a sheet pile wall keyed into the native till confining unit that encircled all of Building U-75.

3. Bedrock Groundwater

3.1 Operation Summary

The bedrock groundwater extraction system commenced full scale operation on April 1, 1996. The bedrock groundwater treatment system operational efficiency (percentage of time operating) for the year 2022 was approximately 89.5 percent.

Downtime occurred within the limits specified in the Permit with several exceptions during the year of 2022, as outlined below. Downtime for greater than 72 hours consecutively and/or greater than 120 hours in a month occurred as follows as reported in Quarterly Progress Reports:

- The groundwater treatment system was down in the first quarter of 2022 due to scrubber flow issue/ductwork repair. NYSDEC was notified on January 15, 2022.
- BEW706B and BEW706D were down in January due to pump failures. NYSDEC was notified on January 31, 2022, and March 17, 2022, respectively.
- BEW700B and BEW701B were down in April due to sand filter pump repair. NYSDEC was notified on April 28, 2022.
- The groundwater treatment system was down in May associated with the oxidizer faulty valve. NYSDEC was notified on May 10, 2022.
- BEW700B was down in July. NYSDEC was notified on July 6, 2022.
- The groundwater treatment system was down in July and September. NYSDEC was notified on July 8 and September 20, 2022.
- The groundwater treatment system was down in November (annual oxidizer and scrubber maintenance) and December (communication issues). NYSDEC was notified on November 16 and 21, 2022 and December 27, 2022.
- BEW706B was down in November and December. NYSDEC was notified on November 8 2022, with follow up communications on November 21, December 6, and December 13, 2022.

Minor downtime of the treatment system, extraction well system, or individual wells was due to low scrubber flow due to solids, pH control issues, repairs to the ductwork, pH probe calibration, high oxidizer sump level, various alarms, oxidizer faulty valve, leak detections at BEW705B and BEW705D, rainy conditions, annual oxidizer and scrubber maintenance, air stripper sump high level, air compressor failure, and communication issues.

3.2 Performance Monitoring

Performance monitoring of the bedrock remedial system includes flow, hydraulic, and chemical monitoring. The following sections describe the performance monitoring that has been performed as part of the bedrock remedial system.

3.3 Flow Monitoring

The total flow from each extraction well was recorded weekly. The total flow and average flow rates between each monitoring period for the D-, C-, and B-Zone extraction wells were presented in the quarterly reports.

The average monthly flow rate of the D-Zone while the system was operating ranged between 76 gpm (January) and 100 gpm (July). The average monthly flow rate of the C-Zone while the system was operating ranged between 239 gpm (January) and 311 gpm (November). The average monthly flow rate of the B-Zone while the system was operating ranged between 16 gpm (January) and 23 gpm (June). Table 3.1 summarizes the average flow rates and operating times for each month from each of the D-, C-, and B-Zones.

The yearly average flow rates for the D, C, and B-Zones (including October, November, and December when the extraction wells were mostly down) were as follows:

Bedrock Zone	Average Flow Rate (gpm)
D-Zone	94
C-Zone	275
B-Zone	19

3.4 Hydraulic Monitoring

Hydraulic monitoring of the bedrock groundwater extraction system was performed on March 10, 2022, June 2, 2022, September 8, 2022, and December 6, 2022. New York Power Authority's (NYPA's) monitoring well OW139 and the Niagara River were included in all of the hydraulic monitoring events.

Hydraulic monitoring was performed to allow simultaneous measurement of water levels at wells along vectors perpendicular to the Plant boundary (e.g., wells OW667, OW666, OW407, and OW653). Each hydraulic monitoring event was completed generally within a 3- to 4-hour period. The locations of the monitoring wells are shown on Figure 3.1.

The following procedures were implemented for each quarterly event to ensure potentiometric surface fluctuations were minimized for interpretation of the data:

– Water levels were measured in the D-Zone wells first, followed by the C-Zone wells, and then the B-Zone wells

The D-Zone groundwater elevation contours were developed using S-Area Landfill shallow bedrock groundwater elevations measured during the same event. The combined contours present an overall picture of the effect the Plant and S-Area Landfill remedial systems have on the shallow bedrock groundwater flow regime.

3.4.1 Hydraulic Data Evaluation

The objective of the extraction system is to contain groundwater flow hydraulically at the western Plant boundary and along the western portion of the northern Plant boundary.

Three primary observations were made based on the 2022 hydraulic monitoring data as follows:

1. Hydraulic containment was maintained in the D-Zone when the system was operating
2. Hydraulic containment was maintained in the C-Zone when the system was operating
3. Hydraulic containment was maintained in the B-Zone when the system was operating

A discussion of these observations and an evaluation of the effectiveness of the extraction system in achieving hydraulic containment are provided below.

3.4.2 Horizontal Hydraulic Containment

Groundwater elevation contours are shown on Figures 3.3 through 3.5. The contours are from December 6, 2022 and are typical of the general flow patterns observed when the extraction wells are pumping. The effectiveness of the extraction system in achieving horizontal containment was demonstrated in the quarterly monitoring reports and is discussed in the following subsections.

GSH performed several studies in 2006 and 2007 to evaluate hydraulic containment in the D- and C-Zones under various pumping scenarios. The results of these studies were presented in the reports entitled "Bedrock Groundwater Remediation, Supplemental C-Zone Evaluation", dated May 2007 and "Corrective Measures Implementation, Bedrock Groundwater Remediation, D-Zone Evaluation" dated December 2007. The combined operational and monitoring protocols recommended in these reports were as follows:

1. Pump 100 gpm each from BEW704C, BEW705C, and BEW706C
2. Pump 40 gpm each from BEW704D, BEW705D, and BEW706D
3. Monitor hydraulic containment by:

– Ensuring that BEW704C, BEW705C, and BEW706C continue to pump at approximately 100 gpm each and that BEW704D, BEW705D, and BEW706D continue to pump at approximately 40 gpm each. This will be the primary performance objective.
– Continue quarterly manual water levels per the current monitoring program and produce potentiometric contours. The potentiometric contours will indicate regional containment reflecting the data in combination with professional judgment. The use of well pairs to attempt to demonstrate local containment will be discontinued.

These reports were approved by NYSDEC by letters dated May 22, 2007 and September 25, 2008, respectively.

These studies also showed that the extent of capture extends over 500 feet off-Site. Based on groundwater flow velocities calculated during the RFI and the demonstrated extent of capture off-Site, pumping from the D- and C-Zones would have to cease for a significant period of time (months) before chemical migration occurred outside of the capture zone.

D-Zone

The average monthly flow rate of the D-Zone while the system was operating ranged between 76 gpm (January) and 100 gpm (July). Even though these flows are generally below the target flow rate of 120 gpm (40 gpm each), the groundwater elevations in the three extraction wells were consistent with those observed while pumping at the target rate and hydraulic containment was observed for all hydraulic monitoring events. The lower flows were attributed to BEW705D and BEW706D. These wells were redeveloped in December 2020 in an effort to increase flow rates. Flow rates in these wells before development were approximately 22 and 28 gpm, respectively. Following development, pumping rates increased with some fluctuations occurring. In 2022, the pumping rates in these wells were approximately 24 to 25 gpm and 30 to 32 gpm, respectively, an increase of approximately 3 gpm. These flow rates resulted in hydraulic containment based on the groundwater contours presented in the 2022 quarterly progress reports. Therefore, additional measures to improve flow rates are no required at this time. Should flow rates decrease to the point where hydraulic containment is affected, then additional measures to improve pumping rates will be implemented.

The potentiometric contours presented on Figure 3.3 are representative of conditions in 2022 when the system was operating. The area contained by extraction extended beyond the Plant boundary. The groundwater flow patterns did not change significantly between the first and third quarters, demonstrating that hydraulic stabilization was maintained in the D-Zone.

It should be noted that the Falls Street Tunnel was closed on April 30, 2012. The FST is an unlined storm sewer that runs beneath Royal Avenue. The FST was installed in the D-Zone bedrock and is located approximately 1,900 ft north of the Plant. Prior to closure, the FST acted as a regional groundwater sink that captured D-Zone groundwater. Closure involved plugging all inlets and outlets. Quarterly groundwater monitoring conducted since closure did not show any change in flow pattern north of the Plant prior to 2015. A hydraulic low was generally present at OW654D, the monitoring well closest to the FST (see Figure 3.3). This was likely the result of groundwater infiltration into the Iroquois Street Sanitary Sewer (ISSS) that is adjacent to OW654D (see Figure 3.3). The ISSS is a 54-inch diameter sewer that runs north from Buffalo Avenue along the west side of the Plant to the South Side Interceptor Sewer (located south and parallel to the FST). The sewer was installed within the D-Zone bedrock as presented in the document entitled "Off Site Investigation (OSI) Summary Report", dated August 1992. All flow in the Iroquois Street Sanitary Sewer is treated at the NFWB WWTP. Repairs were completed to the ISSS to eliminate groundwater infiltration in the fourth quarter of 2014 by the NFWB.

Since this repair work was completed, the water elevation in OW654D has risen from approximately 549 ft AMSL to between 553 and 558 ft AMSL. In addition to OW654D, there is another D-Zone monitoring well installed in the immediate vicinity of the ISSS. This monitoring well, OW652D, is located approximately 500 ft south of OW654D. A comparison of groundwater elevations in these monitoring wells and monitoring wells to the west and east of OW652D measured on June 16, 2014 (before repairs to the ISSS) and September 3, 2015 (approximately 9 months after repairs to the ISSS) is presented below.

Monitoring Well	Pre-ISSS Repair Groundwater Elevation (ft AMSL)	Post-ISSS Repair Groundwater Elevation (ft AMSL)
OW654D	549.06	557.06
OW652D	554.37	557.37
OW651D (west of ISSS)	557.14	557.53
OW657D (west of ISSS)	556.15	557.32
OW658D (east of ISSS	555.70	555.87

The groundwater elevation in OW654D increased by 8 ft and in OW652D by 3 ft as a result of the repairs to the ISSS.

Groundwater elevations in OW652D and OW654D are currently at approximately the same elevation as those in OW651D and OW657D located west of OW652D. No apparent change in groundwater elevation in OW658D east of OW652 was observed from pre- to post-ISSS repair.

This rise in elevation off-Site has reversed the hydraulic gradient and groundwater flow direction in the vicinity of the ISSS back toward the Plant and as such, has improved containment along the north Plant boundary. This can be demonstrated by comparing groundwater elevations between OW654D, OW652D, and OW419D before and after repair of the ISSS. OW654D is located farthest from the Plant, OW419D is the closest, and OW652D is in the middle. These wells are aligned in an approximate northwest direction, which was the groundwater flow direction before repair of the FST and ISSS. Groundwater elevations in these wells for four consecutive quarters (to reflect seasonal changes) prior to repair of the ISSS are presented below.

Date	OW654D (ft AMSL)	OW652D (ft AMSL)	OW419D (ft AMSL)
June 16, 2014	549.06	554.37	557.82
March 20, 2014	548.46	552.83	555.22
December 5, 2013	549.24	553.18	555.75
September 4, 2013	549.11	554.08	557.50

The groundwater elevations in OW419D are approximately 6 to 8 ft higher than those in OW654D and 2 to 3 ft higher than those in OW652D, indicating groundwater flow toward OW654D.

Groundwater elevations in these wells for the quarters in 2022 when the system was operating are presented below.

Date	OW654D (ft AMSL)	OW652D (ft AMSL)	OW419D (ft AMSL)
March 10, 2022	553.44	553.18	552.87
June 2, 2022	555.44	555.68	554.70
September 8, 2022	557.36	557.79	556.82
December 6, 2022	555.24	555.18	554.71

The groundwater elevations in OW419D are approximately 0.5 to 0.7 ft lower than those in OW654D and approximately 0.5 ft to 1.0 ft lower than those in OW652D, indicating that groundwater flow direction remains reversed, back toward the Plant when the system was operating.

These monitoring wells now appear to be within the capture zone created by D-Zone extraction well pumping. Therefore, it is expected that chemistry present within these wells will now be drawn back toward the Plant and continue to naturally attenuate. As presented in Table 3.3, (see Section 3.5) the total organic Site-Specific Indicator

(SSI) concentrations in monitoring wells OW652D and OW654D have decreased by 41 percent and 89 percent, respectively, from their historic concentrations.

C-Zone

The average monthly flow rate of the C-Zone while the system was operating ranged between 239 gpm (January) and 311 gpm (November). Hydraulic containment was observed for all hydraulic monitoring events. The Potentiometric contours presented on Figure 3.4 were representative of conditions in 2022 when the system was operating. The area contained by extraction extended beyond the Plant boundary. The groundwater flow patterns did not change significantly between the first and third quarters demonstrating that hydraulic stabilization was maintained in the C-Zone.

B-Zone

The average monthly flow rate of the B-Zone while the system was operating ranged between 16 gpm (January) and 23 gpm (June). Hydraulic containment was observed in the B-Zone for all monitoring events. The groundwater flow patterns presented on Figure 3.5 were representative of conditions in 2022 when the system was operating. The area contained by extraction extended beyond the Plant boundary. The groundwater flow patterns did not change significantly between the first and third quarters demonstrating that hydraulic stabilization was maintained in the B-Zone.

3.5 Chemical Monitoring

The annual bedrock chemical monitoring event was performed between April 1 and May 4, 2022. The chemical monitoring was conducted using the protocols presented in the document entitled "document entitled “Performance Monitoring Plan, Final Corrective Measures”, dated June 2016 (PMP). The locations of the monitored wells are shown on Figure 3.2.

Samples collected from the wells were analyzed for the parameters listed in Table 3.2 using the protocols presented in the PMP. The analytical results, including data validation, were presented in the Appendix of the second quarterly progress report.

3.5.1 Chemical Data Evaluation

D-Zone

The total organic SSI concentrations observed in the D-Zone monitoring wells during the 2022 annual chemical monitoring event were compared to the historic SSI concentrations (Supplemental Data Collection Program [SDCP] or Off-Site Investigation [OSI]) and the previous chemical monitoring events as presented in Table 3.3. The organic SSI parameters consist of the organic parameters listed in Table 3.2 (excluding alkalinity).

Comparison of individual wells in Table 3.3 shows that the total organic SSI concentrations in the D-Zone monitoring wells included in the 2022 annual chemical monitoring event have continued to fluctuate compared to previous events.

The total organic SSI concentration in OW408D (4,295 micrograms per liter [μg/L]) remains higher than the historic concentration at this well (820 μg/L) and 2020 (2,991) μg/L) and 2021 (3,724 μg/L) but lower than 2018 (5,608 μg/L). The concentrations in this well have varied over three orders of magnitude over time. An elevated concentration in 2015 (11,987 μg/L) is likely the result of the limited operation of D-Zone extraction wells that year. It should be noted that data for OW408D are not available from the fall of 1997 through 2001, as the well was not part of the monitoring program at the time. Therefore, a complete database is not available to evaluate concentration trends over this period. An examination of the data for OW408D since 2002 indicates significant fluctuations in the total organic SSI concentration and there appears to be no apparent increasing or decreasing trend over this time. Since full D-Zone pumping resumed in January 2016, concentrations at this well have significantly decreased. This well will continue to be monitored in 2023.

The total organic SSI concentration in OW409D (83 μg/L) decreased from 2021 (350 μg/L). This 2022 concentration is lower than the historic concentration (220 μg/L). The elevated concentration in 2015 is likely the result of the limited operation of D-Zone extraction wells in 2015. Since full D-Zone pumping resumed in January 2016 concentrations at this well have significantly decreased. This well will continue to be monitored in 2023.

The total organic SSI concentration in OW410D (2 μg/L) decreased from 2021 (8 μg/L), and is within the range of other previous concentrations, ranging from non-detect (ND) to 12.6 μg/L. The increase in concentration in 2016 is likely the result of the limited operation of D-Zone extraction wells in 2015. This well is the farthest away from BEW706D (compared to OW408D and OW409D). As such, it took longer for the effect of limited operation of D-Zone extraction wells to be observed in this well. Likewise, it will take more time for concentrations to decrease due to the effect of full D-Zone pumping that resumed in January 2016. This well will continue to be monitored in 2023.

The sum of the total organic SSI concentrations detected in the monitoring wells during the 2022 event was 5,210 μg/L. The overall reduction of chemical concentrations in the D-Zone when compared to historic concentrations was approximately 93 percent, as shown in Table 3.3. It should be noted that this calculation does not include the total organic SSI concentrations from OW408D, since the concentrations in this well have varied by three orders of magnitude over the evaluation period.

Per approval from NYSDEC and USEPA in a letter dated May 9, 2016, the S-Area Environmental Monitoring Program (EMP) in shallow bedrock wells was consolidated into the Niagara Plant's Corrective Action Program annual bedrock chemical monitoring program. These EMP wells include OW405D, OW406D, OW407D, OW408D, OW409D, OW410D, OW417D, and OW667D. The calculation of percent reduction of chemical concentrations in the D-Zone does not include the total organic SSI concentrations from wells OW405D, OW406D, OW417D, and OW667D (from the former EMP). OW405D, OW406D, and OW667D are located between BEW704D, BEW705D, and BEW706D. OW417D is located upgradient with respect to groundwater flow of the D-Zone extraction wells.

The sum of the total organic SSI concentrations in the D-Zone extraction wells fluctuated in 2022 when compared to the concentrations observed in previous events (Table 3.4). The sum of the total organic SSI concentrations detected in the 2022 event was approximately 44,000 μg/L. This represents a decrease of approximately 66 percent when compared to historic conditions. Therefore, the extraction system has been effective in removing chemicals from the D-Zone bedrock groundwater.

C-Zone

The total organic SSI concentrations observed in the C-Zone monitoring wells during the 2022 annual chemical monitoring event were compared to the historic SSI concentrations (SDCP or OSI) and the previous events as presented in Table 3.3.

Comparison of individual wells in Table 3.3 shows that the total organic SSI concentrations in the C-Zone monitoring wells included in the 2022 annual chemical monitoring event have continued to fluctuate compared to previous events.

The sum of the total organic SSI concentrations detected in the monitoring wells during the 2022 event was 757 μg/L, which is consistent with previous years. The overall reduction of organic SSI concentrations in the C-Zone when compared to historic concentrations was approximately 96 percent, as shown in Table 3.3.

The sum of the total organic SSI concentrations in the C-Zone extraction wells fluctuated in 2022 when compared to the concentrations observed in previous events (Table 3.4). The sum of the total organic SSI concentrations detected in the 2022 event was 2,600 μg/L, which is slightly higher than previous years. This represents a decrease of approximately 68 percent when compared to historic conditions. Therefore, the extraction system has been effective in removing chemicals from the C-Zone bedrock groundwater.

B-Zone

The total organic SSI concentrations observed in the B-Zone monitoring wells during the 2022 annual chemical monitoring event were compared to the historic SSI concentrations (SDCP or OSI) and the previous events as presented in Table 3.3.

Comparison of individual wells in Table 3.3 shows that the total organic SSI concentrations in the B-Zone monitoring wells included in the 2022 annual chemical monitoring event have continued to fluctuate compared to previous events.

The total organic SSI concentration in OW408B increased in 2022 to 1,585 µg/L from 1,336 µg/L in 2021 and 465 µg/L in 2020. The concentrations in this well have varied between three orders of magnitude over time. It should be noted that data for OW408B are not available from the fall of 1997 through 2001, as the well was not part of the monitoring program at the time. Therefore, a complete database is not available to evaluate concentration trends over this period. An examination of the data for OW408B since 2002 indicates fluctuations in the total organic SSI concentration, and there appears to be no apparent increasing or decreasing trend at this time.

The total organic SSI concentration in OW653B and OW407B increased from 108 µg/L and 170 µg/L in 2020 to 653 µg/L and 522 µg/L in 2021, respectively. The total organic concentration decreased in 2022 to 153 µg/L and 77 µg/L in 2022, respectively. The reason for the increase in 2021 is unknown. The bedrock groundwater extraction and treatment system was down just prior to the sampling event in 2021; however, it is unlikely to have caused the increase due to low groundwater velocities in the B-Zone (i.e. insufficient time for groundwater to move to these wells).

In 2022, the sum of total organic SSI concentrations in B-Zone monitoring wells was 2,223 µg/L. There was a 19 percent decrease of organic SSI concentrations in the B-Zone when compared to historic concentrations, as shown in Table 3.3. It should be noted that the calculation of percentage change in concentration across the B-Zone wells does not include the total organic SSI concentrations from OW408B, since the concentrations in this well have varied by three orders of magnitude over the evaluation period. Since startup of the extraction system, the B-Zone total organic SSI concentration has fluctuated from 481 µg/L (1998) to 18,859 µg/L (2014). Continued sampling in 2023 will aid in the identification of any trends and in monitoring concentrations.

The total organic SSI concentrations in the B-Zone extraction wells fluctuated in 2022 when compared to the concentrations observed in previous events (Table 3.4). In 2022, the sum of organic SSI concentrations in the B-Zone extraction wells was 12 percent lower than the historic concentration, as shown in Table 3.4. The total organic SSI concentration detected in the 2022 event was 88,000 µg/L. Since startup of the extraction system, the B-Zone total organic SSI concentration in the extraction wells has fluctuated from 41,000 µg/L (2001) to 274,000 (2007). The 2022 B-Zone extraction wells total organic SSI concentration is within the above range.

Overall

As shown in Table 3.3, the overall reduction in total organic SSI concentrations in the monitoring wells of all three bedrock zones based on the 2022 data was 88 percent (not including wells OW408B, OW408D, and EMP wells as explained above). This reduction meets the natural attenuation requirement of the Site's Part 373 Permit, effective September 29, 2008 (C.3.(a)(iv) of Module II), which specified an overall reduction of 50 percent and 75 percent by 2009 and 2014, respectively and the current Part 373 Permit, effective September 15, 2022 (B.3.c.i ('a') of Module II), which specified to maintain total organic concentrations below a 75 precent and a continued reduction over time.

3.5.2 Chemical Loading to the Treatment System

The chemical loading to the treatment system was calculated for the 2022 annual chemical monitoring event using the bedrock extraction well chemical data and average pumping rates for 2022 (Table 3.5). The average daily chemical loading to the treatment system from the D-, C-, and B-Zones was 11.5 pounds per day, 0.8 pounds per day, and 3.3 pounds per day, respectively.

The total average daily rate of removal of organic SSIs by the extraction well system during 2022 was 15.6 pounds per day.

The cumulative removal of chemicals from the groundwater in each zone in the bedrock is presented in Table 3.6. Approximately 5,687 pounds (2.8 tons) of organic SSIs were removed from the bedrock groundwater in 2022. In total, approximately 279,000 pounds (139 tons) of organic SSIs have been removed from the bedrock groundwater since start-up of the system in 1996.

3.5.3 Chemical Loading to the Falls Street Tunnel

The RCRA/Part 373 Permit that became effective September 29, 2008, required OxyChem to estimate the chemical loading to the FST resulting from chemicals that have migrated from the Plant in the D-Zone groundwater. The evaluation was to be performed on an annual basis. The FST was an unlined storm sewer that runs beneath Royal Avenue. The FST was installed in the D-Zone bedrock and is located approximately 1,900 ft north of the Plant. The FST acted as a regional groundwater sink that captured D-Zone groundwater. As discussed in Section 3.4.2, the FST was closed on April 30, 2012. As a result of closure, chemicals that have migrated from the Plant in the D-Zone groundwater can no longer infiltrate into the FST. Therefore, there is no chemical loading to the FST. As such this requirement was not included in the RCRA/Part 373 Permit effective September 15, 2022 and will no longer be included in future annual reports.

4. Bedrock NAPL

4.1 Activities Performed

The NAPL monitoring and collection activities performed for the bedrock regime at the Plant in 2022 are summarized below:

- All wells within the Bedrock Monitoring Network were checked for NAPL presence on an annual basis. If NAPL was detected in an A-well, the corresponding B-well was also checked for NAPL.
- NAPL was monitored and collected on an annual basis from wells OW402A, OW413A, OW417A, and OW401B.
- NAPL was monitored and collected on a quarterly basis from S-Area Landfill monitoring wells that exhibit N-Area NAPL: OW229, OW243, OW618, OW619, OW620, OW621, OW634, OW638, OW635, and OW643.

4.2 NAPL Monitoring and Collection Results

Quarterly NAPL monitoring and collection from the S-Area bedrock wells (OW229, OW243, OW618, OW619, OW620, OW621, OW634, OW638, OW635, and OW643) that exhibit N-Area NAPL was performed quarterly in 2022. A total of 14.4 gallons of NAPL was recovered from four of the ten S-Area bedrock wells in the N-Area (Table 4.1). Unrecoverable amounts were identified in wells OW619, OW620, OW634, and OW635. The locations of these wells are shown on Figure 4.1.

Annual NAPL monitoring and collection from OW402A, OW401B, OW413A, and OW417A was performed in the third quarter of 2022. NAPL was recovered from OW402A and OW413A. NAPL was detected in, but was not recoverable from OW417A, and OW401B. A total of 7.25 gallons of NAPL was recovered from OW402A. A summary of the Bedrock NAPL monitoring and collection is presented in Table 4.1.

The annual monitoring well inspection was carried out from October 17 to December 7, 2022. NAPL was not detected at any of the monitoring wells included in the program, except in wells that are currently monitored for NAPL under the NAPL monitoring and collection program (i.e., OW413A, OW402A, OW401B, and OW417A) as well as OW417D. The amount of NAPL in OW417D was not recoverable.

The cumulative removal of NAPL from the bedrock is presented in Table 3.6. Approximately 14 gallons (151 pounds) of NAPL were collected from the bedrock in 2022. Approximately 76,870 pounds (38 tons) of organic chemicals have been removed from the bedrock in the form of NAPL since 1991 when NAPL collection commenced.

5. Overburden Groundwater

5.1 Perimeter Areas

5.1.1 Operation Summary

In general, the overburden remedial systems operated consistently during 2022. For Flow Zone 1, the operational efficiency (percentage of time operating) for the year was approximately 87.2 percent for both WW1 and WW2. Downtime for greater than 72 hours consecutively and/or greater than 120 hours in a month occurred in all quarters as indicated in Section 3.1.

Minor downtime was due to various treatment system issues described in Section 3.1.

The Flow Zone 3 remedial system was consistently operational in 2022 except for minor downtime due to various treatment system issues as described in Section 3.1.

5.1.2 Performance Monitoring

Performance monitoring of the overburden groundwater remedial systems includes flow, hydraulic, and chemical monitoring. The following sections describe the performance monitoring that has been performed as part of the overburden groundwater remedial systems.

5.1.2.1 Flow Monitoring

The average monthly flow rates in 2022 for WW1 and WW2 are presented in Table 5.1. The average monthly flow rate from WW1 while the system was operating ranged between 17 gpm (January) and 52 gpm (April, May, August, and November). The average monthly flow rate from WW2 ranged between 0.3 gpm (April) and 4 gpm (June). Low flow from WW2 is common during dry periods. The 2022 annual average flow rates from WW1 and WW2 were 40.9 gpm and 1.1 gpm, respectively.

The average monthly flow rates for WWB, MH159L, and MH301 are presented in Table 5.1. The average monthly flow rate from WWB while the system was operating ranged between 3.2 gpm (July) and 11.9 gpm (February). The average monthly flow rate from MH159L while the system was operating ranged between 0.9 gpm (January) and 3.9 gpm (August). The average monthly flow rate from MH301 while the system was operating ranged between 2.2 gpm (December) and 14.2 gpm (February). The 2022 annual average flow rates from WWB, MH159L, and MH301 were 6.4 gpm, 2.9 gpm, and 4.8 gpm, respectively.

5.1.3 Hydraulic Monitoring

Hydraulic monitoring for Flow Zone 1 and Flow Zone 3 is performed once per quarter based on the requirements of the RCRA/Part 373 permit. In addition, hydraulic monitoring of select perimeter wells is performed on an annual basis. The locations of the monitoring points are shown on Figure 5.1. The hydraulic monitoring data collected from these wells in 2022 were presented in the quarterly reports.

5.1.3.1 Hydraulic Data Evaluation

5.1.3.1.1 Flow Zone 1

Figure 5.3 presents the groundwater contours from December 7, 2022. These contours result from pumping from the Flow Zone 1 system. In 2022, a drawdown across the western portion of Flow Zone 1 was achieved (CMH2 to WW2), as well as the eastern portion (WW1 to MH-F) when the system was operating effectively. In recent years, a drawdown along the eastern portion of Flow Zone 1 was not achieved, despite apparent high flowrates at WW-1. A system assessment report (Flow Zone 1 Remedial System Assessment) was submitted to NYSDEC on December 14, 2022 in accordance with the RCRA/Part 373 Permit effective September 15, 2022. Recommendations as specified in the report will be implemented in 2023.

5.1.3.1.2 Flow Zone 3

Figure 5.4 presents the groundwater contours resulting from pumping the EBDTS in Flow Zone 3. Groundwater elevations on Figure 5.4 were measured on December 7, 2022. The groundwater contours and elevations shown indicate the presence of a hydraulic barrier along Flow Zone 3 when the system was operating. Pumping the EBDTS resulted in a drawdown of approximately 2 to 11 ft in the immediate vicinity of the EBDTS in 2022.

5.1.3.1.3 Other Areas

Annual hydraulic monitoring for the overburden groundwater remedial system was performed on September 9, 2022. The locations of the annual groundwater monitoring wells are shown on Figure 5.1. The groundwater elevations are presented in Table 5.3.

The purpose of collecting groundwater elevation data from the annual groundwater monitoring wells is to show that groundwater flow patterns in these areas have not significantly changed over time. The groundwater elevations in these wells measured on September 9, 2022, were compared to the most recent historic comprehensive set of groundwater elevations measured in June 1992 and those measured in 2000 through 2022. As shown in Table 5.3, the current groundwater elevations, although somewhat variable, have not changed significantly since 1992.

As indicated by the comparison of groundwater elevations in Table 5.3, the groundwater elevations do not vary significantly from year to year. This was further demonstrated by Site-wide groundwater contours presented on Figure 5.5 in the 2017 Annual Report which were consistent with historic groundwater contours. Therefore, conditions have not changed over time. The comparison of water levels in Table 5.3 remains sufficient to evaluate any changes to conditions should they occur over time.

5.1.4 Chemical Monitoring

Chemical monitoring of the overburden groundwater was performed between July 18 and July 19, 2022. The chemical monitoring was conducted using the protocols presented in the PMP. The locations of the monitored wells are shown on Figure 5.2.

Samples collected from the wells were analyzed for the parameters listed in Table 5.2 using the protocols presented in the PMP. The analytical results, including data validation, were presented in the Appendix of the second quarterly report.

5.1.4.1 Chemical Data Evaluation

The total organic SSI concentrations observed in the overburden monitoring wells during the 2022 annual chemical monitoring event were compared to the most recent historic SSI concentrations (SDCP or OSI) and the previous annual events (see Table 5.4). The organic SSI parameters consist of the organic parameters listed in Table 5.2.

5.1.4.2 Flow Zone 1

The total organic SSI concentrations in the Flow Zone 1 monitoring wells ranged from 977 μg/L (OW270) to 89,843 μg/L (OW567) for the 2022 annual chemical monitoring event. Comparison of individual wells in Table 5.4 shows that the total organic SSI concentrations in Flow Zone 1 included in the 2022 annual chemical monitoring event have fluctuated compared to previous events. However, the concentrations for these wells are still below the historic concentrations for each respective well (for those with historic data available).

The total organic SSI concentration in well OW300 had been increasing from 5,204 μg/L in 2009 to 21,132 μg/L in 2011. The concentration increased again in 2012, detected at 25,345 μg/L. As a result of the increase and a request from NYSDEC in a letter dated May 24, 2012, an additional investigation was conducted regarding operation of the Flow Zone 1 remedial system to determine the cause of the increasing concentrations. The results of the investigation were presented in the June 13, 2012 letter to the NYSDEC. As stated in the letter, it is believed that the increasing concentrations observed in OW300 were likely the result of the obstruction found in a 30-ft section of the system between W1 and CMH1 due to precipitate accumulating over time. This obstruction was removed on May 25, 2012 and subsequent hydraulic monitoring showed that drawdown consistent with that observed historically was achieved and the water level in the Flow Zone 1 remained below the water level in surrounding monitoring wells. The total organic SSI concentration in well OW300 has varied between 7,791 μg/L (2021) and 19,938 μg/L (2016) from 2013 to 2022, with a concentration of 9,041 μg/L in 2022 (well below the concentration in 2012). The increase in total organic SSI concentration from 2014 to 2016 is likely the result of the limited pumping of WW1 in the fourth quarter of 2014 and through 2015.

The total organic SSI concentration in well OW314 historically through 2002 ranged between 24,000 and 50,000 μg/L. The concentration then decreased to a low of 632 μg/L in 2007 then increased and fluctuated between 10,204 μg/L and 37,478 μg/L (2009 to 2020). In 2021, the total organic SSI concentration increased to 78,622 μg/L. In 2022, the concentration decreased to 23,511 μg/L, back to within the 2009 to 2020 range. The reason for the increase and fluctuations over time is not known. This will be further evaluated in accordance with the recommendations of the Flow Zone 1 Remedial System Assessment report.

It was expected that the total SSI concentration at OW300 would decrease in 2016; however, WW1 was not operational from April 12 to May 17, 2016 due to a forcemain leak in the utility chamber and high spring water levels that prevented immediate repair. The annual sample from OW300 was obtained on May 12, 2016. Given the limited time WW1 was fully operational before the sample was collected (January 25 to April 12, 2016), a decreasing concentration was not expected to be observed. The total SSI concentration in well OW300 has continued to decrease since 2016 with concentrations of 12,480 μg/L in 2019 to 9,041 in 2022. Although the 2022 concentration is higher than that detected in 2021 (7,791 μg/L), it is consistent with the 2020 concentration (9,370 μg/L). Concentrations of total organic SSI at OW300 and other monitoring wells in Flow Zone 1 will continue to be monitored in 2023.

5.1.4.3 Flow Zone 3

The total organic SSI concentration in the Flow Zone 3 wells ranged from non-detect (OW553 and OW556) to 953 μg/L (OW554) for the 2022 annual chemical monitoring event. These results are consistent with the results from previous monitoring events (although fluctuations occur) and lower than historic concentrations (1,500 to 2,000 μg/L).

5.1.4.4 Other Areas

The total organic SSI concentrations ranged from not detected (OW573R), to 547 μg/L (OW304) for the 2022 annual chemical monitoring event. The concentrations in these wells in 2022 are consistent with those in 2021, except in OW304, where the total SSI concentrations increased from 108 μg/L to 547 μg/L. However, this is still a decrease since 2020 in which the total SSI concentration was 1,220 μg/L. Table 5.4 shows that the total organic SSI concentrations in all wells except OW304 remained very low (1 μg/L or lower). The total organic SSI concentration in OW304 is much lower than its historic concentration of 12,000 μg/L.

Per the Site's Part 373 Permit effective September 29, 2008, a reduction from historic total organic SSI concentrations in in these areas is required to show a 50 percent decrease by 2009 and a 75 percent decrease by 2014. Per the current Part 373 Permit, effective September 15, a reduction from historic total organic SSI concentrations in these areas is to be maintained and show a continued reduction over time. In 2022, the total organic SSI concentrations in these areas was 556 μg/L, which is a 99 percent decrease from the historic concentrations of 17,144 μg/L. The reduction requirements of the permit are being met.

5.1.4.5 Chemical Loading

The average daily chemical loading from the Flow Zone 1, Flow Zone 3, and Abandoned Outfall 005 remedial systems was calculated using the applicable chemical data and average pumping rates for 2022 (Table 5.5). A summary of the average daily chemical loading from the overburden groundwater is presented below.

Wet Well	Organic SSI Loading (lbs /day) – 2022
WW1	5.7
WW2	0.076
WWB	0.10
MH159L	0.0047
MH301	0.203
Total	**6.1**

The average total amount of organic SSI chemicals that were removed from the overburden groundwater during 2022 was approximately 6.1 pounds per day.

The cumulative removal of chemicals from the overburden groundwater is presented in Table 3.6. Approximately 2,214 pounds (1.1 tons) of organic SSIs were removed from the overburden groundwater in 2022. In total, approximately 114,865 pounds (57 tons) of organic SSIs have been removed from the overburden groundwater since start-up of the EBDTS in 1983 (WWB), the Stage 4 system (WW1 and WW2) in 1998, the abandoned Outfall 005 system (MH159L) in 2002, and the abandoned D-Area sanitary sewer system (MH301) in 2003.

5.2 Interior Areas

5.2.1 Groundwater Infiltration to Sanitary Sewer System

The collection of groundwater via sanitary sewers is an integral part of the remedial program to address overburden groundwater in the interior areas of the Plant. As described above in Section 5.1.3.1.3, the collected groundwater is discharged to and treated at the NFWB WWTP under permit. The permit with the NFWB was renewed in October 2020. The renewed permit is effective for 5 years. The permit specifies that the City agrees to accept groundwater infiltration and remedial groundwater from the Corrective Action Program.

Monitoring of the sanitary sewer discharge from the Plant is conducted pursuant to the permit with the City of Niagara Falls. A summary of the monitoring results for 2022 is presented in Table 5.6. The sanitary sewer discharge was within the permit limits throughout 2022.

5.2.2 Groundwater Infiltration to Outfall Sewer System

Monitoring of the outfall sewer discharge from the Plant, including groundwater infiltration, is conducted pursuant to the SPDES permit. The SPDES Permit has effective date of January 1, 2016 and expires on December 31, 2020. However, this permit remains in effect in accordance with the State Administrative Procedures Act as indicated in an August 14, 2020 letter from NYSDEC. A summary of the monitoring results for 2022 is presented in Table 5.7. The outfall sewer discharge was within the SPDES Permit limits throughout 2022. It should be noted that discharge to Outfalls 004 and 005 ceased in November 2022 as part of ongoing Plant decommissioning activities.

6. Overburden NAPL

6.1 Activities Performed

The NAPL monitoring and collection activities performed for the overburden regime at the Plant in 2022 are summarized below:

- The two sumps at the north and south ends of the 003 NAPL Collection Trench were monitored for the presence of NAPL on a quarterly basis. NAPL collection occurred from the sumps if the depth of NAPL in any one sump was equal to or greater than 9 inches (approximately 10 gallons).
- The depth of NAPL in the EBDTS Wet Well was monitored on a quarterly basis. NAPL removal from the Wet Well occurred if the depth of NAPL was equal to or greater than 30 inches.
- Monitoring wells OW313 and OW572 were checked for NAPL presence on a semiannual basis. NAPL collection from these wells occurred when the depth of NAPL was greater than 8 inches (approximately 0.25 gallons).
- Monitoring wells OW317, OW320, OW358, OW523, OW562, OW563, TW-7, OW306, OW537, and OW577 were checked for NAPL presence on an annual basis. NAPL collection from these wells occurred when the depth of NAPL was greater than 8 inches (approximately 0.25 gallons).
- All wells within the Overburden Monitoring Network were checked for NAPL presence on an annual basis.
- Overburden NAPL manholes and sumps were checked for NAPL on an annual basis.

The overburden NAPL monitoring and collection locations discussed above are shown on Figure 6.1. The volumes of NAPL collected at each overburden location are presented in Table 6.1.

6.2 NAPL Monitoring and Collection Results

The amount of NAPL collected from the overburden collection trenches and monitoring wells is presented in Table 6.1. A total of 1.85 gallons (19 pounds) of NAPL was collected from the overburden in 2022. NAPL was collected from the 003 NAPL Collection Trench (0.25 gallons), EBDTS (0.75 gallons), OW313 (0.35 gallons), and OW572 (0.5 gallons). NAPL was either not detected or was present at an insufficient volume to allow recovery at the remaining trenches and monitoring wells.

The annual monitoring well inspection was carried out from October 17 and December 7, 2022. NAPL was only observed in wells currently in the NAPL collection program.

The annual NAPL checks in the abandoned sewer manholes, sumps in the V-Area, and the former outfall 003 NAPL sump were performed on October 17 to December 7, 2022. NAPL was not present in any of the manholes or sumps during this event.

The cumulative removal of NAPL from the overburden is presented in Table 3.6. Approximately 74,213 pounds (37 tons) of organic chemicals have been removed from the overburden in the form of NAPL since NAPL was first removed from the EBDTS in 1984.

7. Overburden Soils

7.1 Maintenance of Cover Materials

Pursuant to the RCRA/Part 373 Permit, surface cover materials in various areas of the Plant are inspected on an annual basis to determine the condition of surface cover materials. The locations of these areas are presented on

Figure 7.1. The annual inspection of these areas was performed on May 3, 2022. No repairs were required and the surfaces were in good condition.

7.2 Mercury Cell Area

Monitoring well OW574 was installed in 1999 to provide a monitoring point of the former Mercury Cell Area. As requested by NYSDEC in their letter dated October 26, 2000, and pursuant to a subsequent conversation on October 30, 2000, existing monitoring wells OW304, OW305, and OW306 were added to the former Mercury Cell Area monitoring program. The locations of these wells are shown on Figure 5.2. The Mercury Cell Area monitoring program involves the collection of groundwater samples from the above wells and analysis for mercury on an annual basis. Based on discussions with NYSDEC, OW574 has been sampled semiannually for mercury since 2005.

Groundwater samples were collected from OW304, OW305, and OW306 on July 21, 2022 and from OW574 on July 20 and November 10, 2022.

The groundwater samples were collected and analyzed in accordance with the PMP.

A summary of the analytical results from the 2022 former Mercury Cell Area monitoring program is presented below.

Well	Unit	Result	Date Sampled
OW304	µg/L	0.11 J	July 21, 2022
OW305	µg/L	0.20 U/0.20 U	July 21, 2022
OW306	µg/L	0.38	July 21, 2022
OW574	µg/L	27	July 20, 2022
OW574	µg/L	36.1	November 10, 2022

These mercury concentrations are comparable to those detected in previous years. The minimum and maximum mercury concentrations detected in OW574 since sampling commenced in 1999 were 5.4 µg/L and 74.5 µg/L. The 2022 mercury concentrations detected in OW574 are within the above concentration ranges. The mercury concentration in shallow soil samples collected in the vicinity of OW574 during the Mercury Cell Area Solid Waste Management Unit sampling in 1990 ranged between 16 and 20 milligram per kilogram (mg/kg). The mercury detected in these wells is likely a result of residual mercury presence prior to remediation of Building U-75. Mercury was not detected in OW304, OW305, and OW306 during the SSI sampling conducted in 1989/1990. However, mercury was detected in monitoring wells OW318 (1.7 µg/L) and BH10-88 (1.1 µg/L) during the Round 2 SSI sampling in 1990. These wells are in the vicinity of OW304 and OW305. In 2022, mercury was either not detected or detected just above or just below the associated reporting limit in wells OW304, OW305, and OW306, consistent with past sampling results. Based on the above, further corrective action to address the Mercury Cell Area is not warranted at this time. The current monitoring program will track the mercury presence in the groundwater to determine if future corrective action is required.

8. Conclusions

Based on the monitoring data collected and the evaluations performed in 2022, the following conclusions have been made:

8.1 Bedrock Groundwater

1. The annual average treatment system operational efficiency was approximately 89.5 percent.

2. Hydraulic containment was maintained in the D-, C-, and B-Zones 2022 when the system was operating as indicated by the potentiometric contour maps and maintaining required pumping rates in the D-, C-, and B-Zones.
3. The total organic SSI concentrations in the bedrock groundwater have continued to fluctuate compared to the previous sampling events. The C- and D-Zones are showing a general decrease.
4. The total organic SSI concentrations in OW408D and OW409D decreased in 2016 due to the resumption of full D-Zone pumping in January 2016. The decreased concentrations have fluctuated since with a slight increase (OW408D) and slight decrease (OW409D) in 2022. The total organic SSI concentration in OW410D increased in 2016 (243 μg/L) as compared to 2015 (12 μg/L); however, the concentration dropped in 2017 (26 μg/L) and has since decreased to 2 μg/L in 2022. The increase in concentration in 2016 is likely the result of the limited operation of D-Zone extraction wells in 2015. OW410D is the farthest away from BEW706D (compared to OW408D and OW409D). As such, it took longer for the effect of limited operation of D-Zone extraction wells to be observed in this well. Likewise, it will take more time for concentrations to respond to the effect of full D-Zone pumping that resumed in January 2016.
5. Total organic SSI concentrations in off-Site bedrock monitoring wells have decreased by 88 percent when compared to historic concentrations. The D-Zone concentrations have decreased by 93 percent. The C-Zone concentrations have each decreased by 96 percent. The B-Zone concentrations have decreased by 19 percent.
6. The groundwater extraction system has been effective in removing chemicals present in the bedrock groundwater flow system. The chemical loading to the treatment system based on the 2022 chemical monitoring event was approximately 15.6 pounds per day.
7. Approximately 5,687 pounds (2.8 tons) of organic SSIs were removed from the bedrock groundwater in 2022. In total, approximately 278,000 pounds (139 tons) of organic SSIs have been removed from the bedrock groundwater since start-up of the system in 1996.

8.2 Bedrock NAPL

1. The bedrock NAPL monitoring and collection program has been successful in addressing NAPL presence in the bedrock as NAPL continued to be collected in 2022.
2. Approximately 14 gallons (151 pounds) of NAPL were collected from the bedrock in 2022. Approximately 76,870 pounds (38 tons) of organic chemicals have been removed from the bedrock in the form of NAPL since NAPL collection commenced in 1991.

8.3 Overburden Groundwater

1. The annual average operational efficiencies in the Flow Zone 1 remedial system for both Wet Well 1 and Wet Well 2 was 87 percent. The 2022 annual average flow rates from WW1 and WW2 were 40.9 gpm and 1.1 gpm, respectively.
2. The 2022 annual average flow rates from WWB, MH159L, and MH301 were 6.4 gpm, 2.9 gpm, and 4.8 gpm, respectively.
3. The Flow Zone 1 system between WW2 and CMH2 was maintained in a dewatered state to the extent possible when the system was operational.
4. A drawdown across the Flow Zone 1 system from WW1 to MHF and CMH1 to WW1 was achieved while the entire system was operational.
5. The EBDTS in Flow Zone 3 has created a hydraulic barrier along the north boundary of the Plant when it was operational, with a drawdown of approximately 2 to 11 ft.
6. Total organic SSI concentrations in the majority of the wells have continued to fluctuate compared to the previous sampling events.

7. Since 2012, the total organic SSI concentration in well OW300 has ranged between 7,791 µg/L (2021) and 19,938 µg/L (2016). In 2022, the total organic SSI concentration was 9,041 µg/L, well below the concentration in 2012. The increase in total organic SSI concentration from 2014 to 2016 is likely the result of the limited pumping of WW1 since the fourth quarter of 2014. It was expected that the total SSI concentration at OW300 would decrease in 2016; however, WW1 was not operational from April 12 to May 17, 2016 due to a forcemain leak in the utility chamber and high spring water levels which prevented immediate repair. The annual sample from OW300 was obtained on May 12, 2016. Given the limited time WW1 was fully operational before the sample was collected (January 25 to April 12, 2016), a decreasing concentration was not expected to be observed. The total SSI concentration in well OW300 has continued to decrease since 2016 from concentrations of 14,991 µg/L in 2018 and 12,480 µg/L in 2019 to 9,370 µg/L in 2020, 7,791 µg/L in 2021, and 9,041 µg/L in 2022.
8. The Flow Zone 1 and 3 collection systems have been effective in removing chemicals in the overburden groundwater flow system. The chemical loading from the collection systems based on the 2022 chemical monitoring data was approximately 6.1 pounds per day.
9. Approximately 2,214 pounds (1.1 tons) of organic SSIs were removed from the overburden groundwater in 2022. In total, approximately 114,865 pounds (57.4 tons) of organic SSIs have been removed from the overburden groundwater since start-up of the EBDTS in 1983 (WWB), the Stage 4 system (WW1 and WW2) in 1998, the abandoned Outfall 005 system (MH159L) in 2002, and the abandoned D-Area sanitary sewer system (MH301) in 2003.

8.4 Overburden NAPL

1. The overburden NAPL monitoring and collection program continued to address NAPL presence in the overburden.
2. Approximately 1.85 gallons (19 pounds) of NAPL was collected from the overburden in 2022. In total, approximately 74,213 pounds (37 tons) of organic chemicals have been removed from the overburden in the form of NAPL since 1980.

8.5 Overburden Soils

1. Surface cover materials in various areas of the Plant were inspected and found to be adequate for the intended purpose (prevent exposure to underlying soils).
2. In the former Mercury Cell Area, mercury was either not detected or detected just above or just below the associated reporting limit in wells OW304, OW305, and OW306, consistent with past sampling results. Mercury was detected at concentrations of 27 µg/L (July) and 36.1 µg/L (November) at well OW574. The current concentrations are consistent with pre-remedial conditions in these areas.

8.6 Chemical Mass Removal Summary

The Corrective Measures have been effective in removing chemicals and NAPL from the bedrock and overburden units with an average of 22.1 pounds per day recovered in 2022. The following table summarizes the estimated annual and cumulative removal of chemicals and NAPL since the beginning of the programs.

Unit	2022 (lbs.)	Cumulative Removal (lbs.)
Bedrock		
Groundwater	5,687	278,576
NAPL	151	76,870

Unit	2022 (lbs.)	Cumulative Removal (lbs.)
Overburden		
Groundwater	2,214	114,865
NAPL	19	74,213
Total	**8,069**	**544,524**

A graph showing the average daily removal rate and cumulative chemical mass removed per year is presented on Figure 8.1.

9. Recommendations

The following recommendations have been made for the next year of the Corrective Action Program.

9.1 Bedrock Groundwater

The bedrock groundwater remedial program should continue without modification.

9.2 Bedrock NAPL

The bedrock NAPL remedial program should continue without modification.

9.3 Overburden Groundwater

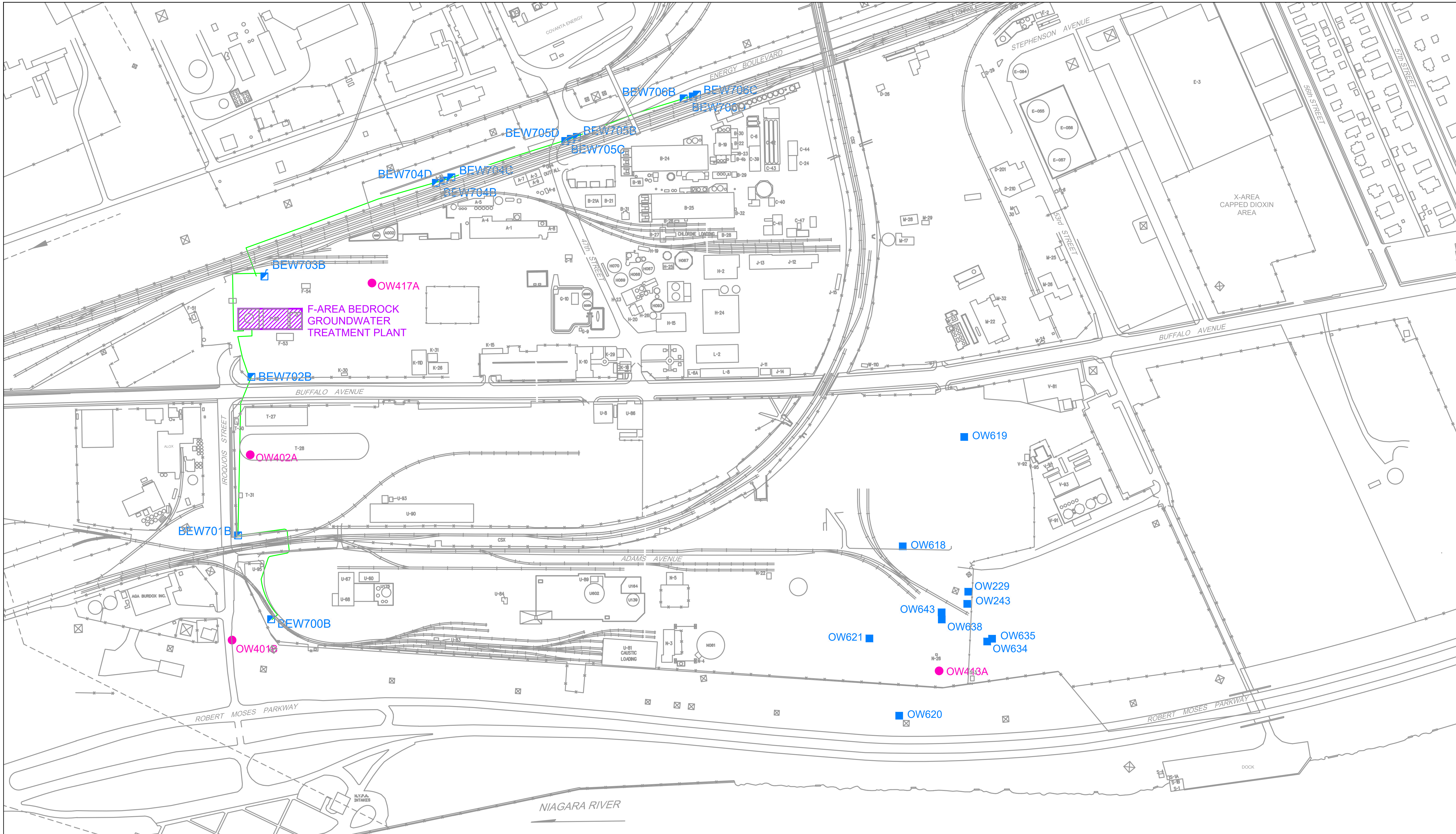
Recommendations as specified in the Flow Zone 1 Remedial System Assessment, dated December 14, 2022, will be implemented in 2023.

9.4 Overburden NAPL

The overburden NAPL remedial program should continue without modification.

9.5 Overburden Soils

1. Monitoring of surface cover materials should continue without modification.
2. The Mercury Cell Area Monitoring Program should continue without modification.



LEGEND

(green line)	BEDROCK GROUNDWATER FORCEMAIN
BEW700B	BEDROCK EXTRACTION WELL
OW401B	BEDROCK NAPL COLLECTION WELL
OW229	S-AREA NAPL COLLECTION WELL

0 150 300 ft
1" = 300 ft

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GLENN SPRINGS HOLDINGS, INC.
BUFFALO AVENUE PLANT
NIAGARA FALLS, NEW YORK

BEDROCK REMEDIAL SYSTEMS

Project No. 11225008
Date March 2023

FIGURE 2.1

Filename: \\ghdnet\ghd\CA\Waterloo\Projects\662\11225008\Digital_Design\ACAD\Figures\RPT004\11225008-GHD-00-00-RPT-EN-D101_WA-004.dwg
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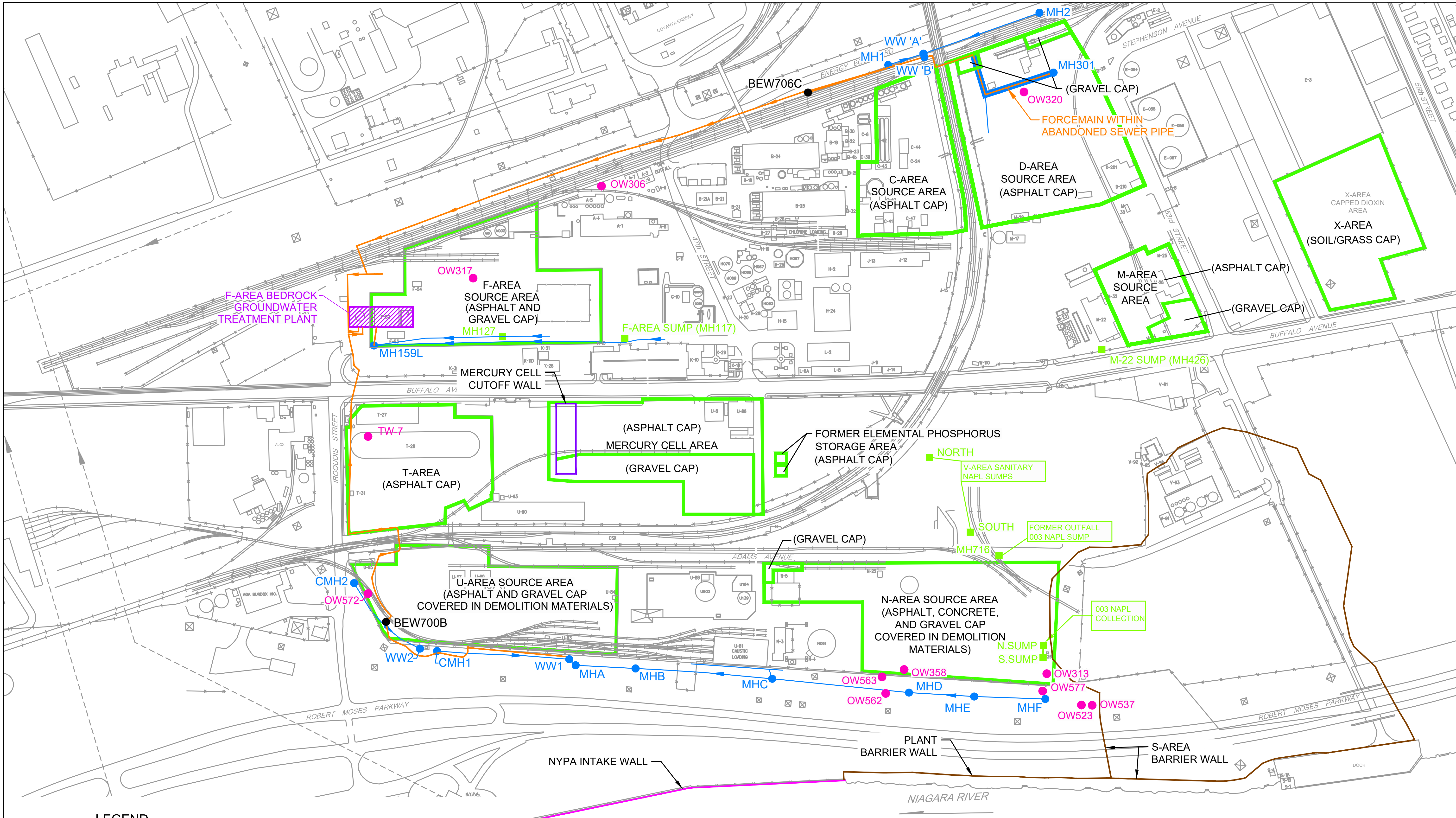

LEGEND

- OVERBURDEN GROUNDWATER COLLECTOR
- FORCEMAIN
- AREA TO BE INSPECTED UNDER PART 373 PERMIT
- MH1 — MANHOLE
- WW1 — WET WELL
- BEW706C — BEDROCK EXTRACTION WELL
- OW523 — NAPL COLLECTION WELL
- NORTH — NAPL COLLECTION/ MONITORING SUMP

0 150 300 ft
1" = 300 ft

GHD

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BUFFALO AVENUE PLANT
NIAGARA FALLS, NEW YORK

Project No. 11225008
Date March 2023

OVERBURDEN REMEDIAL SYSTEMS

FIGURE 2.2

Filename: \\ghdnet\ghd\CA\Waterloo\Projects\662\11225008\Digital_Design\ACAD\Figures\RPT004\11225008-GHD-00-00-RPT-EN-D102_WA-004.dwg
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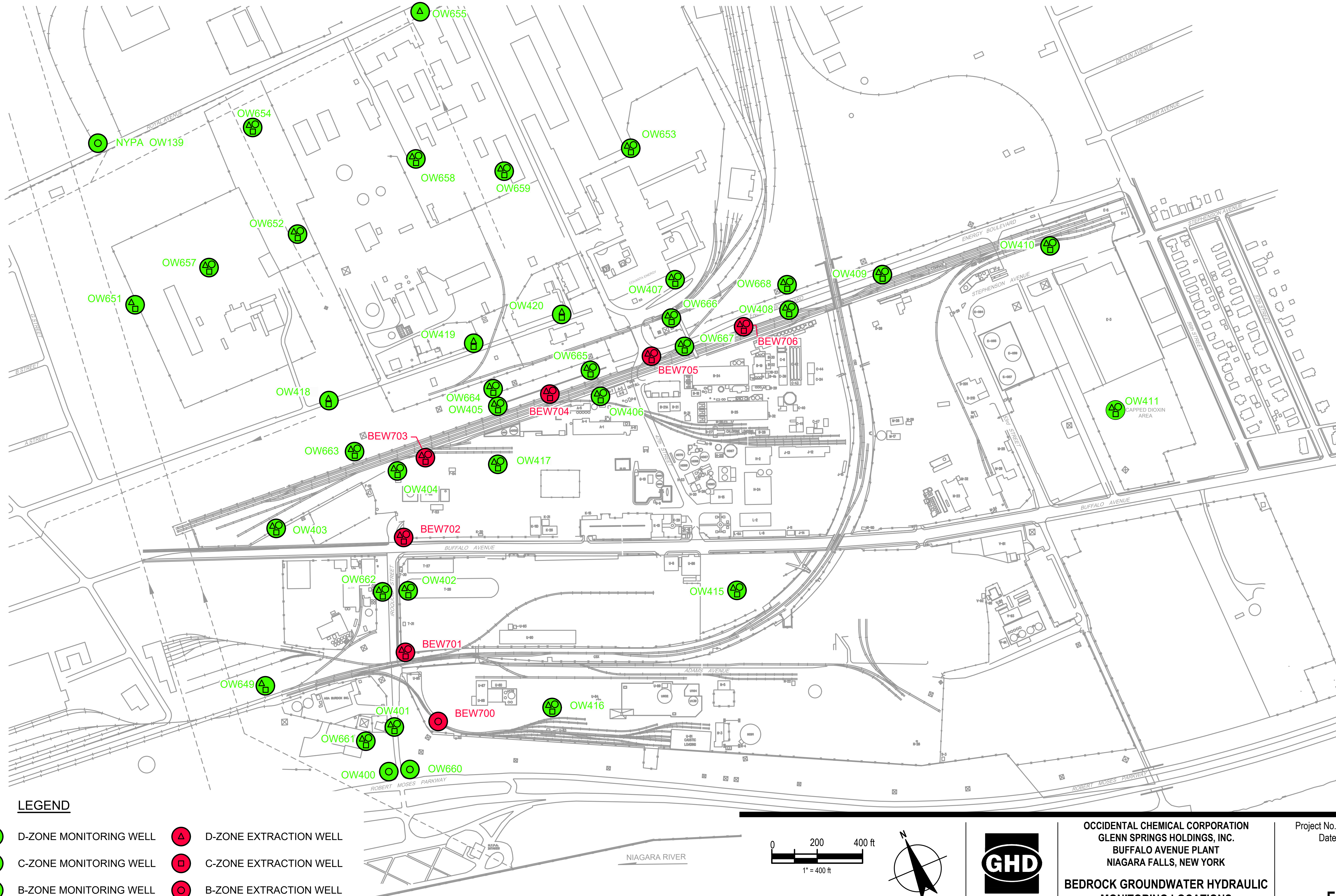

LEGEND

- D-ZONE MONITORING WELL
- C-ZONE MONITORING WELL
- B-ZONE MONITORING WELL
- D-ZONE EXTRACTION WELL
- C-ZONE EXTRACTION WELL
- B-ZONE EXTRACTION WELL

0 200 400 ft
1" = 400 ft

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BUFFALO AVENUE PLANT
NIAGARA FALLS, NEW YORK

Project No. 11225008
Date March 2023

BEDROCK GROUNDWATER HYDRAULIC MONITORING LOCATIONS

FIGURE 3.1

Filename: \\ghdnet\ghd\CA\Waterloo\Projects\662\11225008\Digital_Design\ACAD\Figures\RPT004\11225008-GHD-00-00-RPT-EN-D103_WA-004.dwg
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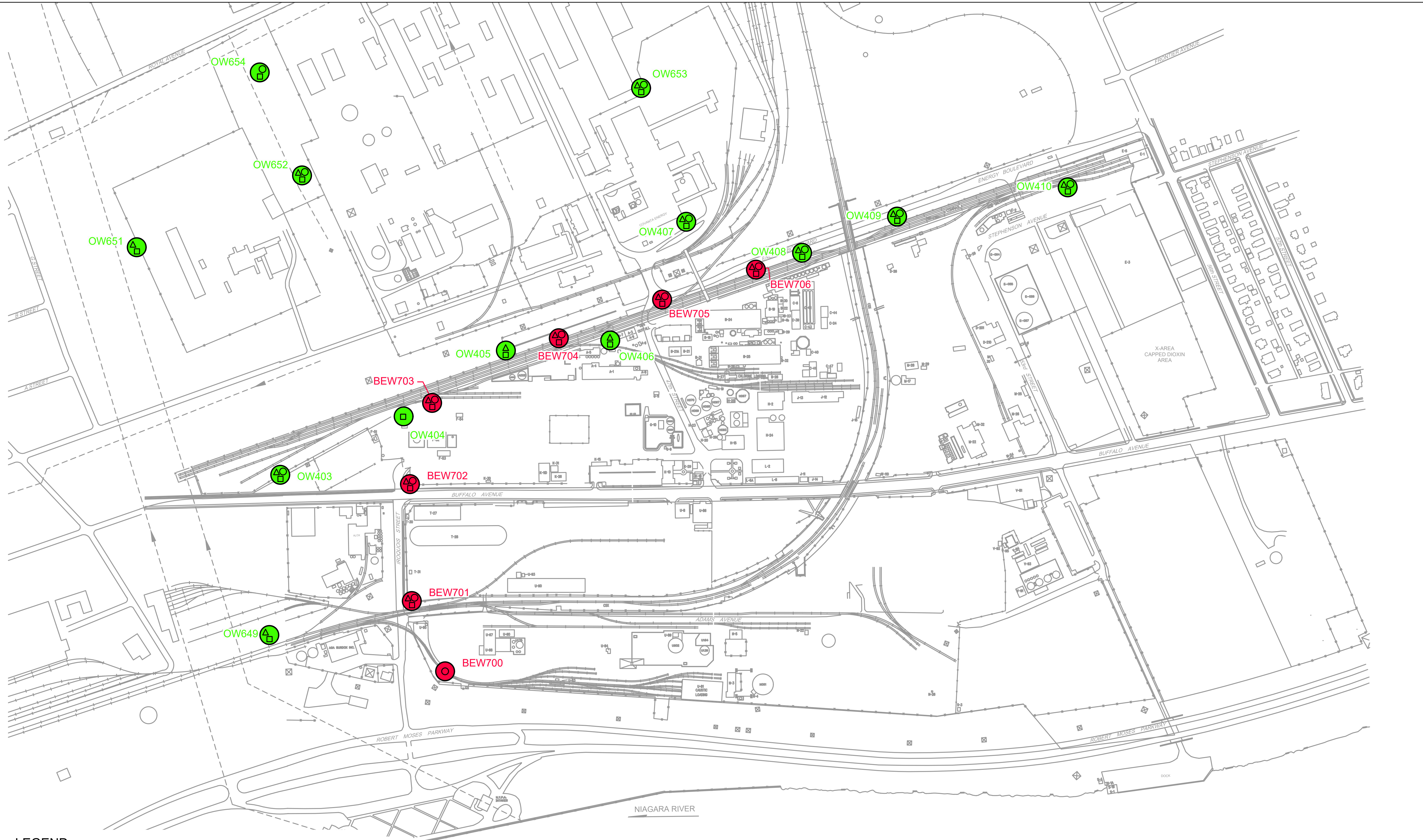

LEGEND

- D-ZONE MONITORING WELL
- C-ZONE MONITORING WELL
- B-ZONE MONITORING WELL
- D-ZONE EXTRACTION WELL
- C-ZONE EXTRACTION WELL
- B-ZONE EXTRACTION WELL

0 200 400 ft
1" = 400 ft

N

GHD

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BUFFALO AVENUE PLANT
NIAGARA FALLS, NEW YORK

BEDROCK GROUNDWATER CHEMICAL MONITORING LOCATIONS

Project No. 11225008
Date March 2023

FIGURE 3.2

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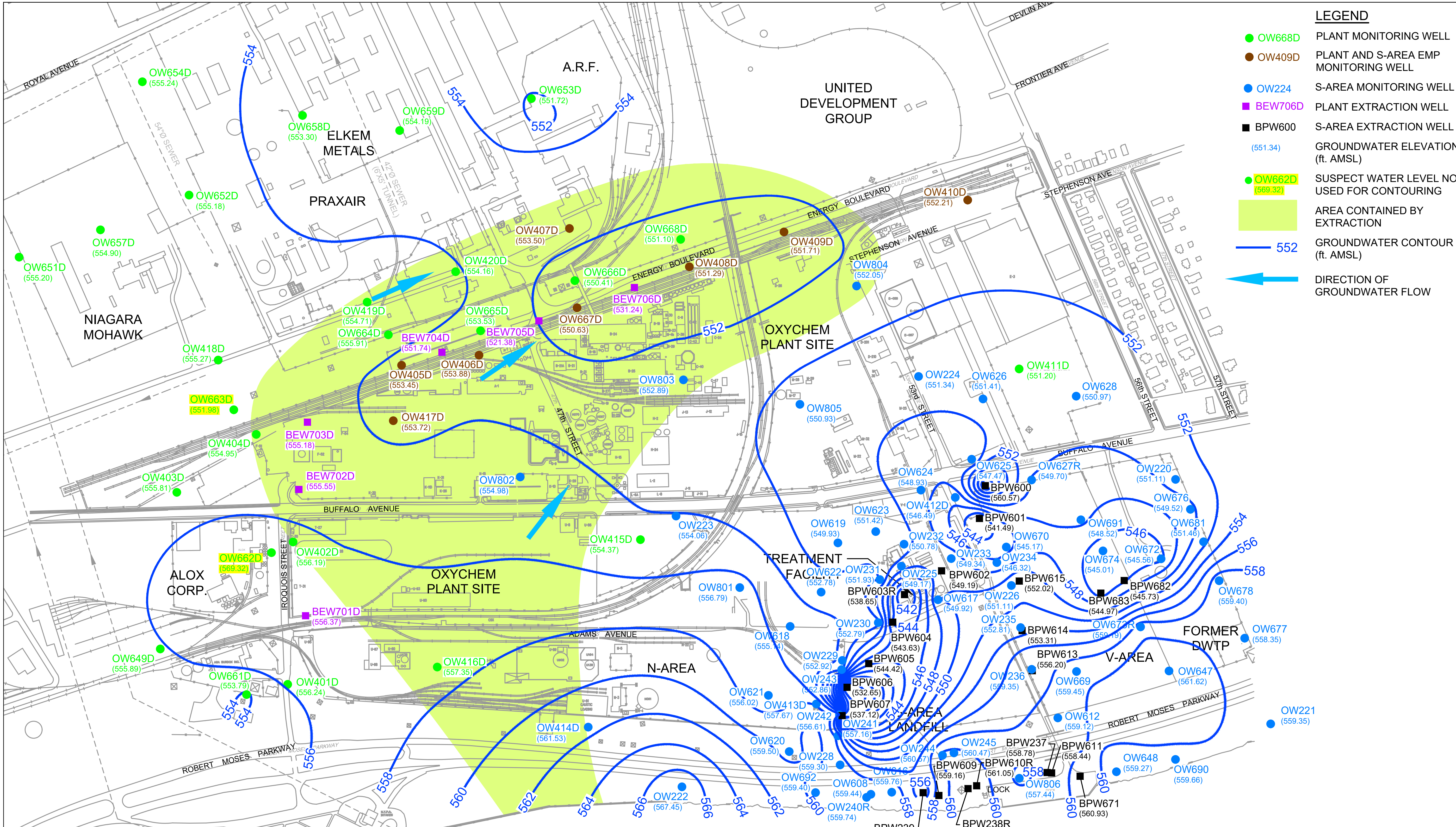

NOTES:

- CONTOURS REFLECT AN AVERAGE CONDITION OVER THE DATA COLLECTION PERIOD, APPROXIMATELY 4 HOURS. UNLESS OTHERWISE NOTED, CONTOURS RESPECT ALL WATER LEVEL MEASUREMENTS TO THE LEVEL OF UNCERTAINTY ASSOCIATED WITH COLLECTING LEVELS OVER A PERIOD OF SEVERAL HOURS. THAT UNCERTAINTY IS APPROXIMATELY +/-0.5 FEET FOR NYPA WINTER OPERATING CONDITIONS.
- MEASURED ELEVATIONS FOR PLANT EXTRACTION WELLS BEW701D-BEW706D WERE NOT USED FOR CONTOURING.

0 200 400 ft
1" = 400 ft

GHD

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D-ZONE BEDROCK GROUNDWATER CONTOURS - DECEMBER 6, 2022

Project No. 11225008
Date March 2023

FIGURE 3.3

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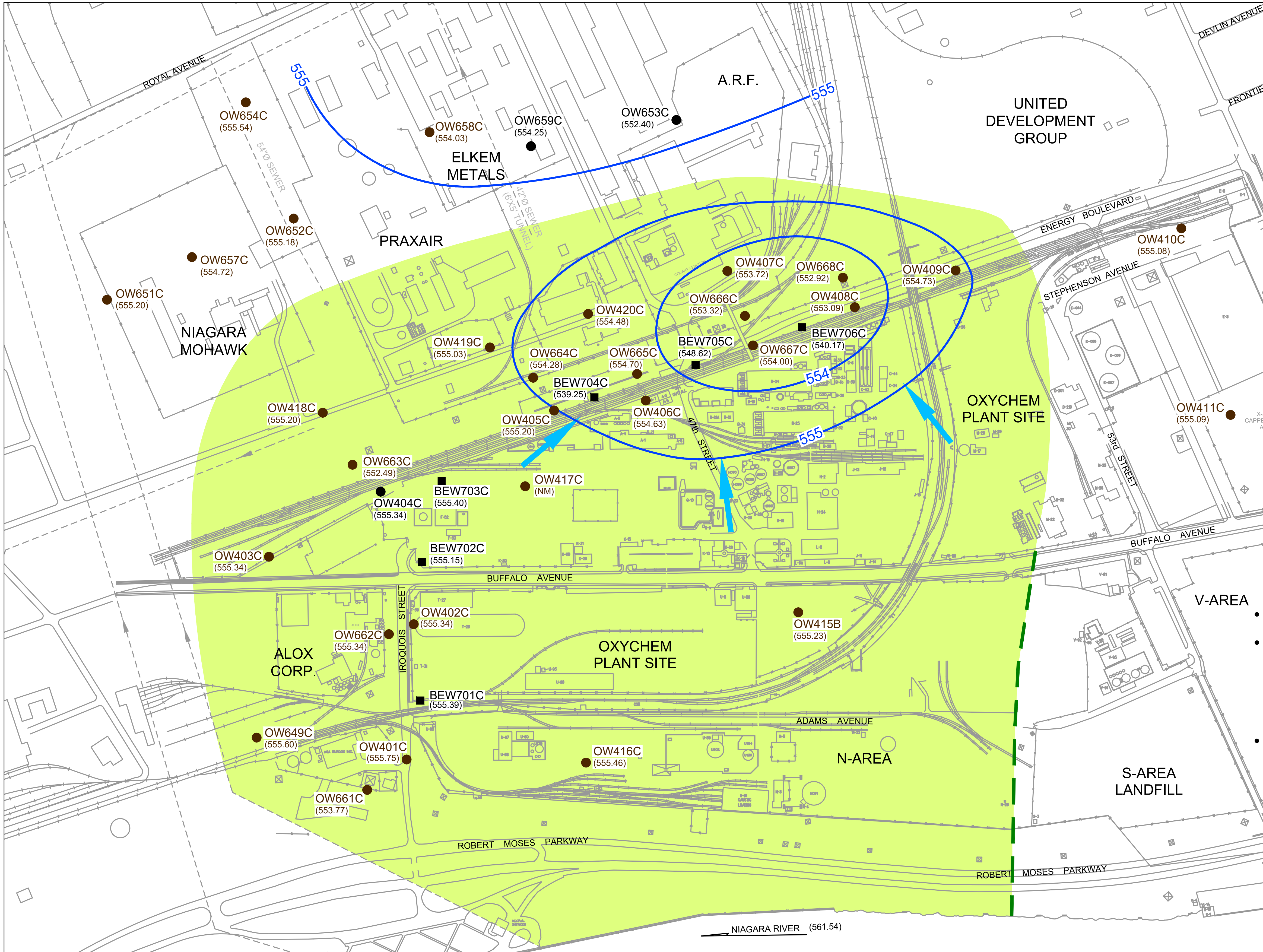

LEGEND

●OW410C	MONITORING WELL
■BEW706C	EXTRACTION WELL
(555.08)	GROUNDWATER ELEVATION (ft AMSL)
(NM)	NOT MEASURED
(green area)	AREA CONTAINED BY EXTRACTION
(dashed green line)	ESTIMATED BOUNDARY DUE TO S-AREA REMEDIAL PROGRAM
556	GROUNDWATER CONTOUR (ft AMSL)
(arrow)	DIRECTION OF GROUNDWATER FLOW

NOTES

- EXTRACTION WELLS BEW701C TO BEW706C ARE NOT USED FOR CONTOURING.
- CONTOURS REFLECT AN AVERAGE CONDITION OVER THE DATA COLLECTION PERIOD, APPROXIMATELY 4 HOURS. UNLESS OTHERWISE NOTED, CONTOURS RESPECT ALL WATER LEVEL MEASUREMENTS TO THE LEVEL OF UNCERTAINTY ASSOCIATED WITH COLLECTING LEVELS OVER A PERIOD OF SEVERAL HOURS. THAT UNCERTAINTY IS APPROXIMATELY +/-0.5 FEET FOR NYPA WINTER OPERATING CONDITIONS.
- OW415C IS NOT REPRESENTATIVE OF C-ZONE CONDITIONS; WHEREAS OW415B IS REPRESENTATIVE OF C-ZONE CONDITIONS AND IS THEREFORE USED FOR CONTOURING.

0 200 400 ft
1" = 400 ft

GHD

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C-ZONE BEDROCK GROUNDWATER CONTOURS - DECEMBER 6, 2022

Project No. 11225008
Date March 2023

FIGURE 3.4

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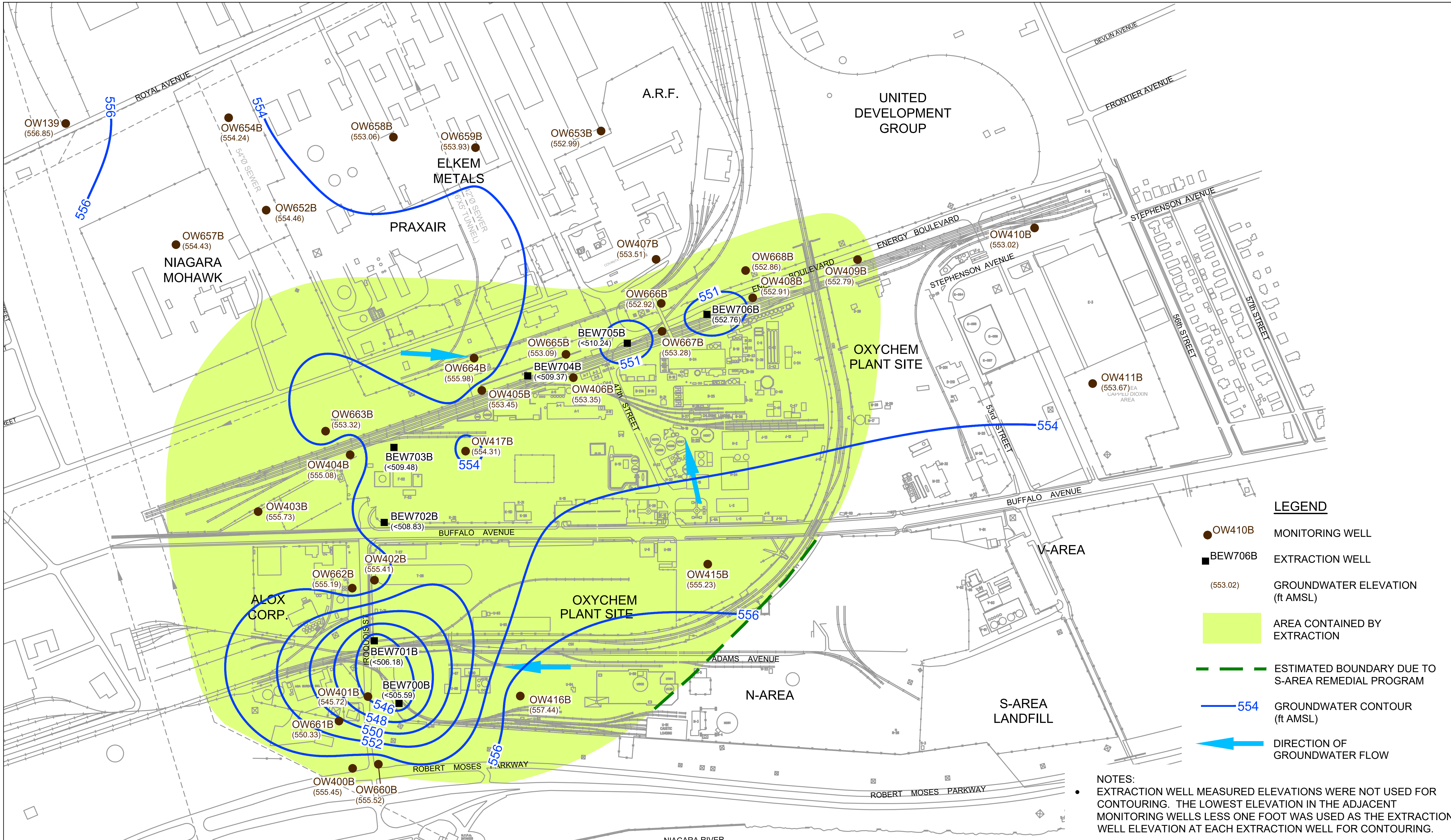

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BUFFALO AVENUE PLANT
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B-ZONE BEDROCK GROUNDWATER CONTOURS - DECEMBER 6, 2022

Project No. 11225008
Date March 2023

FIGURE 3.5

Filename: \\ghdnet\ghd\CA\Waterloo\Projects\662\11225008\Digital_Design\ACAD\Figures\RPT004\11225008-GHD-00-00-RPT-EN-D107_WA-004.dwg
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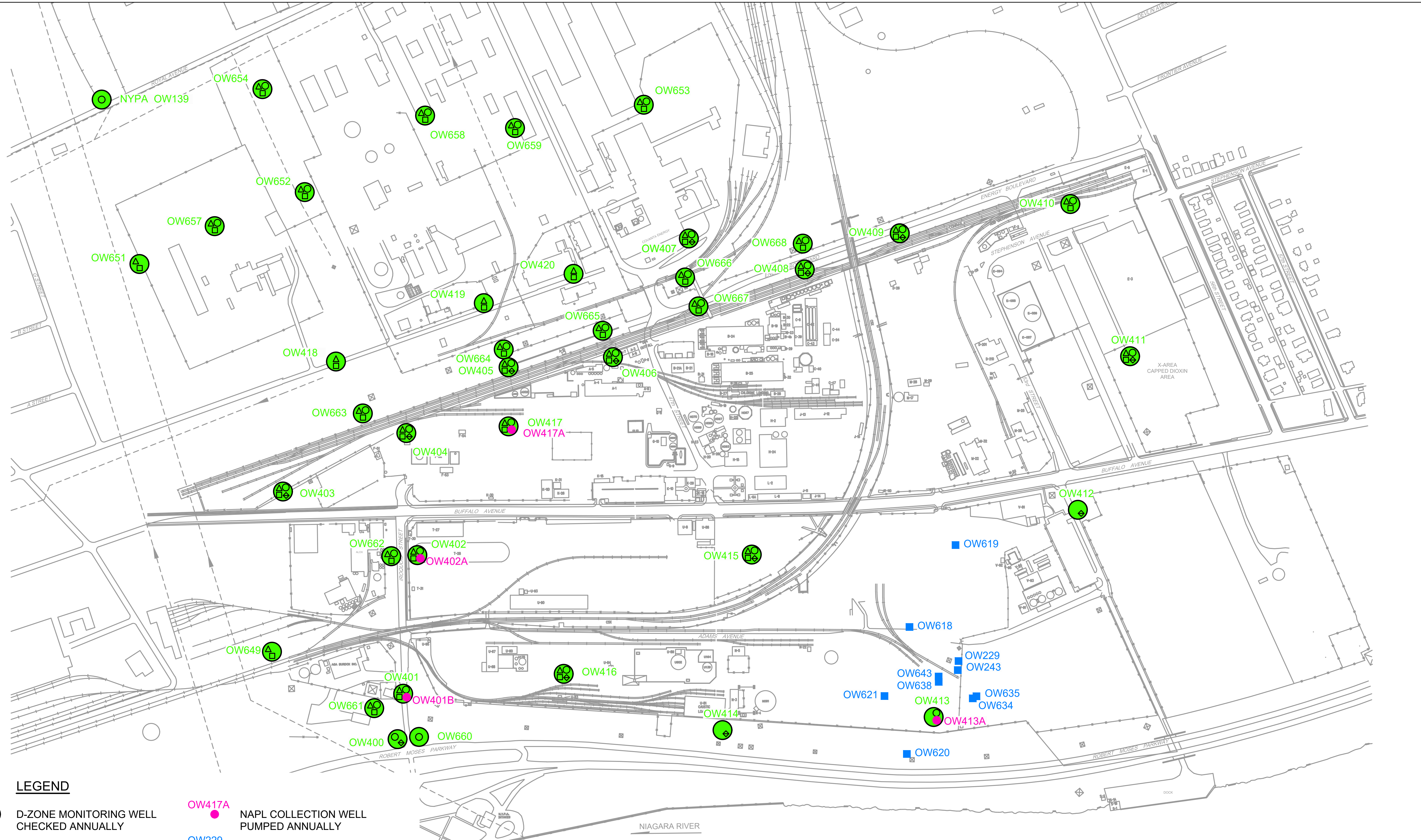

LEGEND

- D-ZONE MONITORING WELL CHECKED ANNUALLY
- C-ZONE MONITORING WELL CHECKED ANNUALLY
- B-ZONE MONITORING WELL CHECKED ANNUALLY
- A-ZONE MONITORING WELL CHECKED ANNUALLY
- OW417A — NAPL COLLECTION WELL PUMPED ANNUALLY
- OW229 — S-AREA NAPL COLLECTION WELL PUMPED QUARTERLY (MINIMUM)

0 200 400 ft
1" = 400 ft

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BEDROCK NAPL MONITORING AND COLLECTION LOCATIONS

Project No. 11225008
Date March 2023

FIGURE 4.1

Filename: \\ghdnet\ghd\CA\Waterloo\Projects\662\11225008\Digital_Design\ACAD\Figures\RPT004\11225008-GHD-00-00-RPT-EN-D108_WA-004.dwg
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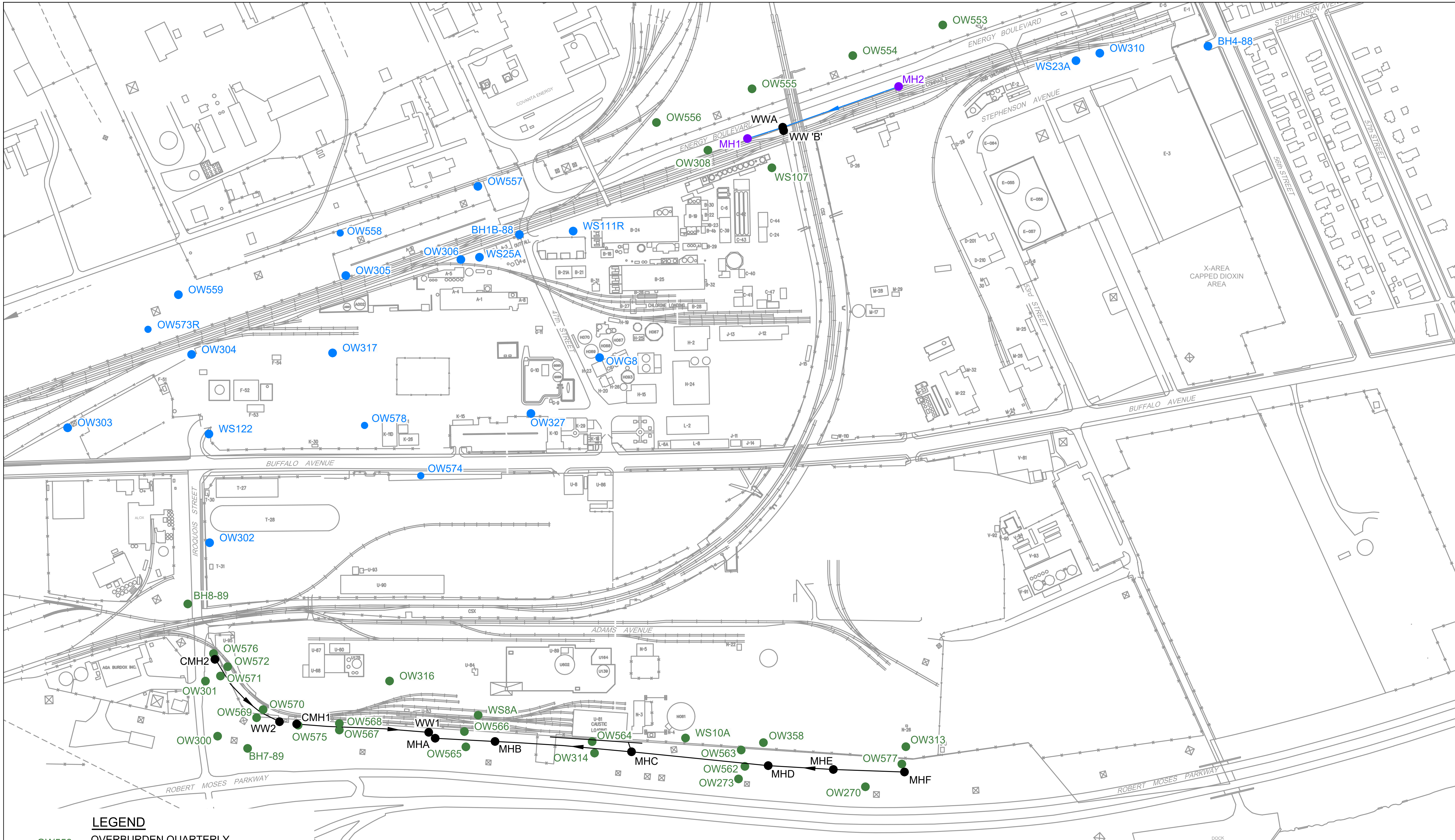

LEGEND

- OW553 — OVERBURDEN QUARTERLY GROUNDWATER MONITORING WELL
- OW559 — OVERBURDEN ANNUAL GROUNDWATER MONITORING WELL
- WW2 — WETWELL / MANHOLE QUARTERLY GROUNDWATER MONITORING LOCATION
- MH1 — FLOW ZONE 3 MANHOLE LOCATION

0 150 300 ft

1" = 300 ft

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BUFFALO AVENUE PLANT
NIAGARA FALLS, NEW YORK

OVERBURDEN GROUNDWATER HYDRAULIC MONITORING LOCATIONS

Project No. 11225008
Date March 2023

FIGURE 5.1

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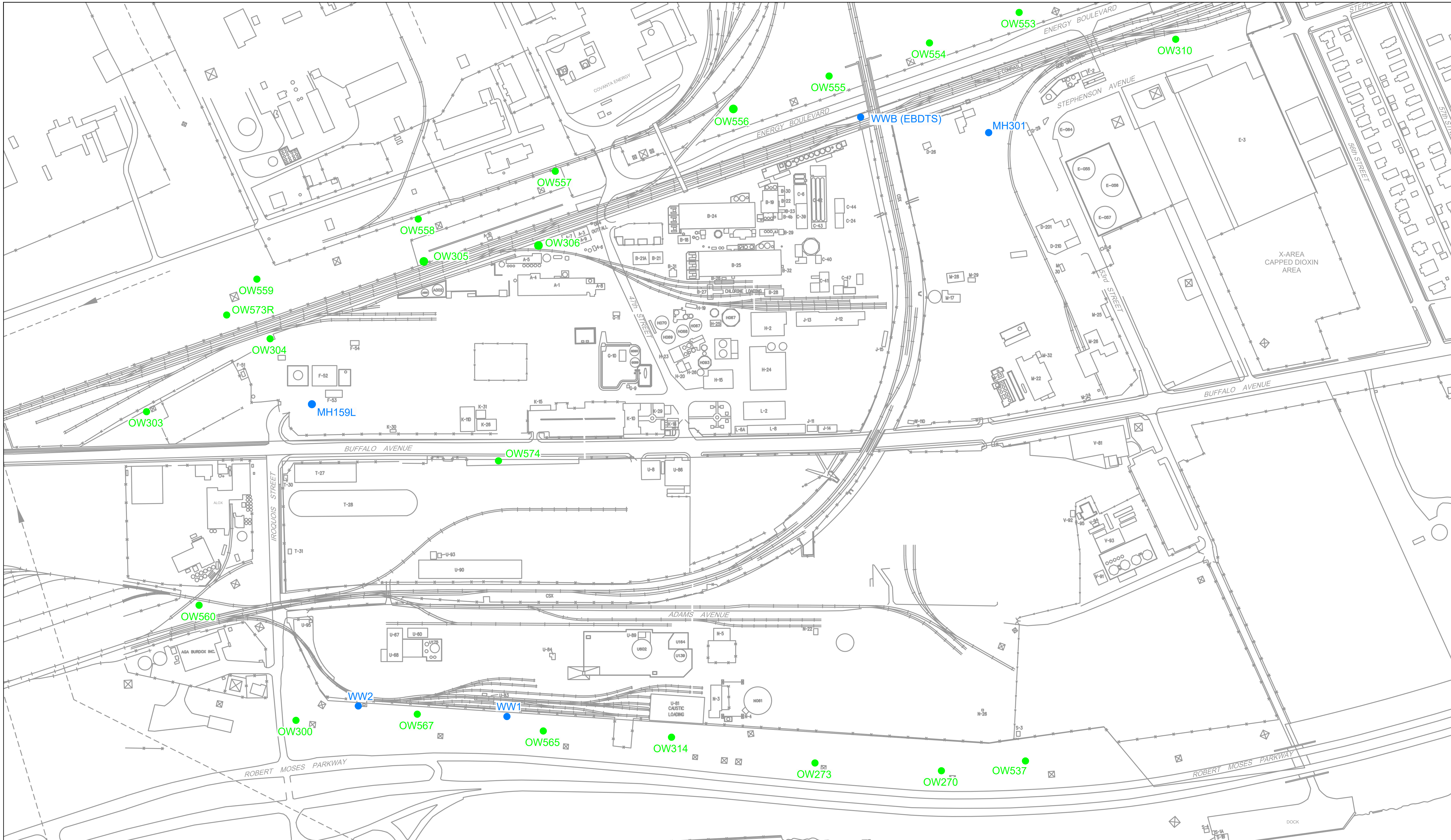

LEGEND

- OW553 — OVERBURDEN GROUNDWATER MONITORING WELL
- WW1 — WET WELL
- MH159L — MANHOLE

0 150 300 ft

1" = 300 ft

GHD

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BUFFALO AVENUE PLANT
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OVERBURDEN GROUNDWATER
CHEMICAL MONITORING LOCATIONS

Project No. 11225008
Date March 2023

FIGURE 5.2

Filename: \\ghdnet\ghd\CA\Waterloo\Projects\662\11225008\Digital_Design\ACAD\Figures\RPT004\11225008-GHD-00-00-RPT-EN-D110_WA-004.dwg
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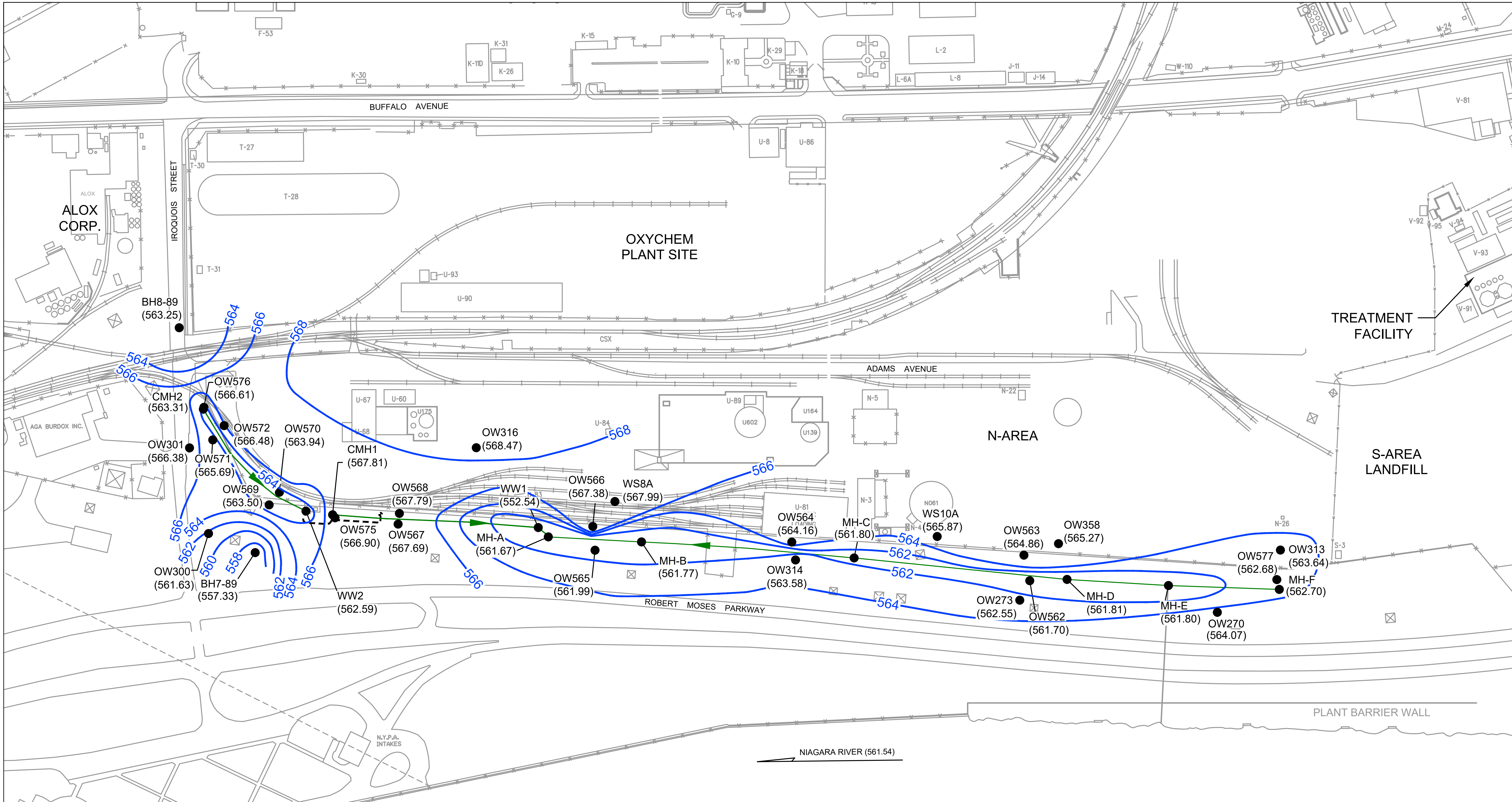

LEGEND

FLOW ZONE 1 COLLECTION SYSTEM

OW316 EXISTING OVERBURDEN MONITORING WELLS

(568.47) GROUNDWATER ELEVATION

566 OVERBURDEN GROUNDWATER CONTOUR (ft AMSL) DASHED WHERE INFERRED

0 100 200 ft
1" = 200 ft

N

GHD

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BUFFALO AVENUE PLANT
NIAGARA FALLS, NEW YORK

FLOW ZONE 1 OVERBURDEN GROUNDWATER CONTOURS - DECEMBER 7, 2022

Project No. 11225008
Date March 2023

FIGURE 5.3

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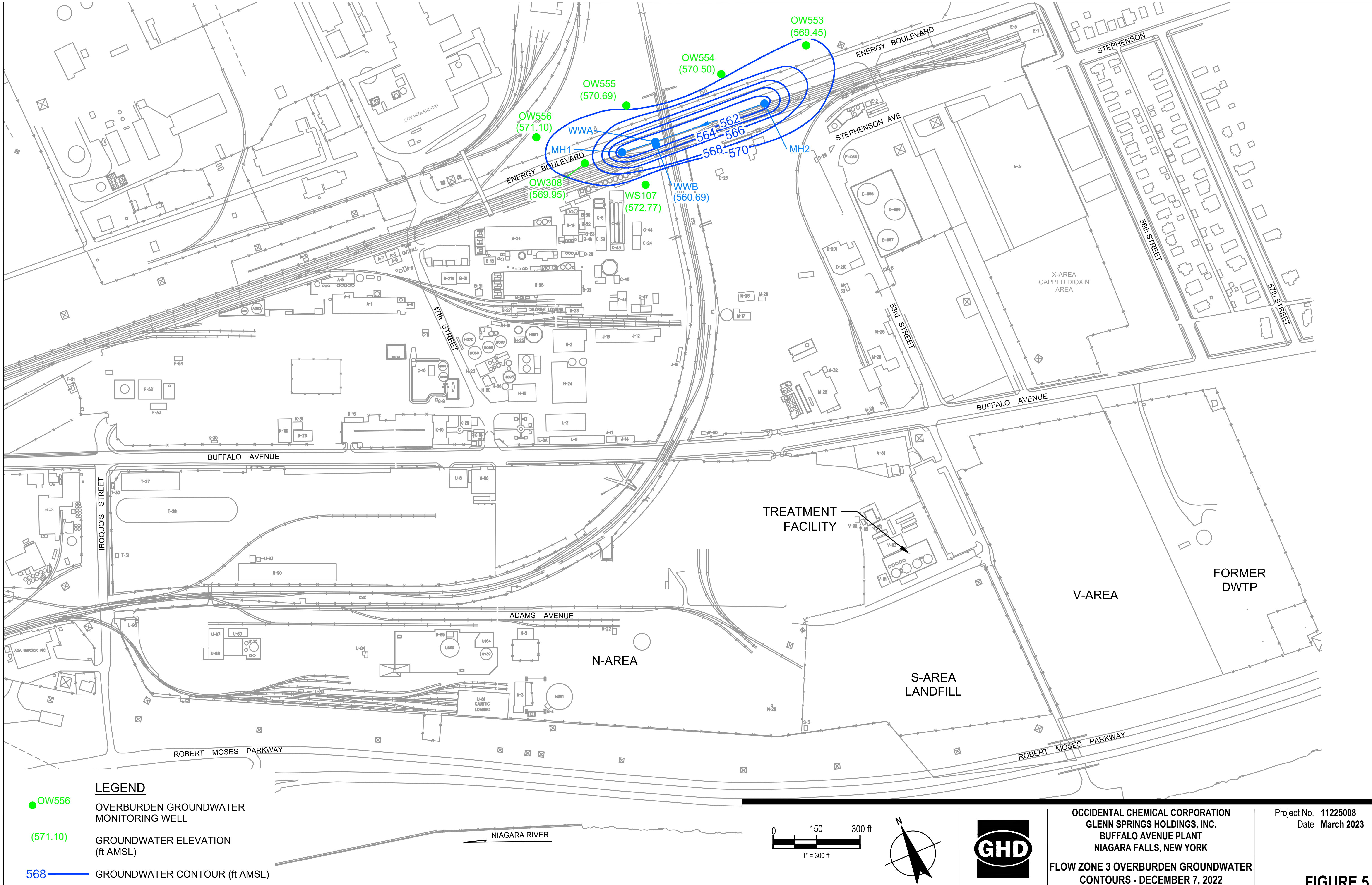

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BUFFALO AVENUE PLANT
NIAGARA FALLS, NEW YORK

FLOW ZONE 3 OVERBURDEN GROUNDWATER
CONTOURS - DECEMBER 7, 2022

Project No. 11225008
Date March 2023

FIGURE 5.4

Filename: \\ghdnet\ghd\CA\Waterloo\Projects\662\11225008\Digital_Design\ACAD\Figures\RPT004\11225008-GHD-00-00-RPT-EN-D112_WA-004.dwg
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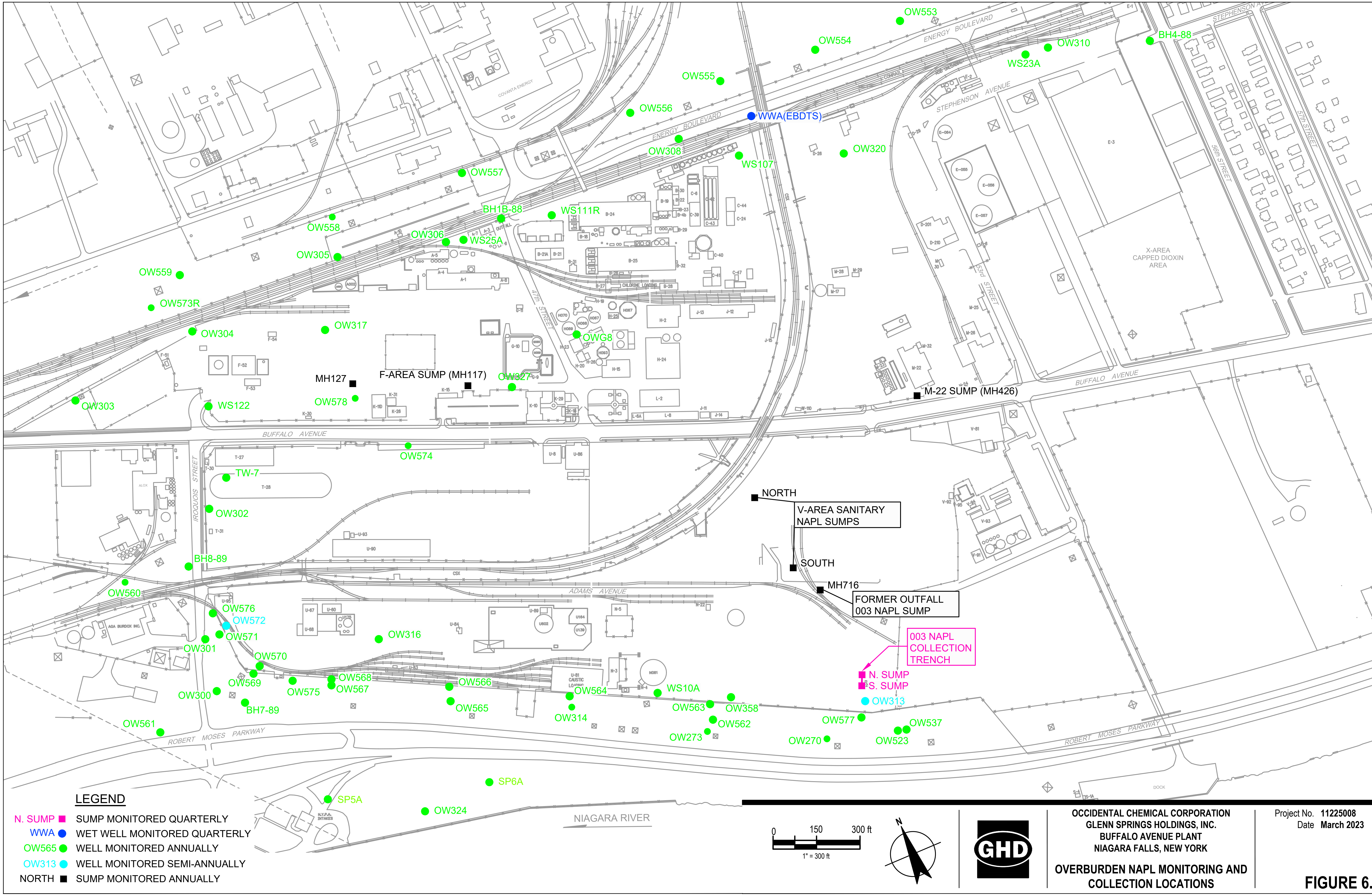

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BUFFALO AVENUE PLANT
NIAGARA FALLS, NEW YORK

Project No. 11225008
Date March 2023

OVERBURDEN NAPL MONITORING AND COLLECTION LOCATIONS

FIGURE 6.1

Filename: \\ghdnet\ghd\CA\Waterloo\Projects\662\11225008\Digital_Design\ACAD\Figures\RPT004\11225008-GHD-00-00-RPT-EN-D113_WA-004.dwg
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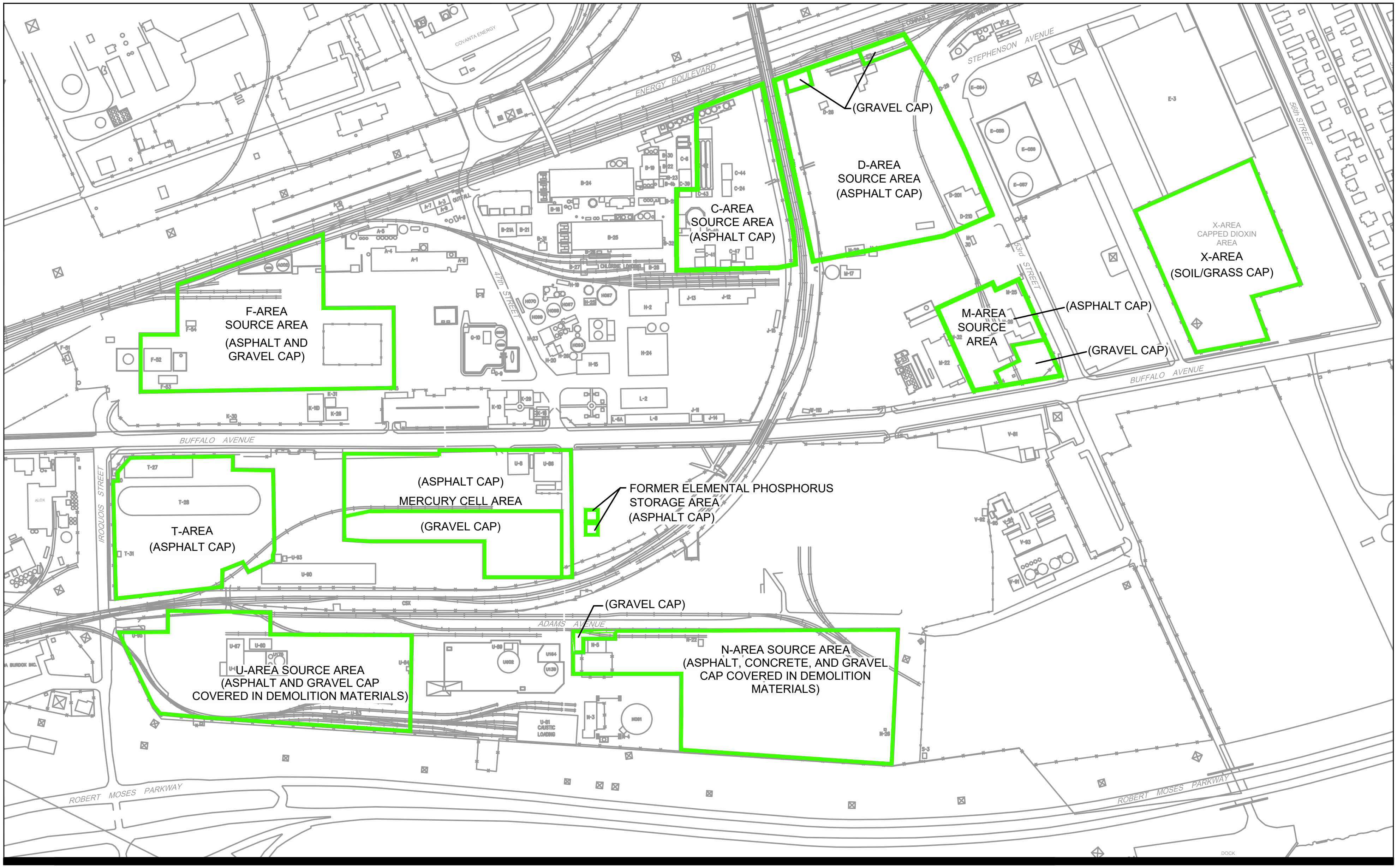

LEGEND

AREA TO BE INSPECTED UNDER PART 373 PERMIT

0 200 400 ft

1" = 400 ft

N

GHD

OCCIDENTAL CHEMICAL CORPORATION
GLENN SPRINGS HOLDINGS, INC.
BUFFALO AVENUE PLANT
NIAGARA FALLS, NEW YORK

OVERBURDEN COVER INSPECTION LOCATIONS

Project No. **11225008**
Date **March 2023**

FIGURE 7.1

Filename: \\ghdnet\ghd\CA\Waterloo\Projects\662\11225008\Digital_Design\ACAD\Figures\RPT004\11225008-GHD-00-00-RPT-EN-D114_WA-004.dwg
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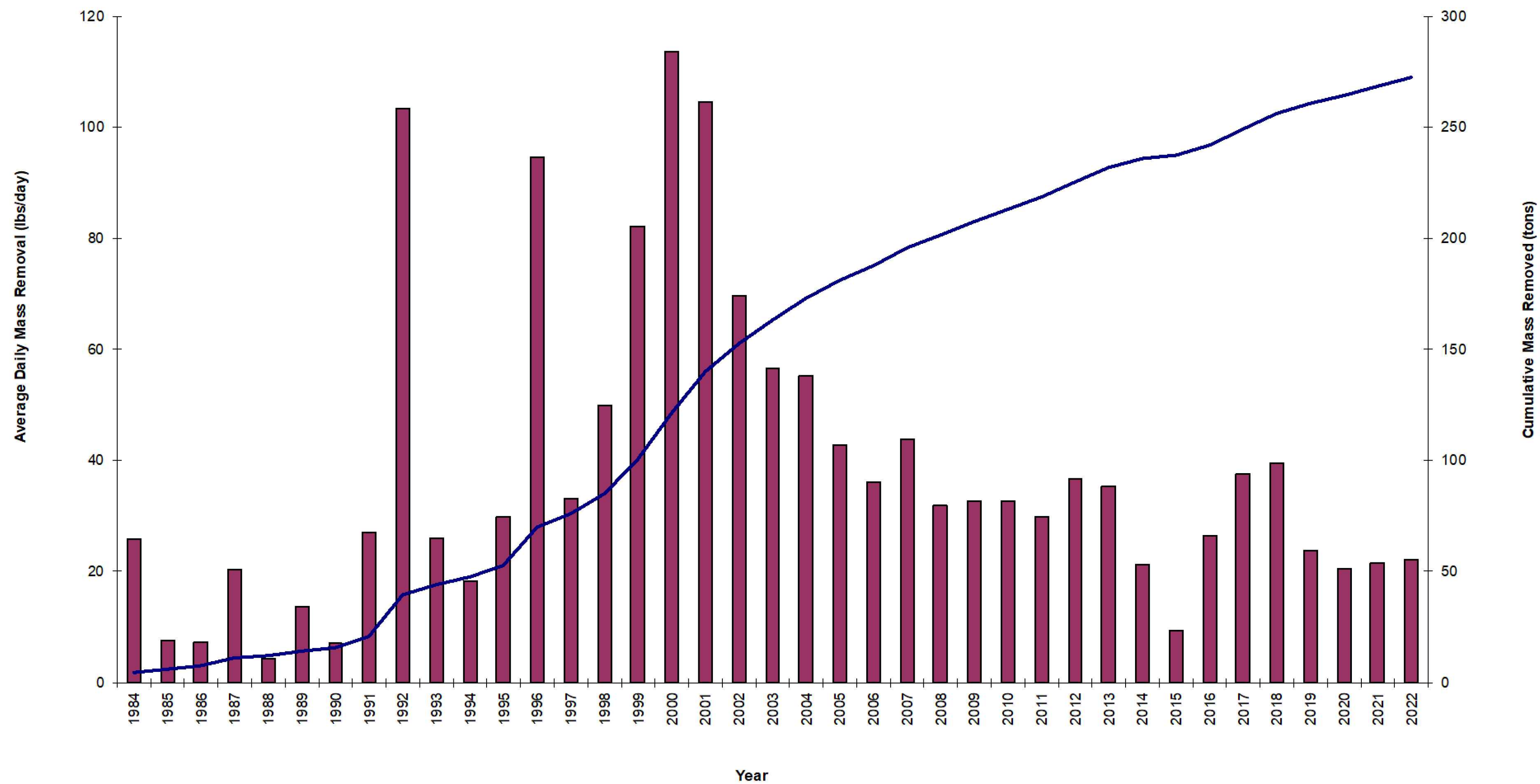

LEGEND

SERIES 1: CUMULATIVE MASS REMOVED (tons)

SERIES 2: AVERAGE DAILY MASS REMOVAL (lbs/day)

OCCIDENTAL CHEMICAL CORPORATION
GLENN SPRINGS HOLDINGS, INC.
BUFFALO AVENUE PLANT
NIAGARA FALLS, NEW YORK

CHEMICAL MASS REMOVAL SUMMARY

Project No. **11225008**
Date **March 2023**

FIGURE 8.1

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Plot Date: 30 March 2023 1:27 PM

Table 3.1

Bedrock Extraction System Flow Rate Summary
Buffalo Avenue Plant

	Target Flow Rates (gpm)	Month												Annual Average (gpm)
		Jan-22 (gpm)	Feb-22 (gpm)	Mar-22 (gpm)	Apr-22 (gpm)	May-22 (gpm)	Jun-22 (gpm)	Jul-22 (gpm)	Aug-22 (gpm)	Sep-22 (gpm)	Oct-22 (gpm)	Nov-22 (gpm)	Dec-22 (gpm)	
System Component														
B-Zone	40	16	18	20	20	22	23	19	20	17	19	19	21	19
C-Zone	300	239	293	289	287	285	281	275	259	248	258	311	281	275
D-Zone	120	76	96	86	98	98	98	100	98	94	97	95	93	94
Operational Average	460	331	333	396	405	406	402	394	376	359	375	425	395	383
Treatment Plant														
Operational Average		421	478	430	445	430	428	394	376	359	375	425	395	413
Operating Time		55.5%	97.4%	99.4%	99.5%	89.4%	100.0%	84.9%	99.6%	79.0%	98.5%	86.4%	84.9%	89.5%

Annual Average Operating Time = 89.5%
Total Volume Treated in 2021 = 201,389,760 gallons

Table 3.2

Bedrock Groundwater Chemical Monitoring Parameters
Buffalo Avenue Plant

Parameters	**Niagara Plant Wells**	**Former EMP Wells**[(1)]	**Units**	***Method Detection Level***
1,2,3,4-Tetrachlorobenzene	X	X	µg/L	5
1,2,3-Trichlorobenzene	X	X	µg/L	1
1,2,4,5-Tetrachlorobenzene	X	X	µg/L	5
1,2,4-Trichlorobenzene	X	X	µg/L	1
1,2-Dichlorobenzene	X	X	µg/L	1
1,3-Dichlorobenzene	X	X	µg/L	1
1,4-Dichlorobenzene	X	X	µg/L	1
2,3,6-Trichlorotoluene	X	X	µg/L	1
2,3/3,4-Dichlorotoluene	X	X	µg/L	1
2,4,5-Trichlorophenol	X	X	µg/L	10
2,4,5-Trichlorotoluene	X	X	µg/L	1
2,4/2,5/2,6-Dichlorotoluene	X	X	µg/L	1
2,4-Dichlorobenzotrifluoride	X	X	µg/L	1
2-Chlorotoluene	X	X	µg/L	1
2-Monochlorobenzotrifluoride	X	X	µg/L	1
3,4-Dichlorobenzotrifluoride	X	X	µg/L	1
4-Chlorotoluene	X	X	µg/L	1
4-Monochlorobenzotrifluoride	X	X	µg/L	1
Alkalinity, Total (As CaCO3)	X	X	µg/L	5000
alpha-BHC	X	X	µg/L	0.05
Benzene	X	X	µg/L	1
beta-BHC	X	X	µg/L	0.05
Chlorobenzene	X	X	µg/L	1
delta-BHC	X	X	µg/L	0.05
gamma-BHC (Lindane)	X	X	µg/L	0.05
Hexachlorobenzene	X	X	µg/L	5
Hexachlorobutadiene	X	X	µg/L	5
Hexachlorocyclopentadiene	X	X	µg/L	5
Mirex	X	X	µg/L	0.05
Octachlorocyclopentene	X	X	µg/L	5
Tetrachloroethene	X	X	µg/L	1
Toluene	X	X	µg/L	1
Trichloroethene	X	X	µg/L	1
Vinyl chloride	X	X	µg/L	1
1,1-Dichloroethene		X	µg/L	1
Endosulfan I		X	µg/L	0.05
Endosulfan II		X	µg/L	0.05
Endosulfan sulfate		X	µg/L	0.05
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)		X	pg/L	100
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)		X	pg/L	100
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)		X	pg/L	50
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)		X	pg/L	50
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)		X	pg/L	50
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)		X	pg/L	50
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)		X	pg/L	50
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)		X	pg/L	50
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)		X	pg/L	50
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)		X	pg/L	50
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)		X	pg/L	50
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)		X	pg/L	50
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)		X	pg/L	50
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)		X	pg/L	50
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)		X	pg/L	50

Table 3.2

Bedrock Groundwater Chemical Monitoring Parameters
Buffalo Avenue Plant

Parameters	**Niagara Plant Wells**	**Former EMP Wells[(1)]**	**Units**	***Method Detection Level***
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)		X	pg/L	10
2,3,7,8-Tetrachlorodibenzofuran (TCDF)		X	pg/L	10
Total heptachlorodibenzo-p-dioxin (HpCDD)		X	pg/L	50
Total heptachlorodibenzofuran (HpCDF)		X	pg/L	50
Total hexachlorodibenzo-p-dioxin (HxCDD)		X	pg/L	50
Total hexachlorodibenzofuran (HxCDF)		X	pg/L	50
Total pentachlorodibenzo-p-dioxin (PeCDD)		X	pg/L	50
Total pentachlorodibenzofuran (PeCDF)		X	pg/L	50
Total tetrachlorodibenzo-p-dioxin (TCDD)		X	pg/L	10
Total tetrachlorodibenzofuran (TCDF)		X	pg/L	10

Notes:

BHC Benzene Hexachloride

(1) Per approval from NYSDEC and USEPA on May 9, 2016, the quarterly S-Area Environmental Monitoring Program (EMP) was consolidated into the Niagara Plant Corrective Action Program annual bedrock sampling. These EMP wells include OW405D, OW406D, OW407D, OW408D, OW409D, OW410D, OW417D, and OW667D.

Table 3.3

Comparison of Pre - and Post-Pumping
Total Organic SSI Concentrations in Off-Site Bedrock Monitoring Wells
Buffalo Avenue Plant

Well No.	Total Organic SSI Concentration (1) (μg/L)																																	
	Historic (2)	Mar/Apr 1997	Sept/Oct 1997	Mar 1998	Sept 1998	Mar 1999	Sept/Oct 1999	Mar 2000	Sept 2000	Mar 2001	Oct 2001	Mar 2002	Sept-Oct 2002	Feb-Apr 2003	Feb-May 2004	May 2005	Mar-Apr 2006	Jan-Mar 2007	Feb-Apr 2008	Mar-Apr 2009	Feb-Apr 2010	Mar 2011	Mar-Apr 2012	Mar-Apr 2013	Mar-Apr 2014	Mar-Apr 2015	Mar-Apr 2016	Mar-Apr 2017	Feb-Apr 2018	Mar-Apr 2019	Mar-May 2020	Mar-Apr 2021	Apr-May 2022	Percent Reduction (3)
D-Zone																																		
OW408	820	620	--	--	--	--	--	1,518	--	--	--	DRY	7.1	6,212	2,984	3,882	4,202	1,942	3,848	3,300	2,309 (7)	3,017 (7)	1,527 (7)	3,241 (7)	1,958 (7)	11,987 (7)	7,116 (7)	3,543 (9)	5,608 (9)	2,991 (9)	2,656 (9)	3,724 (9)	4,295 (9)	-224
OW409	220	56	1,100	310	170	510	76	93	118	99	163	53	10	107	40	31	28	27	54	80	23 (6)(7)	19 (7)	25 (7)	36 (7)	26 (7)	1,223 (6)(7)	1,062 (7)	247 (9)	157 (9)	94 (9)	78 (9)	350 (9)	83 (9)	64
OW410	4	ND	1	1	3	1	1	1	ND	ND	2	0.1	0.7	12.6	0.04	0.7	2.2	3.6	0.5	1.5	1.2 (7)	1.4 (7)	0.5 (7)	0.6 (7)	0.8 (7)	11.9 (7)	243 (7)	26 (9)	75 (9)	4 (9)	35 (9)	8 (9)	2 (9)	-769
OW649	23	33	37	37	36	33	47	30	42	23	39	14	0.4	11	13	3.7	3.5	7.5	5.8	107.6	3.5	10.9	9.1	8.8	4.9	14.7	7.9 (6)	61 (6)	9 (6)	9	11	8	9	52
OW403	500	56	86	71	83	110	61	41	71	40	45	1	0.6	73	6.9	31	13	25	16	112	60	37	33	27	32	97	38	26	20	17	18	13	12	96
OW407	2,600	510	1,600	560	2,100	1,900	950	755	857	761	422	380	7	240	233	214	426	341	289	369	179 (7)	265 (7)	314 (7)	272 (7)	289 (7)	289 (7)	182 (7)	209 (9)	205 (9)	150 (9)	138 (9)	200 (9)	126 (9)	95
OW651	140	16	45	22	43	11	20	13	27	9	4	4	8.3	4.6	11	12	4.6	6.7	8.6	28	13	10	13	11	3.1	16.9	14	10	11	10	11	7	11	93
OW652	950	350	490	470	400	210	370	380	424	427	198	154	201	145	92	88	150	51	131	57	127	81	127	101	103	94	107	368	317	299	556	58	109	41
OW653	1,500	560	2,800	2,800	1,900	1,800	800	540	742	525	271	214	308	357	84	337	352	177	165	111	97	17	67	91	90	117	15	39	94	46	24	25	6	98
OW654	7,332	--	--	--	--	--	--	--	--	--	--	--	--	--	--	362	811	221	507	122	201	109	170	511	303 (6)	327 (6)	388	278	296	1,167	776	66	557	89
OW405(9)	46,780	--	--	--	--	--	--	--	--	--	--	--	11,703	2,755 (6)	2,038	3,539	1,960	12,736	4,089 (6)	27,588	7,809	5,157	5,526	5,334	2,713	14,455	8,079 (9)	6,690 (9)	7,124 (9)	3,949 (9)	2,940 (9)	6,152 (9)	2,494 (9)	94
OW406(9)	23,795	--	--	--	--	--	--	--	--	--	--	--	3,181	5,087	1,635	7,350	4,954	1,547 (6)	653	510	493	393	5,524	673	2,137	2,698	906 (9)	827 (9)	2,043 (9)	615 (9)	990 (9)	857 (9)	398 (9)	96
OW417(9)	361,225	--	--	--	--	--	--	--	--	--	--	--	7,916	43,193	48,027	12,357 (6)	78,560	53,980	42,626	90,764 (6)	87,870	79,072 (6)	131,354	100,647 (6)	156,474 (6)	180,785	136,263 (6)(9)	276,158 (6)(9)	400,994 (6)(9)	256,786 (6)(9)	192,765 (6)(9)	188,076 (6)(9)	142,059 (6)(9)	47
OW667(9)	--	--	--	--	--	--	--	--	--	--	--	--	2,573	12,595	3,338	4,227	6,008	9,709	8,276	4,361	3,278	6,128	4,232 (6)	2,429	2,927	7,372	7,114 (9)	6,085 (9)	4,040 (9)	5,644 (9)	2,812 (9)	2,456 (9)	1,740 (9)	-9
Total	**14,089**	2,201	6,159	4,271	4,735	4,575	2,325	3,371	2,281	1,884	1,144	820	543	7,162	3,464	4,960	5,992	2,802	5,024	4,289	3,014	3,567	2,285	4,299	2,809	14,178	9,174 (10)	4,809 (10)	6,792 (10)	4,789 (10)	4,304 (10)	4,458 (10)	**5,210** (10)	
																																	D-Zone Percent Reduction(4)(5)(10)	**93**
C-Zone																																		
OW408	91	440	--	--	--	--	--	565	--	--	--	6	5	39	42	93	65	37	6	115	51 (6)	39 (6)	50	55 (6)	53	143	49	44	35	22	16	19	14	82
OW409	3	ND	6	ND	ND	ND	ND	ND	ND	ND	ND	1	3	38	6.8	8.2	2.4	2.4	52	6.1	1.9	0.1	ND	ND	0.7	ND	ND	1.3	0.3	ND	0.3	0.1	ND	91
OW410	1	19	3	ND	ND	ND	ND	ND	ND	15	2	0.1	1	2.2	2.3	11	0.5	15	13	33	4.4	ND	15	ND	ND	33	ND	0.1	0.7	ND	ND	ND	ND	100
OW649	280	42	36	38	28	17	8	4	12	9	6	5	60	ND	0.1	3.4	4.1	3.8	5.3	50	10	9.4	11	12	6.3	17.6	30	19	24	24	7	11	6	97
OW403	120	12	110	42	1	34	32	13	29	9	8	5	7	2.1	0.2	8.4	7.5	7.7	6.9	62	9.2	12	15	11	6.6	32.8	34	19	17	17	18	12	16	85
OW407	200	500	3200	550	1700	780	350	264	310	276	69	440	36	48	572	326	187	265	460	390	666	471	675	401	321	469	340	411	485	484	121	254	88	40
OW651	1200	52	88	47	60	41	35	10	42	19	11	9	6	8.0	12	8.0	12	9.3	15	45	18	13	20 (6)	13	10	32	34	24	22	22	21	74	18	98
OW652	81	800	880	1500	660	440	180	95	236	53	116	30	0.1	4	38	12	88	22	124	378	106	157	267	76	60	100	240	181	178	193	262	165	97	-224
OW653	ND	8	8	6	650	6	7	10	2	7	4	2	2	2	5	15	191	8.5	4.7	ND	5.8	5.0	4.8 (6)	4.6	3.5	5.7	3.9	1.6	ND	0.5	ND	2	1	100
OW654	2300	ND	ND	ND	ND	ND	ND	86	144	48	14	2	4	14	14	22	28	16	114	141	61	62	156	28	21	109	222	163	98	303	312	296	53	86
OW404	3321	--	--	--	--	--	--	--	--	--	--	--	--	4	25	16	12	235	107	204	63	50	68	26	35	50	160	88	97	125 (6)	300 (6)	107 (6)	64 (6)	91
OW405	4406	--	--	--	--	--	--	--	--	--	--	--	--	145	297	171	92	210	383	161	566	379	761	407	325	304	288	386	421	318	332	237	136	92
OW406	9164	--	--	--	--	--	--	--	--	--	--	--	--	835	692	554	278	385	232	306	540	447	248	527	484	363	560	532	588	495	307	561	264	97
Total	**21,167**	1,873	4,331	2,183	3,099	1,318	612	1,047	775	436	230	500	124	1,140	1,706	1,247	967	1,218	1,522	1,889	2,103	1,645	2,290	1,561	1,325	1,659	1,961	1,871	1,965	2,003	1,697	1,738	**757**	
																																	C-Zone Percent Reduction(4)	**96**
B-Zone																																		
OW408	210	180	--	--	--	--	--	386	--	--	--	1,208	2,838	463	322	277	223	223	269	230	212	81	8,139	1,738	18,231	1,876	222 (6)	498 (6)	992 (6)	379	465	1,336	1,585	-122
OW409	19	6	13	18	9	7	18	ND	12	11	14	12	15	1.4	3.0	2.8	373.3	8.6	1.2	ND	1.1	0.6	0.7	0.5	0.6	46	366	9	ND	48	39	67	35	-104
OW410	57	17	26	4	1	13	17	13	3	3	2	7	9	5.1	11.4	7.6	6.5	7.1	7.3	ND	8.9	4.8	7.3	5.1	5.6	4.5	10	30	18	21 (6)	17 (6)	20	19 (6)	70
OW403	8	65	120	23	140	200	200	299	184	240	5	175	71	175	6.1	144	219	133	200	140	157	117	145	153	135 (6)	124 (6)	102	91	68	79	82	79	77	-925
OW407	150	490	760	780	1	860	660	493	839	812	441	297	323	235	249	278	155	154	71	558	248	388	376	422	320	322	352	350	318	216	170	522	77	-14
OW652	2	190	210	160	170	120	140	103	73	60	23	16	6	ND	15	17	15	14	28	14	32	15	25	12	20	37	215	284	88	96	230	236	235	-11,423
OW653	250	260	160	830	160	120	57	48	23	44	24	22	4	19	29	178	160	104	166	442	321	169	359	4.6	131	111	124	132	116	98	180	653	153	28
OW654	300	ND	ND	ND	ND	ND	ND	43	29	29	ND	1	5	1.8	5.4	0.8	15	14	52	145	53	28	55	19	15	77	153	87	61	81	82	41	42	73
Total	**996**	1,208	1,289	1,815	481	1,320	1,092	1,385	1,163	1,199	509	1,738	3,272	900	641	904	1,167	657	794	1,529	1,035	804	9,106	2,355	18,859	2,597	1,543	1,480	1,661	1,019	1,267	2,953	**2,223**	
																																	B-Zone Percent Reduction(4)(8)	**19**
																																	Overall Percent Reduction (4)(5)(8)	**88**

Notes:

(1) Total organic site specific indicator (SSI) parameters for bedrock groundwater are listed in Table 3.2 excluding alkalinity
(2) Historic data from the supplemental data collection program (SDCP) or off-site investigation (OSI)
(3) March-April 2018 data compared to historic data
(4) Based on the sum of historic SSI organic concentrations vs the sum of the March-April 2018 SSI organic concentrations
(5) Calculation does not include the total organic SSI concentrations from OW408D, since the concentrations in this well have varied by three orders of magnitude over the evaluation period
(6) Duplicate samples were averaged
(7) Data collected as part of the S-Area Quarterly EMP sampling
(8) Calculation does not include the total organic SSI concentrations from OW408B, since the concentrations in this well have varied by two orders of magnitude over the evaluation period
(9) Per approval from NYSDEC and USEPA on May 9, 2016, the quarterly S-Area Environmental Monitoring Program (EMP) was consolidated into the Niagara Plant Corrective Action Program annual bedrock sampling.
These EMP wells include OW405D, OW406D, OW407D, OW408D, OW409D, OW410D, OW417D, and OW667D.
Wells OW405D, OW406D, OW417D, and OW667D were not included in the Niagara Plant's chemical monitoring program.
(10) Calculation does not include the total organic SSI concentrations from wells OW405D, OW406D, OW417D, and OW667D (from former EMP)
--- Not sampled. Not included in sampling program at time of sampling
DRY Well was dry. No Sample was collected.
ND Not detected (ND's were assumed to be zero)
NA Not applicable

Table 3.4

Summary of Total Organic SSI Concentrations in Extraction Wells
Buffalo Avenue Plant

Total Organic SSI Concentration (1) (µg/L)

Extraction Well	Aug/Sept 1996	Mar/Apr 1997	Sept/Oct 1997	Mar 1998	Sept 1998	Mar 1999	Sept/Oct 1999	Mar 2000	Sept 2000	Mar 2001	Oct 2001	Mar 2002	Sept 2002	Feb-Apr 2003	Mar-May 2004	May 2005	March 2006
D-Zone																	
BEW701D	520	1,600	12,000	840	270	1,300	340	74	480	105	40	28	65	64	138	25	26
BEW702D	3,200	10,000	16,000	14,000	13,000	2,300	8,300	4,300	9,200	7,876	726	1,670	6,390	5,900	5,839	5,904	4,326
BEW703D	56,000	39,000	48,000	49,000	42,000	36,000	5,000	32,000	45,000	37,697	22,521	29,915	34,719	33,985	21,940	26,579	23,393
BEW704D	26,000	50,000	54,000	73,000	46,000	48,000	48,000	41,000	42,000	35,455	19,202	17,262	12,266	12,889	8,322	6,378	9,456
BEW705D	39,000	25,000	69,000	22,000	34,000	42,000	46,000	36,000	31,000	17,172	12,664	20,386	20,478	18,130	15,102	15,469	11,510
BEW706D	3,300	5,000	66,000	5,500	7,200	5,500	4,700	3,900	4,700	2,847	2,333	4,211	2,269	2,111	4,302	6,654	5,767
Total	130,000	130,000	270,000	160,000	140,000	140,000	110,000	120,000	130,000	100,000	57,000	73,000	76,000	73,000	56,000	61,000	54,000
C-Zone																	
BEW701C	66	44	110	NS	70	130	150	77	260	123	59	35	108	79	93	80	28
BEW702C	440	110	470	380	400	230	150	120	210	69	64	151	470	107	155	68	12
BEW703C	320	220	790	610	550	510	430	590	550	228	173	194	144	149	177	236	61
BEW704C	3,600	1,600	4,000	820	3,000	900	1,200	530	850	511	454	534	779	561	515	507	524
BEW705C	1,500	940	27,000	130	1,100	250	660	310	930	349	386	395	640	381	253	284	263
BEW706C	2,100	260	670	90	500	170	220	330	190	159	144	187	154	129	184	120	77
Total	8,000	3,200	33,000	2,000	5,600	2,200	2,800	2,000	3,000	1,400	1,300	1,500	2,300	1,400	1,400	1,300	1,000
B-Zone																	
BEW700B	67,000	162,000	52,000	23,000	23,000	33,000	33,000	30,000	40,000	48,904	28,488	32,622	45,198	91,588	154,280	40,464	66,091
BEW701B	4,500	5,200	12,000	NS	16,000	12,000	8,300	4,800	6,300	3,638	1,260	2,354	1,856	4,199	5,525	7,974	5,846
BEW702B	220	4,800	110	2,400	180	4,300	580	320	550	1,177	86	28	71	871	2,617	1,578	41
BEW703B	50	10	10	7800	3	17	12	6	11,000	667	177	91	1,012	736	4,903	3,618	3,885
BEW704B	7,100	4,000	8,600	4,700	5,000	4,300	4,000	3,000	5,800	3,866	2,610	3,954	4,063	2,892	1,900	3,007	2,801
BEW705B	19,000	1,600	28,000	18,000	25,000	25,000	28,000	30,000	1,960	14,433	7,201	10,246	9,956	9,969	10,485	9,300	6,596
BEW706B	2,900	1,400	4,100	2,000	2,100	2,500	3,000	1,500	2,400	1,614	1,346	1,260	1,367	1,219	912	957	1,383
Total	100,000	180,000	100,000	58,000	71,000	81,000	77,000	70,000	68,000	74,000	41,000	51,000	64,000	111,000	181,000	67,000	87,000

Extraction Well	Feb-Mar 2007	Feb-Apr 2008	Mar-Apr 2009	Feb-Apr 2010	Mar 2011	Feb-Apr 2012	Mar-Apr 2013	Mar-Apr 2014	Apr 2015	Feb-Mar 2016	Mar-Apr 2017	Mar-Apr 2018	Mar-Apr 2019	Feb-Mar 2020	Mar-Apr 2021	Apr-May 2022
D-Zone																
BEW701D	38	44	47	39	39	56	34	42	42	57	44	53	38	44	37	24.2
BEW702D	3,900	4,785	2,030	1,464	969	13,666	2,773	948	1,551	1,591	1,889	2,106	2,041	2,495	1353	924.19
BEW703D	16,777	33,062	41,152	28,556	16,228	1,141	13,404	15,350	17,446	13,098	10,059	12,583	5,526	6,157	7005	6789
BEW704D	4,916	3,764	3,479	7,656 (3)	3,916 (3)	8,746	2,482	2,208	22,976	4,722	7,980	6,710	6,016	5,588	4536	4654
BEW705D	9,393	10,006	15,230	13,982	14,184	19,477	20,593	20,854	1,946	31,200	30,605	31,297	22,221	24,068	24446	24524
BEW706D	3,413	2,776	5,754	4,718	5,652	9,245	5,983	7,338	478	7,187	12,112	9,127 (3)	8,501 (3)	9,901	7744	7453
Total	38,000	54,000	68,000	56,000	41,000	52,000	45,000	47,000	44,000	58,000	63,000	62,000	44,000	48,000	**45,000**	**44,000**
															D-Zone Percent Reduction (2)	**66%**
C-Zone																
BEW701C	27	36	68	31	43	94	25	32	45	791	37	22	11	8	8 (3)	39
BEW702C	40	253	271	34	1.0	310	1,337	16	15	10	5	4	3	3	5	19
BEW703C	53	351	301	401	386	547 (3)	404	192	336	265	365	449	418	777	388	310
BEW704C	302	281	578	334	353	488	467 (3)	612	636	589	613	551	430	296	296	204
BEW705C	171	61	63	125	132	98	169	254	381	272	240	247	189	167	163	37
BEW706C	121	131	204	131	126	276	177	161 (3)	204 (3)	221	243	281	271	309	253	2026
Total	700	1,100	1,500	1,100	1,000	1,800	2,600	1,300	1,600	2,100	1,500	1,600	1,300	1,600	**1,100**	**2,600**
															C-Zone Percent Reduction (2)	**68%**
B-Zone																
BEW700B	256,051	108,116	58,364	71,562	92,236	103,850	131,503	64,743	97,742	78,708	85,510	94,644	77,621	83,100	63740	73060
BEW701B	5,566	1,919	1,297	1,717	2,382	34,800	3,550	2,474	2,325	1,410	1,775	3,000	2,698	2,759	1847	3430
BEW702B	144	191	560	113	89	435	2,469	110	2,231	2,802	239	6,775	24	1,486	332	557
BEW703B	2,489	1,773	721	1,242	1,035	1,174	1,011	539	1,226	1,235	676	11	15	17	438	68.45
BEW704B	2,621	2,722	2,353	2,749	1,686	2,388	2,449	2,230	2,715	3,084	2,788	3,448	2,839	3,103	3964	3568
BEW705B	5,588	4,583	4,182	5,853	5,741	7,981	6,603	6,498	7,148	7,070	6,751	7,262	6,400	5,367	5959	6083
BEW706B	1,694	1,492	1,322	1,202	1,100	1,398	1,522	1,460	1,767	1,709 (3)	1,868 (3)	2,438	1,646	2,021	1347	1108
Total	274,000	121,000	69,000	84,000	104,000	152,000	149,000	78,000	115,000	96,000	100,000	118,000	91,000	98,000	**78,000**	**88,000**
															B-Zone Percent Reduction (2)	**22%**

Notes:

(1) Total organic site specific indicator (SSI) parameters are listed in Table 3.2 excluding alkalinity.
(2) Based on the sum of the August/September 1996 SSI organic concentrations and the sum of the March-April 2018 SSI organic concentrations.
(3) Duplicate sample, results were averaged
NS Well not sampled due to pump malfunction.

Table 3.5

Bedrock Groundwater Chemical Loading Summary
Buffalo Avenue Plant

Well No.:	BEW700B		BEW701B		BEW702B		BEW703B		BEW704B		BEW705B		BEW706B		
	Flow Rate (1) =	2.6	Flow Rate (1) =	2.0	Flow Rate (1) =	0.002	Flow Rate (1) =	0.00	Flow Rate (1) =	7.7	Flow Rate (1) =	2.9	Flow Rate (1) =	2.3	
Parameter	**Conc. (2) (µg/L)**	**Loading (lbs/d)**	**Conc. (2) (µg/L)**	**Loading (lbs/d)**	**Conc. (2) (µg/L)**	**Loading (lbs/d)**	**Conc. (2) (µg/L)**	**Loading (lbs/d)**	**Conc. (2) (µg/L)**	**Loading (lbs/d)**	**Conc. (2) (µg/L)**	**Loading (lbs/d)**	**Conc. (2)(3) (µg/L)**	**Loading (lbs/d)**	**B-Zone Total Loading (lbs/d)**
Volatiles															
1,2,3-Trichlorobenzene	500 U	1.6E-02	10 U	2.4E-04	2.0 U	4.5E-08	1.0 U	3.5E-08	11	1.0E-03	20 U	7.0E-04	10 U	2.8E-04	1.8E-02
1,2,4-Trichlorobenzene	500 U	1.6E-02	10 U	2.4E-04	2 U	4.5E-08	1 U	3.5E-08	28	2.6E-03	8.3 J	2.9E-04	10 U	2.8E-04	1.9E-02
1,2-Dichlorobenzene	500 U	1.6E-02	7.3 J	1.8E-04	17	3.9E-07	5.1	1.8E-07	180	1.7E-02	91	3.2E-03	25	7.0E-04	3.6E-02
1,3-Dichlorobenzene	500 U	1.6E-02	10 U	2.4E-04	12	2.7E-07	16	5.6E-07	680	6.3E-02	1000	3.5E-02	120	3.4E-03	1.2E-01
1,4-Dichlorobenzene	280 J	8.8E-03	8.5 J	2.1E-04	48	1.1E-06	12	4.2E-07	1400	1.3E-01	2100	7.3E-02	240	6.8E-03	2.2E-01
2,3,6-Trichlorotoluene	2500 U	7.8E-02	50 U	1.2E-03	10.0 U	2.3E-07	5.0 U	1.7E-07	50 U	4.6E-03	100 U	3.5E-03	50 U	1.4E-03	8.9E-02
2,3/3,4-Dichlorotoluene	500 U	1.6E-02	10.0 U	2.4E-04	2 U	4.5E-08	1.0 U	3.5E-08	10 U	9.3E-04	20 U	7.0E-04	10 U	2.8E-04	1.8E-02
2,4,5-Trichlorotoluene	2500 U	7.8E-02	50 U	1.2E-03	10.0 U	2.3E-07	5.0 U	1.7E-07	50 U	4.6E-03	100 U	3.5E-03	50 U	1.4E-03	8.9E-02
2,4/2,5/2,6-Dichlorotoluene	750 U	2.3E-02	6 J	1.5E-04	1.5 J	3.4E-08	1.5 U	5.2E-08	51	4.7E-03	44	1.5E-03	15 U	4.2E-04	3.0E-02
2,4-Dichlorobenzotrifluoride	500 U	1.6E-02	10 U	2.4E-04	2 U	4.5E-08	1.0 U	3.5E-08	10 U	9.3E-04	20 U	7.0E-04	10 U	2.8E-04	1.8E-02
2-Chlorotoluene	11000	3.4E-01	1500	3.6E-02	23	5.2E-07	0.8 J	2.8E-08	42	3.9E-03	53	1.9E-03	27	7.6E-04	3.9E-01
3,4-Dichlorobenzotrifluoride	500 U	1.6E-02	10 U	2.4E-04	2 U	4.5E-08	1.0 U	3.5E-08	10 U	9.3E-04	20 U	7.0E-04	10 U	2.8E-04	1.8E-02
4-Chlorotoluene	570	1.8E-02	11	2.7E-04	3	6.8E-08	1.0 U	3.5E-08	10 U	9.3E-04	20 U	7.0E-04	10 U	2.8E-04	2.0E-02
Benzene	140 J	4.4E-03	37	9.0E-04	240	5.4E-06	3.4	1.2E-07	160	1.5E-02	260	9.1E-03	67	1.9E-03	3.1E-02
Chlorobenzene	250 J	7.8E-03	26	6.3E-04	200	4.5E-06	28.0	9.7E-07	970	9.0E-02	2500	8.7E-02	600	1.7E-02	2.0E-01
o-Monochlorobenzotrifluoride	500 U	1.6E-02	10 U	2.4E-04	2 U	4.5E-08	1.0 U	3.5E-08	10 U	9.3E-04	20 U	7.0E-04	10 U	2.8E-04	1.8E-02
p-Monochlorobenzotrifluoride	270 J	8.4E-03	4.5 J	1.1E-04	6.7	1.5E-07	1.0 U	3.5E-08	9 J	8.5E-04	8.8 J	3.1E-04	29	8.2E-04	1.1E-02
Tetrachloroethene	4600	1.4E-01	7.3 J	1.8E-04	1.2 J	2.7E-08	2	7.0E-08	12	1.1E-03	7.3 J	2.6E-04	10 U	2.8E-04	1.5E-01
Toluene	150 J	4.7E-03	6.8 J	1.6E-04	0.44 J	1.0E-08	1.0 U	3.5E-08	10 U	9.3E-04	20 U	7.0E-04	10 U	2.8E-04	6.8E-03
Trichloroethene	54000	1.7E+00	15	3.6E-04	4.3	9.7E-08	0.85 J	3.0E-08	20	1.9E-03	11 J	3.8E-04	10 U	2.8E-04	1.7E+00
Vinyl chloride	1800	5.6E-02	1800	4.4E-02	2 U	4.5E-08	0.3 J	9.7E-09	5 J	4.6E-04	20 U	7.0E-04	10 U	2.8E-04	1.0E-01
Semi-Volatile Organic Compounds															
1,2,3,4-Tetrachlorobenzene	4.5 U	0.0E+00	4.5 U	0.0E+00	5 U	1.1E-07	4.5 U	1.6E-07	5 U	4.6E-04	5 U	1.7E-04	4.5 U	1.3E-04	7.7E-04
1,2,4,5-Tetrachlorobenzene	9.1 U	0.0E+00	9.1 U	0.0E+00	10 U	2.3E-07	9.1 U	3.2E-07	10 U	9.3E-04	10 U	3.5E-04	9.1 U	2.6E-04	1.5E-03
2,4,5-Trichlorophenol	9.1 U	0.0E+00	9.1 U	0.0E+00	10 U	2.3E-07	9.1 U	3.2E-07	10 U	9.3E-04	10 U	3.5E-04	9.1 U	2.6E-04	1.5E-03
Hexachlorobenzene	9.1 U	0.0E+00	9.1 U	0.0E+00	10 U	2.3E-07	9.1 U	3.2E-07	10 U	9.3E-04	10 U	3.5E-04	9.1 U	2.6E-04	1.5E-03
Hexachlorobutadiene	9.1 U	0.0E+00	9.1 U	0.0E+00	10 U	2.3E-07	9.1 U	3.2E-07	10 U	9.3E-04	10 U	3.5E-04	9.1 U	2.6E-04	1.5E-03
Hexachlorocyclopentadiene	9.1 U	0.0E+00	9.1 U	0.0E+00	10 U	2.3E-07	9.1 U	3.2E-07	10 U	9.3E-04	10 U	3.5E-04	9.1 U	2.6E-04	1.5E-03
Octachlorocyclopentene	4.5 U	0.0E+00	4.5 U	0.0E+00	5 U	1.1E-07	4.5 U	1.6E-07	5 U	4.6E-04	5 U	1.7E-04	4.5 U	1.3E-04	7.7E-04
Pesticides															
alpha-BHC	0.05 U	0.0E+00	0.045 U	0.0E+00	0.05 U	1.1E-09	0.05 U	1.7E-09	4.7	4.4E-04	0.08	2.7E-06	0.05 U	1.4E-06	4.4E-04
beta-BHC	0.05 UJ	1.6E-06	0.045 U	0.0E+00	0.08 J	1.8E-09	0.02 J	7.0E-10	0.35	3.2E-05	0.11	3.8E-06	0.05 JJ	1.4E-06	3.9E-05
delta-BHC	0.05 U	0.0E+00	0.045 U	0.0E+00	0.05 U	1.1E-09	0.05 U	1.7E-09	0.4	3.7E-05	0.21	7.3E-06	0.05 U	1.4E-06	4.6E-05
gamma-BHC (Lindane)	0.05 U	0.0E+00	0.045 U	0.0E+00	0.05 U	1.1E-09	0.05 U	1.7E-09	1	9.3E-05	0.045 U	1.6E-06	0.05 U	1.4E-06	9.6E-05
Mirex	0.05 U	0.0E+00	0.045 U	0.0E+00	0.05 U	1.1E-09	0.05 U	1.7E-09	0.091 U	8.4E-06	0.045 U	1.6E-06	0.05 U	1.4E-06	1.1E-05
Total Loading (lbs/day)		**2.6**		**8.7E-02**		**1.5E-05**		**5.0E-06**		**0.35**		**0.23**		**0.04**	**3.3**

Notes:

J Estimated value.
BHC Benzene hexachloride.
U Non-detect at associated value.
(1) FR (flow rate) is the average flow rate for 2022 (total volume pumped for the year in gallons / 525,600 minutes).
(2) Bedrock groundwater concentrations are from the April 2022 sampling event.
(3) BEW706B has duplicate samples. Only the sample with the highest total organic site-specific indicator (SSI) concentration is represented here.

Table 3.5

Bedrock Groundwater Chemical Loading Summary
Buffalo Avenue Plant

Well No.:	BEW704C		BEW705C		BEW706C			BEW704D		BEW705D		BEW706D			
	Flow Rate (1) =	93.2	Flow Rate (1) =	92.7	Flow Rate (1) =	56.5		Flow Rate (1) =	36.2	Flow Rate (1) =	21.83	Flow Rate (1) =	26.3		
Parameter	**Conc. (2) (μg/L)**	**Loading (lbs/d)**	**Conc. (2) (μg/L)**	**Loading (lbs/d)**	**Conc. (2) (μg/L)**	**Loading (lbs/d)**	**C-Zone Total Loading (lbs/d)**	**Conc. (2) (μg/L)**	**Loading (lbs/d)**	**Conc. (2) (μg/L)**	**Loading (lbs/d)**	**Conc. (2) (μg/L)**	**Loading (lbs/d)**	**D-Zone Total Loading (lbs/d)**	**Total Loading, All Zones (lbs/d)**
Volatiles															
1,2,3-Trichlorobenzene	2.0 U	2.2E-03	1.0 U	1.1E-03	2.0 U	1.4E-03	4.7E-03	20 U	8.7E-03	53 J	1.4E-02	20 U	6.3E-03	2.9E-02	5.2E-02
1,2,4-Trichlorobenzene	2.0 U	2.2E-03	1.0 U	1.1E-03	2.0 U	1.4E-03	4.7E-03	20 U	8.7E-03	100 U	2.6E-02	8 J	2.5E-03	3.7E-02	6.1E-02
1,2-Dichlorobenzene	2.0 U	2.2E-03	1.0 U	1.1E-03	0.5 J	3.3E-04	3.7E-03	82	3.6E-02	770	2.0E-01	160	5.1E-02	2.9E-01	3.3E-01
1,3-Dichlorobenzene	0.8 J	8.5E-04	1.00 U	1.1E-03	0.70 J	4.8E-04	2.4E-03	170	7.4E-02	1300	3.4E-01	130	4.1E-02	4.6E-01	5.8E-01
1,4-Dichlorobenzene	1.3 J	1.5E-03	0.27 J	3.0E-04	1.40 J	9.5E-04	2.7E-03	700	3.0E-01	4100	1.1E+00	560	1.8E-01	1.6E+00	1.8E+00
2,3,6-Trichlorotoluene	10.0 U	1.1E-02	5.0 U	5.6E-03	10.0 U	6.8E-03	2.4E-02	100 U	4.4E-02	500 U	1.3E-01	21 J	6.6E-03	1.8E-01	2.9E-01
2,3/3,4-Dichlorotoluene	2.0 U	2.2E-03	1.0 U	1.1E-03	2.0 U	1.4E-03	4.7E-03	20 U	8.7E-03	100 U	2.6E-02	16.0 J	5.1E-03	4.0E-02	6.3E-02
2,4,5-Trichlorotoluene	10.0 U	1.1E-02	5.0 U	5.6E-03	10.0 U	6.8E-03	2.4E-02	100 U	4.4E-02	500 U	1.3E-01	21 J	6.6E-03	1.8E-01	2.9E-01
2,4/2,5/2,6-Dichlorotoluene	3.0 U	3.4E-03	1.5 U	1.7E-03	1.5 J	1.0E-03	6.1E-03	12 J	5.2E-03	100 J	2.6E-02	120	3.8E-02	6.9E-02	1.1E-01
2,4-Dichlorobenzotrifluoride	2.0 U	2.2E-03	1.0 U	1.1E-03	2.00 U	1.4E-03	4.7E-03	20 U	8.7E-03	100 U	2.6E-02	20 U	6.3E-03	4.1E-02	6.4E-02
2-Chlorotoluene	2.0 U	2.2E-03	1.0 U	1.1E-03	28	1.9E-02	2.2E-02	52	2.3E-02	870	2.3E-01	1100	3.5E-01	6.0E-01	1.0E+00
3,4-Dichlorobenzotrifluoride	2.0 U	2.2E-03	1.0 U	1.1E-03	1.5 J	1.0E-03	4.4E-03	20 U	8.7E-03	100 U	2.6E-02	20 U	6.3E-03	4.1E-02	6.3E-02
4-Chlorotoluene	2.0 U	2.2E-03	1.0 U	1.1E-03	2.0 U	1.4E-03	4.7E-03	20 U	8.7E-03	46 J	1.2E-02	28	8.9E-03	3.0E-02	5.4E-02
Benzene	2.0 U	2.2E-03	1.0 U	1.1E-03	0.47 J	3.2E-04	3.7E-03	2600	1.1E+00	8400	2.2E+00	1600	5.1E-01	3.8E+00	3.9E+00
Chlorobenzene	1.9 J	2.1E-03	0.3 J	3.7E-04	1.70 J	1.2E-03	3.7E-03	950	4.1E-01	8300	2.2E+00	1700	5.4E-01	3.1E+00	3.3E+00
o-Monochlorobenzotrifluoride	2.0 U	2.2E-03	1.0 U	1.1E-03	1.60 J	1.1E-03	4.4E-03	20 U	8.7E-03	100.00 U	2.6E-02	20.0 U	6.3E-03	4.1E-02	6.3E-02
p-Monochlorobenzotrifluoride	2.2	2.5E-03	11	1.2E-02	270	1.8E-01	2.0E-01	6 J	2.6E-03	130	3.4E-02	270	8.5E-02	1.2E-01	3.3E-01
Tetrachloroethene	28	3.1E-02	6.7	7.5E-03	3	2.0E-03	4.1E-02	30	1.3E-02	100 U	2.6E-02	20 U	6.3E-03	4.6E-02	2.3E-01
Toluene	2.0 U	2.2E-03	1.0 U	1.1E-03	2.0 U	1.4E-03	4.7E-03	20 U	8.7E-03	35 J	9.2E-03	19 J	6.0E-03	2.4E-02	3.5E-02
Trichloroethene	170	1.9E-01	19	2.1E-02	4.9	3.3E-03	2.1E-01	52	2.3E-02	100 U	2.6E-02	20 U	6.3E-03	5.5E-02	2.0E+00
Vinyl chloride	2.0 U	2.2E-03	1.0 U	1.1E-03	0.9 J	6.2E-04	4.0E-03	20 U	8.7E-03	420	1.1E-01	1700	5.4E-01	6.6E-01	7.6E-01
Semi-Volatile Organic Compounds															
1,2,3,4-Tetrachlorobenzene	5 U	5.6E-03	5 U	5.6E-03	4.5 U	3.1E-03	1.4E-02	5 U	2.2E-03	5 U	1.3E-03	4.5 U	1.4E-03	4.9E-03	2.0E-02
1,2,4,5-Tetrachlorobenzene	10 U	1.1E-02	10 U	1.1E-02	9.1 U	6.2E-03	2.9E-02	10 U	4.4E-03	10 U	2.6E-03	9.1 U	2.9E-03	9.9E-03	4.0E-02
2,4,5-Trichlorophenol	10 U	1.1E-02	10 U	1.1E-02	9.1 U	6.2E-03	2.9E-02	10 U	4.4E-03	10 U	2.6E-03	9.1 U	2.9E-03	9.9E-03	4.0E-02
Hexachlorobenzene	10 U	1.1E-02	10 U	1.1E-02	9.1 U	6.2E-03	2.9E-02	10 U	4.4E-03	10 U	2.6E-03	9.1 U	2.9E-03	9.9E-03	4.0E-02
Hexachlorobutadiene	10 U	1.1E-02	10 U	1.1E-02	9.1 U	6.2E-03	2.9E-02	10 U	4.4E-03	10 U	2.6E-03	9.1 U	2.9E-03	9.9E-03	4.0E-02
Hexachlorocyclopentadiene	10 U	1.1E-02	10 U	1.1E-02	9.1 U	6.2E-03	2.9E-02	10 U	4.4E-03	10 U	2.6E-03	9.1 U	2.9E-03	9.9E-03	4.0E-02
Octachlorocyclopentene	5 U	5.6E-03	5 U	5.6E-03	4.5 U	3.1E-03	1.4E-02	5 U	2.2E-03	5 U	1.3E-03	4.5 U	1.4E-03	4.9E-03	2.0E-02
Pesticides															
alpha-BHC	0.06	6.7E-05	0.04 J	4.8E-05	0.023 J	1.6E-05	1.3E-04	0.11	4.8E-05	1.6	4.2E-04	0.17 J	5.4E-05	5.2E-04	1.1E-03
beta-BHC	0.25	2.8E-04	0.098	1.1E-04	0.048 J	3.3E-05	4.2E-04	0.086	3.7E-05	0.94	2.5E-04	0.05 JJ	1.6E-05	3.0E-04	7.6E-04
delta-BHC	0.045	5.0E-05	0.020 J	2.2E-05	0.050 U	3.4E-05	1.1E-04	0.045 U	2.0E-05	0.78	2.0E-04	0.05 U	1.6E-05	2.4E-04	3.9E-04
gamma-BHC (Lindane)	0.03 J	3.4E-05	0.045 U	5.0E-05	0.05 U	3.4E-05	1.2E-04	0.045 U	2.0E-05	0.05	1.3E-05	0.05 U	1.6E-05	4.9E-05	2.6E-04
Mirex	0.045 U	5.0E-05	0.045 U	5.0E-05	0.05 U	3.4E-05	1.3E-04	0.045 U	2.0E-05	0.045 U	1.2E-05	0.05 U	1.6E-05	4.7E-05	1.9E-04
Total Loading (lbs/day)		**0.35**		**0.14**		**0.27**	**0.8**		**2.2**		**6.9**		**2.4**	**11.5**	**15.6**

Notes:

J Estimated value.
BHC Benzene hexachloride.
U Non-detect at associated value.
(1) FR (flow rate) is the average flow rate for 2022 (total volume pumped for the year in gallons / 525,600 minutes).
(2) Bedrock groundwater concentrations are from the April 2022 sampling event.
(3) BEW706B has duplicate samples. Only the sample with the highest total organic site-specific indicator (SSI) concentration is represented here.

Table 3.6

Chemical Removal Summary
Buffalo Avenue Plant

	Amount of Organic Chemicals Removed																												
Unit	**1996 (lbs)**	**1997 (lbs)**	**1998 (lbs)**	**1999 (lbs)**	**2000 (lbs)**	**2001 (lbs)**	**2002 (lbs)**	**2003 (lbs)**	**2004 (lbs)**	**2005 (lbs)**	**2006 (lbs)**	**2007 (lbs)**	**2008 (lbs)**	**2009 (lbs)**	**2010 (lbs)**	**2011 (lbs)**	**2012 (lbs)**	**2013 (lbs)**	**2014 (lbs)**	**2015 (lbs)**	**2016 (lbs)**	**2017 (lbs)**	**2018 (lbs)**	**2019 (lbs)**	**2020 (lbs)**	**2021 (lbs)**	**2022 (lbs)**	**Cumulative (lbs)**	**(tons)**
Bedrock																													
D-zone Groundwater (1)	18,500	4,800	9,000	22,700	23,900	15,600	14,000	11,700	7,800	7,500	7,059	5,709	5,028	2,575	4,702	3,880	5,957	4,094	2,800	7 (5)	4,811	5,292	5,424	4,513	3,923	3,760	4,208	209,241	105
C-zone Groundwater (1)	3,600	1,500	1,600	1,100	1,200	700	900	700	700	700	504	402	176	297	177	238	356	311	389	466	396	459	446	384	260	256	277	18,492	9
B-zone Groundwater (1)	800	1,500	1,700	2,200	2,300	2,100	1,600	2,100	3,200	1,000	1,153	6,242	2,232	1,053	2,165	2,036	2,495	2,882	1,219	1,717	1,927	1,619	1,591	1,011	849	949	1,202	50,843	25
NAPL (2)	2,800	750	630	330	170	570	950	670	510	315	483	341	168	1,609	977	782	711	683	415	450	635	449	376	234	316	294	151	76,870 (3)	38
Overburden																													
Flow Zone 1 Groundwater (1)	- -	- -	- -	610	9,500	19,000	5,900	5,400	7,700	5,500	3,939	3,002	3,816	4,761	3,795	3,621	3,797	4,548	2,766	718 (5)	1,712	5,605	6,516	2,305	2,011	2,531	2,103	111,157	56
Flow Zone 3 Groundwater (1)	16	16	16	16	190	69	44	44	37	329	12	116	62	46	42	40	36	78	105	3 (5)	41	50	15	51	42	29	35	1,578	0.8
Abandoned Outfall 005	- -	- -	- -	- -	- -	- -	- -	13	110	73	19	105	62	5	2	1	10	2	5	0 (5)	25	20	20	51	8	1	2	532	0.3
Abandoned D-Area Sanitary Sewer	- -	- -	- -	- -	- -	- -	- -	- -	73	219	3	62	53	73	53	261	11	281	26	0.04 (5)	21	212	1	110	33	30	74	1,598	0.8
NAPL (2)	8,800	3,500	5,300	3,000	4,200	65	2,000	37	0	0	0	0	32	1,488	12	9	17	13	9	8	12	8	6	15	9	5	19	74,213 (4)	37
Total	**34,516**	**12,066**	**18,246**	**29,956**	**41,460**	**38,104**	**25,394**	**20,664**	**20,129**	**15,636**	**13,172**	**15,978**	**11,629**	**11,907**	**11,924**	**10,868**	**13,390**	**12,893**	**7,735**	**3,369 (5)**	**9,580**	**13,713**	**14,396**	**8,675**	**7,451**	**7,855**	**8,071**	**544,524**	**272**

Notes:

(1) Based on Total Organic SSI concentrations of the extracted groundwater.
(2) Assumes NAPL weight of 10.5 lbs/gallon.
(3) Includes NAPL collected from the A-wells since 1991.
(4) Includes NAPL collected from the EBDTS since 1984 and the 003 NAPL Collection Trench since 1995.
(5) Due to the oxidizer being down in 2015 (with air stripper bypass), only bedrock B-Zone wells, C-Zone wells BEW704C, BEW705C, and BEW706C, and overburden WW2 were fully operational. Organic chemical recovery was therefore much lower at other pumping wells.

Table 4.1

Summary of Bedrock NAPL Monitoring and Collection
Buffalo Avenue Plant

	Bedrock A-Wells				S-Area Bedrock Wells in the N-Area									
					Shallow						Intermediate		Deep	
	OW402A (gallons)	OW413A (gallons)	OW417A (gallons)	OW401B (gallons)	OW229 (gallons)	OW243 (gallons)	OW618 (gallons)	OW619 (gallons)	OW620 (gallons)	OW621 (gallons)	OW634 (gallons)	OW638 (gallons)	OW635 (gallons)	OW643 (gallons)
Total NAPL Recovered as of 2003	5,918	427	<30.2	-	-	-	-	-	-	-	-	-	-	-
Total NAPL Recovered in 2004	15	34	0	-	-	-	-	-	-	-	-	-	-	-
Total NAPL Recovered in 2005	15	15	0	-	-	-	-	-	-	-	-	-	-	-
Total NAPL Recovered in 2006	0	46	0	6.0	-	-	-	-	-	-	-	-	-	-
Total NAPL Recovered in 2007	15	14	3.5	0	-	-	-	-	-	-	-	-	-	-
Total NAPL Recovered in 2008	0	16	0	0	-	-	-	-	-	-	-	-	-	-
Total NAPL Recovered in 2009	28.5	14.5	4	0	3	22.5	2.5	-	-	5.75	-	3.75	-	68.75
Total NAPL Recovered in 2010	24.3	8.5	1	0	1	6.25	3.25	NR	ND	6	4	13	-	25.75
Total NAPL Recovered in 2011	22.75	2.25	1	0	3.75	4	1.5	NR	ND	2.5	1.5	10.75	6.25	18.25
Total NAPL Recovered in 2012	NR	NR	NR	ND	0.25	7.75	2.25	NR	ND	4.75	NR	28.75	2.5	21.5
Total NAPL Recovered in 2013	20.5	1.25	NR	NR	1.5	6.5	1.5	NR	NR	2.5	NR	17	NR	14.3
Total NAPL Recovered in 2014	16.5	NR	0.1	NR	0.25	0.75	1.6	NR	NR	0.15	NR	6.75	NR	13.45
Total NAPL Recovered in 2015	19.0	NR	NR	NR	0.35	0.75	1.5	NR	NR	1.75	NR	2.75	NR	16.75
Total NAPL Recovered in 2016	16.5	1.5	1	NR	0.5	1.75	2.5	NR	NR	0.75	NR	13.75	NR	22.25
Total NAPL Recovered in 2017	14.0	NR	NR	NR	NR	NR	1	NR	NR	3.5	NR	13.25	NR	11
Total NAPL Recovered in 2018	12.5	NR	NR	NR	NR	1.25	0.6	NR	NR	1.25	NR	14.25	NR	6
Total NAPL Recovered in 2019	10.0	NR	NR	NR	0.5	2.2	0.1	NR	NR	0.6	NR	1.45	NR	7.45
Total NAPL Recovered in 2020	6.5	NR	NR	NR	NR	2.5	2.3	NR	NR	NR	NR	8.75	NR	10
Total NAPL Recovered in 2021	6.0	1.25	NR	NR	0.2	0.7	0.6	NR	NR	4.25	NR	9.75	NR	5.25
Total NAPL Recovered in 2022	NR	NR	NR	NR	1.35	4.6	NR	NR	NR	3.1	NR	4.95	NR	0.4
Cumulative Volume Recovered (as of December 31, 2022)	**6,160**	**580**	**<41**	**6**	**11**	**62**	**21**	**0**	**0**	**30**	**6**	**149**	**9**	**241**
Current Monitoring Frequency	annually	annually	annually	annually	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly
Proposed 2023 Monitoring Frequency	annually	annually	annually	annually	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly

Notes:

- \- Not checked per schedule.
- ND Not Detected
- NR Not recoverable

Table 5.1

Overburden Average Flow Rate Summary
Buffalo Avenue Plant

Flow Zone 1

System Component	Month												Annual
	Jan-22 (gpm)	Feb-22 (gpm)	Mar-22 (gpm)	Apr-22 (gpm)	May-22 (gpm)	Jun-22 (gpm)	Jul-22 (gpm)	Aug-22 (gpm)	Sep-22 (gpm)	Oct-22 (gpm)	Nov-22 (gpm)	Dec-22 (gpm)	Average (gpm)
Wet Well 1	16.8	19.7	19.5	52.3	52.3	50.6	46.0	52.3	37.9	40.0	52.3	51.4	40.9
Wet Well 2	0.7	0.7	0.4	0.3	0.4	3.9	0.5	0.9	0.9	1.4	1.7	0.9	1.1
Total	17.5	20.4	19.9	52.8	54.5	53.3	53.2	38.8	46.2	53.2	38.8	46.2	41.2
Operating Time													
Wet Well 1	51.3%	98.0%	99.8%	88.2%	89.0%	98.0%	86.0%	99.8%	80.6%	97.6%	88.6%	69.4%	87.2%
Wet Well 2	51.3%	98.0%	99.7%	88.2%	89.0%	98.0%	86.0%	99.8%	80.6%	97.6%	88.6%	69.4%	87.2%

Total Volume Extracted in 2022 = 18,250,000 gallons

System Component

Flow Zone 3	Month												Annual
	Jan-22 (gpm)	Feb-22 (gpm)	Mar-22 (gpm)	Apr-22 (gpm)	May-22 (gpm)	Jun-22 (gpm)	Jul-22 (gpm)	Aug-22 (gpm)	Sep-22 (gpm)	Oct-22 (gpm)	Nov-22 (gpm)	Dec-22 (gpm)	Average (gpm)
WWB	4.6	11.9	6.9	5.3	6.6	5.1	3.2	5.2	6.8	8.1	8.4	4.3	6.4
Abandoned Outfall 005													
MH159L	0.9	2.0	2.0	2.6	3.0	3.7	3.2	3.9	3.0	3.6	3.4	3.0	2.9
Abandoned D-Area Sanitary Sewer													
MH301	2.5	14.2	10.0	3.0	4.1	4.1	2.3	3.8	4.7	2.3	3.8	2.2	4.8

Notes:

GPM Gallons per minute.

Table 5.2

Overburden Groundwater Chemical Monitoring Parameters
Buffalo Avenue Plant

Parameters	Units	Method Detection Level
1,2,3,4-Tetrachlorobenzene	µg/L	5
1,2,4,5-Tetrachlorobenzene	µg/L	5
1,2,4-Trichlorobenzene	µg/L	1
1,2-Dichlorobenzene	µg/L	1
1,3-Dichlorobenzene	µg/L	1
1,4-Dichlorobenzene	µg/L	1
2,4,5-Trichlorophenol	µg/L	10
2,4/2,5/2,6-Dichlorotoluene	µg/L	1
2-Chlorotoluene	µg/L	1
3,4-Dichlorobenzotrifluoride	µg/L	1
4-Chlorotoluene	µg/L	1
alpha-BHC	µg/L	0.05
Benzene	µg/L	1
Chlorobenzene	µg/L	1
Mercury(1)	µg/L	0.4
o-Monochlorobenzotrifluoride	µg/L	1
p-Monochlorobenzotrifluoride	µg/L	1
Tetrachloroethene	µg/L	1
Toluene	µg/L	1
Trichloroethene	µg/L	1

Note:

(1) Groundwater samples collected from monitoring wells OW304, OW305, OW306, and OW574 are analyzed for mercury, in addition to remaining parameters

Table 5.3

Select Perimeter Well Overburden Groundwater Elevation Summary
Buffalo Avenue Plant

Well	Historic (1) (ft AMSL)	Jan-10, 2000 (ft AMSL)	Jan-01, 2001 (ft AMSL)	Oct-03, 2001 (ft AMSL)	Sep-19, 2002 (ft AMSL)	Nov-12, 2003 (ft AMSL)	Aug-16, 2004 (ft AMSL)	Sep-21, 2005 (ft AMSL)	Sep-26, 2006 (ft. AMSL)	Sep-28, 2007 (ft. AMSL)	Sep-26, 2008 (ft. AMSL)	Sep-18, 2009 (ft. AMSL)
BH4-88	566.42	566.36	(2)	566.3	566.59	571.42	566.49	566.46	567.85	566.63	567.14	566.14
OW310	570.67	570.32	570.94	572.24	570.14	571.74	571.22	570.68	572.18	570.07	570.51	570.65
WS23A	570.85	FLOODED	BURIED (3)	565.52	NM	NM	570.81	570.96	571.11	570.35	570.54	570.67
WS111R (4)	NM	PAVED	BURIED	BURIED	567.98	NM	569.06	568.61	NM	NM	NM	568.25
BH1B-88	565.24	565.30	570.44	DESTROYED	565.43	565.37	565.39	565.40	565.48	563.86	565.27	565.28
OW557	567.17	568.16	565.52	565.72	565.12	567.70	567.67	567.67	567.68	566.69	567.13	566.40
WS25A	570.14	BURIED	BURIED	554.25	567.33	BURIED	569.51	569.52	569.50	568.97	569.19	570.02
OW306	567.32	FLOODED	565.15	567.23	566.84	568.49	568.67	569.13	569.65	568.86	569.18	568.39
OW305	570.04	FLOODED	564.37	568.81	568.55	570.54	570.56	570.30	570.55	569.18	569.55	569.57
OW317	570.35	563.92	570.2	569.77	569.20	569.97	570.07	570.25	570.45	568.95	569.72	570.25
OW559	FLOODED	569.65	FLOODED	564.48	562.18	569.30	FLOODED	568.53	568.48	567.42	567.96	568.17
OW573 (5)	NA	563.75	567.7	563.97	564.10	DESTROYED	566.27	566.32	568.62	564.81	565.24	566.24
OW304	568.09	569.09	GRAVEL	564.43	564.40	567.22	567.53	567.54	568.30	567.25	567.50	566.90
OW303	567.17	NM	562.37	566.65	564.37	568.93	568.32	568.94	569.02	567.71	568.65	567.21
WS122	565.79	FLOODED	FLOODED	569.67	566.59	569.73	569.84	570.97	570.67	570.77	570.67	Flooded
OW302	565.36	565.00	563.46	564.24	565.08	567.98	564.12	565.28	565.53	565.21	564.52	565.69
OW327	566.98	PAVED	DRY	569.56	567.32	568.56	568.82	568.64	568.55	568.62	568.65	569.20
OWG8	569.13	569.71	569.53	569.81	569.41	569.59	569.77	569.56	569.66	569.56	569.67	569.74
OW574	NA	NA	NA	NA	567.86	567.87	567.98	567.77	568.76	567.75	567.94	567.75
OW558	NA	NA	NA	NA	NA	569.48	569.42	569.36	569.36	NM	568.76	568.82
OW578	NA	NA	NA	NA	NA	569.13	569.37	571.61	NM	571.61	571.41	569.53

Notes:

(1) Historic water levels were measured in June 1992.
(2) Truck trailer parked over well. Water level could not be taken.
(3) Well was located and uncovered in March 2001.
(4) Well WS111 was replaced by WS111R on June 6, 2002.
(5) Well OW573 was replaced by OW573R on June 29, 2004
(6) Well OWG8 was barricaded with red tape and a measurement could not be taken
(7) Well paved over.
NM Not measured. Could not locate well.
NA Not available since well was not part of the program.

Table 5.3

Select Perimeter Well Overburden Groundwater Elevation Summary
Buffalo Avenue Plant

Well	Sep-17, 2010 (ft. AMSL)	Sep-29, 2011 (ft. AMSL)	Sep-13, 2012 (ft. AMSL)	Sep-10, 2013 (ft. AMSL)	Dec-05, 2014 (ft. AMSL)	Sep-04, 2015 (ft. AMSL)	Sep-16, 2016 (ft. AMSL)	Sep-11, 2017 (ft. AMSL)	Sep-13, 2018 (ft. AMSL)	Sep-6, 2019 (ft. AMSL)	Sep-4, 2020 (ft. AMSL)	Sep-7, 2021 (ft. AMSL)	Sep-9, 2022 (ft. AMSL)
BH4-88	566.33	566.54	566.50	565.70	566.62	566.62	566.24	566.25	566.10	566.14	567.68	567.53	569.78
OW310	571.17	571.21	571.31	570.95	570.82	570.56	570.61	570.86	571.05	570.94	570.38	570.51	570.80
WS23A	572.09	571.57	571.04	571.51	571.06	570.53	570.54	570.78	570.90	570.72	570.11	570.41	570.96
WS111R (4)	568.81	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)
BH1B-88	565.95	565.51	565.55	565.70	565.47	565.34	565.30	565.43	565.41	565.47	565.43	565.44	565.45
OW557	566.08	566.80	566.73	566.40	568.00	566.02	565.41	566.78	566.27	566.61	564.56	566.10	566.83
WS25A	558.98	568.17	559.16	555.87	569.54	568.89	569.01	569.55	569.81	569.6	568.93	569.07	569.65
OW306	568.93	569.02	569.42	569.15	568.76	567.88	567.59	568.36	568.84	568.67	567.75	567.87	569.07
OW305	569.75	570.42	570.39	570.08	570.47	569.44	568.59	570.18	569.94	570.22	568.14	569.29	569.93
OW317	570.24	570.63	570.78	570.44	571.11	570.18	569.89	570.76	570.91	570.78	569.65	565.76	570.87
OW559	567.01	569.30	569.30	569.15	568.73	569.46	562.23	569.03	562.71	565.79	562.33	565.76	568.11
OW573 (5)	565.59	567.00	567.63	566.60	567.22	566.02	Dry	566.33	565.29	566.49	563.74	565.76	570.72
OW304	566.67	568.81	567.92	567.27	567.92	566.73	565.37	567.52	566.82	567.83	565.56	566.29	566.54
OW303	567.1	569.40	568.83	567.90	569.15	566.50	566.26	570.25	568.69	569	567.61	567.69	568.13
WS122	570.6	567.07	570.51	568.26	567.71	570.96	570.05	570.03	570.35	571.49	570.68	570.25	570.54
OW302	567.44	565.20	564.95	565.05	565.12	564.96	565.00	565.06	565.19	565.08	564.88	564.94	565.04
OW327	567.81	568.97	568.82	569.06	569.28	568.82	568.52	568.82	568.65	568.52	568.52	568.60	568.76
OWG8	(6)	569.83	569.79	569.59	569.84	569.74	569.73	569.93	569.79	569.88	569.56	569.88	569.58
OW574	567.69	567.98	567.99	567.60	567.69	567.54	567.48	567.75	567.72	567.72	567.48	567.53	567.70
OW558	568.37	569.79	569.25	569.38	569.77	569.44	568.02	569.55	568.90	569.36	567.21	569.12	569.34
OW578	569.48	569.63	569.27	569.18	569.76	569.02	569.03	569.33	569.22	569.48	568.58	568.86	569.47

Notes:

(1) Historic water levels were measured in June 1992.
(2) Truck trailer parked over well. Water level could not be taken.
(3) Well was located and uncovered in March 2001.
(4) Well WS111 was replaced by WS111R on June 6, 2002.
(5) Well OW573 was replaced by OW573R on June 29, 2004
(6) Well OWG8 was barricaded with red tape and a measurement could not be taken
(7) Well paved over.
NM Not measured. Could not locate well.
NA Not available since well was not part of the program.

Table 5.4

Comparison of Pre- and Post-Pumping
Total Organic SSI Chemical Concentrations in Overburden Monitoring and Wet Wells
Buffalo Avenue Plant

Well	Total Organic SSI Concentration (µg/L) (1)																							
	Historic (2)	Sep/Oct 99	Sep 00	Oct 01	Sep 02	Sep/Oct 03	Sep-Dec 04	Sep 05	Oct 06	May 07	May 08	Jun 09	Apr/Jun 10	Jun 11	May 12	May 13	May 14	May 15	May 16	Jun 17	May 18	June 19	June 20	May 21	July 22
Flow Zone 1																									
OW270	15,000	3,500	9,300	8,200	4,100	7,300 (6)	5,485	5,173	8,530	1,186	1,234	1,028	487	404 (9)	621 (9)	1,303 (9)	351 (9)	1,097 (9)	1,146 (9)	594 (9)	462 (9)	519 (9)	951 (9)	906 (9)	977 (9)
OW273	23,000	7,500	5,100	4,200	1,100	ND	206	779	DRY	28	112	1,940	2,428 (9)	1,664	2,705	2,683	560	1,734	354	58	663	68	2,088	2,904	1,892
OW300	82,000	23,000	94,000	5,600	7,100	3,000	2,562	394	1,866	1,397	1,415	5,204	17,282 (9)	21,132	25,345	8,995	12,310	14,090	19,938	15,534	14,991	12,480	9,370	7,791	9,041
OW314	24,000	34,000	50,000	45,000	48,000	2,000	22,220	8,875	756	632	4,945	20,341	14,069	10,204	12,135	37,379	24,884	28,292	37,478	11,365	21,834	17,644	26,892	78,662	23,511
OW537	NA	NP	94,000	25,000 (4)	60,000	47,500	58,376	59,083	47,495	33,405	49,739	57,536	56,898	54,549	67,668	71,195	71,206	73,148	65,259	72,070	62,121 (9)	75,238 (9)	76,595 (9)	68,292 (9)	71,072 (9)
OW565	NA	37,000	76,000	33,000	14,000	1,400	381	526	151	8.5	10,622	14,400	17,054	31,737	23,748	18,059	4,597	14,251	11,762	23,295	12,696	10,266	11,121	10,919	23,877
OW567	NA	208,000	237,000	DRY	NM	DRY	218,056	337,004	6,661	8,536	DRY	52,389	157,278 (9)	15,516	139,472	333,829	64,698	128,215	91,125	148,722	85,828	58,389	145,174	94,000	89,843
Flow Zone 3																									
OW553	ND	0.09	0.05	0.01	DRY	DRY	2.3	1.2	1.5	0.34	0.19	0.03	0.63	0.59	0.52	0.56	0.22	ND	ND	0.72	0.84	0.28	0.34	1	ND
OW554	1,500	2,000	1,700	1,030	DRY	1,600	174	1,498	81	183	338	659	270	773	DRY	457	155	65	77	132	164	69	289	90	953
OW555	1.0	5.0	2.0	DRY	DRY	DRY	2.0	DRY	0.45	0.50	0.38	0.05	ND	0.23	0.32	0.28	ND	ND	13	0.43	ND	ND	0.6	ND	0.3
OW556	ND	NP	NP	NP	DRY	DRY	ND	ND	ND	ND	ND	0.81	ND	ND	ND	0.4	ND	ND	ND	ND	ND	0.11	0.75	ND	ND
Other Areas																									
OW303	3.0	3.0	2.0	4.9	DRY	ND	0.06	0.03	0.04	0.10	0.05	0.03	0.07	ND	ND	DRY	0.37	ND	ND	ND	ND	0.033	ND	0.02	3.9
OW304	12,000	14,000	7,500	1,900	7,300	60	2,809	92	149	53	262	1,439	1,167	50	1,360	1,613	70	4,108	1,115	1,996	2,189	1,972	1,220 (9)	108 (9)	547 (9)
OW310	460	82	55	0.04	62 (5)	DRY	2.1	DRY	DRY	DRY	0.29	1.3	6.8	4.4	4.9	3.9	1.0	1.0	0.31	0.43	0.37	0.47	ND	0.3	3.5
OW557	4,600	ND	ND	3.0	DRY	ND	ND	0.23	ND	ND	ND	0.03	ND	ND	ND	DRY	ND	ND	ND	ND	0.25	ND	0.56	ND	0.2
OW558	6.0	2.0	ND	0.01	DRY	ND	0.16	0.74	1.3	0.47	ND	0.05	0.16	0.22	0.28	0.57	ND	ND	2.3	0.23	ND	0.5	0.50	ND	0.3
OW559	45	410	44	DRY	DRY	DRY	48	ND	ND	43	10	23	4.6	1.4	0.47	0.22	3.7	1.4	2.5	4.1	ND	17	ND	ND	0.3
OW560	ND	ND	ND	ND	1.4	34	5.0	ND	ND	ND	ND	0.03	0.14	ND	2.8	0.22	ND	ND	7.3	ND	0.22	9.5	ND	0.2	0.7
OW573R (7)	NA	NP	1.1	2.4	DRY	11 (8)	1.4	0.66	1.2	0.23	0.03	17	0.05	ND	ND	0.83	ND	ND	1.5	ND	ND	ND	ND	ND	ND
Wet Wells																									
WW1	106,000	18,000	114,000	110,000	41,000	41,700	55,221	42,871	32,741	36,737	39,786	40,380	33,571	34,759	42,595	40,555	37,399	36,227	16,851	26,054	27,739	33,125	36,084	24,511	14,405
WW2	NA	11,000	24,000	14,000	72,000	6,100	9,978	9,543	8,391	6,419	8,356	9,545	8,915	8,593	7,584	9,638	24,154	21,264	5,237	1,423	2,759	12,031	6,559	10,984	6,526
WWB	75	360	4,400	1,600	1,000	1,000	1,412	14,494	501	6,128	3,154	2,980	1,294	1,401	1,797	2,383	4,292	1,199	2,004	1,481	704	1,824	1,406	1,133	1,487
MH159L	NA	NA	447 (3)	NM	NM	NM	5,063	4,827	1,077	5,431	3,422	682	63	60 (9)	884	270	751	1,227	2,319	1,306	1,588	3,982	812	72	118
MH301	NP	NP	NP	NP	NP	NP	7,927	39,794	241	6,472	6,034	12,235	5,015	19,317	3,001	18,630	5,118	149	3,532	16,216	175	6,773	1,841	1,899	2,461

Notes:

(1) Total organic SSI parameters for overburden groundwater are listed in Table 5.2.
(2) Historic data from second round SSI program or second round OSI program.
(3) Total organic SSI concentrations are from the December 2000 sampling event.
(4) OW537 was sampled on January 25, 2002.
(5) OW310 was sampled on March 27, 2003.
(6) Duplicate for OW270 was not used in calculation as the detection limits were elevated due to matrix interference.
(7) OW573 was reinstalled as OW573R on June 29, 2004.
(8) OW573R was sampled on July 30, 2004 after it was reinstalled.
(9) Duplicate samples, results were averaged
NP Not part of program at time of sampling.
NM Not measured.
ND Not detected (ND's were assumed to be zero).
NA Not applicable. Historic analytical data were not collected as the well was not installed at that time.
DRY Well was dry. No sample was collected.

Table 5.5

Overburden Groundwater Chemical Loading Summary
Buffalo Avenue Plant

Well No.:	WW1		WW2		WWB		MH159L		MH301		
	Flow Rate (1)=	32.4	Flow Rate (1)=	1.0	Flow Rate (1)=	5.3	Flow Rate (1)=	2.8	Flow Rate (1)=	6.8	
Parameter	**Conc. (2) (µg/L)**	**Loading (lbs/d)**	**Conc. (2) (µg/L)**	**Loading (lbs/d)**	**Conc. (2) (µg/L)**	**Loading (lbs/d)**	**Conc. (2) (µg/L)**	**Loading (lbs/d)**	**Conc. (2) (µg/L)**	**Loading (lbs/d)**	**Total Loading (lbs/d)**
Volatile Organic Compounds											
1,2,4-Trichlorobenzene	64 J	2.5E-02	130	1.5E-03	14	9.0E-04	2.7	9.2E-05	13.0	1.1E-03	**2.8E-02**
1,2-Dichlorobenzene	80 J	3.1E-02	38	4.4E-04	14	9.0E-04	0.88 J	3.0E-05	17	1.4E-03	**3.4E-02**
1,3-Dichlorobenzene	87 J	3.4E-02	25 J	2.9E-04	17	1.1E-03	28	9.5E-04	8.5 J	6.9E-04	**3.7E-02**
1,4-Dichlorobenzene	290	1.1E-01	55	6.4E-04	32	2.0E-03	31	1.1E-03	20	1.6E-03	**1.2E-01**
2,4/2,5/2,6-Dichlorotoluene	74 J	2.9E-02	130	1.5E-03	27	1.7E-03	6.6	2.2E-04	18	1.5E-03	**3.4E-02**
2-Chlorotoluene	7400	2.9E+00	2300	2.7E-02	35	2.2E-03	1.1	3.7E-05	45	3.7E-03	**2.9E+00**
3,4-Dichlorobenzotrifluoride	100 U	3.9E-02	25.0 U	2.9E-04	16	1.0E-03	1.0 U	3.4E-05	33	2.7E-03	**4.3E-02**
4-Chlorotoluene	1300	5.1E-01	1400	1.6E-02	18	1.2E-03	0.55 J	1.9E-05	18	1.5E-03	**5.2E-01**
Benzene	160	6.2E-02	38	4.4E-04	5 J	3.1E-04	4.3	1.5E-04	4.1 J	3.3E-04	**6.4E-02**
Chlorobenzene	190	7.4E-02	77	8.9E-04	46	2.9E-03	7.8	2.7E-04	38.0	3.1E-03	**8.1E-02**
o-Monochlorobenzotrifluoride	100 U	3.9E-02	25.0 U	2.9E-04	280	1.8E-02	1.0 U	3.4E-05	530	4.3E-02	**1.0E-01**
p-Monochlorobenzotrifluoride	2100	8.2E-01	25 U	2.9E-04	700	4.5E-02	2.5	8.5E-05	1300	1.1E-01	**9.7E-01**
Tetrachloroethene	1400	5.5E-01	1400	1.6E-02	150	9.6E-03	0.3 J	8.5E-06	240	2.0E-02	**5.9E-01**
Toluene	240	9.3E-02	140	1.6E-03	23	1.5E-03	1.0 U	3.4E-05	27.0	2.2E-03	**9.9E-02**
Trichloroethene	1000	3.9E-01	780	9.0E-03	110	7.0E-03	0.2 J	7.1E-06	150	1.2E-02	**4.2E-01**
Semi-volatile Organic Compounds											
1,2,3,4-Tetrachlorobenzene	9.4	3.7E-03	4.8 J	5.5E-05	4.5 U	2.9E-04	5.7 J	1.9E-04	4.5 U	3.7E-04	**4.6E-03**
1,2,4,5-Tetrachlorobenzene	4.7 J	1.8E-03	5.9 J	6.8E-05	8.9 U	5.7E-04	8.9 U	3.0E-04	8.9 U	7.3E-04	**3.5E-03**
2,4,5-Trichlorophenol	1.8 J	7.0E-04	2.6 J	0.0E+00	8.9 U	5.7E-04	8.9 U	3.0E-04	8.9 U	7.3E-04	**2.3E-03**
Pesticides											
alpha-BHC	3.7	1.4E-03	0.045 U	5.2E-07	1.600	1.0E-04	26	8.8E-04	0.089	7.3E-06	**2.4E-03**
Total Loading (lbs/d)		**5.7**		**7.6E-02**		**0.10**		**4.7E-03**		**2.03E-01**	**6.1**

Notes:

(1) Flow rate is the average flow rate for 2022 (total volume pumped for the year in gallons / 525,600 minutes)
(2) Overburden groundwater concentrations are from the July 2022 sampling event
BHC Benzene hexachloride
J Estimated value
U Non-detect at associated value
R Sample rejected

Table 5.6

Summary of Sanitary Sewer Monitoring Data
Buffalo Avenue Plant

2022 Summary Sample Date ------>		12/08/21 1st Quarter 22 ppb	lb/D		3/9/2022 2nd Quart 22 ppb	lb/D		6/2/2022 3rd Quart 22 ppb	lb/D		9/8/2022 4th Quart 21 ppb	lb/D		Annual Average ppb	lb/D	Annual Avg Limit lb/D	Daily Max Limit lb/D	# = exceedence MS1 & MS2 Avg Total lb/D	Limit lb/D	Quarterly MS1 & MS2 Sum Total 1st Q lb/D	Total 2nd Q lb/D	Total 3rd Q lb/D	Total 4th Q lb/D	Limit lb/D
MS#1 47th St.																								
FLOW (MGD)		0.081			0.247			0.076			0.021													
Volatiles																								
Carbon Tetrachloride	<	0.34	0.0000	<	0.3	0.0000	<	0.3	0.0000	<	0.34	0.0000	<	0.3	0.00			0.00	1.96	0.00	0.00	0.00	0.00	4.90
Chlorodibromomethane	<	0.2	0.0000	<	0.2	0.0000	<	0.2	0.0000		0.278	0.0000		0.1	0.00			0.00	0.75	0.00	0.00	0.00	0.00	1.88
Dichlorobromomethane		0.225	0.0002		0.3	0.0007		0.4	0.0002		1	0.0001		0.4	0.00			0.00	0.66	0.00	0.00	0.00	0.00	1.65
Chloroform		1.63	0.0011		2.37	0.0049		2.0	0.0013		1.97	0.0003		2.0	0.00			0.02	1.68	0.01	0.02	0.02	0.01	4.20
Bromoform	<	0.25	0.0000	<	0.3	0.0000	<	0.3	0.0000	<	0.25	0.0000	<	0.25	0.00			0.00	1.74	0.00	0.00	0.00	0.00	4.35
Ethylbenzene	<	0.2	0.0000	<	0.2	0.0000	<	0.2	0.0000	<	0.2	0.0000	<	0.2	0.00	0.9	2.25							
Tetrachloroethylene		2.23	0.0015		3.1	0.0064		2.4	0.0015		2.14	0.0004		2.5	0.00			0.15	3.76	0.2	0.2	0.1	0.1	6.0
Toluene		2.77	0.0019		6.9	0.0142		1.3	0.0008		1.12	0.0002		3.0	0.00			0.01	3.63	0.01	0.02	0.01	0.00	18.20
Monochlorotoluenes		52	0.0349		102.664	0.2115		8.2	0.0052		4.994	0.0009		42	0.06			0.08	27.0	0.0	0.2	0.0	0.0	45.0
Base Neut.Extractables																								
Dichlorobenzenes		5.854	0.0040		9.12	0.0188		6.08	0.0039		3.0	0.0005		6.0	0.01			0.13	1.00	0.05	0.13	0.22	0.14	1.80
Dichlorotoluene		7.35	0.0050		14.7	0.0303		43.75	0.0277		13.4	0.0023		19.8	0.02			0.03	5.0	0.01	0.04	0.0	0.01	7.0
Trichlorobenzene		0.758	0.0005		2.113	0.0044		3.12	0.0020		4.268	0.0007		2.6	0.00			0.04	3.55	0.03	0.05	0.06	0.01	17.75
Trichlorotoluene		1.8	0.0012		3.7	0.0076		25	0.0158		9.47	0.0017		10.0	0.01			0.01	1.97	0.0	0.0	0.0	0.0	5.0
Tetrachlorobenzene	<	2.7	0.0000	<	2.7	0.0000	<	2.7	0.0000	<	2.7	0.0000	<	2.7	0.00			0.01	1.55	0.00	0.02	0.03	0.01	3.96
Hexachlorobenzene	<	1.6	0.0000	<	1.6	0.0000	<	1.6	0.0000	<	1.6	0.0000	<	1.6	0.00	0.0043	0.025							
Trichlorophenol	<	2.5	0.0000	<	2.5	0.0000	<	2.5	0.0000	<	2.5	0.0000	<	2.5	0.00			0.05	1.60	0.04	0.11	0.03	0.01	2.25
Phenols, Total (mg/L)	<	0.0029	0.0000	<	0.0029	0.0000	<	0.003	0.0000		0.0062	0.0011		0.002	0.00			0.02	2.12	0.0	0.0	0.0	0.0	3.0
Pesticides																								
Hexachlorocyclohexane		0.1905	0.0001		0.9751	0.0020		0.4	0.0003		0.3	0.0001		0.466	0.00			0.01	0.19	0.0	0.0	0.0	0.0	1.0
alpha-BHC		0.0325	0.0000		0.0441	0.0001		0.1	0.0001		0.2	0.0000		**										
beta-BHC		0.158	0.0001		0.931	0.0019		0.2	0.0001	<	0.0	0.0000		**										
delta-BHC	<	0.02	0.0000	<	0.02	0.0000	<	0.0	0.0000	<	0.0	0.0000	<	**										
gamma-BHC (lindane)	<	0.02	0.0000	<	0.02	0.0000		0.0	0.0000		0.1	0.0000		**										
Endosulfan I & II	<	0.04	0.0000		0.12	0.0002	<	0.0	0.0000	<	0.04	0.0000		0.030	0.00			*	*	*	*	*	*	*
Endosulfan Sulfate	<	0.02	0.0000	<	0.02	0.0000	<	0.02	0.0000	<	0.02	0.0000	<	0.020	0.00			*	*	*	*	*	*	*
sum of Endo I + II + Sulfates	<	0.060	0.0000		0.12	0.0002	<	0.06	0.0000	<	0.06	0.0000		0.050	0.00			0.00	0.42	0.00	0.00	0.00	0.00	1.0
Dechlorane Plus	<	0.025	0.0000		0.371	0.0008		0.0718	0.0000	<	0.025	0.0000		0.1	0.00			0.00	0.51	0.00	0.00	0.00	0.00	0.80
Metals																								
Cadmium	<	0.7	0.0000	<	0.7	0.0000	<	0.7	0.0000	<	1	0.0000	<	0.70	0.00			0.00	0.37	0.00	0.00	0.00	0.00	0.93
Chromium	<	1	0.0000		4	0.0082		2	0.0013		2	0.0004		2.0	0.00			0.02	2.48	0.02	0.03	0.01	0.01	6.20
Copper		3	0.0020		399	0.8219		9	0.0057		11	0.0019		105.5	0.21	19.67	49.18							
Mercury	<	0.08	0.0000	<	0.4	0.0000		0.18	0.0001		0.1	0.0000		0.07	0.00			0.00	0.01	0.00	0.00	0.00	0.00	0.25
Nickel	<	3	0.0000		22	0.0453	<	3	0.0000	<	3	0.0000		5.5	0.01			0.01	10.3	0.0	0.0	0.0	0.0	25.8
Zinc		14	0.0095		44	0.0906		43	0.0273		16	0.0028		29.3	0.03			0.23	30.00	0.3	0.3	0.2	0.1	55.0
MS#2 Iroquois St.																								
FLOW (MGD)		0.726			0.726			0.500			0.477													
Volatiles																								
Benzene		0.5	0.0029		1.1	0.0067		1.6	0.0067		1.9	0.0076		1.3	0.01	0.95	2.38							
Carbon Tetrachloride		0.5	0.0031	<	0.3	0.0000		0.5	0.0019		0.4	0.0015		0.3	0.00									
Chlorodibromomethane	<	0.2	0.0000	<	0.2	0.0000	<	0.2	0.0000	<	0.2	0.0000	<	0.2	0.00									
Dichlorobromomethane		0.3	0.0015	<	0.2	0.0000		0.5	0.0019		0.348	0.0014		0.3	0.00									
Monochlorobenzene		1.5	0.0089		5.16	0.0312		11.2	0.0467		8.09	0.0322		6.5	0.03	1.07	3.30							

Table 5.6

Summary of Sanitary Sewer Monitoring Data
Buffalo Avenue Plant

2022 Summary Sample Date ------>	12/08/21 1st Quarter 22 ppb	lb/D	3/9/2022 2nd Quart 22 ppb	lb/D	6/2/2022 3rd Quart 22 ppb	lb/D	9/8/2022 4th Quart 21 ppb	lb/D	Annual Average ppb	lb/D	Annual Avg Limit lb/D	Daily Max Limit lb/D	# = exceedence MS1 & MS2 Avg Total lb/D	Limit lb/D	Quarterly MS1 & MS2 Sum Total 1st Q lb/D	Total 2nd Q lb/D	Total 3rd Q lb/D	Total 4th Q lb/D	Limit lb/D
Volatiles (cont'd)																			
Chloroform	2.2	0.0132	2.15	0.0130	4.1	0.0172	2.47	0.0098	2.7	0.01									
Bromoform	< 0.3	0.0000	< 0.25	0.0000	< 0.3	0.0000	< 0.25	0.0000	< 0.3	0.00									
Tetrachloroethylene	39.2	0.2373	30.6	0.1853	16.1	0.0671	23.4	0.0931	27.3	0.15									
Toluene	0.796	0.0048	0.676	0.0041	1.5	0.0063	0.644	0.0026	0.9	0.00									
Trichloroethylene	4.24	0.0257	5.19	0.0314	5.4	0.0226	4.07	0.0162	4.7	0.02	10.0	15.0							
Monochlorotoluenes	2.0	0.0120	4.28	0.0259	5.0	0.021	4.775	0.0190	4.0	0.02									
Monochlorobenzotriflouride	10.5	0.0634	33.47	0.2027	7.0	0.0291	9.927	0.0395	15.2	0.08	7.81	19.52							
Dichloroethylenes 1,2	10.1	0.0612	15.0	0.0908	8.2	0.0344	9.86	0.0392	10.8	0.06	3.37	6.74							
Dichloroethylenes 1,1	< 0.2	0.0000	0.3	0.0019	< 0.2	0.0000	0.292	0.0012	0.2	0.00	1.00	3.37							
Vinyl chloride	0.8	0.0046	0.9	0.0056	1.3	0.0055	1.74	0.0069	1.2	0.01	1.16	1.50							
Base Neut.Extractables																			
Dichlorobenzenes	8.4	0.0506	17.68	0.1070	52.1	0.2174	33.9	0.1350	28.0	0.13									
Dichlorotoluene	1.5	0.0088	2.1	0.0127	4.023	0.0168	2.3	0.0091	2.5	0.01									
Trichlorobenzene	4.1	0.0245	7.6	0.0462	14.517	0.0605	2.916	0.0116	7.3	0.04									
Trichlorotoluene	< 1.3	0.0000	< 1.3	0.0000	3.0	0.0126	1.942	0.0077	1.2	0.01									
Hexachlorobutadiene	< 1.0	0.0000	< 1	0.0000	< 1	0.0000	< 1	0.0000	< 1.0	0.00	0.34	1.0							
Tetrachlorobenzene	< 2.7	0.0000	3.47	0.0210	6.09	0.0254	2.15	0.0086	2.9	0.01									
Hexachlorocyclopentadiene	< 2.2	0.0000	< 2.2	0.0000	< 2.2	0.0000	< 2.2	0.0000	< 2.2	0.00	0.42	1.0							
Dichlorobenzotriflouride	4.7	0.0286	11.3	0.0682	4.76	0.0198	6.842	0.0272	6.9	0.04	0.56	5.0							
Fluoranthene	< 1.5	0.0000	< 1.5	0.0000	< 1.5	0.0000	< 1.5	0.0000	< 1.5	0.00	0.42	1.0							
Trichlorophenol	6.9	0.0418	18.5	0.1120	6.95	0.0290	1.82	0.0072	8.5	0.05									
Phenols, Total (mg/L)	< 0.0	0.0000	0	0.0279	0.0089	0.0371	0.01	0.0290	0.0	0.02									
Pesticides																			
Hexachlorocyclohexane	0.7	0.0041	1.017	0.0062	0.9	0.0036	1.0	0.0041	0.90	0.00									
alpha-BHC	0.1	0.0006	0.12	0.0007	0.3	0.0013	0.2	0.0007	**										
beta-BHC	0.3	0.0017	0.377	0.0023	0.2	0.0010	0.5	0.0019	**										
delta-BHC	0.3	0.0016	0.396	0.0024	0.2	0.0009	0.3	0.0012	**										
gamma-BHC (lindane)	0.0	0.0002	0.124	0.0008	0.1	0.0005	0.1	0.0003	**										
PCB's	< 4	0.0000	< 4.00	0.0000	< 4.0	0.0000	< 4	0.0000	< 4.00	0.00	0.01	0.05							
Endosulfan I & II	< 0.04	0.0000	< 0.0	0.0000	< 0.04	0.0000	< 0.04	0.00000	< 0.04	0.00									
Endosulfan Sulfate	< 0.02	0.0000	< 0.02	0.0000	< 0.02	0.0000	0.0	0.00008	0.01	0.00									
sum of Endo I + II + Sulfates	< 0.06	0.0000	< 0.06	0.0000	< 0.06	0.0000	0.02	0.00008	0.01	0.00									
Mirex	< 0.02	0.0000	< 0.02	0.0000	< 0.02	0.0000	< 0.0	0.00000	< 0.02	0.00	0.01	0.05							
Dechlorane Plus	< 0.025	0.0000	0.0461	0.0003	< 0.025	0.0000	< 0.025	0.0000	0.0	0.00									
Metals																			
Cadmium	< 0.7	0.0000	< 0.7	0.0000	< 0.7	0.0000	< 0.7	0.0000	< 0.7	0.00									
Chromium	4.0	0.0242	4	0.0242	2	0.0083	2	0.0080	3.0	0.02									
Copper	6.0	0.0363	6	0.0363	9	0.0375	7	0.0278	7.0	0.03	12.88	33.12							
Lead	< 3.0	0.0000	< 3.0	0.0000	< 3	0.0000	< 3	0.0000	< 3.0	0.0	18.4	47.8							
Mercury	< 0.08	0.0000	< 0.08	0.0000	0.1	0.0004	< 0.08	0.0000	0.0	0.00									
Nickel	< 3.0	0.0000	< 3.0	0.0000	< 3.0	0.0000	< 3	0.0000	< 3.0	0.00									
Zinc	45.0	0.2725	42	0.2543	42	0.1751	27	0.1074	39.0	0.20									
Phosphorus (mg/l)	0.8	5.0497	0.8	4.5411	0.891	3.7155	1.0	3.9225	0.9	4	50	175							

Notes:

ppb parts per billion
lb/D pounds per day
MGD million gallons per day

Table 5.7

Summary of Outfall Sewer Monitoring Data
Buffalo Avenue Plant

Outfall #	Parameter	Units	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22
003M	Temperature (degrees F)	degrees F	40 / 57	39 / 41	41 / 44	46 / 51	59 / 70	65 / 71	75 / 78	75 / 76	70 / 74	60 / 65	56 / 58	51 / 58
	pH	SU	6.6 / 8.2	7.0 / 7.9	6.8 / 8.0	7.1 / 8.0	7.5 / 8.1	7.3 / 7.8	7.5 / 8.1	7.5 / 8.2	7.5 / 7.9	7.3 / 8.5	7.2 / 7.9	7.0 / 8.3
	Flow, in Conduit or Thru Treatment Plant (mgd)	MGD	2.1 / 2.9	2.1 / 3.0	2.0 / 2.8	1.8 / 2.4	1.8 / 2.2	1.7 / 2.1	1.9 / 2.3	1.9 / 2.3	1.9 / 2.2	1.1 / 2.3	0.3 / 0.5	0.3 / 0.7
	Chlorine, Total Residual (mg/L)	mg / L	0.01 / 0.01	0.01 / 0.01	0.02 / 0.07	0.01 / 0.01	0.03 / 0.05	0.03 / 0.03	0.03 / 0.05	0.04 / 0.07	0.02 / 0.03	0.01 / 0.03	0.02 / 0.04	0.03 / 0.04
003R	Sum of Chlorinated dibenzo-p-dioxins & Chlorinated dibenzo-p-furans (lb/d)	lbs / day	NA	NA	9 E-8 / 9 E-8	NA	NA	1 E-7 / 1 E-7	NA	NA	2 E-7 / 2 E-7	NA	NA	2 E-7 / 2 E-7
	Flow Rate (mgd)	MGD	0.2 / 0.2	0.2 / 0.2	0.2 / 0.3	0.2 / 0.3	0.1 / 0.2	0.2 / 0.3	0.2 / 0.3	0.2 / 0.2	0.2 / 0.3	0.2 / 0.2	0.2 / 0.2	0.2 / 0.2
	Solids, Total Suspended (lb/d)	lbs / day	0 / 0	0 / 0	4 / 4	4 / 5	2 / 3	1 / 3	1 / 2	0 / 0	0 / 0	0 / 0	0 / 0	2 / 4
	Total Agg. Concentration # 2 (lb/d)	lbs / day	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000
	Carbon Tetrachloride (lb/d)	lbs / day	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000
	Chloroform	lbs / day	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000
	Toluene	lbs / day	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000
	Benzene	lbs / day	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000
	Chlorobenzene	lbs / day	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000
	Tetrachloroethylene	lbs / day	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000
	1,2 - Trans-Dichloro-Ethylene	lbs / day	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000
	Trichloroethlyene	lbs / day	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000
	Hexachlorobenzene	lbs / day	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000
	Hexachlorobutadiene	lbs / day	<0.002 / <0.002	<0.002 / <0.002	<0.002 / <0.002	<0.002 / <0.002	<0.001 / <0.001	<0.002 / <0.002	<0.002 / <0.002	<0.002 / <0.002	<0.002 / <0.002	<0.002 / <0.002	<0.002 / <0.002	<0.002 / <0.002
	Phenolics, Total	lbs / day	<0.005 / <0.005	<0.005 / <0.005	0.006 / 0.006	<0.006 / <0.006	<0.002 / <0.002	<0.004 / <0.004	<0.005 / <0.005	<0.006 / <0.006	<0.006 / <0.006	<0.006 / <0.006	<0.006 / <0.006	<0.005 / <0.005
	Hexachlorocyclohexane (BHC) Total	lbs / day	<0.0001 / <0.0001	<0.0001 / <0.0001	<0.0002 / <0.0002	<0.0002 / <0.0002	<0.0001 / <0.0001	<0.0001 / <0.0001	<0.0001 / <0.0001	<0.0002 / <0.0002	<0.0002 / <0.0002	<0.0002 / <0.0002	<0.0002 / <0.0002	<0.0001 / <0.0001
	Octachlorocyclopentene	lbs / day	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000
	Trichlorobenzene		0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000
	Tetrachlorobenzene	lbs / day	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000
	Monochlorotoluene	lbs / day	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000
	Dichlorobenzene	lbs / day	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00
004 M	Temperature	degrees F	45 / 56	41 / 45	42 / 46	48 / 54	61 / 67	69 / 73	76 / 78	77 / 78	71 / 76	61 / 66	* / *	* / *
	pH	SU	6.3 / 8.3	6.7 / 8.2	7.6 / 8.2	8.0 / 8.2	7.8 / 8.1	8.0 / 8.3	8.0 / 8.3	8.1 / 8.3	8.1 / 8.3	7.4 / 8.4	* / *	* / *
	Flow, in Conduit or Thru Treatment Plant	MGD	0.9 / 1.3	1.0 / 1.4	0.9 / 1.1	0.8 / 1.1	0.9 / 1.2	0.7 / 0.9	0.8 / 1.0	0.8 / 0.9	0.8 / 0.9	0.5 / 0.9	* / *	* / *
	Chlorine, Total Residual	mg / L	0.00 / 0.00	0.01 / 0.01	0.02 / 0.06	0.04 / 0.07	0.10 / 0.11	0.04 / 0.07	0.04 / 0.06	0.05 / 0.08	0.02 / 0.03	0.02 / 0.02	* / *	* / *

Table 5.7

Summary of Outfall Sewer Monitoring Data
Buffalo Avenue Plant

Outfall #	Parameter	Units	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22
005 M	Temperature	degrees F	39 / 52	40 / 44	40 / 42	46 / 52	57 / 64	68 / 72	75 / 77	77 / 78	70 / 75	64 / 74	* / *	* / *
	pH	SU	6.6 / 8.0	6.8 / 8.0	7.0 / 8.2	7.6 / 8.3	8.0 / 8.2	8.1 / 8.2	8.1 / 8.4	8.1 / 8.4	8.2 / 8.4	8.1 / 8.4	* / *	* / *
	Flow, in Conduit or Thru Treatment Plant	MGD	1.6 / 2.2	1.6 / 2.0	2.0 / 2.9	2.1 / 2.8	1.6 / 2.8	1.2 / 1.8	0.8 / 1.1	0.7 / 1.1	1.1 / 1.3	1.0 / 1.2	* / *	* / *
	Chlorine, Total Residual	mg / L	0.01 / 0.03	0.02 / 0.03	0.02 / 0.03	0.01 / 0.02	0.03 / 0.04	0.03 / 0.06	0.05 / 0.14	0.03 / 0.07	0.02 / 0.02	0.02 / 0.02	* / *	* / *
006 M	Flow Rate	GPD	<13845 / <13845	103,836 / 103,836	24,921 / 24,921	35,997 / 35,997	22,152 / 22,152	49,842 / 49,842	124,604 / 124,604	49,842 / 49,842	20,767 / 20,767	81,685 / 81,685	99,683 / 99,683	60,917 / 60,917
	Oil and Grease	mg / L	<1.6 / <1.6	<1.6 / <1.6	2.5 / 2.5	3.9 / 3.9	<1.7 / <1.7	<1.6 / <1.6	<1.6 / <1.6	<1.6 / <1.6	1.8 / 1.8	<0.8 / <0.8	<1.6 / <1.6	2.7 / 2.7
007 M	Sum of Chlorinated dibenzo-p-dioxins & Chlorinated dibenzo-p-furans	lbs / day	NA	NA	1 E-6 / 1 E-6	NA	NA	3 E-7 / 3 E-7	NA	NA	2 E-6 / 2 E-6	NA	NA	4 E-7 / 4 E-7
	Solids, Total	lbs / day	0 / 0	9 / 18	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0
	Dichlorobromomethane	lbs / day	0.00 / 0.00	0.00 / 0.00	0.01 / 0.01	0.01 / 0.01	0.02 / 0.02	0.02 / 0.02	0.02 / 0.02	0.02 / 0.02	0.03 / 0.03	0.03 / 0.03	0.02 / 0.02	0.03 / 0.03
	Carbon Tetrachloride	lbs / day	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00
	1,2 - Dichloroethane	lbs / day	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00
	Chloroform	lbs / day	0.004 / 0.004	0.01 / 0.01	0.02 / 0.02	0.03 / 0.03	0.03 / 0.03	0.03 / 0.03	0.03 / 0.03	0.03 / 0.03	0.03 / 0.03	0.03 / 0.03	0.03 / 0.03	0.03 / 0.03
	Toluene	lbs / day	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00
	Benzene	lbs / day	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00
	Mono-Chloro-Benzenes	lbs / day	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00
	Ethylbenzene	lbs / day	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00
	Hexachlorocyclopentadiene	lbs / day	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00
	Tetrachloroethylene	lbs / day	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00
	1,1 - Dichloroethane	lbs / day	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00
	1,1 - Dichloroethylene	lbs / day	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00
	1,2 - Transdichloroethylene	lbs / day	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00
	Vinyl Chloride	lbs / day	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00
	Trichloroethylene	lbs / day	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.001 / 0.001	0.001 / 0.001	0.002 / 0.002	0.003 / 0.003	0.004 / 0.004
	Phenolics, Total	lbs / day	<0.02 / <0.02	<0.02 / <0.02	<0.02 / <0.02	<0.02 / <0.02	<0.02 / <0.02	<0.01 / <0.01	<0.01 / <0.01	<0.01 / <0.01	<0.01 / <0.01	<0.01 / <0.01	<0.02 / <0.02	<0.02 / <0.02
	Flow, in Conduit or Thru Treatment Plant	MGD	0.3 / 0.7	0.6 / 0.7	0.6 / 0.7	0.6 / 0.7	0.6 / 0.7	0.6 / 0.7	0.5 / 0.7	0.6 / 0.6	0.5 / 0.6	0.7 / 0.8	0.6 / 0.7	0.6 / 0.7
	Hexachlorocyclohexane (BHC) Total	lbs / day	<0.0004 / <0.0004	<0.0004 / <0.0004	<0.0004 / <0.0004	<0.0004 / <0.0004	<0.0004 / <0.0004	<0.0004 / <0.0004	<0.0004 / <0.0004	0.0001 / 0.0001	<0.0004 / <0.0004	<0.0004 / <0.0004	<0.0004 / <0.0004	<0.0005 / <0.0005
	Monochlorobenzotrifluoride	lbs / day	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00
	Dichlorobenzotrifuoride	lbs / day	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00
	Monochlorotoluene	lbs / day	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00
	Dichlorobenzene	lbs / day	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00
	Trichlorobenzene	lbs / day	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00
	pH	SU	6.9 / 8.0	7.6 / 8.0	7.3 / 7.6	7.4 / 7.6	7.4 / 7.6	7.4 / 7.5	7.5 / 7.7	7.5 / 7.7	7.5 / 8.5	7.5 / 8.1	7.3 / 8.8	7.3 / 8.5

Table 5.7

Summary of Outfall Sewer Monitoring Data
Buffalo Avenue Plant

Outfall #	Parameter	Units	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22
SUM M	Zinc, Total	lbs / day	0.6 / 0.6	0.1 / 0.1	0.1 / 0.1	0.2 / 0.2	0.1 / 0.1	0.1 / 0.1	0.1 / 0.1	0.7 / 0.7	0.1 / 0.1	0.1 / 0.1	0.1 / 0.1	0.1 / 0.1
	Phenolics, Total	lbs / day	0.0 / 0.0	0.0 / 0.0	0.0 / 0.0	0.0 / 0.0	0.0 / 0.0	0.0 / 0.0	0.0 / 0.0	0.0 / 0.0	0.0 / 0.0	0.0 / 0.0	0.0 / 0.0	0.0 / 0.0
	Flow, in Conduit or Thru Treatment Plant	MGD	5.3 / 5.3	5.3 / 5.3	5.3 / 5.3	5.6 / 5.6	5.3 / 5.3	4.2 / 4.2	4.2 / 4.2	3.9 / 3.9	4.4 / 4.4	4.9 / 4.9	0.9 / 0.9	1.0 / 1.0

Notes:

SU standard units
MGD million gallons per day
mg/L milligrams per liter
lbs/d pounds per day
GPD gallons per day
NA Not applicable. Not analyzed
** Down, No Discharge
* NODI C - No discharge

Table 6.1

Summary of Overburden NAPL Monitoring and Collection
Buffalo Avenue Plant

Date	003 NAPL Collection Trench (gallons)	OW313 (gallons)	OW572 (gallons)	OW317 (gallons)	OW320 (gallons)	OW354 (gallons)	OW358 (gallons)	OW523 (gallons)	OW562 (gallons)	OW563 (gallons)	TW-7 (gallons)	OW306 (gallons)	BH8-89 (gallons)	OW564 (gallons)	OW537 (gallons)	OW577 (gallons)	Energy Boulevard Drain Tile System (gallons)	Total NAPL Removed (gallons)
NAPL Recovered in First Quarter 2022	0.25	0.10	0.25	--	--	-- (1)	--	--	--	--	--	--	--	--	--	--	ND	0.60
NAPL Recovered in Second Quarter 2022	NR	--	--	--	--	-- (1)	--	--	--	--	--	--	--	--	--	--	NR	0.00
NAPL Recovered in Third Quarter 2022	ND	0.25	0.25	--	--	-- (1)	--	--	--	--	--	--	--	--	--	--	0.75	1.25
NAPL Recovered in Fourth Quarter 2022	NR	--	--	--	--	-- (1)	--	--	--	--	--	--	--	--	--	--	ND	0
Total NAPL Recovered in 2022	**0.25**	**0.35**	**0.5**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0.75**	**1.85**
Cumulative volume (as of December 31, 2021)	959.75	45.65	38.08	0.21	1.50	0.86	0.50	0.30	0.00	9.00	0.56	0.00	0.00	0.00	0.00	0.25	6011	7068
Cumulative volume (as of December 31, 2022)	**960**	**46.00**	**38.58**	**0.21**	**1.50**	**0.86**	**0.50**	**0.30**	**0.00**	**9.00**	**0.56**	**0.00**	**0.00**	**0.00**	**0.00**	**0.25**	**6012**	**7070**
Current Monitoring Frequency	quarterly(2)	semi-annually	semi-annually	annually(3)	annually(3)	-- (1)	annually(3)	annually(3)	annually(3)	annually(3)	annually(3)	annually(3)	annually(3)	annually(3)	annually(3)	annually(3)	quarterly	
Proposed 2019 Monitoring Frequency	quarterly(2)	semi-annually	semi-annually	annually(3)	annually(3)	-- (1)	annually(3)	annually(3)	annually(3)	annually(3)	annually(3)	annually(3)	annually(3)	annually(3)	annually(3)	annually(3)	quarterly	

Notes:

--	Not checked per schedule.
NR	Not recoverable
ND	None detected
(1)	Well has been removed from the NAPL program, as approved by NYSDEC (letter dated August 1, 2013)
(2)	Changed from monthly to quarterly to reflect NYSDEC's May 4, 2010 letter
(3)	Changed from semiannual to annual to reflect NYSDEC's May 4, 2010 letter