

Alternatives Analysis Report
Carlson Park Site
Rochester, New York
NYSDEC Site #C828199

Prepared for
100 Carlson Road LLC, Rochester,
New York
September 19, 2025

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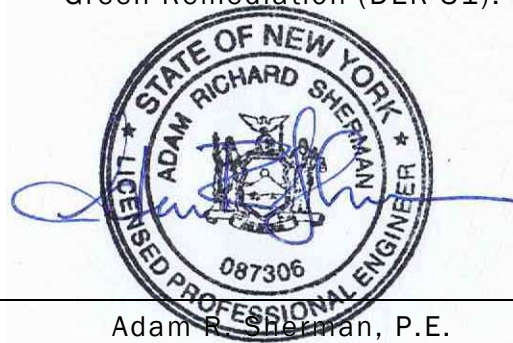
Prepared for
100 Carlson Road LLC
100 Carlson Road
Rochester, New York 14610

September 19, 2025

Project Number: 195343.100

New York State Professional Engineer Certification:

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List of Abbreviations

1,1-DCA	1,1-dichloroethane
1,1-DCE	1,1-dichloroethene
1,1,1-TCA	1,1,1-trichloroethane
AAR	Alternatives Analysis Report
BC	Brown and Caldwell Associates
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
bgs	below ground surface
CAMP	Community Air Monitoring Plan
CFR	Code of Federal Regulations
cis-1,2-DCE	cis-1,2-dichloroethene
CP	Commissioner Policy
COC	Constituent of Concern
COMIDA	County of Monroe Industrial Development Agency
CSCO	Commercial Soil Cleanup Objective
CVOC	Chlorinated Volatile Organic Compound
DER	Division of Environmental Remediation
DNAPL	Dense Non-Aqueous Phase Liquid
DRO	Diesel Range Organics
EC	Engineering Control
EPA	United States Environmental Protection Agency
FWRIA	Fish and Wildlife Impact Analysis
GRA	General Response Action
IC	Institutional Control
IRM	Interim Remedial Measures
ISCO	In Situ Chemical Oxidation
ISCR	In Situ Chemical Reduction
ISEB	In Situ Enhanced Bioremediation
LDR	Land Disposal Restrictions
MCDPH	Monroe County Department of Public Health
MCL	Maximum Contaminant Level
mg/kg	Milligram Per Kilogram
MNA	Monitored Natural Attenuation
MTBE	methyl tertiary butyl ether
µg/m ³	micrograms per cubic meter
msl	mean sea level
NCP	National Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NYCRR	New York Codes, Rules, and Regulations

NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
O&M	operations and maintenance
OMM	Operations, monitoring, and maintenance
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PCE	tetrachloroethene
PDI	Pre-Design Investigation
PFAS	Per- and poly fluoroalkyl Substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctanesulfonic Acid
POTW	Publicly Owned Treatment Works
PGW	protection of groundwater
PGWSCO	Protection of Groundwater Soil Cleanup Objective
QHHEA	Qualitative Human Health Exposure Assessment
RAG	Remedial Action Goal
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RI	Remedial Investigation
RIR	Remedial Investigation Report
SCG	Standards, Criteria and Guidance
SCO	Soil Cleanup Objectives
Site	100 Carlson Road, (also known as 390 Blossom Road), Rochester, New York, 14610
SMP	Site Management Plan
SPDES	State Pollutant Discharge Elimination System
SSHASP	Site-Specific Health and Safety Plan
SSVMS	Sub-Slab Vapor Mitigation System
SSDS	Sub-Slab Depressurization System
SVI	Soil Vapor Intrusion
TCE	Trichloroethene
TOG	Technical and Operational Guidance Series
µg/L	Micrograms Per Liter
VCA	Voluntary Cleanup Agreement
VCP	Voluntary Cleanup Program
VOC	Volatile Organic Compound

Section 1

Introduction

Alternatives Analysis Report (AAR) has been prepared by Brown and Caldwell Associates (BC) to document the evaluation and recommendation of remedial actions to address known impacts to the soils and groundwater at the Carlson Park Site located at 100 Carlson Road, (also known as 390 Blossom Road), Rochester, New York, 14610 (Site). The location of the Site is shown on Figure 1. The Site is being remediated under the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) outlined in Environmental Conservation Law Article 27 Title 14 and the applicable regulations in 6 NYCRR Part 375 Subparts 3 and 6. This AAR have been prepared pursuant to the Brownfield Cleanup Agreement (BCA) Index Number C828199-09-17, dated January 22, 2018, between Volunteer - 100 Carlson Road LLC and the NYSDEC.

A Remedial Investigation (RI) was completed at the Site to characterize the nature and extent of contamination and is documented in the Remedial Investigation Report (RIR), prepared by S2C2, Inc. and BC (S2C2 and BC, April 2021). The RIR was subsequently revised per comments from the NYSDEC and the New York State Department of Health (NYSDOH) and resubmitted to the agencies on May 24, 2024. An addendum to the RIR, containing RIR Appendices C (laboratory data reports), D (Data Usability Summary Reports) and R (Interim Remediation Measures Activities for Soil) was submitted on March 17, 2025 (referred to as the RIR Addendum). This AAR represents the next step in the remediation process. Using information and data from previous investigations, including the RI, and in accordance with applicable NYSDEC regulations and guidance, including “Division of Environmental Remediation (DER-10)/Technical Guidance for Site Investigation and Remediation” (NYSDEC, May 2010), this AAR documents the decision-making process for evaluation/selection of a remedy for the Site.

1.1 Report Organization

This AAR is organized as follows, consistent with DER-10 requirements:

- **Section 1:** Introduction
- **Section 2:** Site Description and History
- **Section 3:** Summary of the Remedial Investigation and Exposure Assessment
- **Section 4:** Remedial Goals and Remedial Action Objectives
- **Section 5:** Development and Analysis of Alternatives
- **Section 6:** Recommended Remedy
- **Section 7:** Pre-Design Investigation
- **Section 8:** Schedule
- **Section 9:** References

Section 2

Site Description and History

The following subsections present a description of the Site, zoning and land use, historic activities and operations, and a summary of the regulatory and remedial history. Additional details regarding these topics are provided in the RIR (S2C2, Inc. and BC, May 2024).

2.1 Site Setting and Description

The Site is located in the City of Rochester, New York on 390 Blossom Road (mailing address 100 Carlson Road) within tax parcel 122.32-1-58. The Site occupies 38.81 acres and is bound to the north by Humboldt Street, to the east by residential properties and Hampden Road, to the south by Blossom Road and property owned by the New York Central Railroad, and to the west and northwest by commercial properties (refer to Figure 2 – Site Aerial and Figure 3 – Existing Conditions Plan). Carlson Road, a private road owned and maintained by 100 Carlson Road LLC, extends through the Site from south to north connecting Blossom Road to Humboldt Street. The Site is in an urban setting characterized by adjacent industrial, commercial, and residential development.

Since 1925, there have been multiple uses of the Site, including manufacturing, office buildings, storage spaces, shipping and receiving areas, a dining room, and light industrial. The primary structure on the Site, referred to as the facility building complex, consists of a multi-story office, commercial, industrial building complex, with 12 separate but connected buildings (buildings 1 through 9, and 10A, 10B, and 10C), together constituting approximately 880,000 square feet of floor space. Building 14, which occupies an approximately 5,000 square foot area, is a separate building not connected to the facility building complex.

The existing facility building complex was constructed in four main segments between 1925 and 1952. Buildings 1, 2, 3, 4, and 6 were built around 1925. Buildings 5 and 7 were built by 1950. Building 8 was built in 1957. Building 9 was built in 1970. Building 10 was built in 1957 and is located in the northern part of the facility complex where the ground surface grade is nearly the lowest on the Site property. Building 10's basement extends to a lower elevation than any other basement in the facility building complex. The Building 10 basement extends into the underlying bedrock. There is a sump in the basement of Building 10 which was installed to intercept and collect water found to be entering the basement. The elevation of the Building 10 basement is lower than any other parts of the facility building complex. Due to contamination subsequently found in the water in the sump (see Section 2.3), this water is directed through a carbon treatment unit in the basement of Building 10; the treated water is then discharged to the municipal sanitary sewer. The treatment system has been in operation since 1998. The entire facility is serviced by this sanitary sewer except for Building 14, which as described above is a separate building and is not connected to the sewer system. There are paved parking lots on the property surrounding the facility building complex, and some landscaped areas, most of which are directly adjacent to the building complex.

The following buildings are fully or partially vacant at the time this report was prepared:

- Building 2 – rear warehouse is vacant
- Building 3 – rear warehouse is vacant, front office is partly occupied by a co-working space
- Building 4 - front office will be occupied on June 1, 2025, rear warehouse is vacant
- Building 5 – partly vacant and partly occupied by a warehouse/distribution tenant
- Building 8 - vacant

- Building 9 – rear portion is occupied for storage; the front is occupied, and
- Building 14 - not occupied but is used for storage

The remainder of the buildings are occupied with the following uses: offices, a bowling alley and restaurant, a comedy club, warehouse/distribution operations, radio stations, storage, light manufacturing, catering, and retail office furniture sales.

The buildings are composed primarily of steel skeletal construction, reinforced concrete floors, rubber sheet and tar roofs, and a brick exterior. A basement is only present in Buildings 4 and 10, located in the northern portion of the Site. The basement contains a boiler room, chiller pit, electrical meter and power rooms, a former recreation and leisure space, and elevator machine rooms. Building 14, which is separated from the primary facility building complex, was formerly used for chemical material storage (refer to Figures 2 and 3).

The Site is located in an M-1 Industrial District, which promotes the retention and growth of employment opportunities by providing areas where a broad range of industrial uses may locate and where options for complementary uses exist in older two-story and multi-story buildings. Pursuant to the City of Rochester Zoning Code §§ 120-80, 120-81(A), 120-81(B), and 120-81(C), the allowed uses are commercial (i.e., retail, offices, restaurants, manufacturing, warehouses, vehicle repair stations and storage, schools, animal hospitals, health clubs, parking garages, etc.); industrial (manufacturing, high-tech or light industrial use) and restricted residential (dwelling unit conversions and live-work loft apartments in any existing multi-story building or a single-story building not originally designed for industrial purposes).

The topography of the Site in the area of the facility buildings is generally flat, with a gentle south to north downward slope that levels off near Humboldt Street to the north (Figure 1). The grade increases to the southwest of the facility buildings, and in the southeastern corner of the Site. The ground surface elevation in the area southeast of the large parking lot is substantially higher than that in the parking lot. The elevation of the property ranges from approximately 470 feet above mean sea level (MSL) in the southwestern and southeastern corners of the Site, to approximately 435 feet above MSL in the northeastern part of the Site, near Humboldt Street.

There are no major surface water features in the direct vicinity of the Site. The Site is approximately 2.5 miles east of the Genesee River, approximately 2 miles west of Irondequoit Creek, approximately 2 miles southwest of the southern end of Irondequoit Bay, and about 1 mile northeast of the Cobbs Hill Reservoir (refer to Figure 1).

2.2 Site Use

As noted in Section 2.1, and consistent with the existing zoning, the Site is used by commercial tenants for the following uses: offices, bowling alley and restaurant, comedy club, warehouse/distribution operations, radio stations, storage, light manufacturing, outdoor parking, catering, retail office furniture sales, and print shop. It is anticipated that the Site will continue to be used for similar types of commercial and industrial uses in the future. As described in Section 6.1, it is anticipated that site use will be restricted to these uses via an environmental easement that will be granted to NYSDEC at the conclusion of the remediation process.

2.3 Site Background and History

Appendix A of the RIR includes tables entitled “Previous Owner List” and “Previous Operator List” from Exhibit E of the Brownfield Cleanup Program application submitted in 2017. These tables include information regarding property owners, dates of ownership, operators, and operations in each of the buildings within the facility building complex.

Historical industrial activities led to chlorinated solvent releases, most notably trichloroethene (TCE), to soils and groundwater at the Site. TCE was used for cleaning and degreasing during manufacturing processes. TCE-impacted water was first discovered in or about the late 1990s in the basement mechanical room in Building 10, which has three water sumps fed by several lateral floor drains in the basement area. The sump with the lowest elevation is in the mechanical room and collects water from the other sumps. A substantial amount of the water collected in the sump is groundwater. Samples of the water in this sump, collected and analyzed in 1998, indicated the presence of TCE. Carlson Park Associates voluntarily installed a carbon treatment system in the sump room in Building 10 after this discovery and has been extracting and treating TCE-impacted groundwater since that time. Water collected in the sump is directed through the treatment system. Effluent from the treatment system is directed to the sanitary sewer system servicing the Site and discharged to the local publicly owned treatment works (POTW). Sewer Use Permit (No. 1065) was issued for this discharge by the Monroe County Department of Environmental Services and is included in Appendix S of the RIR.

2.4 Regulatory and Remedial History

As discussed in Section 1, investigation and remediation activities have been conducted pursuant to a BCA Index Number C828199-09-17 between 100 Carlson Road LLC and the NYSDEC, which became effective on January 22, 2018. 100 Carlson Road LLC is a Volunteer under the BCA. Prior to the BCA, remediation activities were conducted pursuant to a Voluntary Cleanup Agreement (VCA, Site #V00514-8) between Carlson Park LLC and the NYSDEC, dated June 7, 2002, under the former New York State Voluntary Cleanup Program (VCP). Carlson Park LLC was a Volunteer under the VCA. Carlson Park LLC changed its name to 100 Carlson Road LLC, and this entity shortly thereafter acquired the Site on August 16, 2002. On February 26, 2003, the VCA was amended to note that the Volunteer had changed its name from Carlson Park, LLC to 100 Carlson Road LLC. In September 2017, the Site was approved for transition into the BCP when the non-statutory VCP was terminated, and the BCA was executed in January 2018. Additionally, several environmental investigation and assessment activities were conducted prior to the issuance of the VCA and the beginning of the RI. The following is a chronology of the remedial activities, including investigation activities, and a description of the Interim Remedial Measure (IRM) activities conducted at the Site to date.

2.4.1 Remedial Chronology

The remedial chronology, including investigation activities, is as follows:

Prior to VCP

- March 1995 – “Phase I Environmental Assessment Report”, Eastman Kodak Company, C-Plant, 100 Carlson Road (McLaren/Hart, March 1995).
- Late 1998 – Discovery of TCE in the water in the Building 10 sump.
- 1999 – Installation of a carbon treatment system in the sump room in Building 10 to treat the water and groundwater collected in the sump prior to discharge to the sanitary sewer system.
- April 1999 – “Phase I Environmental Assessment Report” (Galson Consulting, April 1999).
- February 2001 – “Preliminary Site Investigation Data” (AMEC, February 2001).

Under VCP (effective June 2, 2002)

- June 2005 – Volunteer began RI field activities per NYSDEC approved work plan entitled “Voluntary Cleanup Program Remedial Investigation Work Plan, Carlson Park Site (Site #V00514; Index # B8-604-12-01), 100 Carlson Road, Rochester, New York” (GeoQuest Environmental, Inc. and S2C2 Inc., October 2004).
- November 2005 – Volunteer conducted supplemental RI activities per the NYSDEC-approved work plan entitled “Supplemental Remedial Investigation Activities” (S2C2 Inc., October 2005).

- December 2006 – Volunteer submitted to the NYSDEC the “Interim Remedial Measures (IRM) Work Plan for the Installation of a Sub-Slab Vapor Mitigation System – Carlson Park, Rochester, New York” (Carlson Park LLC, December 2006).
- January 2008 through February 2009 – Volunteer installed the sub-slab vapor mitigation system (SSVMS) was conducted from January 2008 through February 2009 per the December 2006 NYSDEC-approved IRM Work Plan referenced above. After evaluation and testing of the system, additional components were added to the system in January 2010.
- April 2008 – Volunteer submitted to the NYSDEC a work plan entitled “Soil Removal Work Plan, Interim Remedial Measure (IRM) for Carlson Park, Rochester, New York” (100 Carlson Road LLC, April 2008).
- October 2009 – Volunteer submitted to the NYSDEC an addendum to the IRM work plan, entitled “Addendum to Soil Removal Work Plan” (S2C2 Inc., October 2009).
- April 2010 – Volunteer conducted soil removal activities per the above-referenced NYSDEC-approved Soil Removal Work plan (April 2008) and the October 2009 addendum.
- April 2010 – Volunteer implemented RI activities per the NYSDEC-approved “Supplemental Work Plan for Initial Bedrock Evaluation Activities” (S2C2 Inc., February 2010).
- September and October 2010 – Volunteer implemented RI activities per the NYSDEC-approved work plan entitled “Supplemental Remedial Investigation Activities” (S2C2 Inc., September 2010).
- August 2011 – Volunteer implemented RI activities per the NYSDEC-approved “Supplemental Shallow (Overburden) Remedial Investigation Work Plan” (S2C2 Inc., August 2011).
- November 2011 – Volunteer implemented RI activities per the NYSDEC-approved work plan entitled “Supplemental Remedial Investigation Activities” (S2C2 Inc. November 2011).
- June and July 2012 – Volunteer implemented RI activities per the NYSDEC-approved work plan entitled “Supplemental Remedial Investigation Activities” (S2C2 Inc. June 2012).
- December 2013 – Volunteer submitted “Sub-Slab Vapor Mitigation Construction Completion Report” (O’Brien & Gere and Mitigation Tech, December 2013) to NYSDEC.
- July 2013 – Volunteer implemented RI activities per the NYSDEC-approved work plan entitled “Supplemental Remedial Investigation Activities” (S2C2 Inc., June 2013).
- July 2014– Volunteer implemented RI activities per NYSDEC-approved work plan entitled “Supplemental Remedial Investigation Activities” (S2C2 Inc., June 2014).
- September and October 2014 – Volunteer implemented RI activities per the NYSDEC-approved work plan entitled “Supplemental Remedial Investigation Activities” (S2C2 Inc., September 2014).
- November 2014 – Volunteer implemented RI activities per the NYSDEC-approved work plan entitled “Supplemental Remedial Investigation Activities” (S2C2 Inc., October 2014).
- June 2016 through May 2017 – Volunteer implemented RI activities per the NYSDEC-approved work plan entitled “Supplemental Remedial Investigation Activities” (S2C2 Inc., May 2016).

Under BCA (Effective January 22, 2018)

- December 2019 – Volunteer implemented RI activities per the NYSDEC-approved work plan entitled “Supplemental Remedial Investigation Activity at Carlson Park. NYSDEC BCP Site ID# C828199” (S2C2 Inc., September 2018).
- December 2019 – Volunteer implemented RI activities per the NYSDEC-approved work plan entitled “Final Supplemental On-Site Remedial Investigation Activities at Carlson Park” (S2C2 Inc., December 2019).
- April 2021 – Volunteer submitted the “Draft Remedial Investigation Report, Carlson Park Site” to NYSDEC (S2C2 and BC, April 2021).
- March 2023 – Volunteer submitted “2021 Annual Report, Sub-Slab Depressurization System” (GHD, March 2023) to NYSDEC.
- April 2024 – Volunteer submitted “2022 Annual Report, Sub-Slab Depressurization System” (GHD, April 2024) to NYSDEC.
- May 2024 - Volunteer submitted “Remedial Investigation Report, Carlson Park Site” (S2C2 and BC, May 2024). This report is a revised version of the April 2021 draft report. Revisions were based on NYSDEC and NYSDOH comments and changes in guidance and regulation since April 2021.
- July 2024 - Volunteer submitted “2023 Annual Report, Sub-Slab Depressurization System” (GHD, July 2024) to NYSDEC.
- March 2025 - Volunteer submitted “Addendum to Remedial Investigation Report, Carlson Park Site” (S2C2 and BC, March 2025), which provided additional appendices for the RIR including laboratory reports, Data Usability Summary Reports, and documentation of the IRM Activities for Soil.

2.4.2 IRM and Related Activities

On-Site IRM activities were conducted during the investigation activities at the Site to address potential exposure pathways and encountered source materials. Other activities were also implemented at the Site prior to the investigation activities that further mitigate groundwater and soil vapor impacts. These activities are summarized below.

2.4.2.1 Facility-Wide Sub-Slab Depressurization System

Soil vapor intrusion became more widely recognized in New York as a potential environmental concern after the NYSDOH issued its October 2006 Soil Vapor Intrusion Guidance document (NYSDOH, October 2006, as amended). Subsequently, as an IRM, work on the design and installation of a sub-slab depressurization system (SSDS) in the facility building complex was commenced after the issuance of this guidance document. The basement levels in the building complex, located in the northern part of the complex (Buildings 4 and 10), first had to be investigated and sealed for a facility-wide SSDS to be effective. The primary objective for implementing this preemptive, precautionary measure was to mitigate potential intrusion of possible volatile organic compound (VOC) vapors within the subsurface into the building. The facility-wide SSDS, also referred to in some Site documents as the sub-slab vapor mitigation system (SSVMS), is intended to minimize the risk of potential vapor intrusion by maintaining a negative pressure below the building slabs relative to the air pressure above the slabs.

The work was conducted pursuant to the work plan entitled “Interim Remedial Measures (IRM) Work Plan for the Installation of a Sub-Slab Vapor Mitigation System – Carlson Park, Rochester, New York” (Carlson Park LLC, December 2006). This work plan was approved by the NYSDEC, the NYSDOH, and the Monroe County Department of Public Health (MCDPH) in January 2007. The installation of the system was conducted from January 2008 through February 2009. After evaluation and testing of the system, additional components were added to the system in February and March 2010. The

Construction Completion Report for the facility-wide SSDS prepared by O'Brien & Gere and Mitigation Tech, entitled "Sub-Slab Vapor Mitigation Construction Completion Report, Carlson Park Facility, Rochester, New York" (O'Brien & Gere and Mitigation Tech, December 2013), was submitted to the NYSDEC in December 2013. Operation, monitoring, and maintenance (OMM) of the facility-wide SSDS is being conducted in accordance with the "Sub-Slab Vapor Mitigation Operation, Monitoring and Maintenance Plan," which is included as Appendix D of the Construction Completion Report. Reports documenting the operation, monitoring, inspection and maintenance activities related to the SSDS are submitted annually to NYSDEC.

2.4.2.2 Soil Removal Activities

IRM activities were conducted in April 2010 to remove shallow impacted soils deemed to be a source of groundwater impacts from two areas identified during RI activities at the Site. The two areas of soil removal were identified as Area A and Area B (see Figure 4 in the RIR as provided in Appendix A). These activities were conducted in accordance with the following documents:

- "Soil Removal Work Plan, Interim Remedial Measure (IRM) for Carlson Park, Rochester, New York" (100 Carlson Road LLC, April 2008)
- "Addendum to Soil Removal Work Plan" (S2C2 Inc., October 2009)

Area A was located to the east of the loading dock area of Building 2 in the southeastern portion of the property. The IRM was conducted to address a sludge layer that was identified in the shallow soils beneath the pavement. The maximum thickness of the sludge layer was observed to be 1.7 feet. Laboratory analysis of samples obtained from the area indicated the presence of certain polycyclic aromatic hydrocarbons (PAHs) at concentrations above the Soil Cleanup Objectives (SCOs) for Industrial Use established in 6NYCRR Subpart 375-6.

Area B was situated beneath a small area of the paved parking area in the southwestern portion of the property. Impacted soil in this area was suspected to be an ongoing source of a localized dissolved TCE plume in shallow groundwater. Soils generally exceeding the TCE SCO for Commercial Use of 200 milligram per kilogram (mg/kg) were removed as part of this IRM activity.

The approximate limits and volume of soil removed as part of these activities were estimated based upon analytical results obtained from soil sampling conducted prior to soil excavation. Once excavated, soil from these areas was properly disposed of off-site. Clean fill was placed and compacted in the excavated areas which were then capped with 4 to 5 inches of asphalt pavement. A summary of the analytical results, figures indicating the soil removal locations and areas, actual volumes of soil removed, and soil disposal details, etc. for these two soil removal areas are presented in Appendix R of the RIR Addendum (S2C2 and BC, March 2025).

2.4.2.3 Treatment System for Building 10 Sump

There are three water sumps fed by several lateral floor drains in the basement of Building 10. The sump with the lowest elevation on the Site is located in the mechanical room and receives flow from the other sumps and is equipped with a pump to extract the water. These sumps were initially installed at the time when the building was constructed to prevent water accumulation within the mechanical room. Samples of the water in this sump collected in 1998 indicated the presence of TCE. Carlson Park Associates voluntarily installed a carbon treatment system in the sump room in Building 10 after this discovery to treat the water prior to discharge to the sanitary sewer system. A County of Monroe Sewer Use Permit (No. 1065) was issued for this discharge by the Monroe County Department of Environmental Services. As discussed in Section 3.3.2, the sump and the carbon treatment system in Building 10 have been extracting and treating TCE-impacted groundwater since the late 1990s and thus has been contributing to the remediation of groundwater at the Site. See the RIR for additional details.

Section 3

Summary of the Remedial Investigation and Exposure Assessment

The following subsections provide a summary of the findings and conclusions from the RI activities conducted at the Carlson Park Site between June 2005 and December 2019. This information is presented in more detail in the RIR. Information regarding environmental conditions at the Site obtained during the RI (and from previous investigation activities), have been used to describe the nature and extent of environmental impacts to soils and groundwater associated with past releases from historic Site operations. The operations thought to be the source of the contaminants include cleaning and degreasing activities used during former manufacturing processes. The primary contaminant of concern at the Site is TCE and its degradation products.

3.1 Stratigraphy

Unconsolidated overburden deposits overlie bedrock through most of the Site. The one exception to this is beneath Building 10 located in the northernmost portion of the facility complex. At this location, the foundation of the building extends into bedrock, which was locally excavated for the construction of this building. The overburden material consists primarily of varying thicknesses of fill, and/or native deposits consisting of former lake bed (lacustrine) and glacial till deposits. Artificial fill is most commonly found overlying the native deposits in the southwestern portion of the Site and is composed primarily of sand and gravel and locally containing intervals of cinders and ash. The ash and cinders are likely related to the historic operation of coal-fired boilers near the west side of Building 1. Some portions of the artificial fill also contain glass and other debris. Native deposits generally consist of fine to medium sand mixed with silt and some gravel.

The overburden thickness varies across the Site between approximately 5 and 25 feet. In the northern portion of the Site, the overburden thickness is generally about 5 feet or less. In the southeastern corner of the Site, the thickness of the overburden increases to 40 feet or greater.

The bedrock directly underlying the overburden at the Site is primarily gray dolomite (also referred to as dolostone) and is part of a sequence of predominantly dolomite formations referred to as the Lockport Group. The sediment in the Lockport Group was deposited approximately 430 million years ago during the Silurian Period. This Lockport Group is estimated to be about 55 to 95 feet thick beneath the Site. Rocks of the Clinton Group underlie the Lockport Group sequence, the uppermost portions of which consist mostly of the thick (± 120 feet) Rochester Shale, with a thin (8 to 12 feet) dolomite unit (DeCew Dolomite) situated between the Rochester Shale and the Lockport Group.

On a Site-wide scale, the orientation of the bedding planes in the Lockport Group rocks beneath the Site is nearly horizontal, dipping at ± 1 degree or less to the southeast. On a smaller scale (e.g., on the scale of a rock core or typical outcrop), the actual surface of the rock beds ranges from being nearly flat to undulating or irregular.

3.2 Hydrostratigraphy and Groundwater Flow

Groundwater flow direction in saturated overburden at the Site is generally towards the north-northeast (see Appendix A, Figures 16 and 17). The water table in the northernmost portions of the Site is below the top of bedrock, resulting in unsaturated overburden in these areas. The reason for this is partly due to the shallow depth of the bedrock surface in this area, combined with a likely lowering of the water table caused by continuous pumping from the sump installed in the basement of Building 10 in 1958 and the infiltration of shallow groundwater into sewers/sewer bedding material under Humboldt Street and the northern portions of Carlson and Hampden Roads.

Lateral groundwater flow in bedrock is generally to the north-northeast, with a flow pattern similar to overburden groundwater. Because the rock matrix of the dolomite generally has a very low permeability, groundwater flow occurs primarily through open and continuous fractures, where present. In the Lockport Group, the most continuous open fractures are near-horizontal bedding plane fractures. Thus, groundwater flow in bedrock is largely controlled by these open bedding plane fractures. Lateral groundwater flow in the Lockport Group is predominant over vertical flow due to the orientation of these open fractures.

Vertical groundwater flow in the bedrock is restricted relative to lateral flow due to several factors. These factors include: a lower frequency and continuity of open vertical fractures relative to open near-horizontal bedding plane fractures; a general decrease in fracture permeability and frequency of open fractures with depth; and an increase in the presence of void-filling gypsum with depth. The presence of pressurized natural gas accumulations in the deepest bedrock intervals assessed during the RI supports the conclusion that the vertical permeability of the rock at this depth is relatively low, consistent with the presence of a regional confining unit/aquitard below the impacted groundwater at the Site.

Although the natural direction of groundwater flow in the overburden and bedrock at the Site is generally expected to be in a north-northeast direction, it is believed based on investigation results that the sump located within shallow bedrock beneath building 10 is intercepting much of the overburden and shallow bedrock groundwater flow at the Site. In this way, the sump and the sewer lines that are present below the water table under Humboldt Street and the northern portions Carlson and Hampden Roads, locally influence the direction of groundwater flow, and capture some of the shallow groundwater flowing towards the north and northeast.

3.3 Nature and Extent of Contamination

The following describes the nature and extent of contamination in soil, groundwater, and soil vapor, as identified in the RIR.

3.3.1 Soil Quality

The discussion of soil quality below is separated into two sections: surface soil and subsurface soil. DER-10 classifies soil as either surface soil or subsurface soil based on the potential exposure pathways. For assessing human exposure via direct contact or inhalation, DER-10 classifies the 0- to 2-inch below ground surface (bgs) depth interval as surface soil, except when VOCs are the only constituent of concern (COC), wherein the 0- to 6-inch bgs interval is classified as surface soil. However, an acceptable soil cover at a site where use is restricted to commercial or industrial use must be 1-foot thick (in areas not covered by pavement, buildings, etc.). Accordingly, soil quality data from the 0- to 1-foot bgs depth interval were evaluated for discussion of surface soil at the Site. Data from deeper intervals were evaluated for the discussion of subsurface soil.

3.3.1.1 Surface Soil

Surface soil at the Site is generally covered by pavement or landscaped cover, which reduces the potential for human direct-contact exposure to surface soil, incidental ingestion, or dust generation. The following constituents were detected in the surface soil at concentrations above the 6 NYCRR Subpart 375-6.8(b) SCOs for Commercial Use (CSCOs) or the SCOs for the Protection of Groundwater (PGWSCOs):

- **Constituents with concentrations above CSCOs:** benzo(a) anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, indeno(123-cd)pyrene, dieldrin, and mercury
- **Constituents with concentrations above PGWSCOs:** acetone, benzo(a) anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, indeno(123-cd) pyrene, dieldrin, alpha-chlordane, alpha-BHC, endrin and mercury

1,4-Dioxane was not detected, and Polychlorinated biphenyls (PCBs) were not detected at concentrations above the CSCO and PGWSCO in surface soils at the Site. Perfluorooctanesulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA) concentrations in surface soil at the Site are below NYSDEC guidance values for commercial use. In three samples, the PFOS concentration encountered in the surface soil was above NYSDEC guidance values for protection of groundwater (PGW), although evaluation of per- and polyfluoroalkyl substances (PFAS) concentrations in groundwater at the Site, including PFOS, indicates they are not constituents of concern in groundwater at the Site. The guidance values are provided in “Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC’s Part 375 Remedial Programs” (NYSDEC, April 2023).

3.3.1.2 Subsurface Soil

In subsurface soil at the Site, the following constituents were detected at concentrations above the CSCOs or PGWSCOs:

- **Constituents with concentrations above CSCOs:** TCE, benzo(a)anthracene, benzo(a) pyrene, benzo(b)fluoranthene dibenzo(a,h)anthracene, arsenic, barium, cadmium, copper, mercury, and lead; and
- **Constituents with concentrations above PGWSCOs:** TCE, cis-1,2-dichloroethene (cis-1,2-DCE), 1,2-DCE, vinyl chloride, tetrachloroethene (PCE), 1,1,1-trichloroethane (1,1,1-TCA), 1,1-dichloroethane (1,1-DCA), 1,1-dichloroethene (1,1-DCE), benzene, toluene, ethylbenzene, xylenes, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, arsenic, cadmium, lead, mercury, and selenium.

PCBs and pesticides were not detected at concentrations above the CSCOs or PGWSCOs in subsurface soil samples from the Site. However, following RI activities, soils excavated during the 2023 repair of a fire hydrant located directly west of Building 2 were characterized for disposal and found to contain PCB concentrations above these SCOs. Based on data from nearby soil borings, which do not indicate detections of PCBs, this appears to be a localized occurrence and will be further evaluated as part of the pre-design investigation (PDI) described in Section 7.

3.3.1.3 Sources of Constituents in Soil

TCE-related impacts in soil at the Site are likely the result of spills or releases during historical manufacturing operations in which TCE was used for cleaning and degreasing. PAHs in soil at the Site are likely related to historic fill at the Site as well as sources associated with the urban setting surrounding the Site (e.g., stormwater run-off from roads, parking lots and building roofs, fuel spills, and atmospheric deposition of emissions and soot from combustion of fuels such as petroleum, wood, or coal, etc.). Elevated PAH concentrations were identified at one location within the subsurface ash and cinder layer in the southwest corner of the Site, possibly associated with coal residue or coal combustion products from the former on-Site power plant. The elevated levels of the

metals, arsenic, barium, cadmium, copper, lead, mercury, and selenium are likely inherent in the fill material at the Site, in particular the ash and cinder layer in the subsurface soil in the southwest part of the Site. The source of elevated mercury concentrations in the surface soil adjacent to building 8 is uncertain. Pesticides (primarily dieldrin) detected in the surface soil are likely residue from former pest control measures at the facility.

3.3.1.4 Area of Oil-Impacted Soil

In an area between Buildings 5 and 14, oil-impacted soil was found to be present. This area has been estimated to be about 4,500 square feet. Oil-impacted soils were found to start at depths ranging from approximately 1 to 3 feet bgs and displayed thicknesses ranging from 1 to 8 feet. In the lowest lying portions of this area, the depths to oil-impacted soil were generally shallower. There have been no observations of oil or a sheen present at the ground surface. Investigations conducted in 2005 and 2019 noted that the extent of oil impacts does not appear to be changing substantially over time. Seasonal variations in water table elevation are anticipated to have some influence on the vertical distribution of the oil impacts.

Three 30,000-gallon No. 2 fuel oil tanks were formerly located immediately west and adjacent to Building 14 and adjacent to the oil-impacted soil. It is suspected that these tanks may have been the source of the subsurface oil identified to be present in this area. These tanks were closed and removed in 1990. Based upon Diesel Range Organics (DRO) analysis of samples obtained from this area, it is believed that the oil present in the soil at this location is either diesel fuel or No. 2 fuel oil.

3.3.2 Groundwater

The most prevalent impact to groundwater quality at the Site is related to historic releases of TCE, and the subsequent degradation of dissolved TCE into other chlorinated VOCs (CVOCs). Measured concentrations of these compounds in groundwater plumes at the Site have been found to exceed Class GA groundwater quality criteria (i.e., 6 NYCRR Part 703 groundwater standards for Class GA water or, for constituents with no standard, the corresponding guidance value from Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1). Some other VOCs, not related to TCE, also locally exceed the Class GA criteria at certain locations. These exceedances, where they occur, are generally co-located with the dissolved TCE and TCE-related compounds present in the groundwater plumes.

3.3.2.1 TCE-Related Impacts on Groundwater

Direct visual evidence, and/or TCE concentrations in groundwater samples greater than the aqueous solubility of TCE, indicate the presence of subsurface residual dense non-aqueous phase liquid (DNAPL) at the overburden and bedrock surface and within the upper and shallow bedrock at limited locations in the southeastern portion of the Site. In addition to direct evidence, commonly used indirect indicators that infer the potential presence of DNAPL, such as high dissolved TCE concentrations in groundwater, were found in the general area where subsurface residual DNAPL was observed to be present.

DNAPL was observed to be present at two nearby locations at the overburden and bedrock surface. These include a very limited area beneath the eastern edge of loading bays in Building 2, and within a topographic low point of the bedrock surface just east of Building 1. In addition, DNAPL was observed at an approximate depth of 30 to 37 feet bgs at two locations within the upper bedrock underlying a parking area east-southeast of Building 1. Very elevated concentrations of dissolved TCE (greater than 250,000 micrograms per liter [$\mu\text{g/L}$]) were also identified within the upper bedrock at several locations generally east-southeast of Buildings 1, 2, and 7, and extending towards the eastern property boundary. This DNAPL locally represents a source of the dissolved-phase CVOCs in groundwater. The TCE DNAPL is from historical releases during former manufacturing-related operations at the Site, possibly resulting from leaks or spills in or near the facility building complex,

As described in the RIR, the characteristics of the DNAPL, the historic nature of the releases, the nature of the subsurface, and observations in Site monitoring wells support the conclusion that DNAPL migration is no longer occurring and that DNAPL encountered in bedrock at the Site is residual.

3.3.2.1.1 TCE-Related Impacts in Overburden Groundwater

Five plumes of dissolved phase TCE-related compounds were identified in the overburden groundwater at the Site, as depicted in Figure 20 of the RIR (provided in Appendix A). Four of these five plumes do not migrate off-site in overburden groundwater. These overburden plumes are summarized as follows:

- **Southeast Side of the Facility Building Complex:** TCE-related compounds in this plume originate directly east of Building 2 and migrate towards the northeast before bending slightly to the northwest towards Building 10. This plume appears to be captured by the sump under Building 10 and does not migrate off-site. The source of this plume is believed to be the DNAPL identified at the overburden and bedrock surface beneath the eastern edge of Building 2.
- **West of Building 7:** TCE-related compounds in this plume migrate to the northeast and reach the western side of the facility building complex south of Building 5. It is believed that this plume either terminates under the facility or is captured by the sump under Building 10 and does not migrate off-site. The source of this plume is elevated TCE concentrations identified in a limited area of shallow soils. The majority of the shallow soils with the highest TCE concentrations were removed from this area during IRM activities in 2010.
- **West of Building 14 and Extending North:** TCE-related compounds in this narrow plume in the western part of the Site migrate to the north. The thickness of the saturated overburden generally decreases to the north along this plume, and the vertical position of the water table transitions from being within the overburden to within the bedrock north of the plume. Therefore, this overburden plume does not migrate off-site. A distinct source for this plume has not been identified, but it appears to have originated from a shallow or surficial source or release.
- **Between Buildings 6 and 8:** TCE-related compounds in this small plume migrate to the northeast. North of this area, the water table transitions from being within the overburden to within the bedrock. Thus, this overburden groundwater plume does not migrate off-site. No specific source for these dissolved phase concentrations was identified.
- **Northeast Part of the Site/MWBR-30B Area:** This small plume extends slightly off-site within a limited area west of Hampden Road not extending to the east side of Hampden Road. TCE-related compounds in this plume migrate to the northeast and appear to be captured by the sewers and/or permeable bedding around the sewers that are under Hampden Road. Although the saturated zone in the area of this plume is thin, there is some stratification in the concentrations, with the higher TCE concentrations at the base of the overburden, and with the shallower groundwater having lower concentrations. No distinct source of this plume has been identified, and it is likely a “detached plume” that was separated from the overburden TCE plume located east of the facility building complex (described above) when operation of the sump under Building 10 commenced in 1958. At that time, the sump began to capture shallow groundwater and influence the localized groundwater flow patterns due to a general lowering of the water table in the surrounding area. The overall decrease in concentrations of TCE-related compounds over time in the vicinity of MWBR-030B supports the likelihood that this is a detached plume that is dissipating.

3.3.2.1.2 TCE-Related Impacts in Bedrock Groundwater

BR-6 Area

The most significant TCE impacts in bedrock groundwater are associated with DNAPL observed and/or inferred to be present within shallow bedrock east-northeast of Buildings 1 and 2 and extending to the eastern property boundary (see Figures 21, 22B and 24 in the RIR [provided in Appendix A]). As discussed in Section 3.3.2.1, this DNAPL is expected to be present in a residual form and thus would no longer be migrating. However, this residual DNAPL, and high concentrations of TCE that have diffused into the low permeability rock matrix, represent a long-term ongoing source for the continued formation of dissolved-phase TCE-related plumes in bedrock groundwater.

Dissolved-phase TCE-related compounds, at concentrations substantially lower than in the area of DNAPL occurrence, then migrate away from this source material with groundwater flow within the bedrock. Concentrations of TCE-related compounds in wells screened in the slightly deeper bedrock typically are below the Class GA criteria. Vertical contaminant profiles at individual locations show that dissolved CVOC concentrations generally decrease in bedrock with depth throughout the Site. The downward movement of DNAPL and dissolved-phase constituents is restricted by the overall low vertical hydraulic conductivity of the bedrock and the presence of the underlying aquitard. Thus, the residual DNAPL and resulting dissolved plume are positioned within a rather vertically limited zone within the bedrock. Near these subsurface source zones, the most highly impacted areas within the bedrock were generally found to be present at depths ranging from about 30 to 37 feet bgs in the parking area east of the facility building complex. The highly impacted bedrock groundwater zone in this area is overlain with approximately 15 to 20 feet of unimpacted overburden/bedrock groundwater. (See Appendix A, Figure 22B).

BR-12 Area

A limited area in the northwestern part of the property, referred to as the BR-12 area, was subject to packer sampling in the bedrock. Packer sample results indicated elevated concentrations of TCE and other VOCs along a limited area near Humboldt Street. However, groundwater sampling data from a permanent bedrock groundwater monitoring well, (MWBR-12A) installed at the same location, and vertical interval where packer test data showed the highest concentration, indicates substantially lower concentrations than from the packer sampling (see Figures 22 and 24 in the RIR [provided in Appendix A]). The results from the packer sampling have thus not been replicated by the data from the permanent monitoring well. This demonstrated that the actual stabilized dissolved VOC concentrations within shallow bedrock groundwater in this area are much lower than the concentrations observed in the groundwater sampled during packer testing. In addition, a deeper bedrock well (MWBR-12B) installed adjacent to MWBR 12A, indicates dissolved CVOC concentrations are below Class GA criteria. (See Appendix A, Figure 22C).

Overall Observations of TCE-Related Impacts in Bedrock Groundwater

The dissolved CVOC constituents identified in bedrock groundwater along the downgradient property boundaries towards the north and northeast of the Site primarily consist of degradation products of TCE, mainly cis-1,2-DCE and vinyl chloride, and a relatively low concentration of dissolved TCE.

Certain of these compounds are present at concentrations that exceed Class GA criteria.

Downgradient groundwater in the upper bedrock is intercepted to some degree by: (1) the local sewers (or permeable sewer bedding) where they are situated below the water table and set into bedrock trenches under Humboldt Street and the northern ends of Carlson and Hampden Roads, and (2) the Building 10 sump. As discussed previously, contaminated groundwater collected by the Building 10 sump is treated by the carbon treatment system in Building 10 prior to discharge to the sanitary sewer under a Sewer Use Permit with Monroe County. However, the potential exists for TCE- impacted groundwater in bedrock to extend off-site to some degree. On a voluntary basis, at the

request of NYSDEC and NYSDOH, 100 Carlson Road, LLC installed and sampled monitoring wells to assist in an off-site bedrock groundwater evaluation.

3.3.2.2 Other VOCs in Groundwater

Locally, concentrations of three other CVOCs (1,1,1-TCA, 1,1-DCE, and 1,1-DCA) exceed Class GA criteria at various bedrock groundwater sampling locations. These exceedances are co-located with exceedances of other TCE-related compounds. At some locations on the east side of the facility building complex, there are concentrations of non-chlorinated hydrocarbon VOCs including toluene, ethylbenzene, and xylenes above the Class GA criteria. These are also co-located with exceedances of TCE-related compounds. The hydrocarbons are likely in part associated with the natural gas that is present in the bedrock beneath the Site, especially in the deeper bedrock groundwater samples. Chloroform and methyl tertiary butyl ether (MTBE) were also detected at concentrations above the Class GA criteria at some locations. These compounds were not associated with past Site operations.

3.3.2.3 Emerging Contaminants in Groundwater

Groundwater samples were collected in December 2019 from six wells at the Site and analyzed for the following constituents:

- PFAS (21 compounds)
- 1,4-dioxane

This sampling was requested by NYSDEC as part of a statewide initiative to add emerging contaminants (PFAS and 1,4-dioxane) to the scope of investigations at all remediation sites in New York. This sampling was not requested due to any information indicating that PFAS and/or 1,4-dioxane were used and/or released at the Site.

Based on a comparison to NYSDEC criteria, the data indicate PFAS compounds are not contaminants of concern at the Site. 1,4-Dioxane was not detected in groundwater samples collected from overburden monitoring wells. However, 1,4-dioxane was detected in bedrock groundwater at three well locations: upgradient well MWBR-9A, and downgradient wells MWBR-2A and MW-BR-8A. The concentration in each of these wells was greater than the Class GA guidance value of 0.35 µg/L. The presence of 1,4-dioxane in the upgradient well indicates that some 1,4-dioxane may be contributed from off-site, but the concentrations in the downgradient wells are somewhat higher and thus 1,4-dioxane may potentially have also been contributed from the Site. The exceedances in the downgradient wells are co-located with concentrations of TCE-related compounds that exceed the Class GA standards and thus will be addressed in conjunction with the Site-related constituents by the remedy for the Site.

3.3.2.4 Other Constituents in Groundwater

Groundwater samples collected prior to the RI did not indicate impacts from SVOCs, PCBs, or cyanide in the overburden groundwater. Some metals (cadmium, chromium, lead, mercury, and silver) were detected at concentrations greater than the Class GA criteria at a few locations. The concentrations are highest at the southern upgradient property boundary, which is downgradient of the railroad lines and other commercial and former industrial properties to the south. Thus, these metals generally appear to be related to an upgradient source that is not associated with the Site.

3.3.3 Soil Vapor Assessment and Mitigation Activities

As described in Section 2.4.2.1, a facility-wide SSDS was installed as a precautionary soil vapor mitigation system for the entire facility building complex. This was done as an IRM in compliance with the October 2006 NYSDOH Soil Vapor Guidance document (NYSDOH, October 2006, as amended), and the identification of elevated concentrations of TCE and associated compounds in shallow groundwater near and beneath the building complex. The SSDS was installed to address potential vapor intrusion from this impacted groundwater.

The implementation of the facility-wide SSDS was conducted pursuant to the work plan entitled “Interim Remedial Measures (IRM) Work Plan for the Installation of a Sub-Slab Vapor Mitigation System – Carlson Park, Rochester, New York” (Carlson Park LLC, December 2006). This work plan was approved by the NYSDEC, the NYSDOH, and MCDPH in January 2007. Installation of the system was conducted from January 2008 through February 2009. After evaluation and testing of the system, additional components were added to the system in February and March 2010.

This system is fully described in the “Sub-Slab Vapor Mitigation Construction Completion Report, Carlson Park Facility, Rochester, New York (O’Brien & Gere and Mitigation Tech, December 2013), which was submitted to the NYSDEC in December 2013.

On-Site soil gas sampling conducted as part of the RI was done immediately adjacent to bedrock groundwater evaluation location BR-6, which is located near the eastern property boundary. At this location, residual DNAPL was identified in shallow bedrock at an approximate depth of 30 to 35 feet bgs. The impacted bedrock zone is situated below approximately 20 feet of unimpacted overburden/bedrock groundwater. A total of four soil gas samples were collected in November 2010 from three locations situated within 20 feet from well MWBR-06 A (at one of the locations, two samples were collected). Each of these soil gas samples were collected from soil vapor implants set at a depth of 8.5 to 9 feet bgs. This depth was slightly above the water table. This location and depth were considered to represent a worst-case scenario for the potential of sub-slab soil vapor intrusion. Analytical results obtained from these soil gas samples indicated the presence of TCE at concentrations ranging from 27 to 88 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$).

Several phases of soil vapor intrusion (SVI) investigation activities were conducted by 100 Carlson Road LLC on a voluntary basis between 2011 and 2021 at off-site properties adjacent to the northern and eastern sides of the Site. With respect to groundwater flow, these properties are positioned generally downgradient or side-gradient of the Site. The SVI investigation activities, including sub-slab and indoor basement air sampling conducted during the heating season, were implemented in accordance with work plans that were requested and approved by the NYSDEC and the NYSDOH. The SVI data were provided to NYSDEC, NYSDOH, and the property owners. The data were compared to the Soil Vapor/Indoor Air Matrix in NYSDOH’s October 2006 (amended May 2017) Soil Vapor Guidance to evaluate if mitigation was required. At most properties, no further action was required. The data from five properties indicated additional action was required. At these properties, 100 Carlson Road LLC opted to install SSDSs, even though 100 Carlson Road LLC is a Volunteer in the BCP Program and thus not obligated to conduct off-site remediation activities. At a sixth property, the SVI data indicated concentrations below the criteria requiring additional action in NYSDOH Soil Vapor/Indoor Air Matrix, but the concentrations were close to these criteria. 100 Carlson Road LLC voluntarily opted to install an SSDS at this property as well. Five of these SSDSs were installed between 2011 and 2013. The sixth SSDS was installed in 2021. These SSDSs continue to be operated, inspected, and maintained.

3.4 Exposure Assessments

As part of the RI, an evaluation was conducted to confirm that there are no fish and wildlife resources on or in the vicinity of the Site. The evaluation confirmed that a Fish and Wildlife Resource Impact Analysis (FWRIA) was not required.

The qualitative human health exposure assessment (QHHEA) conducted as part of the RI indicated potential exposure pathways and potential exposure routes for constituents in each medium as described below.

3.4.1 Surface Soil

Constituents detected in surface soil at concentrations above the CSCOs include several high-molecular weight PAH compounds [benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene], dieldrin, and mercury. The surface soil at the Site is covered by either buildings, pavement, or landscaping. The landscaped areas, which occupy approximately 5 acres of the 38.81-acre Site (approximately 13 percent of Site area) are covered by grass lawn, mulch, bushes, and trees. Thus, humans that are not involved in intrusive activities (e.g., outdoor and indoor workers, Site visitors, and trespassers) do not have the potential for exposure to constituents in these soils. A potentially complete exposure pathway for constituents in surface soil exists to utility workers (under current and future conditions) and construction workers (under potential current and future conditions) if these workers conduct intrusive work into the surface soil. These exposures may result from incidental ingestion, dermal contact, or inhalation of soil particles with sorbed constituents that are suspended in the air as dust. These potential exposure pathways to surface soil are controlled by conducting intrusive activities at the Site in accordance with provisions in an excavation management requirements document that has been developed for the Site. Future worker activities will be subject to a Site Management Plan (SMP) that will be developed as part of the remedy for the Site and will include requirements for mitigating these potential exposure pathways during intrusive activities. The above-mentioned excavation management requirements document that is currently in use has requirements consistent with those in a SMP.

3.4.2 Subsurface Soil

Constituents detected in subsurface soil at concentrations above the CSCOs include several high molecular weight PAH compounds [benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, and dibenzo(a,h)anthracene], TCE, and metals including arsenic, barium, cadmium, copper, lead, and mercury. Potentially complete exposure pathways for constituents in subsurface soil exist for the following receptor populations:

- Utility workers (current and future conditions) and construction workers (potential future conditions) who conduct intrusive activities into the subsurface soil. The potential exposure route from the subsurface soil would be via dermal contact, inhalation (dust particles and/or vapors), and accidental ingestion. Note that these potential exposure pathways to subsurface soil are controlled by conducting intrusive activities at the Site in a manner consistent with provisions in the above-mentioned excavation management requirements document. Future worker activities will be subject to a SMP that will be developed as part of the remedy for the Site and will include requirements for mitigating these potential exposure pathways during intrusive activities.
- Indoor workers (current and future conditions) or visitors to the Site buildings via inhalation of VOCs that may have migrated from the subsurface soil, through the vadose zone and into the indoor air of Site buildings. The potential for this exposure pathway was mitigated by the facility-wide SSDS, which is operational in all occupied portions of the facility building complex, as described in Section 2.4.2.1.

3.4.3 Groundwater

There are no known users of groundwater for potable water or other supply uses in the vicinity of the Site. The area is served by the City of Rochester's public water supply, which obtains water from Hemlock Lake and Canadice Lake, and is supplemented by water from Lake Ontario. Thus, there is no potential for ingestion of groundwater. Potentially complete exposure pathways for constituents in groundwater may exist for the following receptor populations to the extent the active SSDS is not functioning and in the event the protocols in the above-mentioned excavation management requirements document are not complied with:

- Utility workers (current and future conditions) and construction workers (potential future conditions) who encounter groundwater in excavations. Routes of potential exposure would include dermal contact, inhalation of vapors volatilizing from the groundwater, and accidental ingestion. Note that these potential exposure pathways to groundwater are controlled by conducting intrusive activities at the Site in a manner consistent with provisions in the above-mentioned excavation management requirements document. Future worker activities will be subject to a SMP, including a Site Health and Safety Plan (HASP), which will be developed as part of the remedy for the Site, which will include requirements for mitigating these potential exposure pathways during intrusive activities.
- Indoor workers and visitors to the Site building (current and future conditions) via inhalation of VOCs that may have migrated from the groundwater, through the vadose zone and into the indoor air of a building in the absence of a functioning SSDS. The potential for this exposure pathway was mitigated by sealing the basement floors and operation of the facility-wide SSDS, which is operational in all occupied portions of the facility building complex, as described in Section 2.4.2.1. Occupants of off-site residential and commercial buildings proximal to the Site via potential inhalation of VOCs through the vadose zone and into the indoor air of a building. The off-site investigation only indicated a few off-site buildings for which, as a precautionary measure, the Volunteer installed SSDSs and took other measures to mitigate vapor intrusion, as described in Section 2.4.2.1.

Section 4

Remedial Goals and Remedial Action Objectives

This section identifies potentially applicable Standards, Criteria, and Guidance (SCGs) and presents the Remedial Goals and Remedial Action Objectives (RAO) for the Site.

4.1 Identification of Standards, Criteria, and Guidance

The following federal, state, and local SCGs are considered potentially applicable to the remediation of the Site and have been selected from the NYSDEC's "Index of Standards, Criteria and Guidance (SCGs) for Investigation and Remediation of Inactive Hazardous Waste Disposal Sites."

4.1.1 Federal SCGs

Potentially applicable federal SCGs include the following:

- **Laws, Policy, and Guidance for Federal Superfund:** provides a listing of federal rules, regulations, and guidance for the Superfund Program.
- **National Contingency Plan (NCP):** provides the organizational structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants, and contaminants.
- **Waste Cleanup and Risk Assessment:** human health risk assessments.
- **29 Code of Federal Regulations (CFR) Part 1910.120 – Hazardous Waste Operations and Emergency Response:** health and safety.

4.1.2 State SCGs

Potentially applicable state SCGs include the following:

- **Division of Environmental Remediation (DER) SCGs:**
 - **Remedial Guidance and Policy Documents:** this includes but is not limited to Commissioner Policy 43 (CP-43): Groundwater Monitoring Well Decommissioning Policy and CP-51: Soil Cleanup Guidance Policy and DER series documents DER-10: Technical Guidance for Site Investigation and Remediation and DER-31: Green Remediation.
 - **6 NYCRR Part 364 – Waste Transporters:** establishes requirements, including permitting requirements, for waste transporters.
 - **6 NYCRR Parts 370-374 and 376 – Hazardous Waste:** establishes requirements for management of hazardous waste and Land Disposal Restrictions (LDRs).
- **BCP Law & 6 NYCRR Part 375 – Environmental Remediation Programs and Regulations:** establishes requirements for environmental remediation programs in New York State, including the BCP (per BCP Law in New York Environmental Conservation Law Article 27, Title 14).

- **Division of Materials Management SCGs:**
 - **6 NYCRR Part 360 - Solid Waste Management Facilities and Regulations:** establishes solid waste management facility requirements. May be applicable for on-site consolidation of excavated soil.
- **Division of Water SCGs:**
 - **Technical and Operational Guidance Series (TOGS):** includes a listing of guidance including TOGS 1.1.1 Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations.
 - **6 NYCRR Part 702.15:** empowers NYSDEC to apply and enforce guidance where there is no promulgated standard.
 - **6 NYCRR Part 700-706 - NYSDEC Water Quality Regulations for Surface Waters and Groundwater:** includes 700 - Definitions, Samples and Tests; 701 - Classifications Surface Waters and Groundwaters; 702 - Derivation and Use of Standards and Guidance Values; 703 - Surface Water and Groundwater Quality Standards and Groundwater Effluent Standards.
 - **6 NYCRR Part 750-757 - Implementation of National Pollutant Discharge Elimination System (NPDES) Program in New York State (NYS):** regulations regarding the State Pollutant Discharge Elimination System (SPDES) program.
- **Division of Fish and Wildlife and Marine Resources SCGs:**
 - As discussed, an evaluation was conducted as part of the RI to confirm that there are no fish and wildlife resources on or in the vicinity of the Site.
- **Division of Environmental Permits SCGs:**
 - **DEC Permits Guidance:** listing of guidance for permits.
 - **6 NYCRR Part 621 - Uniform Procedures:** permit processing requirements.
- **Division of Air Resources SCGs:**
 - **Air Guidance and Policy Documents:** includes a list of guidance including Air Guide 1 - Guidelines for the Control of Toxic Ambient Air Contaminants.
 - **6 NYCRR Parts 200, 201, 211, 212, 257:** establishes requirements for air discharges, including required permitting and standards.
- **NYSDOH SCGs:**
 - **Generic Community Air Monitoring Plan:** provides requirements and action levels for community air monitoring.
 - **Guidance for Evaluating Soil Vapor Intrusion in New York:** for use in exposure assessments for vapor intrusion.
- **NYS Department of State SCGs:**
 - The Site is not located within a coastal area and is not subject to the Coastal Management Program.

4.1.3 Local SCGs

Potentially applicable local SCGs include the following:

- Local codes and ordinances in the City of Rochester.
- Local permits from the City of Rochester.
- Local approvals from the POTW for potential discharge of waters generated from remediation to the sanitary sewer system.

4.2 Remedial Goals

In accordance with 6 NYCRR Part 375-3.8, the goal of the remedial program is to implement a remedy that is fully protective of public health and the environment including, but not limited to, groundwater, drinking water, surface water, air (including indoor air), sensitive populations, and ecological resources. The selection of the remedy shall consider the current, intended, and reasonably anticipated future land use of the Site and its surroundings and shall evaluate the feasibility of a permanent remedy which would allow for the Site to be used for any purpose without restriction and without reliance on the long-term employment of institutional or engineering controls.

4.3 Target Remediation Areas, Media, and Constituents

As discussed in Section 3.3, TCE is the most prevalent constituent of concern (COC) impacting Site soil, groundwater, and soil vapor. Surface water and sediments are not media of concern at this Site.

Soil

Soil (surface and subsurface) is a medium of concern at the Site. TCE in Site soil is likely the result of spills or releases during historical manufacturing processes/operations in which TCE was used for cleaning and degreasing. Soil sample analyses have indicated concentrations of TCE above applicable SCOs at the Site. The available soil quality data is supplemented by an extensive amount of depth-discrete overburden groundwater samples collected from temporary well points and analyzed for VOCs, as depicted in Figure 2 in the RIR (provided in Appendix A). These data provide an indirect indication of where TCE concentrations are elevated in soil at the Site. The concentration of TCE from these groundwater sample analyses are depicted in Figure 20 of the RIR (provided in Appendix A). The areas where the highest concentrations of TCE are present in groundwater are likely associated with elevated TCE concentrations in the local soil, which serves as a source for the dissolved phase TCE and related compounds in the groundwater.

PAHs at concentrations greater than applicable SCOs appear to be associated with some historic fill as well as ash, cinders and possibly deposition of emissions from the former use of coal at the Site. Additionally, PAHs may also be partly derived from sources associated with the urban setting of the Site (i.e., urban runoff and/or atmospheric deposition). Inorganics (i.e., arsenic, barium, cadmium, copper, lead, mercury, and selenium) at concentrations greater than applicable soil criteria also appear to be inherent to the fill material at the Site. Oil-impacted soil was found to be present in an area between buildings 5 and 14 (refer to Figure 4 of the RIR provided in Appendix A) and is suspected to be associated with three former #2 fuel oil tanks that were located in the area and have since been closed.

Groundwater

The most prevalent impact to groundwater quality (overburden and bedrock) at the Site is related to historic releases of TCE, and the subsequent degradation of dissolved TCE into other CVOCs, primarily cis-1,2-DCE and vinyl chloride. Measured concentrations of these compounds in groundwater at the Site have been found to exceed Class GA criteria. Some other VOCs, not related to TCE degradation products, also locally exceed the Class GA criteria. These exceedances, where they occur, are generally co-located with the dissolved TCE and TCE-related compounds present in the groundwater plumes. In addition to dissolved-phase impacts, direct visual evidence and/or TCE concentrations in groundwater samples greater than the aqueous solubility of TCE, indicated the presence of subsurface residual DNAPL at the overburden and bedrock surface and within the upper and shallow bedrock at limited locations in the southeastern portion of the Site (e.g., BR-6 Area identified on Figure 22B of the RIR provided in Appendix A), as described in Section 3.3.2.

Within overburden groundwater, five plumes of dissolved phase TCE-related compounds have been identified. Four of these five plumes do not migrate off-site in overburden groundwater due to either

being captured by the Building 10 sump and/or the water table transitioning from overburden to bedrock. One relatively small, detached plume extends slightly off-site within a limited area west of Hampden Road but does not extend to the east side of Hampden Road (refer to Section 3.3.2.1.1 and to Appendix A Figure 20).

Within bedrock groundwater, the most significant TCE-related impacts are associated with the indications of residual DNAPL within shallow bedrock east-northeast of Buildings 1 and 2 and extending to the eastern property boundary (i.e., BR-6 Area identified on Figure 22B in Appendix A). This residual DNAPL, and high concentrations of TCE that have diffused into the low permeability rock matrix, represent a long-term ongoing source for the continued formation of dissolved phase plumes of TCE-related compounds in bedrock groundwater that extend to the north and northeast. The downgradient groundwater in the upper bedrock is captured or intercepted to some degree by the local sewers (i.e., under Humboldt Street, Carlson Road, and Hampden Road) or by the Building 10 sump. However, the potential exists for TCE-impacted groundwater in bedrock to extend off-site to some degree. On a voluntary basis, at the request of NYSDEC and NYSDOH, 100 Carlson Road, LLC installed and sampled off-Site monitoring wells to assist in an off-site bedrock groundwater evaluation.

Soil Vapor

Soil vapor is also a potential medium of concern at the Site. As described in Section 3.3.3, a facility wide SSDS was installed in the facility building complex due to the identification of VOCs in shallow groundwater outside, and adjacent to, several of the facility buildings, as well as in the sump at Building 10. The sealing of the basement floors and the operation of the SSDS mitigates the potential for intrusion of VOC soil vapors into occupied portions of the facility building complex by maintaining a negative pressure below the various building slabs. Additionally, as described in Section 3.3.3, 100 Carlson Road LLC voluntarily installed SSDSs at six properties to the north and east of the Site to address potential concerns with intrusion of VOCs in soil vapors.

4.4 Remedial Action Objectives (RAOs)

Based on the conclusions from the RIR, summarized in Section 3, and the target media to be addressed, the RAOs for the Site include the following:

Groundwater:

- RAOs for Public Health Protection:
 - Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
 - Prevent contact with, or inhalation of volatiles, from contaminated groundwater.
- RAOs for Environmental Protection:
 - Restore groundwater aquifer to pre-disposal/pre-release conditions, to the extent practicable.
 - Remove the source of groundwater contamination.

Soil:

- RAOs for Public Health Protection:
 - Prevent ingestion and direct contact with contaminated soil.
 - Prevent inhalation exposure to contaminants volatilizing from soil.

- RAOs for Environmental Protection:
 - Prevent migration of contaminants that would result in groundwater contamination.

Soil Vapor:

- RAOs for Public Health Protection:
 - Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings.

Section 5

Development and Analysis of Alternatives

This section presents the development and screening of the General Response Actions (GRAs), identification and screening of the remedial technologies, development of remedial alternatives, and detailed analysis of the alternatives against criteria prescribed in DER-10.

5.1 General Response Actions

This section presents the development and screening of the GRAs to address the target remediation areas, media, and constituents. The GRAs are then developed and screened based on the potential to satisfy the RAOs established in Section 4.4. The GRA screening process is summarized in Table 1. The GRA's retained from the screening process are as follows:

- Institutional Controls
- Monitored Natural Attenuation (MNA)
- Containment
- Removal
- In Situ Treatment
- Ex Situ Treatment
- Off-Site Treatment and Disposal

Two GRAs were eliminated during the screening process (No Action and On-Site Consolidation). The No Action GRA was eliminated since the Site is being remediated under the Brownfield Cleanup Program (BCP) and, per 6 NYCRR Part 375 and DER-10, evaluation of a No Action alternative is not necessary for sites managed under the BCP. The On-Site Consolidation GRA was eliminated since it would not be compatible with the current and anticipated future Site uses. Off-site management and on-site treatment of impacted media are more practical options that would not hinder current and future Site commercial and/or industrial uses.

5.2 Identification and Screening of Technologies

This section presents the identification and screening of the remedial technologies. The outcome of this process is the establishment of the list of remedial technologies that will be used to develop the remedial alternatives for the Site.

5.2.1 Identification of Technologies

Potentially applicable remedial technologies associated with each of the GRAs retained after the screening presented in Section 5.1 were identified based on their applicability and documented effectiveness for the media of concern and COCs identified at the Site. The applicable candidate remedial technologies are presented in Table 2.

5.2.2 Screening of Technologies

The technologies were evaluated and screened based on their applicability to the Site-specific conditions and implementability. A summary of the results of the screening process is presented in Table 2. Based on the screening, the technologies listed below were retained to be used in assembling of the remedial alternatives. Refer to Table 2 for comments justifying the retention or elimination of a remedial technology. The technologies, organized by GRA, that were retained from the technology screening are as follows:

- Institutional Controls (ICs):
 - Environmental Easement
- Monitored Natural Attenuation (MNA)
- Containment:
 - Surface Covers
 - Hydraulic Control/Containment
 - Sub-slab Vapor Mitigation
- Removal:
 - Excavation
 - Groundwater Extraction
 - NAPL Recovery
- In Situ Treatment:
 - In Situ Thermal Treatment
 - In Situ Chemical Oxidation (ISCO) or Reduction (ISCR)
 - In Situ Enhanced Bioremediation (ISEB)
- Ex Situ Treatment:
 - Ex Situ Groundwater Treatment Technologies
 - Ex Situ Vapor Treatment Technologies
- Off-Site Treatment/Disposal:
 - Non-Hazardous Waste Landfill/Treatment Facility
 - Hazardous Waste Landfill/Treatment Facility

5.3 Alternatives Development

The remedial technologies retained after the technology screening were assembled into potential remedial alternatives for further evaluation. The remedial alternatives are described below and presented in Table 3.

For this AAR, two alternatives have been developed for further evaluation. Each of the retained remedial technologies identified in Section 5.2.2 are utilized in one or both remedial alternatives. The first achieves a Track 4 commercial use remedy, as defined in 6 NYCRR Part 375-3.8(e), and the second attempts to achieve an unrestricted use cleanup scenario that satisfies Track 1 remedy requirements, as defined in 6 NYCRR Part 375-3.8(e). The inclusion of an alternative that would meet Cleanup Track 1 in the alternatives analysis is a requirement of Part 375-3.8(f)(3)(ii)(a).

5.3.1 Alternative 1 - Track 4 Commercial Use Remedy

Alternative 1 employs a range of remedial technologies to achieve a Track 4 commercial use remedy as defined in 6 NYCRR Part 375-3.8(e). The alternative is conceptually depicted in Figure 4. Note that the details of this Track 4 commercial use remedy are conceptual and would be refined and finalized pending the results of pre-design investigation (PDI) activities, groundwater modeling, and a detailed remedial design.

Alternative 1 includes a Site-wide surface cover to serve as an engineering control to mitigate the potential for direct contact with impacted soil. This cover would be an enhancement of the surface cover currently present at the Site (see Section 3.4.1). The surface covers would include a combination of existing, or new vegetated or landscaped soil covers (minimum 12 inches thick of soil meeting Commercial Use SCOs), crushed stone cover (minimum 12 inches thick), asphalt pavement, concrete sidewalks, concrete building slabs, or other final surface restorations.

This alternative would include a groundwater migration control system, employing groundwater extraction and treatment, which would provide hydraulic control and containment of impacted overburden and bedrock groundwater, with the objective of controlling off-site migration of Site-impacted groundwater. The existing Building 10 sump has been shown to be effective in locally controlling groundwater migration from the Site. The alternative assumes that the Building 10 sump would be incorporated into the extraction system (with potential modifications or upgrades) and supplemented with approximately three new bedrock groundwater extraction wells to achieve sufficient additional capture. Extracted groundwater would be directed via a force main to an on-Site groundwater treatment system (assumed to be located within Building 10C where the existing carbon treatment system is located) for treatment to meet effluent limits (established in a discharge permit, which may be a modification of the existing discharge permit described in Section 2.3) prior to being discharged via the sanitary sewer system to the POTW.

The Oil-Impacted Soil Area would be addressed through excavation and off-site treatment and disposal. It is anticipated that the areal extent of the excavation will be delineated in the field as the excavation activities are progressing through a combination of field screening for the visual determination of oil impacts. Impacted soil would be physically removed through mechanical excavation to an extent practicable. Utility conflicts, foundations, or other subsurface obstacles may limit the extent to which oil-impacted soil can be removed. Remaining impacts that are not accessible via excavation would be addressed by other components of the remedy (e.g., engineering, and institutional controls). Monitoring and passive NAPL recovery may also be applicable to this area to address recoverable oil impacts that may remain after the removal activities.

MNA would be employed to address COCs in overburden groundwater that exceed their respective Class GA Criteria and are outside the capture zone of the hydraulic control system. MNA is anticipated to be applied to the off-site overburden groundwater impacts northeast of the Site. This area appears to be a detached dissolved phase plume with no ongoing source of COCs. The MNA component of the remedy would include periodic groundwater monitoring of COCs and natural attenuation indicators to support ongoing evaluations of the effectiveness of MNA and confirm that potential receptors are not being impacted.

The existing SSDSs (both on-Site and off-site) would be incorporated into the comprehensive remedy and continue to mitigate the potential for subsurface vapor intrusion into occupied building spaces. In addition, potential future buildings would also be required to include vapor mitigation measures.

Since Alternative 1 is a restricted use remedy and incorporates the use of engineering controls (ECs), the alternative would also include the application of institutional controls (ICs), i.e., an environmental easement, to: (a) limit the use and development of the property to commercial or industrial uses, (b) restrict the use of groundwater as a source of potable water without treatment as determined by New York State Department of Health (NYSDOH) and local health department, (c) require vapor

mitigation measures for potential future on-Site buildings, (d) require periodic certification of institutional and engineering controls (based on inspections, monitoring, operations and maintenance), and (e) require compliance with a Site Management Plan (SMP) approved by the NYSDEC in consultation with the NYSDOH.

Alternative 1 would require long-term operation, monitoring, and maintenance of the Site-wide cover system, groundwater migration control system, MNA component, and SSDSs.

5.3.1.1 Alternative 1 Development Considerations

Additional remedial technologies were considered, but ultimately not included in the development of Alternative 1. Remedial measures were considered to address the source of the ongoing groundwater impacts. In situ treatment technologies retained after the technology screening (e.g., enhanced bioremediation, chemical oxidation or reduction, thermal treatment) can be effective in addressing the COCs present at the Site. However, in situ remediation would be challenging at this Site due to: (1) the presence of DNAPL and the slow process of DNAPL dissolution into groundwater would act as a persistent source causing concentrations to rebound after treatment, thus requiring long-term or repeat applications, (2) the fractured bedrock matrix presents challenges in distributing the treatment reagents in situ and achieving effective contact between reagents and COCs and can also act as a persistent source as COCs diffuse out of the matrix, and (3) the likely presence of COCs acting as a source to groundwater impacts beneath the building complex in areas inaccessible to treatment. For these reasons, in situ technologies are not expected to be effective in the treatment of the source impacting groundwater at this Site and are not anticipated to decrease the timeframe over which the groundwater migration control system or the facility-wide SSDS would need to operate. Furthermore, the addition of in situ treatment to Alternative 1 is not expected to have significant incremental benefit to the effectiveness/protectiveness of the alternative as the other remedial components employed by the alternative would effectively address the potential exposure pathways necessary to allow for the commercial and/or industrial use of the Site, which is the objective of Alternative 1.

Other remedial technologies were also considered for the Oil-Impacted Area. As indicated in Section 5.3.1, Alternative 1 employs excavation to remove oil-impacted media to the extent practicable given the subsurface obstacles (utilities, foundations) present in this area. If recoverable oil impacts in the form of NAPL are present following the excavation, passive NAPL recovery would be employed to monitor and recover remaining oil impacts from this area. In situ treatment measures (e.g., thermal treatment) could be effective for oil-impacted soil, however, the approach was eliminated as excavation is expected to be a more effective approach for the relatively shallow (approximately 10 feet bgs) oil impacts in this area. Thermal treatment, for example, would require the design, installation, and operation of an extensive heating and vapor/liquid recovery system to address the oil-impacted soil that can more readily be addressed through excavation.

5.3.2 Alternative 2 - Track 1 Unrestricted Use Remedy

Alternative 2 employs a range of remedial technologies to attempt to achieve an unrestricted use cleanup scenario that satisfies Track 1 remedy requirements, as defined in 6 NYCRR Part 375- 3.8(e). The alternative is conceptually depicted on Figure 5. The inclusion of an alternative that would meet Cleanup Track 1 in the alternatives analysis is a requirement of Part 375-3.8(f)(3)(ii)(a).

To meet Track 1 remedy requirements, the soil component of the remedial program must achieve the Unrestricted Use SCOs (6 NYCRR Part 375 6.8(a)) for all soils above bedrock pursuant to 6 NYCRR Part 375-3.8(e)(1)(ii). Considering the widespread occurrence of COCs exceeding Unrestricted Use SCOs, it is assumed that this alternative would require demolition of the existing facility building complex (880,000-square foot) to allow full excavation of all the on-Site soil down to bedrock over the 38.81-acre Site. Soil characterization (either pre-excavation or post-excavation) would have to be conducted to determine if some of the soil volume meets the Unrestricted Use

SCOs and may remain in-place or could be eligible for re-use as backfill. The excavation volume for removal of soil down to bedrock is estimated to be approximately 788,000 cubic yards. Following excavation, the soil would be transported off-site by licensed haulers for disposal at a permitted treatment or disposal facility. As described in Section 5.4.4, this would require over 28,000 truck trips assuming 40 tons per truck. Demolition debris would either be processed for re-use as backfill (e.g., clean concrete) or transported off-site by licensed haulers for disposal at a permitted disposal facility. Due to the depth of the excavation, this alternative would require excavation shoring to protect adjacent properties, roadways, and utilities. Dewatering would be required to remove groundwater and stormwater from the excavation areas until backfilling is complete. Water generated during dewatering activities would be passed through the on-Site treatment and directed to the sanitary sewer system for further treatment at the local POTW. Utilities within the excavation footprint would also need to be located and properly managed. This may require temporary or permanent utility re-routing or other temporary measures (e.g., by-pass pumping for sewers). Following excavation, the Site would be backfilled to approximately match existing grades and surfaces would be restored, as appropriate pending Site development plans. As described in Section 5.4.4, importing the fill would require over 47,000 truck trips assuming 15 cubic yards per truck.

A groundwater migration control system, employing groundwater extraction and treatment, would be required to provide hydraulic control and containment of remaining impacted bedrock groundwater, with the objective of controlling off-site migration of Site-impacted groundwater. This alternative assumes that four new bedrock groundwater extraction wells would be required to achieve sufficient capture. Extracted groundwater would be directed via force main to an on-Site groundwater treatment system for treatment to meet effluent limits (established in a discharge permit) prior to being discharged via the sanitary sewer system to the POTW.

Since Track 1 remedies cannot include long-term ICs and ECs, it is assumed that additional measures would be required to actively remediate source areas that, if left untreated, would act as a long-term source of groundwater impacts. Therefore, this alternative also includes an in situ treatment component to target bedrock groundwater in the area east-northeast of Buildings 1 and 2 and extending to the eastern property boundary where residual DNAPL and high concentrations of TCE that have diffused into the low permeability rock matrix represent a potential long-term ongoing source for bedrock groundwater impacts, as identified during the RIR, and potentially areas under the building, which were not accessible for characterization during the RIR. The in-situ treatment component would be determined based on PDIs and evaluations and could consist of a variety of in situ approaches, including biological, chemical (oxidation or reduction), and/or thermal treatment, which could be used alone or in combination with each other. Depending on the type of in-situ treatment, additional measures may be required to control potential short-term risks and COC migration (e.g., vapor collection and treatment, groundwater migration control system).

MNA would be employed to address COCs in overburden groundwater that exceed Class GA criteria and are outside the capture zone of the hydraulic control system. MNA is anticipated to be applied to the off-site overburden groundwater impacts northeast of the Site. This area appears to be a detached dissolved phase plume with no ongoing source of COCs. The MNA component of the remedy would include periodic groundwater monitoring of COCs and natural attenuation indicators to support ongoing evaluations of the effectiveness of MNA and confirm that potential receptors are not being impacted.

The existing off-site SSDSs would be incorporated into the comprehensive remedy and continue to mitigate the potential for subsurface vapor intrusion into occupied building spaces. Future buildings would also require the evaluation and potential inclusion of vapor mitigation measures.

As a Track 1 remedy, Alternative 2 cannot include the long-term use of ICs and ECs, as it is assumed that COCs would be either removed or treated following implementation of the remedial program to a point where such controls would not be necessary. A restriction on groundwater usage may be

included as a component of the Track 1 remedial program for a Volunteer per 6 NYCRR Part 375- 3.8(e)(1)(iii) if NYSDEC determines there has been bulk reduction in groundwater contamination to asymptotic levels. ICs may be used in the short-term pursuant to existing regulations while the remedial program is being implemented to (a) restrict the use of groundwater as a source of potable water without treatment as determined by NYSDOH and local health department, (b) require periodic certification of institutional and engineering controls (based on inspections, monitoring, operations and maintenance), and (c) require compliance with a SMP approved by the NYSDEC in consultation with the NYSDOH.

Alternative 2 would require short-term operation, monitoring, and maintenance of the in-situ treatment technology, groundwater migration control system, MNA component, and SSDSs.

5.4 Alternatives Evaluation

This section presents the analysis of the two remedial alternatives. It includes the presentation of the evaluation criteria, the individual analysis of the alternatives, as well as their comparative analysis which is summarized in Table 4.

5.4.1 Evaluation Criteria

The following eight evaluation criteria are used in the analysis of the remedial alternatives, as described in DER-10:

1. Overall Protectiveness of Public Health and the Environment
2. Compliance with Standards, Criteria, and Guidance
3. Long-Term Effectiveness and Permanence
4. Reduction in Toxicity, Mobility, and Volume
5. Short-Term Impact and Effectiveness
6. Implementability
7. Cost Effectiveness
8. Land Use

A ninth criterion, community acceptance, will be addressed after the period of public comments, in accordance with DER-10. Detailed descriptions of the evaluation criteria are provided below.

Overall Protectiveness of Public Health and the Environment: This criterion is an evaluation of the ability of each alternative to protect public health and the environment. It includes the evaluation of the ability of each alternative to eliminate, reduce, or control through removal, treatment, containment, engineering controls, or institutional controls existing or potential human exposures or environmental impacts associated with Site-related contamination identified by the RI. This criterion also evaluates the ability of each alternative to achieve each of the RAOs. The overall protection of human health and the environment draws on the assessments of other evaluation criteria, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with SCGs. This criterion, along with the criterion of “Compliance with SCGs” is a threshold criterion, which must be satisfied for an alternative to be considered for selection.

Compliance with SCGs: This threshold criterion is an evaluation of the ability of each alternative to comply with SCGs and determines whether a remedy will meet applicable environmental laws, regulations, standards, and guidance. Applicable SCGs for the Site were identified in Section 4.1.

Long-Term Effectiveness and Permanence: This criterion evaluates the long-term effectiveness of the remedy after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated:

- The magnitude of the remaining risks (i.e., will there be any significant threats, exposure pathways, or risks to the community and environment).
- The adequacy of the engineering and institutional controls intended to limit the risk.
- The reliability of these controls.
- The ability of the remedy to continue to meet RAOs in the future.

Reduction of Toxicity, Mobility, and Volume: This criterion evaluates the ability of each alternative to reduce the toxicity, mobility, or volume of Site contamination. The evaluation focuses on the following specific factors for each remedial alternative:

- The quantity of impacted materials that will be destroyed or treated.
- The degree of expected reduction in toxicity, mobility, or volume.
- The degree to which the treatment will be irreversible.
- The type and quantity of treatment residuals that will remain following treatment.

Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility, or volume of the wastes at the Site.

Short-Term Impact and Effectiveness: This criterion evaluates the potential short-term adverse impacts and risks of each alternative upon the community, the workers, and the environment during the construction and/or implementation. The evaluation includes consideration as to how adverse impacts and health risks to the community or workers, if any, at the Site will be controlled, and the effectiveness of the controls. Further, this criterion considers engineering controls that will be used to mitigate short-term impacts (i.e., dust control measures). The length of time needed to implement the alternative and achieve the RAOs is estimated and included in the evaluation.

Implementability: This criterion evaluates the technical and administrative feasibility of implementing each alternative. Technical feasibility includes the difficulties associated with construction and the ability to monitor the effectiveness of the remedy. Administrative feasibility includes the availability of the necessary personnel and material along with potential difficulties in obtaining specific operating approvals, access for construction, permits, etc. for remedy implementation. This criterion also considers the reliability and viability of engineering and institutional controls implemented as part of an alternative.

Cost Effectiveness: This criterion includes an evaluation of the cost (capital, operation, maintenance, and monitoring costs) of each alternative and an assessment as to whether the cost is proportional to the overall effectiveness of the alternative. These costs are developed and presented on a present worth basis for comparison purposes. The estimated costs are considered Class 4 Cost Estimates with an expected accuracy of -30 percent to +50 percent, which is consistent with United States Environmental Protection Agency's (EPA's) document "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final" (EPA, 1988).

Land Use: This criterion includes an evaluation of the current, intended and reasonably anticipated future use of the Site and its surroundings, as it relates to the alternative or remedy, when unrestricted levels would not be achieved.

5.4.2 Individual Analysis of Alternatives

In this section, the alternatives identified and developed in Section 5.3 are individually analyzed with respect to the evaluation criteria. A summary of the analysis is provided in Table 4.

5.4.2.1 Alternative 1 - Track 4 Commercial Use Remedy

Overall Protectiveness of Public Health and the Environment: Alternative 1 would provide overall protectiveness of public health and the environment and would achieve RAOs for soil, groundwater, and soil vapor through a combination of ECs (cover system, groundwater migration control system

[groundwater extraction and treatment], and SSDSs), ICs (Environmental Easement) described in Section 5.3.1, and implementation of a SMP to control potential exposure to COCs that will remain on-Site in soil and groundwater after completion of the implementation of the remedy. This alternative is not considered *permanent*, as defined by 6 NYCRR Part 375, as it relies on long-term employment of ECs and ICs. Exposure pathways to COCs that remain on-Site are addressed through implementation and maintenance of ECs and ICs. These controls are compatible with current and anticipated future commercial and /or industrial Site uses. Therefore, long-term application of ECs and ICs is expected to be reliable and effective.

Compliance with SCGs: Compliance with soil SCGs would be achieved through some source removal activities the application of ECs (including but not limited to the enhancing the existing site cover), ICs, and adherence to an SMP to address soil containing COC concentrations greater than Applicable SCOs that will remain on-Site after implementation of remedial construction. Compliance with groundwater SCGs would be achieved through the application ECs, ICs, and adherence to an SMP to address groundwater with COC concentrations greater than applicable Class GA Criterion. Furthermore, permitted and licensed waste transporters and treatment/disposal facilities would be contracted for waste management services, permits and approvals would be obtained for the treatment and discharge of collected and treated groundwater, and local permits and approvals would be obtained for various work activities (e.g., electrical, paving, and other restoration activities, etc.), as necessary.

Long-Term Effectiveness and Permanence: Alternative 1 relies on some source removal, ECs (cover system, groundwater migration control system [groundwater extraction and treatment], on-Site facility-wide SSDS and off-site SSDSs), MNA, ICs (implementation of the SMP to control potential exposure to COCs remaining in soil and groundwater that will remain on-Site after remedial construction) and maintain long-term effectiveness. ECs and ICs are considered compatible with current and anticipated future commercial and/or industrial Site uses therefore, long-term application of ECs and ICs is expected to be an effective approach. Since residual COCs would remain at the Site at concentrations greater than Unrestricted-Use SCOs and Class GA Criteria, this alternative is not considered *permanent*, as defined by 6 NYCRR Part 375, as it relies on long-term employment of ECs and ICs.

Reduction of Toxicity, Mobility, and Volume: Alternative 1 relies primarily on a combination of ECs and ICs to control exposure to COCs and reduce or control COC toxicity and mobility. The surface cover system would reduce mobility of COCs by controlling potential migration by erosion or dust generation. Excavation would permanently remove, to the extent practicable, impacted soil (reducing the volume) from the Oil-Impacted Area. The long-term management of excavated soil would be addressed by the off-site permitted treatment/disposal facility. The groundwater migration control system and MNA component of the remedy would control the mobility of COCs in groundwater and the groundwater treatment system would remove COCs (reducing toxicity and volume) from groundwater prior to discharge (likely to the POTW consistent with the current discharge permit for treated water from the Building 10 sump). The on-Site and off-site SSDSs would continue to control the mobility of COCs in soil vapor to prevent intrusion to indoor air in occupied buildings.

Short-Term Impact and Effectiveness: Short-term risks and impacts (construction, drilling hazards, potential exposure to COCs, dust and vapor emissions, increased truck traffic for waste transporting and fill importing, soil erosion, etc.) associated with implementation of the alternative are relatively low due to the smaller scale of the alternative and anticipated short construction duration (estimated to be approximately 1 year or less). Short-term risks would be mitigated through implementation and adherence to a Site-Specific Health and Safety Plan (SSHASP), a Community Air Monitoring Plan (CAMP), traffic control plans, erosion and sediment control plans, dust, and vapor mitigation measures (e.g., water trucks, odor suppressing foams, sprays, covering stockpiles, good housekeeping practices, etc.). Potential short-term risks to indoor air quality during remedy implementation would be mitigated through ongoing operation of the on-Site and off-site SSDSs.

Implementability: The alternative is technically feasible as it involves readily implementable remedial components. The alternative is also administratively feasible, as necessary personnel and materials are readily available. Procurement of necessary regulatory approvals and access agreements are not anticipated to be an issue. This alternative would also be minimally disruptive to ongoing commercial and light industrial business operations at the Site. The alternative requires long-term (30+ years) operation, monitoring, and maintenance of ECs (cover system, groundwater migration control system, and on-Site and off-site SSDSs), MNA, and ICs (environmental easement). However, the ECs and ICs are compatible with current and anticipated future commercial and/or industrial Site uses, could be reliably implemented, and could be maintained as long as necessary.

Cost Effectiveness: The estimated cost for Alternative 1 is approximately \$11,730,000, as presented in Appendix B. Alternative 1 would cost-effectively achieve RAOs and satisfy the threshold criteria. Although the alternative relies on ICs and ECs to manage long-term risks, these controls would be compatible with current and anticipated future commercial and/or industrial Site use.

Land Use: The alternative would allow for continued beneficial use of the Site for commercial and/or industrial purposes, which is consistent with current and anticipated future uses. For example, the existing 880,000-square foot facility building complex would remain in place providing space for the ongoing commercial and industrial operations and serving the community with amenities. Future intrusive activities (e.g., utility work, excavation) and uses would have to comply with the requirements of the ICs and the SMP due to the presence of COCs in soil, groundwater, and soil vapor that will remain at the Site after remediation. Future redevelopment would also have to incorporate ECs (covers) to maintain protectiveness.

5.4.2.2 Alternative 2 - Track 1 Unrestricted Use Remedy

Overall Protectiveness of Public Health and the Environment: Alternative 2 would provide overall protectiveness of public health and the environment and would achieve RAOs for soil, groundwater, and soil vapor through a combination of physical removal via the demolition of the existing facility building complex and excavation of soil containing COC concentrations greater than the Unrestricted Use SCOs and treatment (via in situ treatment and MNA) of groundwater with COC concentrations greater than the applicable Class GA Criteria. ICs (restricting groundwater use) and short-term ECs (groundwater migration control system [groundwater extraction and treatment]) and SSDSs would be implemented to manage potential risks from COCs until such time that applicable standards are met. This alternative is considered *permanent*, as defined by 6 NYCRR Part 375, as it does not rely on long-term employment of ECs and ICs.

Compliance with SCGs: Compliance with soil Track 1 SCGs would be achieved by demolishing the on-Site facility and removing soil containing COC concentrations greater than Unrestricted Use SCOs potentially to bedrock across the Site. Compliance with groundwater SCGs would be achieved through the removal of source material in the overburden and the treatment (via in situ treatment and MNA) of bedrock groundwater with COC concentrations greater than applicable Class GA Criteria. Furthermore, permitted/licensed waste transporters and treatment/disposal facilities would be contracted for waste management services. Permits and approvals would be obtained for the treatment and discharge of collected and treated groundwater. Local permits and approvals would be obtained for various work activities (e.g., demolition, electrical, paving, and other restoration activities, etc.), as necessary.

Long-Term Effectiveness and Permanence: The removal of soil with COC concentrations greater than the Unrestricted-Use SCOs and treatment of bedrock groundwater would offer long-term effectiveness. COCs at concentrations greater than Unrestricted-Use SCOs in soils would be removed from the Site, therefore, this alternative would offer long-term effectiveness and, with respect to soil remediation, is considered *permanent*, as defined by 6 NYCRR Part 375, as it does not rely on long-term employment of ECs and ICs. COCs in groundwater would be treated in situ, therefore, this alternative may eventually be considered permanent with respect to groundwater remediation. In

situ treatment within bedrock and observed and/or inferred presence of chlorinated DNAPL present challenges to effective in situ treatment and it is uncertain that the Track 1 remedy could be achieved in groundwater even after a Track 1 remedy is implemented for the soil media.

ICs (restricting groundwater use and the SMP) and short-term ECs (groundwater migration control system and SSDSs) would be implemented to manage potential exposure pathways to COCs until such time that COCs in groundwater met applicable criteria.

Reduction of Toxicity, Mobility, and Volume: Alternative 2 would permanently remove (via excavation) soil containing COC concentrations greater than the Unrestricted-Use SCO, thus vastly reducing the volume of COC-impacted soil and permanently addressing on-Site toxicity and mobility of COCs in soil. The long-term management of COCs in the excavated soil would be addressed by the off-site permitted treatment/disposal facility. The alternative would also treat (via in situ treatment and MNA) remaining groundwater impacts, to the extent practical (i.e., to asymptotic levels- see Section 5.3.2), which would reduce the toxicity, mobility, and volume of COCs in groundwater. The groundwater migration control system and MNA would control the mobility of COCs in groundwater until such time that that applicable standards are met. Furthermore, the groundwater treatment system would remove COCs (reducing toxicity and volume) from groundwater prior to discharge to the POTW. The off-site SSDSs would control the mobility of COCs in soil vapor to prevent intrusion to indoor air in occupied buildings.

Short-Term Impact and Effectiveness: Short-term risks and impacts (construction, drilling and demolition hazards, and potential worker and community exposure to COCs, dust and/or vapor emissions, increased truck traffic for waste transporting and fill importing [i.e., over an estimated 75,000 truck trips per Section 5.4.4], soil erosion, etc.) associated with implementation of this alternative are high due to the extremely large and complex scope of the implementation of this alternative and anticipated long construction duration (estimated to be from 5 to 10 years). Short-term risks would be mitigated through implementation and adherence to a SSHASP, a CAMP, traffic control plans, erosion and sediment control plans, dust and/or vapor mitigation measures (e.g., water trucks, odor suppressing foams and sprays, covering stockpiles, good housekeeping, etc.). Potential short-term risks to groundwater quality and indoor air quality during in situ treatment implementation would be mitigated through operation of a groundwater migration control system and continued operation of off-site SSDSs (operation of the on-Site SSDS would not be necessary as the building would be decommissioned and demolished as part of this alternative).

Implementability: Implementation of Alternative 2 may be technically feasible, although Site-wide, large-scale excavation activities, some of which would be conducted below the water table, would be challenging and require substantial planning, sequencing, and use of temporary measures (shoring, dewatering, sediment, and erosion controls, etc.) to implement. In addition, in situ treatment of bedrock groundwater would be challenging due to the potential presence of chlorinated DNAPL and long-term COC diffusion from the rock matrix. Administrative feasibility may be an issue with implementation of this alternative. Although obtaining regulatory approvals are not anticipated to be an issue, obtaining the approvals and support for the removal of a source of revenue for the property owner (i.e., rental of building space), displacement of and loss of revenue for active local businesses, and demolition of the building would be challenging. In addition, the large scale of the implementation would likely stress the availability of resources necessary to implement the alternative (e.g., personnel, waste haulers, clean fill sources, landfill space, etc.). Further, the alternative would still require an estimated 5 to 10 years of operation, monitoring, and maintenance of ECs (e.g., groundwater migration control system and off-site SSDSs), MNA, and ICs (environmental easement and SMP) which is not consistent with a Track 1 remedy.

Cost Effectiveness: The estimated cost for Alternative 2 is approximately \$168,480,000 as presented in Appendix B. Although Alternative 2 would achieve RAOs, satisfy threshold criteria, and place limited restrictions on the Site, the alternative is not considered cost-effective as considerably

less expensive remediation measures (by over an order of magnitude) could achieve the RAOs while still allowing for productive continued use of the Site and its large on-Site facility complex.

Land Use: Alternative 2 would allow for unrestricted re-use of the Site (except for a restriction on groundwater use). Future Site uses and future Site work would not be encumbered by long-term ICs or a SMP. However, remediating Site soils to allow for unrestricted use of the Site is unnecessary considering that the anticipated future Site use is commercial and/or industrial. Demolition of the existing 880,000-square foot facility building complex would eliminate the space for current and future commercial or industrial operations and would remove the amenities currently used by the community at the Site.

5.4.3 Comparative Analysis of Alternatives

This section presents a comparison of the relative performance of each remedial alternative using the eight evaluation criteria presented in Section 5.4.1. Comparisons are conducted in a qualitative manner and identify substantive advantages and disadvantages between the alternatives. A summary discussion of the comparative analysis against each evaluation criterion is included in the following subsections.

5.4.3.1 Overall Protectiveness of the Public Health and the Environment

Alternatives 1 and 2 would both provide overall protectiveness of the public health and the environment and would achieve RAOs for soil, groundwater, and soil vapor. Alternative 1 would do so through source removal activities and through a combination of ECs and ICs, which, by definition, would not be considered a *permanent* remedy, as defined by 6 NYCRR Part 375. However, the application of ICs and ECs and the level of Site use that Alternative 1 would allow (i.e., commercial or industrial) is compatible with current and anticipated future Site uses. Alternative 2 would provide a greater level of removal and/or treatment of COCs, would achieve Unrestricted Use SCOs, and would be considered a *permanent* remedy, as it does not rely on long-term employment of ICs and ECs. However, as described in Section 5.4.2.2, the time needed to achieve required conditions for a Track 1 remedy due to the challenges related to remediation of the contaminated groundwater in bedrock are not known. Although both alternatives would be protective, Alternative 2 would be considered to provide a higher level of overall protectiveness of public health and environment.

5.4.3.2 Compliance with SCGs

Alternative 1 would achieve the applicable soil and groundwater SCGs through implementation of a Track 4 commercial use remedy and application of ICs, ECs, and adherence to an SMP. The degree of compliance with remediation and cleanup SCGs is the highest for Alternative 2 since soil would be remediated to Unrestricted-Use SCOs and groundwater impacts would be addressed through a combination of in situ treatment, groundwater extraction and treatment, and MNA. Both alternatives would utilize permitted/licensed waste transporters and treatment/disposal facilities, permit the discharge of treated effluent from the groundwater treatment system, and obtain applicable local permits and approvals for work activities.

5.4.3.3 Long-term Effectiveness and Permanence

Both alternatives would provide long-term effectiveness. Alternative 2 would be considered a *permanent* remedy (as defined by 6 NYCRR Part 375) if eventually it does not rely on long-term employment of ICs and ECs. However, as mentioned in Section 5.4.3.1, the time needed to achieve conditions required for a Track 1 remedy due to the challenges related to remediation of the contaminated groundwater is not known. Alternative 1 would be effective, although it would not be considered *permanent* (as defined by 6 NYCRR Part 375) as it relies on ICs and ECs. However, the application of ICs and ECs is compatible with current and anticipated future commercial and/or industrial Site uses. As Alternative 2 is considered a *permanent* remedy, it offers slightly more long-term effectiveness and permanence than Alternative 1.

5.4.3.4 Reduction of Toxicity, Mobility, and Volume

Alternative 2 provides a higher level of reduction in toxicity, mobility, and volume than Alternative 1 as it would include removal of soil with COC concentrations exceeding Unrestricted Use SCOs and remediation of groundwater with COC concentrations greater than applicable Class GA Criteria via in situ treatment, groundwater extraction and treatment, and MNA. Alternative 1 would permanently remove impacted soil, to the extent practicable from the Oil-Impacted Area, however, it would primarily rely on a combination of ECs (cover system, groundwater migration control and treatment system, and on-Site and off-site SSDs), MNA, and ICs (environmental easement) to control exposure to COCs and reduce or control COC toxicity and mobility.

5.4.3.5 Short-term Impact and Effectiveness

Both alternatives involve short-term risks and impacts associated with implementation, including, but not limited to, those related to construction, drilling, potential exposure to COCs, dust and/or vapor emissions, increased truck traffic for waste transporting and fill importing, and soil erosion. These short-term risks and impacts would be managed through implementation and adherence to a SSHASP, a CAMP, traffic control plans, erosion and sediment control plans, dust and/or vapor mitigation measures (e.g., water trucks, odor suppressing foams and sprays, covering stockpiles, good housekeeping, etc.). Alternative 1 involves a substantially smaller construction scope and duration compared to Alternative 2, which would involve substantially more heavy construction elements (e.g., demolition of entire facility, security fencing, shoring, dewatering, etc.) and a comparatively long construction duration (5 to 10 years for Alternative 2 compared to 1 year or less for Alternative 1). Therefore, Alternative 2 has a substantially higher degree of short-term risks and impacts when compared to Alternative 1.

5.4.3.6 Implementability

Alternative 2 presents substantially more technical and economic feasibility challenges, including those associated with the large-scale excavation activities (e.g., sequencing, site demolition, shoring, dewatering, sediment, and erosion controls, etc.), as well as the disposal of very large volumes of excavated material (estimated 788,000 cubic yards). Effective in situ treatment of bedrock groundwater would be complicated by the potential presence of DNAPL and long-term COC diffusion from the rock matrix. By comparison, implementation of Alternative 1 would be relatively straightforward due to the smaller scale of the remedial construction. Further, some elements of Alternative 1 have already been implemented e.g., on-Site and off-site SSDs, some existing Site features that serve as surface cover, treatment of groundwater extracted at Building 10 sump).

Alternative 2 may present challenges in gaining local approvals and support for the displacement of active businesses and demolition of the building. In addition, the large scale of the implementation of Alternative 2 may stress the availability of resources (e.g., personnel, waste haulers, clean fill sources, landfill space, etc.). By comparison, Alternative 1 would not be expected to strain the availability of resources and would be minimally disruptive to ongoing leasing/use of the building and business operations at the Site, which would maintain revenue streams for both the property owner (Volunteer) and local businesses.

Alternative 1 would require long-term (30+ years) operation, maintenance, and monitoring of ECs and ICs, whereas Alternative 2 may not include long-term operation if conditions for a Track 1 remedy are achieved (see Section 5.4.2.2 regarding discussion of challenges related to remediation of the contaminated groundwater in bedrock). The ECs and ICs could be reliably implemented and maintained as long as needed, and Alternative 2 will require ECs and ICs for an undetermined period before it is confirmed that a Track 1 remedy is achieved. Based on this, and for the technical, financial and administrative feasibility advantages, Alternative 1 is considered a more readily implementable alternative.

5.4.3.7 Cost Effectiveness

Alternative 1 would effectively achieve RAOs, satisfy the two threshold criteria (overall protectiveness of public health and the environmental and compliance with SCGs), and allow for continued productive commercial use and for industrial use of the Site and would do so at a substantially lesser cost than Alternative 2 (\$11,730,000 for Alternative 1 versus \$168,480,000 for Alternative 2). Alternative 2 would achieve RAOs and satisfy the threshold criteria, however, it would provide little additional protectiveness of the environment and public health at such a substantially higher cost.

5.4.3.8 Land Use

Alternative 2 would only permit unrestricted future use of the property 5 to 10 years after remedy construction commences. Under this alternative future invasive subsurface work (i.e., post-remedy implementation) potentially would not be encumbered by the requirements of long-term ICs and an SMP. However, as mentioned in Section 5.4.3.6, ECs and ICs will be required for an undetermined period before it is confirmed that a Track 1 remedy is achieved due to the challenges related to remediation of the contaminated groundwater in bedrock. Alternative 1 would require future work to comply with the ICs and an SMP and would restrict future uses to commercial or industrial purposes. Therefore, Alternative 2 would rank more favorably with respect to this criterion assuming at some time the ICs and ECs related to groundwater contamination will no longer be needed. However, the future use restrictions afforded by Alternative 1 are not anticipated to be an impediment as they are consistent with the current and anticipated future-use scenarios.

5.4.4 Green and Sustainable Remediation Comparative Analysis

As discussed in NYSDEC's guidance document DER-31 Green Remediation, the concepts of green remediation/sustainability can be considered under many of the criteria evaluated under Sections 5.4.2 and 5.4.3, including long-term effectiveness and permanence, short-term impacts and effectiveness, implementability, cost effectiveness, and land use. It also can impact the evaluation of the community acceptance criterion. Rather than incorporate green remediation/sustainability concepts into the many criteria listed above, this section provides an overall summary of green remediation/sustainability concepts. The following provides a summary of how the alternatives compare with respect to some notable green remediation/sustainability aspects:

- Electricity use:
 - During construction, both alternatives would require electricity use primarily for temporary facilities (e.g., construction trailer light, heating, cooling) and powering monitoring equipment. Alternative 1 would be expected to use considerably less electricity since it has an estimated construction duration of approximately 1 year compared to 5 to 10 years for Alternative 2.
 - During the operations and maintenance (O&M) period, both alternatives would require electricity for groundwater extraction and treatment system operation and for operation of SSDS systems. Alternative 1 is anticipated to have an O&M period of 30 or more years. Alternative 2 could conceivably have a shorter O&M period; however, challenges associated with the remediation of the bedrock groundwater could require an extended O&M period.
 - Based on this evaluation, Alternative 1 is anticipated to use less electricity compared to Alternative 2.
- Fuel consumption and emissions:
 - During construction both alternatives would require fuel use for on-Site equipment operation, material deliveries, and waste transportation. Alternative 1 has a considerably shorter construction duration which correlates to less on-Site equipment operation (1 year for Alternative 1 compared to 5 to 10 years for Alternative 2), fewer truck trips for import fill

(assuming 15 cubic yards per truck, approximately 400 truck trips for Alternative 1 versus over 47,000 truck trips for Alternative 2), and fewer truck trips for waste transportation (assuming 40 tons per truck, approximately 280 truck trips for Alternative 1 versus over 28,000 truck trips for Alternative 2).

- During the O&M period, both alternatives would require fuel use for O&M Site visits associated with treatment plant operation, monitoring, and inspections. Alternative 1 is anticipated to have an O&M period of 30 or more years. Alternative 2 could conceivably have a shorter O&M period; however, challenges associated with the remediation of the bedrock groundwater could require an extended O&M period.
- Based on this, Alternative 1 is anticipated to use considerably less fuel and have fewer emissions compared to Alternative 2. As an example, for the fill importing and waste exporting alone, the carbon dioxide emission from Alternative 2 would be approximately 100 times greater than Alternative 1 (estimated 45,000 tons compared to 430 tons).
- Site use/re-use: As discussed in Section 2.1, the property occupied by the Site is zoned M-1 Industrial District, which allows commercial, industrial, and certain restricted residential uses. Consistent with this zoning, the Site is currently used by commercial and light industrial tenants for a variety of uses. It is anticipated that the Site will continue to be used for similar types of commercial and/or industrial usage in the future. Although Alternative 2 could allow for a wider range of Site uses, as it would strive for attainment of unrestricted use status, the resources necessary to achieve this status are not justified considering that the anticipated future uses are commercial and/or industrial and unrestricted use may require rezoning. Alternative 1 would allow for the commercial/industrial uses which is consistent with current zoning and anticipated future commercial and industrial uses. In addition, Alternative 1 would maintain the existing building, which is suitable for the current and anticipated future use, whereas Alternative 2 would require the consumption of additional resources to develop the Site following the completion of remediation.

5.5 Summary of Comparative Analysis of Alternatives

This section summarizes the key points from the comparative analysis of the two alternatives regarding the eight remedy selection evaluation criteria and the green remediation/sustainability considerations.

Alternative 1 (Track 4 Commercial Use) is protective of public health and the environment and compliant with SCGs for the current, intended and reasonably anticipated future land uses of the Site (commercial and industrial) and its surroundings, and is consistent with the purpose of the BCP. It provides long-term effectiveness, requires a considerably shorter construction duration than Alternative 2, is readily implementable, and would have minimal impact on site usage and ongoing business operations. Alternative 1 is also a substantially more cost-effective and more green remedial approach when compared to Alternative 2.

Alternative 2 (Track 1) would also be protective of public health and the environment and compliant with SCGs for the current, however, the goal of Alternative 2 would be to remediate the Site to allow for Unrestricted Use, which is not required to be protective of the current and future use of the Site. Furthermore, Alternative 2 would:

- Require demolition of the existing buildings and infrastructure, eliminating their current and future usage and displacing businesses.
- Prevent use of the Site for 5 to 10 years during remedial construction.
- Require substantial truck traffic on local roads to transport waste and fill materials (estimated to be over 75,000 truck trips).

- Require reconstruction of buildings, and associated utilities and infrastructure after the remedial construction is complete to make the Site usable again for commercial or industrial purposes.
- Cost over an order of magnitude more than Alternative 1.
- Require substantially more electricity and fuel consumption and produce substantially more fuel combustion emissions during remedy construction when compared to Alternative 1, as well as during redevelopment of the Site.

Further, the potential presence of residual DNAPL in bedrock and/or high concentrations of TCE in the low permeability rock matrix, may represent a potential long-term, ongoing source for bedrock groundwater impacts after remedial construction activities are completed under either alternative. Thus, it is uncertain that Track 1 remedial goals for groundwater could even be achieved by Alternative 2. As such, despite the noted implementation disadvantages, very high cost, and extended construction schedule, Alternative 2 may still require long-term use of ECs (groundwater migration control and possibly SSDS) and ICs to remain protective.

Section 6

Recommended Remedy

This section presents the recommended remedy along with a discussion supporting why it is recommended, identification and evaluation of ICs and ECs for the recommended remedy, and identification of the cleanup track that would be achieved by the recommended remedy.

6.1 Recommended Remedy

Based on the results of the analysis of the alternatives against the eight evaluation criteria prescribed in DER-10 (refer to Section 5.4.2 and Table 4) and the comparative analysis presented in Section 5.4.3, Alternative 1 - Track 4 Commercial Use Remedy is the recommended alternative for the Site. In summary, Alternative 1, which is depicted on Figure 4, includes the following components:

- PDI to further define the limits of remediation and support detailed design of the remedy (refer to Section 7).
- Remedial design of the remedy and procurement of required permits and approvals, as necessary. The remedial design is anticipated to be presented in a Remedial Action Work Plan (RAWP), prepared in accordance with Section 5.3 of DER-10.
- Site-wide surface cover, including an enhancement of the existing surface cover (e.g., existing pavement, buildings and landscaping), to serve as an EC to mitigate the potential for direct contact with impacted soil. The surface cover components may include a combination of existing, or new vegetated or landscaped soil covers (minimum 12 inches thick of soil meeting Commercial Use SCOs), crushed stone cover (minimum 12 inches thick), asphalt pavement, concrete sidewalk, concrete building slabs, or other final surface restorations.
- Groundwater migration control system, which employs groundwater extraction and treatment, will be implemented to provide hydraulic control and containment of impacted overburden and bedrock groundwater. It is assumed that the Building 10 sump will be incorporated into the extraction system (with potential modifications or upgrades) and supplemented with approximately three new bedrock groundwater extraction wells to achieve sufficient capture. Extracted groundwater will be directed via force main to an on-Site groundwater treatment system (assumed to be located within Building 10C) for treatment to meet effluent limits (established in a discharge permit) prior to being discharged via the sanitary sewer system to the POTW.
- Excavation and off-site treatment/disposal of soil within the Oil-Impacted Soil Area. It is anticipated that the area will be delineated based on field screening for visual determination of oil impacts and the impacted soil will be physically removed through mechanical excavation to the extent practicable. Utility conflicts, foundations, or other subsurface obstacles may limit the extent to which oil-impacted soil can be removed. Remaining impacts that are not accessible via excavation will be addressed by other components of the remedy (e.g., ICs and ECs). Monitoring and passive NAPL recovery may also be applicable to this area if the practicable extent of excavation leaves remaining, recoverable oil impacts.
- MNA, in accordance with EPA's guidance "Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites" (EPA, 1999), will be employed to address COCs in overburden groundwater that exceed Class GA Criteria and are outside the capture zone of the hydraulic control system. MNA is anticipated to be applied to the off-site

overburden groundwater impacts northeast of the Site. The MNA component of the remedy will include periodic groundwater monitoring of COCs and natural attenuation indicators to support ongoing evaluations of the effectiveness of MNA and confirm that potential receptors are being impacted.

- The existing SSDSs (both on-Site and off-site) will be incorporated into the comprehensive remedy and continue to operate to mitigate the potential for subsurface vapor intrusion into occupied building spaces. In addition, potential future on-Site buildings will also require the inclusion of vapor mitigation measures.
- Application of ICs (environmental easement) to (a) limit the use and development of the property to commercial or industrial uses, (b) restrict the use of groundwater as a source of potable water without treatment as determined by NYSDOH and local health department, (c) require vapor mitigation measures for potential future on-Site buildings, (d) require periodic certification of institutional and engineering controls, and (e) require compliance with a SMP approved by the NYSDEC, which includes operation, monitoring, and maintenance of ECs (Site-wide cover system, groundwater migration control system, SSDSs), MNA, an excavation work plan and compliance with ICs.

The following summarizes the basis for selecting Alternative 1, with respect to RAOs and the eight evaluation criteria:

- Achieves the RAOs established for the Site:
 - The Soil RAOs for Public Health Protection and Environmental Protection would be achieved through a combination of excavation of source material (oil-impacted soil), ECs (cover system), ICs, and implementation of the SMP.
 - The Groundwater RAOs for Public Health Protection and Environmental Protection would be achieved through a combination of ECs (hydraulic controls, groundwater treatment system), MNA, ICs, and implementation of the SMP.
 - The Soil Vapor RAOs for Public Health Protection would be achieved through a combination of ECs (SSDSs), ICs, and implementation of the SMP.
- Achieves the threshold criteria of overall protection of public health and the environment and compliance with SCGs (refer to Section 5.4 and Table 4).
- Achieves long-term effectiveness through the long-term operation, monitoring, and maintenance of ECs and ICs in accordance with the SMP.
- Reduces the toxicity, mobility, and volume of COCs through excavation (Oil-Impacted Area), ECs (cover system, groundwater migration control system, SSDSs), and MNA.
- Has relatively low short-term risks and impacts due to the smaller scope of the active remedial construction, reduced truck traffic, and shorter construction duration, when compared to the other alternative evaluated. Short-term risks and impacts will be mitigated through implementation and adherence to a SSHASP, CAMP, traffic control plans, erosion and sediment control plans, and temporary controls (e.g., dust and/or vapor mitigation measures).
- The alternative is both technically and administratively feasible and would be minimally disruptive to ongoing business operations at the Site.
- The alternative would cost-effectively achieve RAOs, satisfy the two threshold criteria (overall protectiveness of public health and the environment and compliance with SCGs), and allow for ongoing and future productive commercial use and/or industrial use of the Site.
- Permits ongoing commercial and/or industrial use of the Site, which is consistent with current and anticipated zoning and future-use scenarios.

6.2 Identification and Evaluation of Institutional/Engineering Controls for the Recommended Remedy

As discussed in Section 6.1, the recommended remedy will incorporate the use of ECs including the following:

- Site-wide cover system
- Hydraulic controls system
- Groundwater treatment system
- Sub-slab depressurization systems (both on-Site and off-site)

Since the recommended remedy is a restricted-use remedy and incorporates the use of ECs, the alternative will also include the application of ICs to (a) limit the use and development of the property to commercial or industrial uses, (b) restrict the use of groundwater as a source of potable water without treatment as determined by NYSDOH and local health department, (c) require a vapor mitigation measures for potential future on-Site buildings, (d) require periodic certification of institutional and engineering controls, and (e) require compliance with a SMP approved by the NYSDEC, which will include an excavation work plan (which will replace the currently-used excavation management requirements document). The IC including the Site use restrictions and requirements for the remedy will be in the form of an environmental easement.

Refer to Section 5 for the evaluation of ICs and ECs was presented in Section 5.

6.3 Identification of Site Cleanup Track

The recommended remedy will achieve Cleanup Track 4 requirements and future Site use will be restricted to commercial or industrial uses.

6.4 Green Remediation Considerations for Recommended Remedy

As identified in the NYSDEC's document DER-31 Green Remediation, elements of green remediation and sustainability will be incorporated into the design and implementation of the recommended remedy, including but not limited to the following requirements:

- Reduce idling of vehicles and equipment used in remedy implementation.
- Beneficial re-use of concrete (if encountered and approved for re-use).
- Use of local suppliers, when feasible, for materials/products used in construction.
- Use of local or regional treatment/disposal facilities, when feasible.
- Use of local subcontractors, when feasible.
- Use of ultra-low sulfur diesel fuel.

In addition, in accordance with DER-31, green remediation/sustainability efforts will be tracked and documented in design reports and construction completion documentation. An environmental footprint analysis will be prepared and included in the construction completion documentation. The footprint analysis will consider water consumption, greenhouse gas emissions, energy use, waste reduction, and raw material use.

Section 7

Pre-Design Investigation

Once a remedy is selected, data needs to further define the limits of remediation and support detailed design will be identified. Based on these data needs, a work plan for a PDI will be prepared and submitted to NYSDEC for review and approval. Examples of possible PDI activities to facilitate the design of the recommended remedy presented in Section 6 are:

- Confirm limits and concentration of overburden plumes on-Site and refine overburden groundwater flow evaluation through installation of additional monitoring wells and subsequent monitoring. To the extent practical, monitoring wells installed during the PDI would be positioned to serve as monitoring components of the remedy.
- Evaluate position of groundwater capture zone for Building 10 Sump through installation of additional wells and hydraulic monitoring. To the extent practical, monitoring wells installed during the PDI would be positioned to serve as monitoring components of the remedy.
- Conduct bedrock groundwater pumping tests at one or more locations near where bedrock extraction wells are anticipated to be installed. This information would be used to design the bedrock groundwater extraction and migration control system, including number, and spacing of extraction wells and pumping rates. Also, sampling of effluent from the pumping tests would be used to assess the requirements for the design of the groundwater treatment system.
- Groundwater flow modeling to support design of the groundwater extraction and migration control system.
- Evaluate the existing sump and water treatment system in Building 10 to determine if modifications are required to meet RAOs and requirements for the discharge of treated water to the sanitary sewer system/POTW.
- Further evaluate the degree to which natural attenuation of Site COCs in groundwater is occurring, where MNA is a component of the remedy (i.e., where COC concentrations in overburden exceed Class GA criteria outside the capture zone of the groundwater extraction and migration control system).
- Further characterization of the Oil-Impacted Area soils to refine the limits of the remediation for this area.
- Site-wide inspection of property conditions, including pavement, structures and landscaped areas, catch basins and other drainage features, etc. to determine where the existing cover needs to be enhanced and to collect other information needed to incorporate existing features into the design.
- Conducting additional topographic surveying, as needed.
- Characterization of soil quality in landscaped areas of the Site that were not previously evaluated.
- Delineate PCB concentrations in soil in an area where characterization of soils excavated for a 2023 fire hydrant repair indicated PCB concentrations above applicable SCOs.
- Evaluate areas where existing cover requires improvement.

Section 8

Schedule

This section provides the proposed schedule for the completion of the next phases of remediation activities. The primary assumptions used to develop the schedule are identified in the notes provided below the table.

Activity	Estimated Duration (Calendar Days)
Alternative Analysis Report (AAR)	
AAR to NYSDEC	
NYSDEC Review and Approval	60
Decision Document (DD) – Remedy Selection	
NYSDEC Prepares and Issues DD	60
Public Comment Period	45
NYSDEC Finalizes DD, Remedy is Selected	30
Pre-Design Investigation (PDI)	
Prepare PDI Work Plan and Submit to NYSDEC	45
NYSDEC Review and Approval	45
PDI Implementation	270
Remedial Action Work Plan (RAWP)	
Prepare RAWP and Submit to NYSDEC.	360
NYSDEC Review and Approval	60

Notes:

1. The duration and timing for field activities are estimated and dependent on several factors, including scope, timing of NYSDEC approvals, weather conditions, subcontractor availability, and site access.

Section 9

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Tables



TAB-1

TABLE 1
IDENTIFICATION AND SCREENING OF GENERAL RESPONSE ACTIONS
CARLSON PARK SITE
ROCHESTER, NEW YORK

General Response Action (GRA)	Description	Retained or Eliminated	Basis/Comments
No Action	Does not include any remedial measures/actions or future activities such as maintenance, monitoring, or establishment of institutional controls.	Eliminated	The Site is being remediated under the Brownfield Cleanup Program (BCP). Per 6 NYCRR Part 375 and DER-10, evaluation of a No Action alternative is not necessary for sites managed under the BCP.
Institutional Controls (ICs)	Establishment of ICs to: (1) serve as notice of remaining impacts, (2) identify activity and use restrictions in impacted areas, and (3) require long-term monitoring and maintenance of engineering controls.	Retained	- ICs will be a component of any remedial action where constituents of concern (COCs) will remain at the Site at concentrations greater than Unrestricted Use Soil Cleanup Objectives (SCOs) and/or where engineering controls are employed. - ICs could accomplish the remedial action objective (RAO) of controlling the direct contact exposure pathway, however, to achieve the other RAOs, institutional controls would need to be combined with other remedial measures.
Monitored Natural Attenuation (MNA)	MNA relies on naturally occurring processes to reduce COC mass or control the mobility/migration of COCs. Groundwater monitoring is conducted to confirm the effectiveness of natural attenuation.	Retained	- The COCs present at the Site are susceptible to several natural processes that can attenuate their concentrations in groundwater and soil including biological degradation, abiotic degradation, sorption, dispersion, and volatilization. - MNA would likely not be an effective or timely remedy by itself for controlling migration of COCs in groundwater throughout the Site; however, it may be effective as a component of an overall remedy.
Containment	Construction of physical barriers (surface caps/covers or subsurface vertical barriers) to isolate impacted media in order to control potential direct contact risks and potential intermedia transfer. Containment may refer to the use of groundwater pumping to hydraulically contain and control the migration of impacted groundwater. Similarly, containment may refer to the use of vapor extraction to contain and control the migration of impacted vapors (e.g., sub-slab depressurization system [SSDS]).	Retained	- Surface cover systems could serve as an effective containment system and engineering control to achieve Soil RAOs. - Vertical barriers could be effective in combination with groundwater extraction to control COC migration in overburden groundwater. - Hydraulic containment via groundwater pumping has been demonstrated to be effective at locally controlling COC migration in groundwater at the Site (i.e., Building 10 sump). An enhanced system with extraction wells and/or collection trenches could be developed to provide more extensive hydraulic containment. - Containment of vapors via an SSDS has been demonstrated to be effective at controlling COC migration in vapors at the Site (i.e., existing facility-wide SSDS and off-site SSDSs). Such vapor intrusion mitigation measures would be necessary for any remedy that does not involve complete treatment and/or removal of COCs.
Removal	Physical removal of impacted media using mechanical means (e.g., excavation, vacuum extraction, groundwater pumping, etc.). Requires combination with ex situ treatment, on-site consolidation, and/or off-site treatment/disposal.	Retained	- Removal of impacted soil through excavation could be an effective means of achieving RAOs. Could be designed as a complete removal of soil exceeding certain SCOs or could target particular areas (e.g., areas with higher COC concentrations or oil-impacted soil) while being combined with other remedial measures to address remaining impacts. - Removal of oil/non-aqueous phase liquids (NAPL) through the use of recovery wells could be an effective means to monitor the potential mobility of oil/NAPL and recover/remove source material. - Removal of vapors in the vadose zone via soil vapor extraction (SVE) or an SSDS could be an effective means of removing COC mass, achieving SCOs for soil, and controlling potential vapor intrusion. - Refer to the "Containment" GRA for comments regarding removal of groundwater to achieve hydraulic containment.

TABLE 1
IDENTIFICATION AND SCREENING OF GENERAL RESPONSE ACTIONS
CARLSON PARK SITE
ROCHESTER, NEW YORK

General Response Action (GRA)	Description	Retained or Eliminated	Basis/Comments
In Situ Treatment	In-place treatment of impacted media through various methods, including physical encapsulation (e.g., solidification/stabilization), separation (e.g., vapor extraction, air sparging/stripping, flushing), thermal treatment, bioremediation (e.g., aerobic, anaerobic), and chemical treatment (e.g., oxidation, reduction, adsorption).	Retained	- The COCs present at the Site are amenable to various in situ soil and groundwater treatment methods, including separation (extraction, air sparging/stripping, flushing), thermal treatment (conductive, resistive), bioremediation (anaerobic), and chemical treatment (oxidation, reduction, adsorption). - Due to the size of the Site (38 acres), expansive building footprint with active businesses, and extent of impacted media, site-wide in situ treatment is considered infeasible. However, in situ treatment may be deployed to target specific media (e.g., soil, overburden groundwater, bedrock groundwater) or areas (e.g., source zones or isolated areas outside the influence of other remedial measures), which lends itself to being readily combined with other remedial measures as part of an overall remedy. - In order to manage short-term risks, in situ treatment is often combined with other remedial measures and good work practices (e.g., vapor mitigation measures, capping, groundwater extraction, ex situ treatment).
Ex Situ Treatment	Treatment of impacted media through physical, chemical, biological, or thermal processes following some method of removal (refer to "Removal" GRA above).	Retained	- Ex situ treatment may be applied to excavated soil to allow for more economical off-site disposal options. - Ex situ treatment of groundwater via an on-site treatment system may be utilized in combination with a groundwater extraction scenario. Treated water could be discharged to either the stormwater or sanitary sewer systems pending approval from local regulatory agencies. - Ex situ treatment of vapors via an on-site vapor treatment system may be utilized in combination with a vapor extraction scenario (SVE or SSDS) to remove COCs from extracted vapors prior to discharging to the atmosphere.
On-Site Consolidation	Physically placing impacted media within an on-site containment system. The consolidated material may be covered with an environmental cover (e.g., cap) or may be underlain with a baseliner and covered with an environmental cover, depending on the location of on-site consolidation and its proximity to groundwater. Consolidation requires combination with removal and may require ex situ treatment before placement in the consolidation area.	Eliminated	Although on-site consolidation of impacted media (e.g., excavated soil) is feasible, it would not be compatible with the current/future Site use. Off-site management of impacted media is a more practical option that would not hinder future Site use.
Off-Site Treatment/Disposal	Transportation and treatment/disposal of impacted media at an off-site permitted facility. Waste characterization and profiling would be required to determine the appropriate treatment/disposal facilities for the waste streams.	Retained	- Off-Site treatment/disposal of media (e.g., soil, groundwater) could be combined with soil excavation or groundwater extraction scenarios. - Off-site treatment/disposal is often required to manage spoils resulting from the installation of remedial components (e.g., trenching spoils, drill cuttings, etc.).

TABLE 2
IDENTIFICATION AND SCREENING OF REMEDIAL TECHNOLOGIES
CARLSON PARK SITE
ROCHESTER, NEW YORK

General Response Action (GRA)	Candidate Technology	Retained or Eliminated	Basis/Comments
Institutional Controls (ICs)	Environmental Easement	Retained	ICs impose land/groundwater use limitations or requirements to protect current or future site occupants from exposure to environmental impacts. ICs are a required component of any remedial action where constituents of concern (COCs) will remain at concentrations greater than Unrestricted Use soil cleanup objectives (SCOs) and/or where engineering controls are employed to minimize exposure pathways.
Monitored Natural Attenuation (MNA)	MNA	Retained	The COCs present at the Site are susceptible to natural attenuation processes. Indications of degradation (trichloroethene [TCE] daughter compounds) are present at the Site. Although MNA would likely not be an effective or a timely remedy by itself for groundwater impacts across the Site, it may be effective locally and as a component of an overall remedy.
Containment	Surface Cover	Retained	- Surface covers can be used as physical barriers and serve as an effective engineering control to minimize potential exposure pathways to impacted soil via direct contact/ingestion or inhalation. - Surface covers could consist of various types of materials, including vegetated soil cover, crushed stone cover, asphalt or concrete pavement, and building foundations/floors. Surface covers typically include a demarcation layer (e.g., geotextile fabric) to demarcate the boundary between the cover materials and the potentially impacted underlying soil. - Existing surface covers at the Site, in conjunction with excavation management requirements, are currently effective in controlling potential exposure pathways to impacted soil. However, there are some areas with exceedances of applicable SCOs in surface soil and areas where existing cover materials may require repair/replacement to provide a suitable long-term barrier.
	Hydraulic Control/Containment	Retained	Hydraulic control/containment via groundwater pumping has been demonstrated to be effective at locally controlling COC migration in groundwater at the Site (i.e., Building 10 sump). An enhanced system with extraction wells and/or collection trenches could be developed to provide more extensive hydraulic control/containment.
	Vertical Barrier	Eliminated	- Existing groundwater conditions indicate that groundwater pumping alone could achieve hydraulic containment and that vertical barrier(s) would not be necessary to control the migration of COCs in groundwater. - Vertical barriers would only be applicable to the overburden and not the bedrock zone where a substantial portion of groundwater impacts are located.
	Sub-Slab Depressurization System (SSDS)	Retained	Containment of vapors via a SSDS has been demonstrated to be effective at controlling COC migration in vapors at the Site (i.e., existing facility-wide SSDS and off-site SSDSs). Considering the current/future use of the Site, such vapor intrusion mitigation measures would likely be necessary to be included in any remedy that does not involve complete treatment and/or removal of COCs.
Removal	Excavation	Retained	- Excavation would be effective at removing soils containing COC with concentrations greater than the SCOs established for the Site. This approach could allow for Site closure without the use of engineering or institutional controls if soils are remediated to Unrestricted Use SCOs. - Excavation of soil could also effectively target source material (e.g., areas with higher COC concentrations or oil-impacted soil) and be combined with other remedial components to address residual COC concentrations. - Depending on the extent of excavation, excavation support may be required to protect sidewalls and surrounding features (e.g., buildings, utilities, roads). Dewatering/treatment may be required to manage groundwater during excavation/backfilling.
	Groundwater Extraction	Retained	Refer to the comments above under Hydraulic Control/Containment within the Containment GRA.

TABLE 2
IDENTIFICATION AND SCREENING OF REMEDIAL TECHNOLOGIES
CARLSON PARK SITE
ROCHESTER, NEW YORK

General Response Action (GRA)	Candidate Technology	Retained or Eliminated	Basis/Comments
Removal (continued)	Vapor Extraction	Eliminated	- Removal of vapors via soil vapor extraction (SVE) as a means of removing COC mass or achieving SCOs for vadose zone soil is considered applicable for the COCs at this Site, however, its overall effectiveness and impact would be limited by the thin overburden vadose zone in some portions of the Site. - This technology does not address impacts present in soil beneath the water table or within bedrock. Therefore, a substantial portion of impacted media would be inaccessible by this technology. - Note: The removal of vapors from the vadose zone for the purposes of vapor intrusion mitigation into occupied structures is addressed above under SSDS within the Containment GRA.
	Non-Aqueous Phase Liquid (NAPL) Recovery	Retained	NAPL monitoring and recovery may be an approach for the oil-impacted area to monitor/recover oil. NAPL recovery could be used alone or in combination with a more aggressive removal approach (e.g., excavation).
In Situ Treatment	In Situ Solidification/Stabilization (ISS)	Eliminated	- ISS (mixing the impacted soils with a combination of Portland cement, blast furnace slag, and/or other additives) is not considered an effective remedial approach for volatile organic compounds (VOCs). - ISS would only be applicable to overburden soil and would not be applicable to bedrock. - ISS is generally not applicable to or cost-effective for shallow applications as the technology requires removal of shallow soil to accommodate for swelling of ISS-treated material and to avoid leaving ISS-treated material within the frost-zone where it is more susceptible to breaking down over time.
	Air Sparging/Air Stripping	Eliminated	- Air sparging/air stripping, which would require combining vapor extraction (e.g., SVE) and treatment technologies, could effectively remove VOCs from overburden groundwater. However, there are substantial portions of the Site where the water table is below the overburden zone (i.e., within bedrock). These technologies would not be effective in treating COCs in a bedrock groundwater setting. - These technologies enhance aerobic degradation of COCs, which is not the proper treatment mechanism for effective biodegradation of chlorinated VOCs. Its application could have a negative effect on anaerobic biodegradation of COCs that may already be occurring.
	In Situ Thermal Treatment	Retained	- In situ thermal treatment may be accomplished through electrical resistance heating, thermal conduction heating, or steam heating. - Requires combination with vapor extraction (e.g., SVE)/treatment technologies and typically also requires combination with groundwater extraction/treatment technologies to collect the increased COC mass in the vapor and aqueous phases that results from heating and to control COC migration. - May require thermal cover over the treatment area to insulate the target treatment zone and avoid excessive heat loss. - Thermal conductive heating has been successfully applied in bedrock settings - In situ thermal treatment is likely infeasible at a site-wide level, however, it may be an applicable technology for targeted treatment of areas with higher COC concentrations/source area(s).
	In Situ Chemical Oxidation (ISCO) or Reduction (ISCR)	Retained	- ISCO may be accomplished through addition of a variety of oxidants (e.g., Fenton's Reagent, permanganates, persulfates). - ISCR may be accomplished through addition of a variety of reductants (e.g., zero valent iron [ZVI], ferrous iron, reduced sulfur species [dithionite]). - ISCO and ISCR both have demonstrated success in treating chlorinated VOCs.

TABLE 2
IDENTIFICATION AND SCREENING OF REMEDIAL TECHNOLOGIES
CARLSON PARK SITE
ROCHESTER, NEW YORK

General Response Action (GRA)	Candidate Technology	Retained or Eliminated	Basis/Comments
In Situ Treatment (continued)	In Situ Chemical Oxidation (ISCO) or Reduction (ISCR) (continued)		- Both rely on effective delivery of reagents to the subsurface for contact between reagents and COCs to take place. Low permeability matrices (e.g., bedrock, clay) present challenges with delivery and contact. Therefore, permeability enhancements (e.g., fracturing) may be required. - The longevity/persistence of the injected reagents varies, and additional applications may be necessary to achieve objectives. - The presence of observed/inferred chlorinated DNAPL identified during the remedial investigation (RI) would substantially increase the treatment timeframe as the chemical reactions occur in the dissolved phase and the dissolution of DNAPL may become a limiting factor. - ISCO and ISCR are likely infeasible at a site-wide level, however, they may be applicable technologies for targeted treatment of areas with higher COC concentrations/source area(s).
	In Situ Enhanced Bioremediation (ISEB)	Retained	- For chlorinated VOCs, the preferred method of degradation is through a process referred to as reductive dechlorination. This occurs under anaerobic conditions and may be accomplished through the addition of a wide variety of amendments to serve as electron donors (e.g., organic matter, lactate, methanol, proprietary products, etc.). - Relies on effective delivery of amendments to the subsurface to develop the proper subsurface conditions for degradation at the desired treatment locations. Low permeability matrices (e.g., bedrock, clay) present challenges with delivery and may require permeability enhancements (e.g., fracturing). - The longevity/persistence of the injected amendments varies, and additional applications may be necessary to achieve objectives. - The presence of observed/inferred chlorinated DNAPL identified during the RI would substantially increase the treatment timeframe as degradation occurs in the dissolved phase and the dissolution of DNAPL may become a limiting factor. - ISEB is likely infeasible at a site-wide level, however, it may be an applicable technology for targeted treatment of areas with higher COC concentrations/source area(s) or as an enhancement to be used in MNA.
Ex Situ Treatment (On-Site)	Ex Situ Soil Treatment Technologies	Eliminated	- Ex situ soil treatment may be achieved through various processes, including physical, chemical, biological, or thermal processes. - If soil is excavated from the Site, off-site treatment/disposal options are readily available and are expected to be a more practical and cost-effective alternative.
	Ex Situ Groundwater Treatment Technologies	Retained	- Ex situ groundwater treatment may be achieved through various processes, including physical, chemical, or biological processes. - Groundwater treatment via carbon adsorption has been demonstrated to be effective at treating groundwater extracted from the Building 10 sump. - Since groundwater extraction has been retained as a remedial technology, ex situ groundwater treatment has been retained as the extracted water will likely require treatment prior to discharge. The appropriate form of groundwater treatment would be selected during the design stage of the project.
	Ex Situ Vapor Treatment Technologies	Retained	- Ex situ vapor treatment may be achieved through various processes, including carbon adsorption, biodegradation, or thermal oxidation. - Since remediation technologies have been retained that may require vapor treatment (e.g., in situ thermal treatment), ex situ treatment technologies have been retained. Ex situ vapor treatment has been retained in the event that one or more remedial technologies are implemented and require vapor treatment. The appropriate form of vapor treatment would be selected during the design stage of the project.

TABLE 2
IDENTIFICATION AND SCREENING OF REMEDIAL TECHNOLOGIES
CARLSON PARK SITE
ROCHESTER, NEW YORK

General Response Action (GRA)	Candidate Technology	Retained or Eliminated	Basis/Comments
Off-Site Treatment/Disposal	Non-Hazardous Waste Landfill/Treatment Facility	Retained	Treatment/disposal at a non-hazardous waste facility would be applicable for waste materials that are characterized as non-hazardous. Existing data from the Site suggests that a substantial portion of the impacted soil would be characterized as non-hazardous.
	Hazardous Waste Landfill/Treatment Facility	Retained	Treatment/disposal at a hazardous waste facility would be applicable for waste materials that are characterized to be hazardous.

TABLE 3
DEVELOPMENT OF REMEDIAL ACTION ALTERNATIVES
CARLSON PARK SITE
ROCHESTER, NEW YORK

Alt ID	Alternative	Remedial Components Based on Areas/Media of Concern						Estimated Quantities
		Soil ^a	On-Site Groundwater ^b	Off-Site Groundwater ^c	Oil-Impacted Area ^d	Soil Vapor ^e	Other	
Alt-1	Alternative 1 – Track 4 Commercial Use Remedy	Surface Covers (Existing and New)	Groundwater Migration Control System (via Groundwater Extraction and Treatment)	Monitored Natural Attenuation	Excavation + Passive NAPL Recovery (as necessary) + Off-Site Treatment/ Disposal	Sub-Slab Depressurization Systems (On-Site and Off-Site)	Institutional Controls	Existing Building Cover = 885,000 square feet (SF) Existing Asphalt Cover = 548,000 SF Existing Soil Cover = 130,000 SF New Soil Cover = 126,000 SF Excavation Volume (Oil-Impacted Area) = 1,400 cubic yards (CY) Extraction Wells = 3 New Extraction Wells + Building 10 Sump
Alt-2	Alternative 2 – Track 1 Unrestricted Use Remedy	Excavation + Off-Site Treatment/ Disposal	In Situ Treatment of Source Areas + Groundwater Migration Control System (via Groundwater Extraction and Treatment)	Monitored Natural Attenuation	Excavation + Off-Site Treatment/ Disposal	Sub-Slab Depressurization Systems (Off-Site)	Institutional Controls	Excavation Volume = 788,000 CY Extraction Wells = 4 New Extraction Wells Alt-2 would also require demolition of the 885,000 SF of existing buildings and off-site debris disposal.

^{a.} Soil: soil that contains constituents at concentrations greater than applicable Soil Cleanup Objectives (SCOs).

^{b.} On-Site Groundwater: Groundwater situated within the limits of the Site and located in the overburden and bedrock that contains constituents at concentrations greater than Class GA Criteria.

^{c.} Off-Site Groundwater: Groundwater situated beyond the limits of the Site that contains constituents at concentrations greater than Class GA Criteria.

^{d.} Oil-Impacted Area: Oil-impacted media in the area between Buildings 5 and 14.

^{e.} Soil Vapor: Impacted soil vapors (both on- and off-site) that have the potential to intrude into occupied buildings and impact indoor air quality.

TABLE 4
REMEDIAL ACTION ALTERNATIVES EVALUATION SUMMARY
CARLSON PARK SITE
ROCHESTER, NEW YORK

Evaluation Criteria	Alternative 1 Track 4 Commercial Use Remedy	Alternative 2 Track 1 Unrestricted Use Remedy
<i>Threshold Criteria:</i>		
Overall Protectiveness of Public Health and the Environment	- Alternative 1 (Alt-1) would provide overall protectiveness of public health and the environment and would achieve Remedial Action Objectives (RAOs) for soil, groundwater, and soil vapor through a combination of engineering controls (ECs) (cover system, groundwater migration control system [via groundwater extraction and treatment], and sub-slab depressurization systems [SSDSs]), institutional controls (ICs) (Environmental Easement), and implementation of the Site Management Plan (SMP) to control potential exposure to constituents of concern (COCs) that will remain on-Site in soil and groundwater after completion of the implementation of the remedy. - This alternative is not considered “permanent,” as defined by 6 NYCRR Part 375, as it relies on long-term employment of ECs and ICs. Exposure pathways to COCs that remain on-site are addressed through implementation and maintenance of ECs and ICs. These controls are compatible with current and anticipated future Site uses. Therefore, long-term application of ECs and ICs is expected to be reliable and effective.	- Alternative 2 (Alt-2) would provide overall protectiveness of public health and the environment and would achieve Remedial Action Objectives (RAOs) for soil, groundwater, and soil vapor through a combination of physical removal (via demolition of existing building complex and excavation) of soil containing COC concentrations greater than the Unrestricted Use Soil Cleanup Objectives (SCOs) and treatment (via in situ treatment and monitored natural attenuation [MNA]) of groundwater with COC concentrations greater than the applicable Class GA Criteria. ICs (restricting groundwater use) and short-term ECs (groundwater migration control system [via groundwater extraction and treatment], SSDS) would be implemented to manage potential risks from COCs until such time that applicable standards are met. - This alternative is considered “permanent,” as defined by 6 NYCRR Part 375, as it does not rely on long-term employment of ECs and ICs.
Compliance with Applicable Standards, Criteria, and Guidance (SCGs)	- Complies with soil SCGs through some source removal, the application of ECs/ICs and adherence to an SMP to address soil containing COC concentrations greater than Unrestricted Use Soil Cleanup Objectives (SCOs) that will remain on-Site after implementation of remedial construction. - Complies with groundwater SCGs through the application ECs/ICs and adherence to an SMP to address groundwater with COC concentrations greater than applicable Class GA Criteria. - Permitted/licensed waste transporters and treatment/disposal facilities would be contracted for waste management services. - Permits/approvals would be obtained for the treatment and discharge of collected and treated groundwater. - Local permits/approvals would be obtained for various work activities (e.g., electrical, paving, and other restoration activities, etc.), as necessary.	- Complies with soil SCGs through the removal of soil containing COC concentrations greater than Unrestricted Use SCOs. - Complies with groundwater SCGs through the treatment (via in situ treatment and MNA) of groundwater with COC concentrations greater than applicable Class GA Criteria. - Permitted/licensed waste transporters and treatment/disposal facilities would be contracted for waste management services. - Permits/approvals would be obtained for the treatment and discharge of collected and treated groundwater. - Local permits/approvals would be obtained for various work activities (e.g., demolition, electrical, paving and other restoration activities, etc.), as necessary.

TABLE 4
REMEDIAL ACTION ALTERNATIVES EVALUATION SUMMARY
CARLSON PARK SITE
ROCHESTER, NEW YORK

Evaluation Criteria	Alternative 1 Track 4 Commercial Use Remedy	Alternative 2 Track 1 Unrestricted Use Remedy
<i>Primary Balancing Criteria:</i>		
Long-Term Effectiveness and Permanence	- Relies on some source removal, ECs (cover system, groundwater migration control system, and SSDSs), MNA, ICs (implementation of the SMP to control potential exposure to COCs remaining in soil and groundwater that will remain on-Site after remedial construction) and maintain long-term effectiveness. ECs and ICs are considered compatible with current and anticipated future Site uses. Therefore, long-term application of ECs and ICs is expected to be effective. - Since residual COCs would remain at the Site at concentrations greater than Unrestricted-Use SCOs and Groundwater Class GA Criteria, this alternative is not considered "permanent," as defined by 6 NYCRR Part 375, as it relies on long-term employment of ECs and ICs.	- The removal of soil with COC concentrations greater than the Unrestricted-Use SCOs (Site-wide overburden soil) and treatment of bedrock groundwater would offer long-term effectiveness. - COCs at concentrations greater than Unrestricted-Use SCOs in soils would be removed from the Site, therefore, this alternative would offer long-term effectiveness and is considered permanent with respect to soil remediation, as it does not rely on long-term employment of ECs and ICs. - COCs in groundwater would be treated in situ, therefore, this alternative is considered permanent with respect to groundwater remediation. In situ treatment within bedrock and observed/inferred presence of chlorinated DNAPL present challenges to effective in situ treatment and it is uncertain that the Track 1 remedy could be achieved in groundwater even after a Track 1 remedy is implemented for soil. - ICs (restricting groundwater use and the SMP) and short-term ECs (groundwater migration control system, SSDS) would be implemented to manage potential exposure pathways to COCs until such time that COCs in groundwater met applicable standards.
Reduction of Toxicity, Mobility, or Volume	- Relies primarily on a combination of ECs and ICs to control exposure to and reduce or control COC toxicity/mobility. - The surface cover system would reduce mobility of COCs by controlling potential migration by erosion or dust generation. - Excavation would permanently remove (reducing the volume) impacted soil from the Oil-Impacted Area. The long-term management of COCs in the excavated soil would be addressed by the off-site treatment/disposal facility. - The groundwater migration control system and MNA would control the mobility of COCs in groundwater. The groundwater treatment system would remove COCs (reducing toxicity and volume) from groundwater prior to discharge (likely to the local sanitary sewer system consistent with the current discharge permit for treated water from the Building 10 sump). - The on-site and off-site SSDSs would control the mobility of COCs in soil vapor to prevent intrusion to indoor air in occupied buildings.	- Would permanently remove (via excavation) soil containing COC concentrations greater than the Unrestricted-Use SCOs, thus vastly reducing the volume of COC-impacted soil. This alternative would also permanently address on-site toxicity and mobility of COCs in soil. The long-term management of COCs in the excavated soil would be addressed by the off-site treatment/disposal facility. - Would treat (via in situ treatment and MNA) remaining groundwater impacts, to the extent practical (i.e., to asymptotic levels), which would reduce the toxicity, mobility, and volume of COCs in groundwater. - The groundwater migration control system and MNA would control the mobility of COCs in groundwater until such time that that applicable standards are met. The groundwater treatment system would remove COCs (reducing toxicity and volume) from groundwater prior to discharge (likely to the local sanitary sewer system). - The off-site SSDSs would control the mobility of COCs in soil vapor to prevent intrusion to indoor air in occupied buildings.

TABLE 4
REMEDIAL ACTION ALTERNATIVES EVALUATION SUMMARY
CARLSON PARK SITE
ROCHESTER, NEW YORK

Evaluation Criteria	Alternative 1 Track 4 Commercial Use Remedy	Alternative 2 Track 1 Unrestricted Use Remedy
Short-Term Impact and Effectiveness	- Short-term risks/impacts (construction/drilling hazards, potential exposure to COCs, dust/vapor emissions, increased truck traffic for waste transporting and fill importing, soil erosion, etc.) associated with implementation of the alternative are relatively low due to the smaller scale of the alternative and anticipated short construction duration (estimated to be approximately 1 year). - Short-term risks would be mitigated through implementation and adherence to a Site-Specific Health and Safety Plan (SSHASP), a Community Air Monitoring Plan (CAMP), traffic control plans, erosion and sediment control plans, dust/vapor mitigation measures (e.g., water trucks, odor suppressing foams/sprays, covering stockpiles, good housekeeping practices, etc.). - Potential short-term risks to indoor air quality during remedy implementation would be mitigated through ongoing operation of the on-site and off-site SSDSs.	- Short-term risks/impacts (construction/drilling hazards, potential exposure to COCs, dust/vapor emissions, increased truck traffic for waste transporting and fill importing, soil erosion, etc.) associated with implementation of this alternative are high due to the larger, more complex scope of the implementation of this alternative and anticipated long construction duration (estimated to be from 5 to 10 years). - Short-term risks would be mitigated through implementation and adherence to a SSHASP, a CAMP, traffic control plans, erosion and sediment control plans, dust/vapor mitigation measures (e.g., water trucks, odor suppressing foams/sprays, covering stockpiles, good housekeeping, etc.). - Potential short-term risks to groundwater quality and indoor air quality during in situ treatment implementation would be mitigated through operation of a groundwater extraction and treatment system and continued operation of off-site SSDSs. Operation of the on-site SSDS would not be necessary as the building would be decommissioned/demolished as part of this alternative.
Implementability	- Technically feasible and implementation would be relatively straightforward compared to Alt-2 due to the smaller scale of the remedial action. This alternative does not include the challenges of site-wide excavation and in situ treatment of bedrock groundwater. - Administratively feasible, as necessary personnel and materials are readily available. Procurement of necessary regulatory approvals/access agreements are not anticipated to be an issue. This alternative would be minimally disruptive to ongoing leasing/use of the building and business operations at the Site, which would maintain revenue streams for both the property owner and local businesses. - Anticipated to require 30+ years to achieve media-specific SCGs. Requires long-term operation, monitoring, and maintenance of ECs (cover system, groundwater migration control system, and on-site and off-site SSDSs), MNA, and ICs (e.g., environmental easement). The ECs and ICs are compatible with current/future Site uses, could be reliably implemented, and could be maintained as long as necessary.	- Technically feasible, although Site-wide, large-scale excavation activities, some of which would be conducted below the water table, would be challenging and require substantial planning, sequencing, and use of temporary measures (shoring, dewatering, sediment and erosion controls, etc.) in order to implement. In addition, in situ treatment of bedrock groundwater would be challenging due to the potential presence of dense non-aqueous phase liquids (DNAPL) and long-term COC diffusion from the rock matrix. - Administrative feasibility may be an issue with implementation of this alternative. Although obtaining regulatory approvals are not anticipated to be an issue, obtaining the approvals/support for the removal of a source of revenue for the property owner (i.e., rental of building space), displacement of and loss of revenue for active local businesses, and demolition of the building would be challenging. In addition, the large scale of the implementation may stress the availability of resources necessary to implement the alternative (e.g., personnel, waste haulers, clean fill sources, landfill space, etc.). - Anticipated to require 5-10 years to achieve media-specific SCGs. Requires short-term operation, monitoring, and maintenance of ECs (e.g., groundwater migration control system, off-site SSDSs), MNA, and ICs (e.g., environmental easement and SMP). The ECs and ICs are needed in the short-term and are compatible with current/future Site uses, could be reliably implemented, and could be maintained as long as necessary.

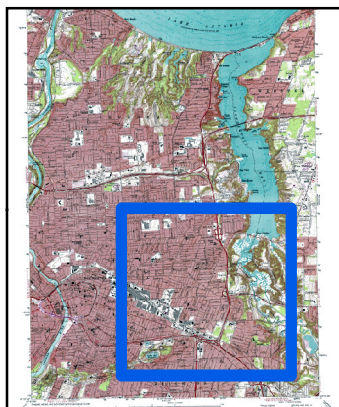
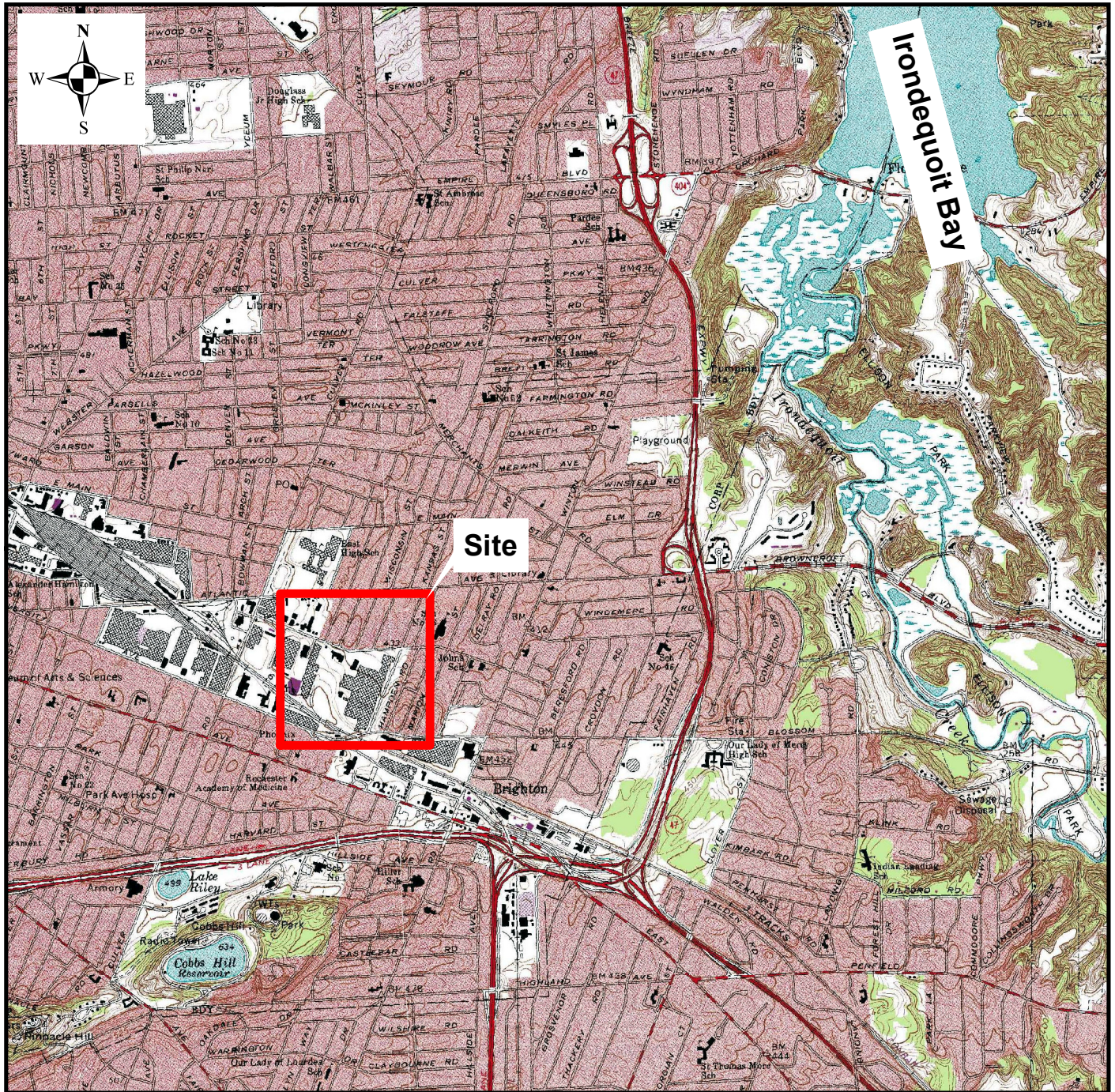
TABLE 4
REMEDIAL ACTION ALTERNATIVES EVALUATION SUMMARY
CARLSON PARK SITE
ROCHESTER, NEW YORK

Evaluation Criteria	Alternative 1 Track 4 Commercial Use Remedy	Alternative 2 Track 1 Unrestricted Use Remedy
Cost Effectiveness	• Net Present Worth estimated at \$11,730,000 (refer to cost tables). • Lower cost relative to Alt-2. • Alt-1 would cost-effectively achieve RAOs and satisfy the threshold criteria. • Relies on engineering and institutional controls to manage long-term risks, however, these controls would be compatible with current and anticipated future Site uses.	• Net Present Worth estimated at \$168,480,000 (refer to cost tables). • Very high cost relative to Alt-1. • Alt-2 would achieve RAOs, satisfy threshold criteria, and place limited restrictions on the Site (restrictions are anticipated to be short-term compared to Alt-1). • The cost to achieve the Site RAOs is substantially higher than Alt-1 while offering little additional benefit.
Land Use	• Would allow for beneficial re-use of the Site for commercial and/or industrial purposes, which is consistent with current and anticipated future Site uses. • Future Site invasive activities and uses would have to comply with the requirements of the ICs and SMP due to the presence of COCs in soil, groundwater, and soil vapor that will remain at the Site after remediation. Future redevelopment would have to incorporate ECs (covers) to maintain protectiveness.	• Demolition of the existing building would eliminate the space for current and future commercial or industrial operations and would remove the amenities currently used by the community at the Site. • Would allow for unrestricted re-use of the Site (with the exception of a restriction on groundwater use). However, remediation of the Site to Unrestricted Use SCO is unnecessary considering that the anticipated future site uses are commercial and/or industrial. • Future Site invasive activities and uses would not be encumbered by the requirements of ICs, ECs, or the SMP.

Figures



FIG-1



SOURCE: FIGURE 1 FROM DRAFT
REMEDIAL INVESTIGATION REPORT,
CARLSON PARK SITE, ROCHESTER, NEW
YORK (S2C2, INC. AND BROWN AND
CALDWELL ASSOCIATES, APRIL 2021)

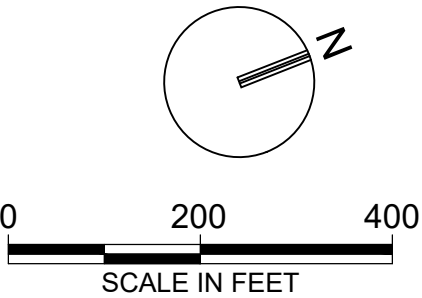
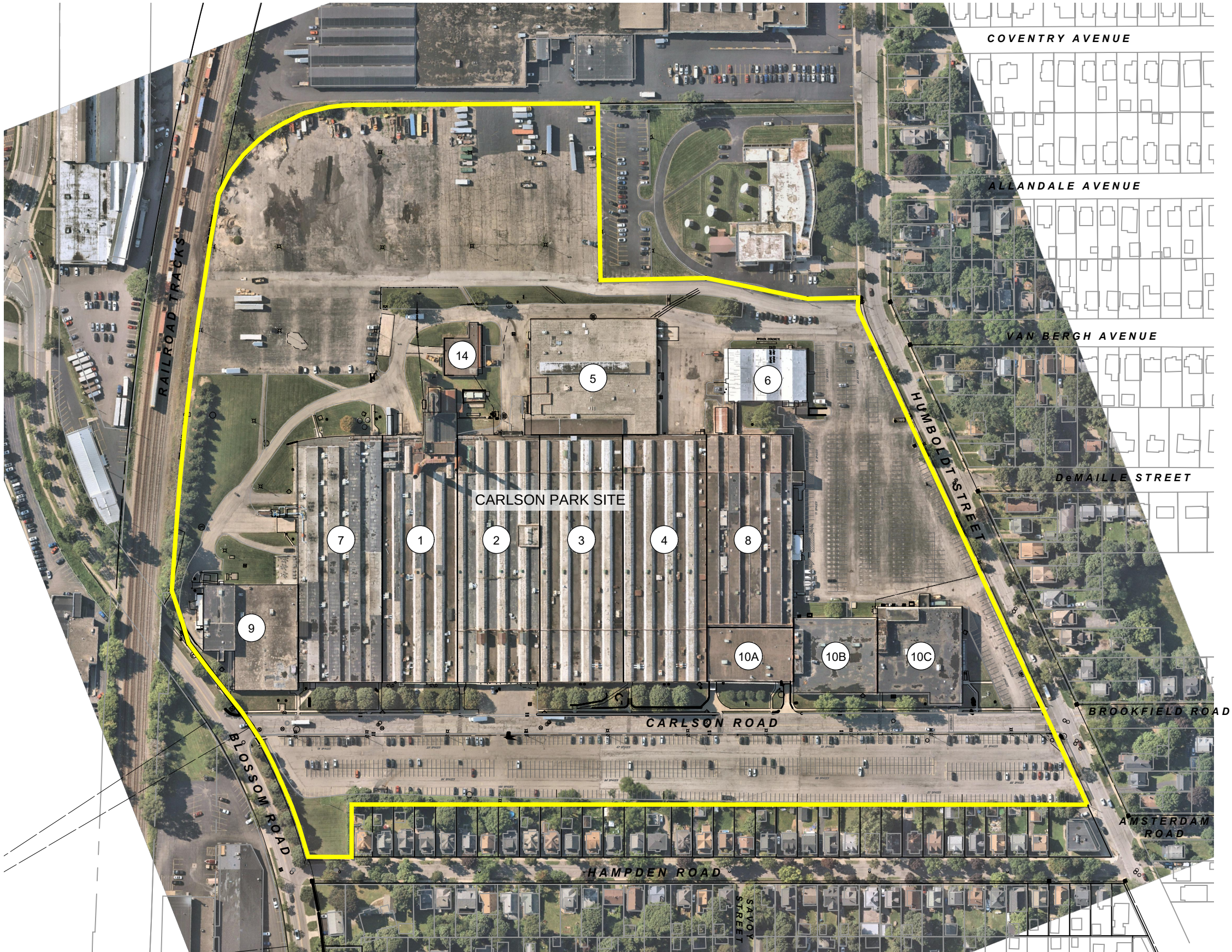
0 1,500 3,000 6,000 Feet



FIGURE 1
SITE LOCATION

CARLSON PARK SITE
ROCHESTER, NEW YORK

DATE:	SCALE:	FIGURE:
11/28/22	1:32,500	1



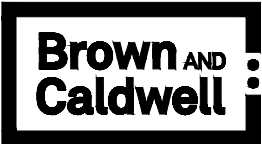
LEGEND

- PROPERTY LINE/SITE BOUNDARY
- BUILDING IDENTIFICATION NUMBER

4

NOTE

REFER TO FIGURE 3 FOR BASE MAP LEGEND AND NOTES.



SCALE: 1" = 200'

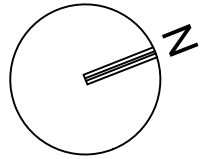
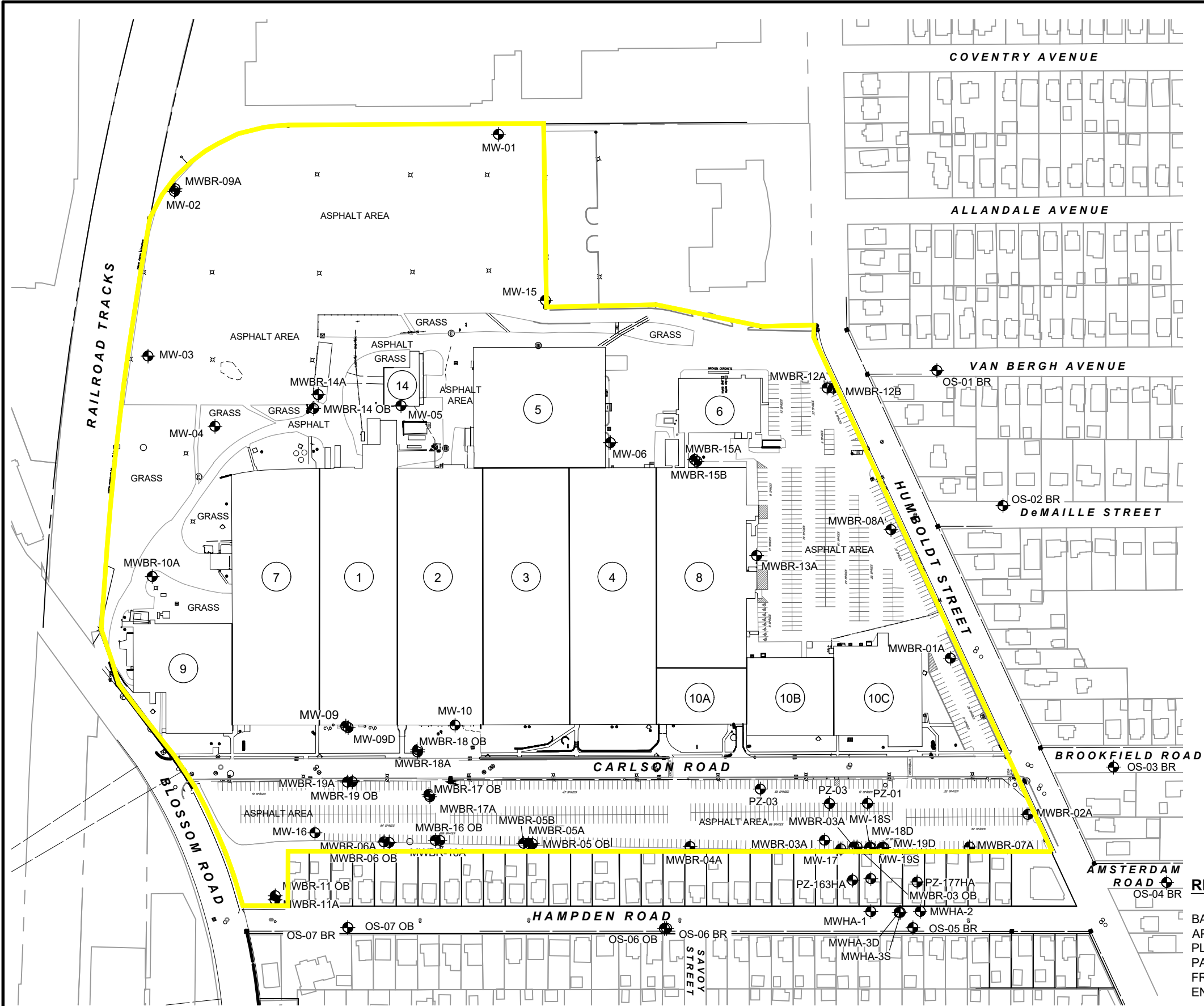
DATE: 12/13/22

CARLSON PARK SITE
ROCHESTER, NEW YORK

SITE AERIAL

FIGURE

2



LEGEND

- PROPERTY LINE/SITE BOUNDARY
- BUILDING IDENTIFICATION NUMBER
- GUIDERAIL
- MONITORING WELL
- CATCH BASIN
- CLEANOUT
- GAS VALVE
- HYDRANT
- LIGHT POLE
- MANHOLE (UNKNOWN TYPE)
- MANHOLE ELECTRIC
- MANHOLE INLET STORM DRAINAGE
- MANHOLE STORM DRAINAGE
- MANHOLE SANITARY SEWER
- SIGN POST
- UTILITY POLE
- UTILITY POLE ANCHOR WIRE
- UTILITY POLE WITH LIGHT
- WATER SERVICE
- WATER VALVE
- TRAFFIC LIGHT SPAN POLE

REFERENCE NOTE

BASE MAP DERIVED FROM AUTOCAD FILE PROVIDED BY PASSERO ASSOCIATES DATED APRIL 17, 2017. BASE MAP UTILIZES NORTH AMERICAN DATUM OF 1983 (NAD83) STATE PLANE NEW YORK WEST NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88). PARCEL BOUNDARIES AND OFF-SITE BUILDING SURVEY DATA WERE DOWNLOADED FROM THE MONROE COUNTY GIS CD (MONROE COUNTY DEPARTMENT OF ENVIRONMENTAL SERVICES, MONROE GIS SERVICES DIVISION, AUGUST 2010).



SCALE: 1" = 200'

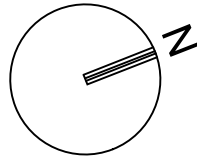
DATE: 12/13/22

CARLSON PARK SITE
ROCHESTER, NEW YORK

EXISTING CONDITIONS PLAN

FIGURE

3



0 200 400
SCALE IN FEET

REMEDIATION LEGEND

- EXISTING BUILDING 10 SUMP
- PROPOSED OVERBURDEN GROUNDWATER MONITORING WELL (23 TOTAL)
- PROPOSED BEDROCK GROUNDWATER MONITORING WELL (9 TOTAL)
- PROPOSED BEDROCK GROUNDWATER EXTRACTION WELL (3 TOTAL)
- SITE COVER (EXISTING BUILDING OR ASPHALT/CONCRETE PAVEMENT)
- SITE COVER (EXISTING 12" THICK SOIL VEGETATED COVER)
- SITE COVER (PROPOSED 12" THICK VEGETATED SOIL COVER)
- MONITORED NATURAL ATTENUATION (MNA) OF IMPACTED OFF-SITE OVERBURDEN GROUNDWATER
- EXCAVATION AND OFF-SITE DISPOSAL OF OIL-IMPACTED AREA
- TARGET CAPTURE ZONE OF GROUNDWATER MIGRATION CONTROL SYSTEM (EXISTING BUILDING 10 SUMP AND PROPOSED BEDROCK GROUNDWATER EXTRACTION WELLS)

ALTERNATIVE 1 NOTES:

- THE REMEDIATION PLAN DEPICTED HEREON IS CONCEPTUAL AND SUBJECT TO CHANGE PENDING THE RESULTS OF PRE-DESIGN INVESTIGATION ACTIVITIES, GROUNDWATER MODELING, AND DETAILED DESIGN. ALTERNATIVE 1 INCLUDES THE FOLLOWING:
- SITE-WIDE COVER SYSTEM (ENGINEERING CONTROL) CONSISTING OF EITHER (1) EXISTING ASPHALT PAVEMENT OR BUILDING SLAB, (2) EXISTING VEGETATED COVER (EXISTING LANDSCAPED AREAS WHERE UPPER 12" OF SOIL MEETS COMMERCIAL USE SCOs), (3) PROPOSED VEGETATED COVER UNDERLAIN BY A DEMARCTION LAYER (EXISTING LANDSCAPED AREAS WHERE UPPER 12" OF SOIL DOES NOT MEET COMMERCIAL USE SCOs).
 - EXCAVATION AND OFF-SITE DISPOSAL OF OIL-IMPACTED SOIL BASED ON VISUAL DETERMINATION, TO THE EXTENT PRACTICABLE (UTILITY CONFLICTS MAY LIMIT ACCESSIBILITY). FOLLOWING BACKFILLING, AREA TO BE RESTORED WITH ASPHALT PAVEMENT OR SOIL COVER.
 - IMPLEMENTATION AND LONG-TERM OPERATION OF GROUNDWATER MIGRATION CONTROL SYSTEM (ENGINEERING CONTROL) CONSISTING OF THE EXISTING BUILDING 10 SUMP (POTENTIALLY WITH MODIFICATIONS) AND PROPOSED BEDROCK GROUNDWATER EXTRACTION WELLS TO PROVIDE HYDRAULIC CONTAINMENT OF IMPACTED OVERBURDEN AND BEDROCK GROUNDWATER. EXTRACTED GROUNDWATER WILL BE TREATED VIA A TREATMENT SYSTEM (LOCATED IN BUILDING 10C) TO MEET DISCHARGE PERMIT EFFLUENT LIMITS PRIOR TO BEING DISCHARGED VIA THE SANITARY SEWER SYSTEM TO THE THE PUBLICLY OWNED TREATMENT WORKS (POTW).
 - MONITORED NATURAL ATTENUATION (MNA) OF IMPACTED OFF-SITE OVERBURDEN GROUNDWATER THAT IS OUTSIDE THE CAPTURE ZONE OF THE GROUNDWATER MIGRATION CONTROL SYSTEM.
 - CONTINUED OPERATION OF THE EXISTING FACILITY-WIDE SUB-SLAB DEPRESSURIZATION SYSTEM (ENGINEERING CONTROL) (NOTE: EXCLUDES BUILDING 14) TO ADDRESS POTENTIAL VAPOR INTRUSION INTO OCCUPIED BUILDING SPACES. CONTINUED OPERATION OF EXISTING SUB-SLAB VAPOR MITIGATION SYSTEMS AT OFF-SITE STRUCTURES, AS NECESSARY.
 - APPLICATION OF INSTITUTIONAL CONTROLS AT THE SITE TO: (A) LIMIT THE USE AND DEVELOPMENT OF THE PROPERTY TO COMMERCIAL OR INDUSTRIAL USES, (B) RESTRICT THE USE OF GROUNDWATER AS A SOURCE OF POTABLE WATER WITHOUT TREATMENT AS DETERMINED BY NEW YORK STATE DEPARTMENT OF HEALTH (NYSDOH) AND LOCAL HEALTH DEPARTMENT, (C) REQUIRE PERIODIC CERTIFICATION OF INSTITUTIONAL AND ENGINEERING CONTROLS, AND (D) REQUIRE COMPLIANCE WITH A SITE MANAGEMENT PLAN (SMP) APPROVED BY THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC).



SCALE: 1" = 200'

DATE: APRIL 2025

CARLSON PARK SITE
ROCHESTER, NEW YORK

CONCEPTUAL REMEDIATION PLAN FOR ALTERNATIVE 1 TRACK 4 COMMERCIAL USE REMEDY

FIGURE

4



REMEDIATION LEGEND

- PROPOSED OVERBURDEN GROUNDWATER MONITORING WELL (6 TOTAL)
- PROPOSED BEDROCK GROUNDWATER MONITORING WELL (9 TOTAL)
- PROPOSED BEDROCK GROUNDWATER EXTRACTION WELL (4 TOTAL)
- EXCAVATION TO BEDROCK AND OFF-SITE DISPOSAL
- IN SITU TREATMENT OF BEDROCK GROUNDWATER SOURCE AREAS
- MONITORED NATURAL ATTENUATION (MNA) OF IMPACTED OFF-SITE OVERBURDEN GROUNDWATER
- TARGET CAPTURE ZONE OF GROUNDWATER MIGRATION CONTROL SYSTEM (EXISTING BUILDING 10 SUMP AND PROPOSED BEDROCK GROUNDWATER EXTRACTION WELLS)

ALTERNATIVE 2 NOTES:

THE REMEDIATION PLAN DEPICTED HEREON IS CONCEPTUAL AND SUBJECT TO CHANGE. ALTERNATIVE 2 INCLUDES THE FOLLOWING:

- EXCAVATION OF SOIL TO THE TOP OF THE BEDROCK SURFACE AND OFF-SITE DISPOSAL. BUILDINGS AND SURFACE FEATURES WOULD BE DEMOLISHED TO FACILITATE THE EXCAVATION. UTILITIES WOULD BE REMOVED AND CUT/CAPPED AS APPROPRIATE AT THE PROPERTY BOUNDARY. FOLLOWING BACKFILLING, THE SURFACE WOULD BE STABILIZED AND RESTORED, AS APPROPRIATE (E.G., PAVEMENT, BUILDING SLAB, CRUSHED STONE, VEGETATED, ETC.).
- IN SITU TREATMENT OF BEDROCK GROUNDWATER SOURCE AREAS. THE EXTENT OF THE IN SITU TREATMENT ZONE, TREATMENT TYPE, AND METHODS WOULD BE DETERMINED BASED ON PRE-DESIGN INVESTIGATIONS AND EVALUATIONS.
- IMPLEMENTATION AND SHORT-TERM OPERATION OF GROUNDWATER MIGRATION CONTROL SYSTEM (ENGINEERING CONTROL) CONSISTING OF PROPOSED BEDROCK GROUNDWATER EXTRACTION WELLS TO PROVIDE HYDRAULIC CONTAINMENT OF IMPACTED OVERBURDEN AND BEDROCK GROUNDWATER. EXTRACTED GROUNDWATER WILL BE TREATED VIA A TREATMENT SYSTEM TO MEET DISCHARGE PERMIT EFFLUENT LIMITS PRIOR TO BEING DISCHARGED VIA THE SANITARY SEWER SYSTEM TO THE THE PUBLICLY OWNED TREATMENT WORKS (POTW).
- MONITORED NATURAL ATTENUATION (MNA) OF IMPACTED OFF-SITE OVERBURDEN GROUNDWATER.
- CONTINUED OPERATION OF EXISTING SUB-SLAB DEPRESSURIZATION SYSTEMS AT OFF-SITE STRUCTURES, AS NECESSARY.
- APPLICATION OF INSTITUTIONAL CONTROLS AT THE SITE TO: (A) RESTRICT THE USE OF GROUNDWATER AS A SOURCE OF POTABLE WATER WITHOUT TREATMENT AS DETERMINED BY NEW YORK STATE DEPARTMENT OF HEALTH (NYSDOH) AND LOCAL HEALTH DEPARTMENT, (B) REQUIRE PERIODIC CERTIFICATION OF INSTITUTIONAL AND ENGINEERING CONTROLS, AND (C) REQUIRE COMPLIANCE WITH A SITE MANAGEMENT PLAN (SMP) APPROVED BY THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC).



SCALE: 1" = 200'

DATE: APRIL 2025

CARLSON PARK SITE
ROCHESTER, NEW YORK

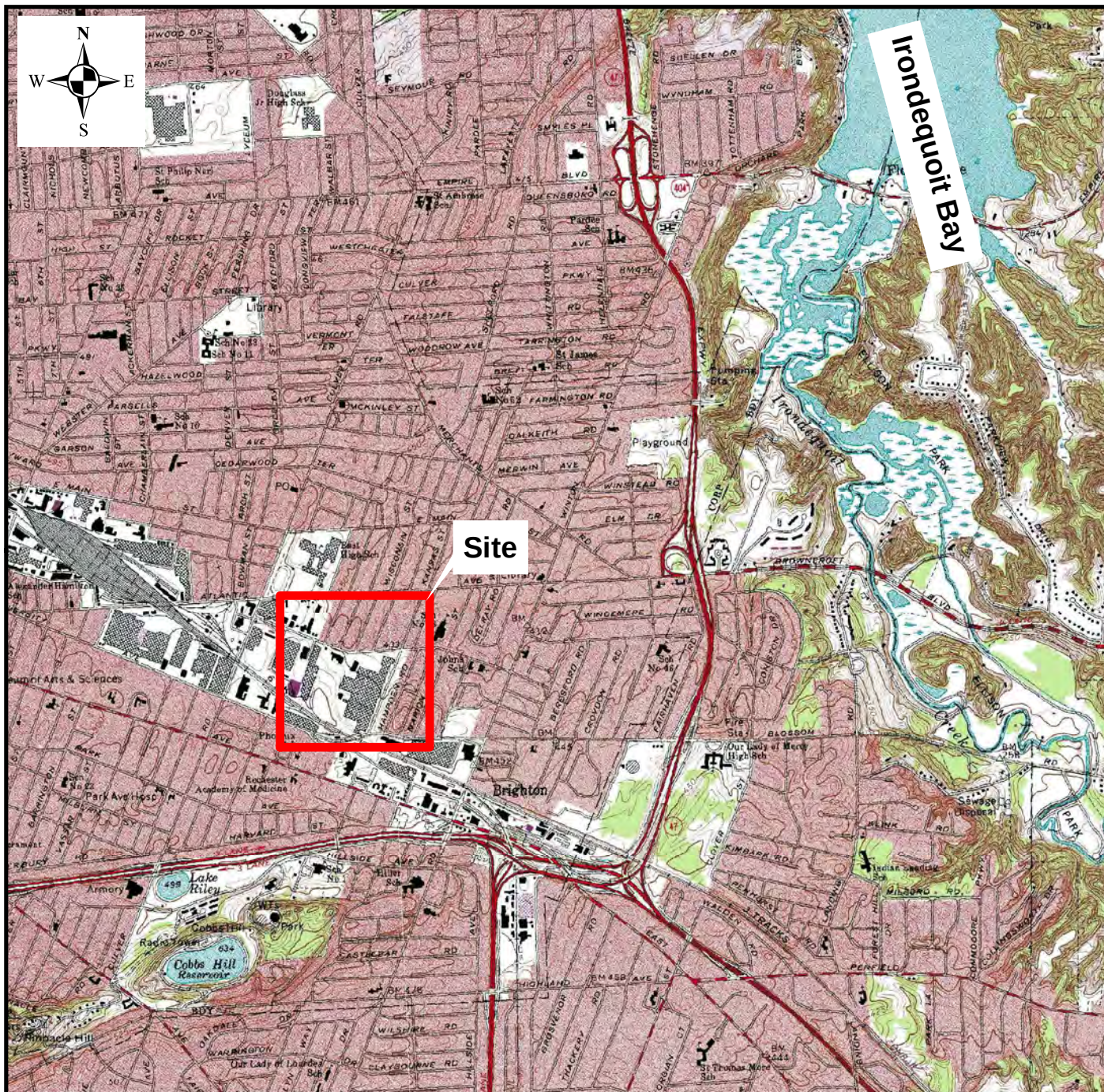
CONCEPTUAL REMEDIATION PLAN FOR ALTERNATIVE 2
TRACK 1 UNRESTRICTED USE REMEDY

FIGURE

5

Appendix A: Remedial Investigation Summary Figures





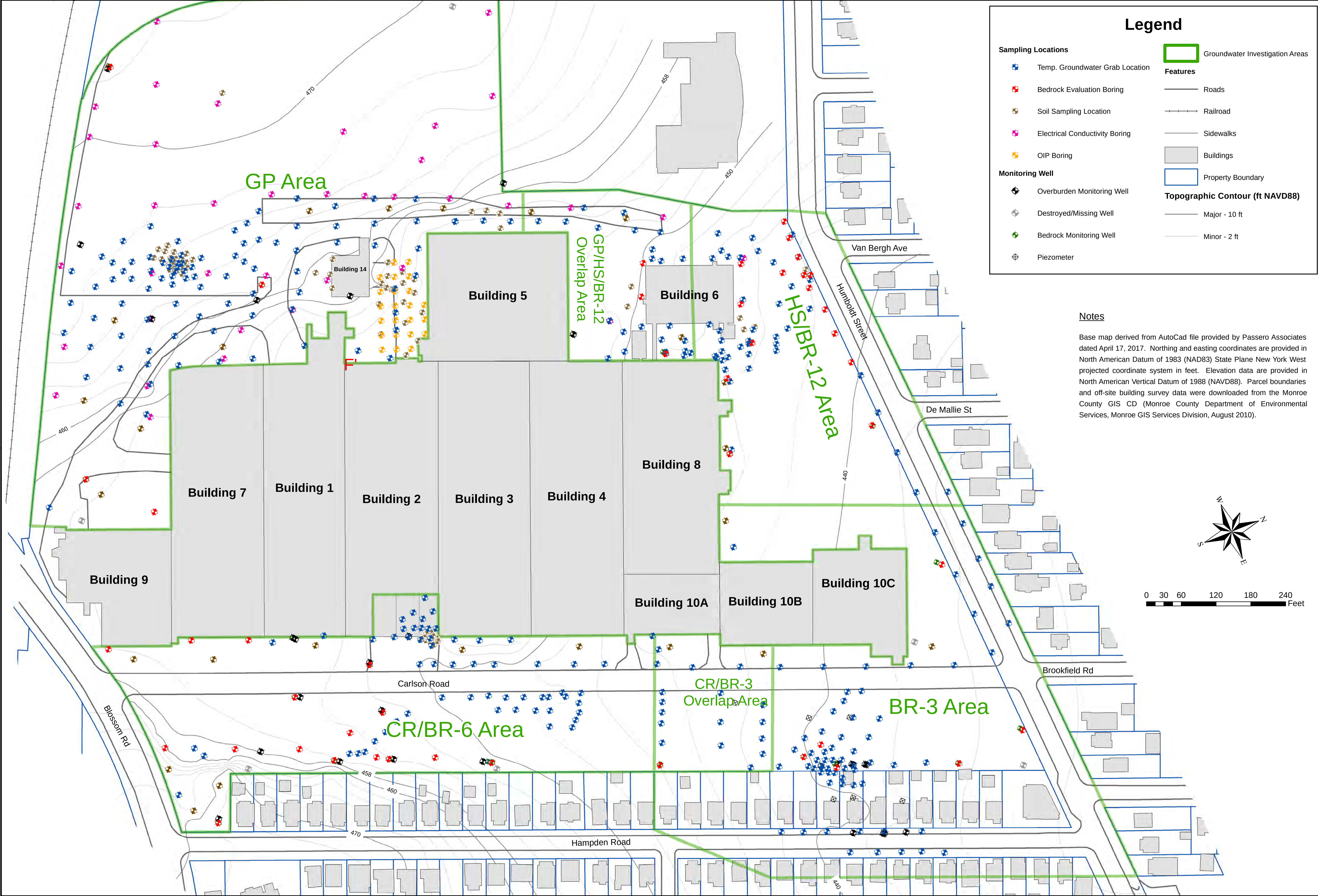
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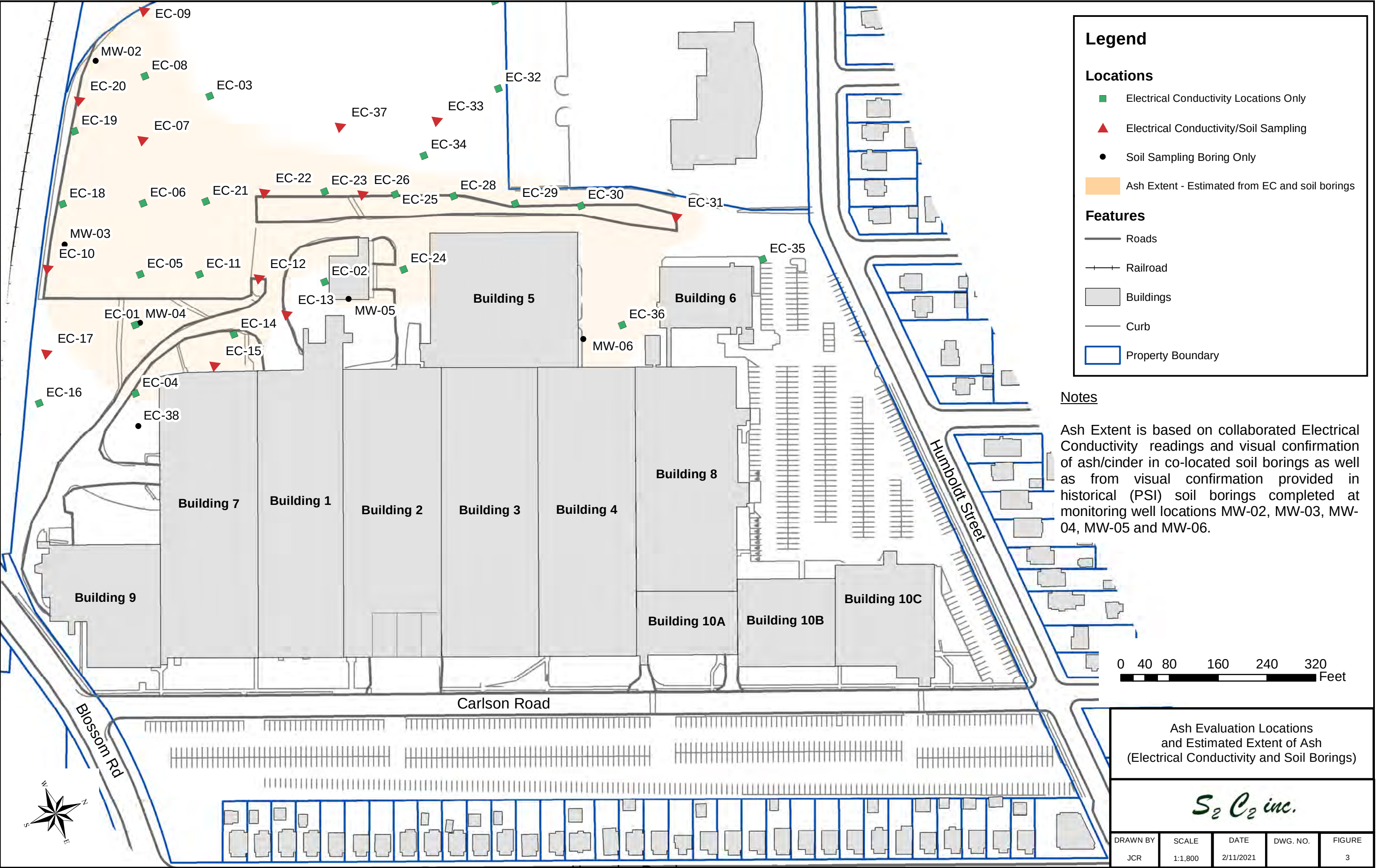
Figure 1
Site Location Map
On-Site Remedial Investigation Report

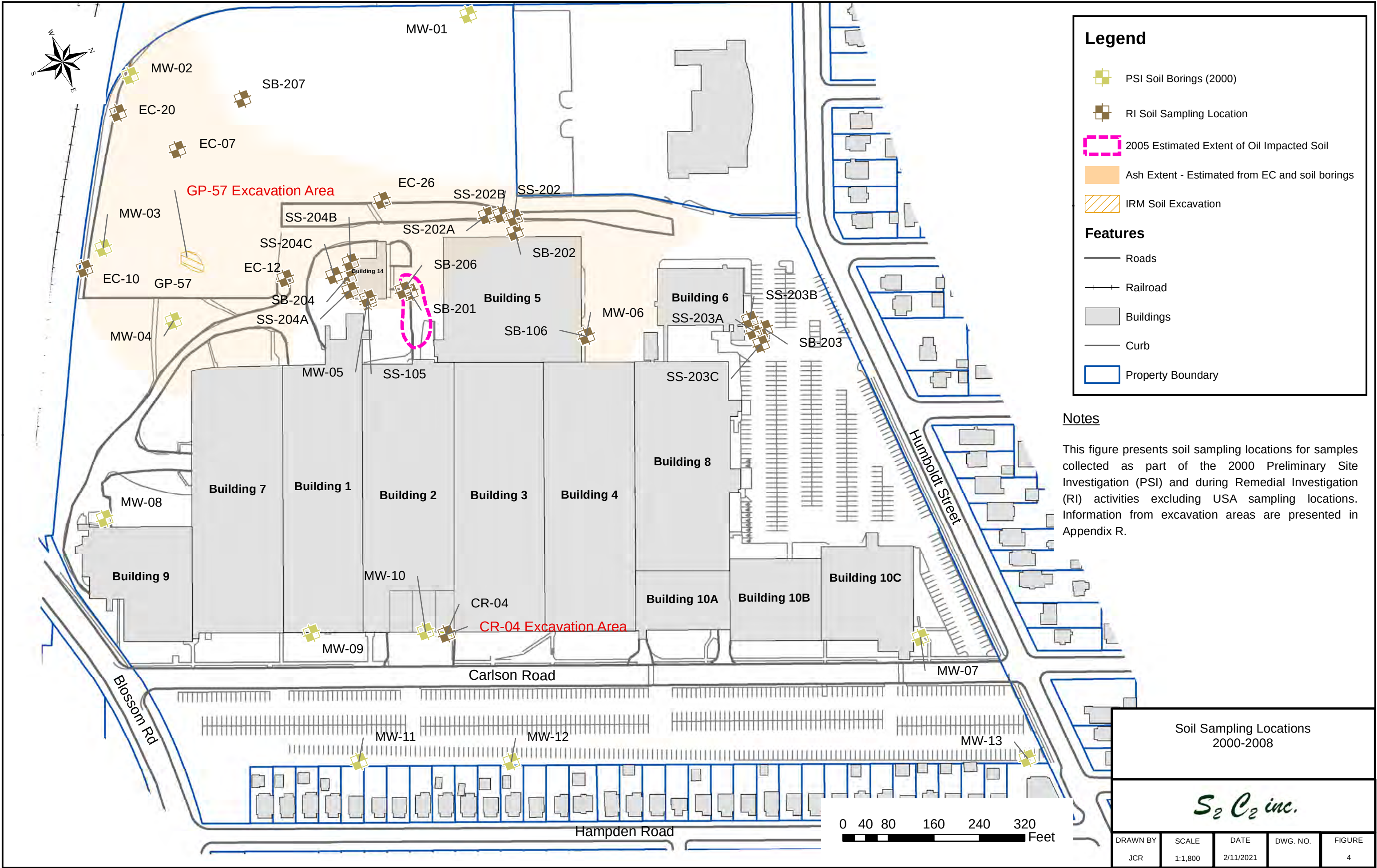
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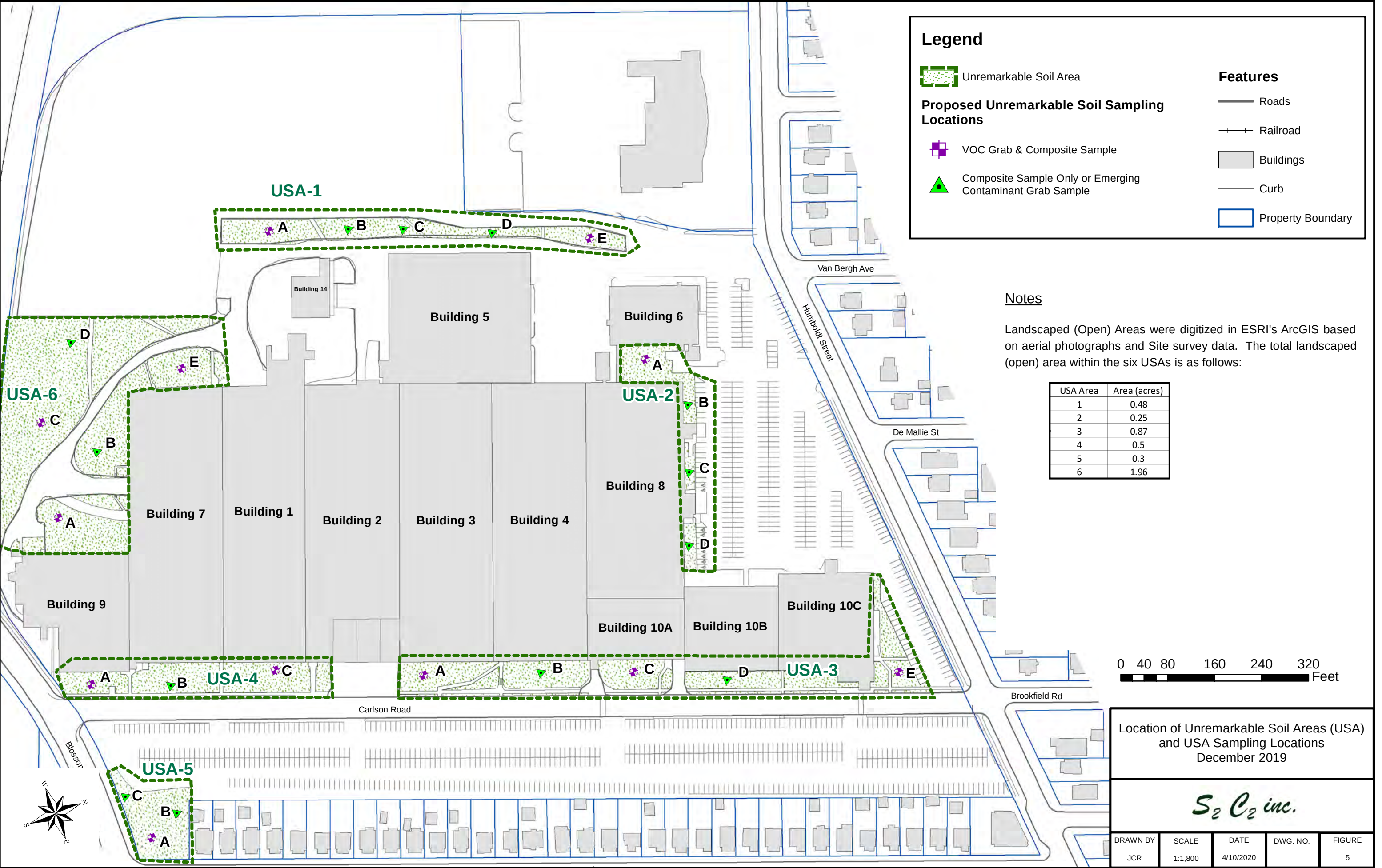
100 Carlson Road
Rochester, New York

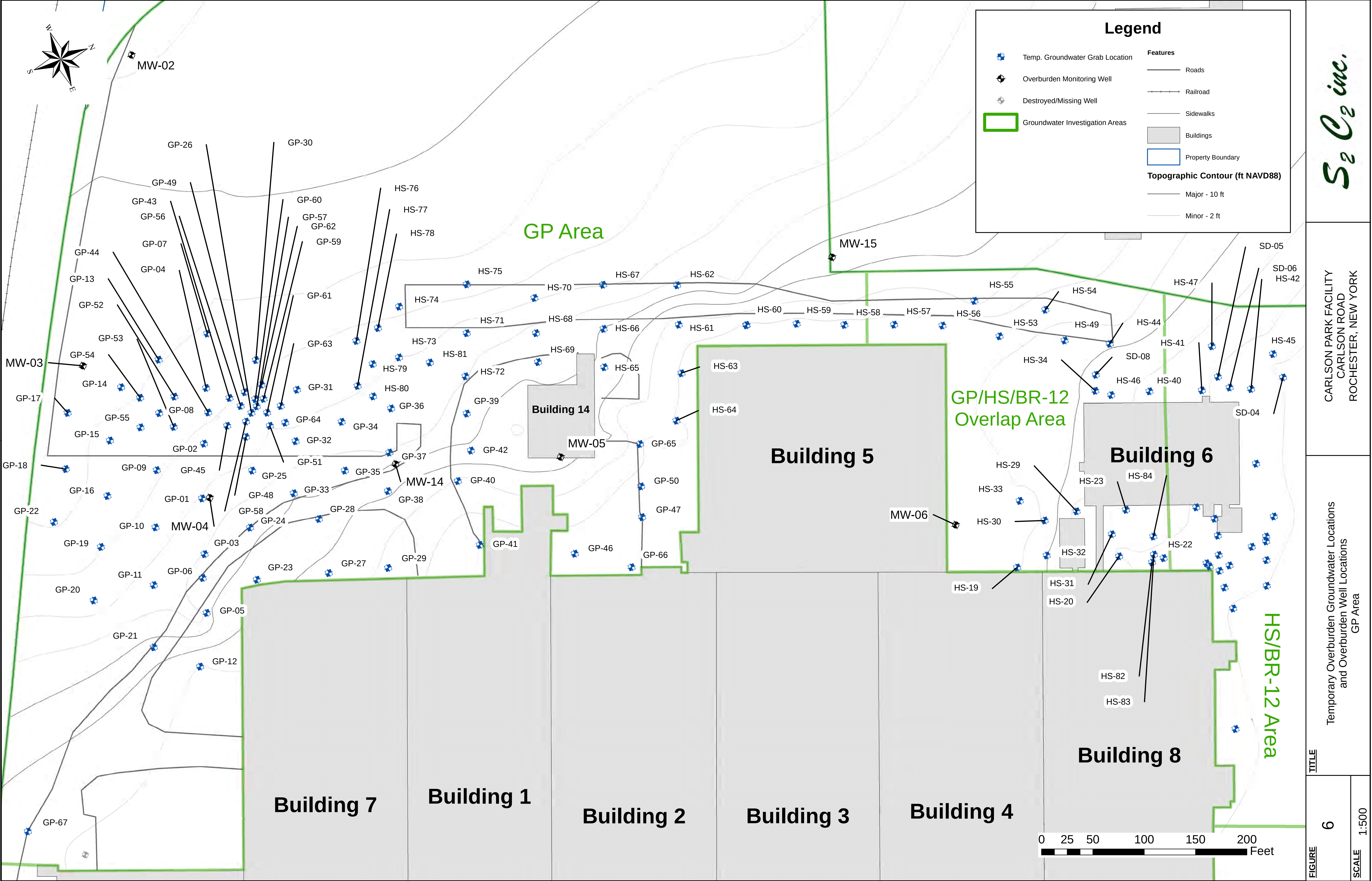
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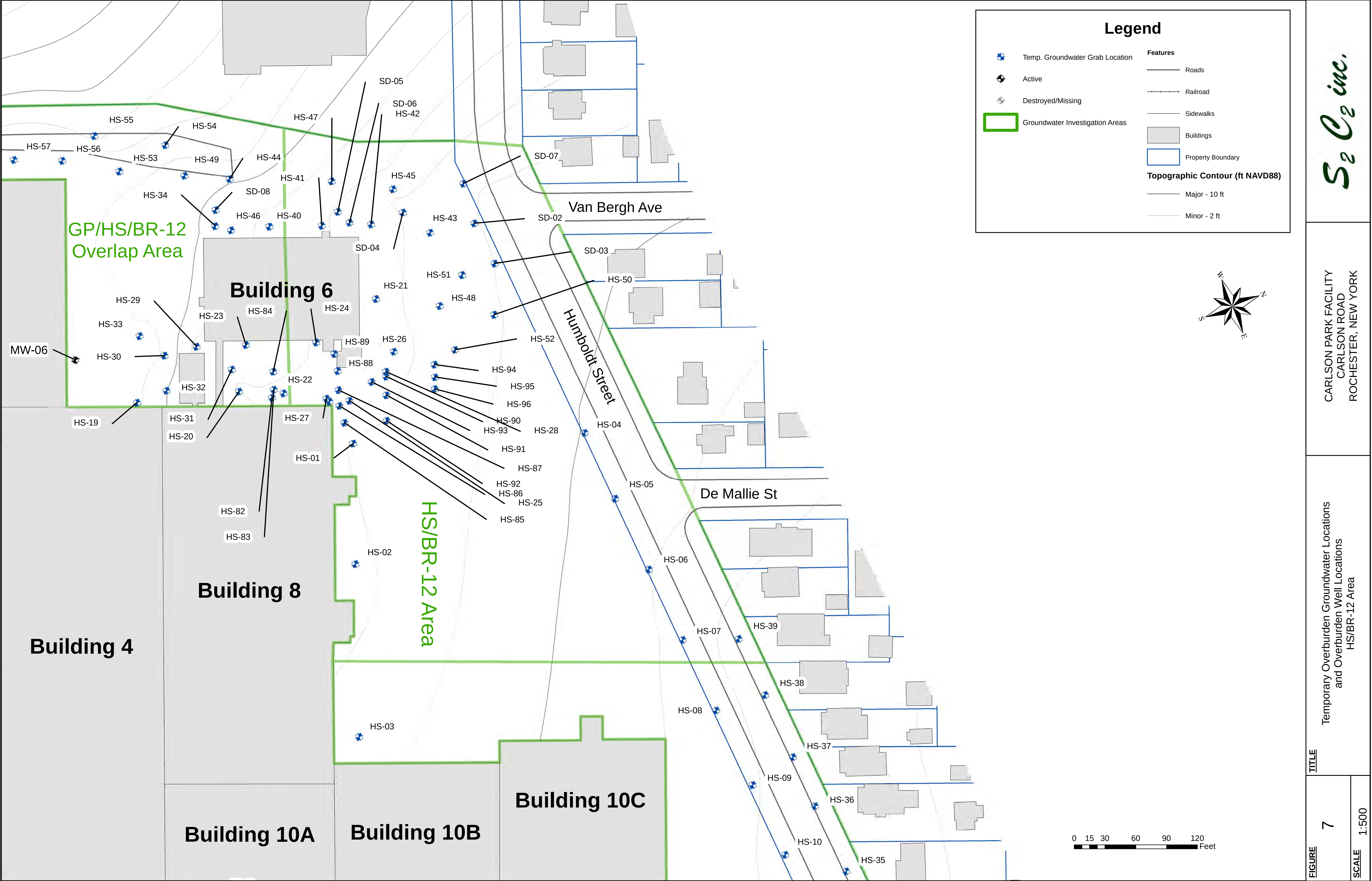


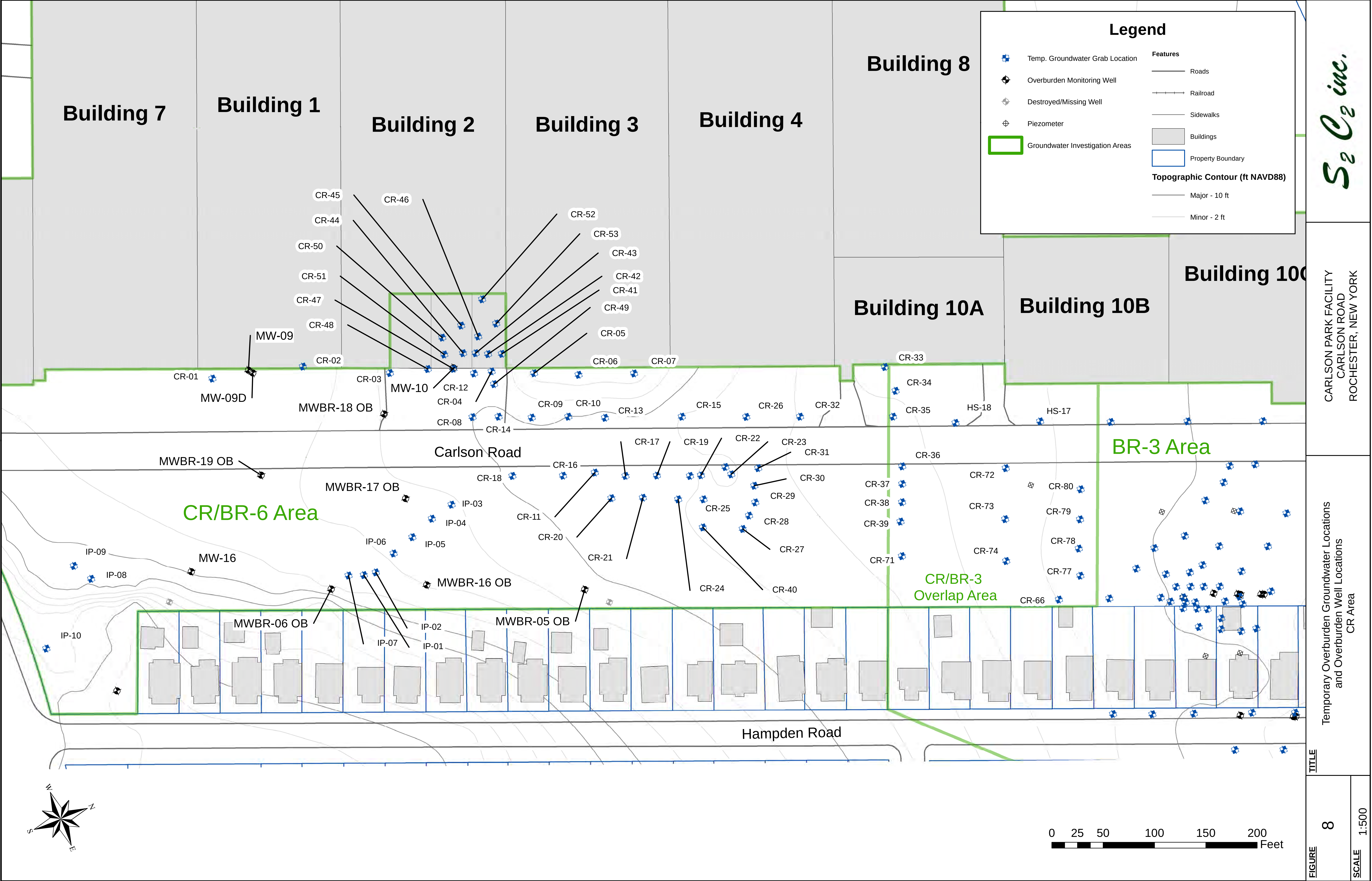


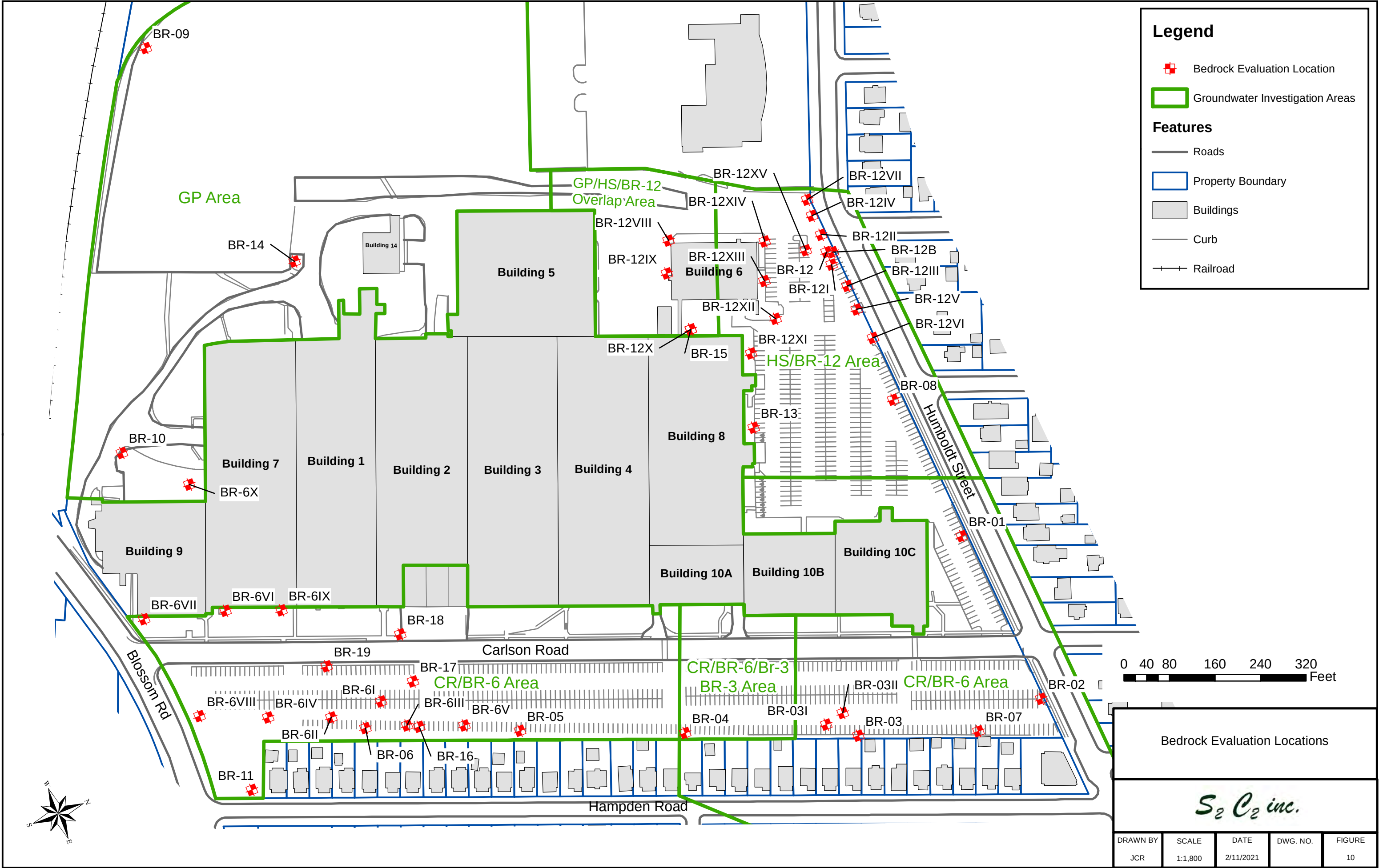


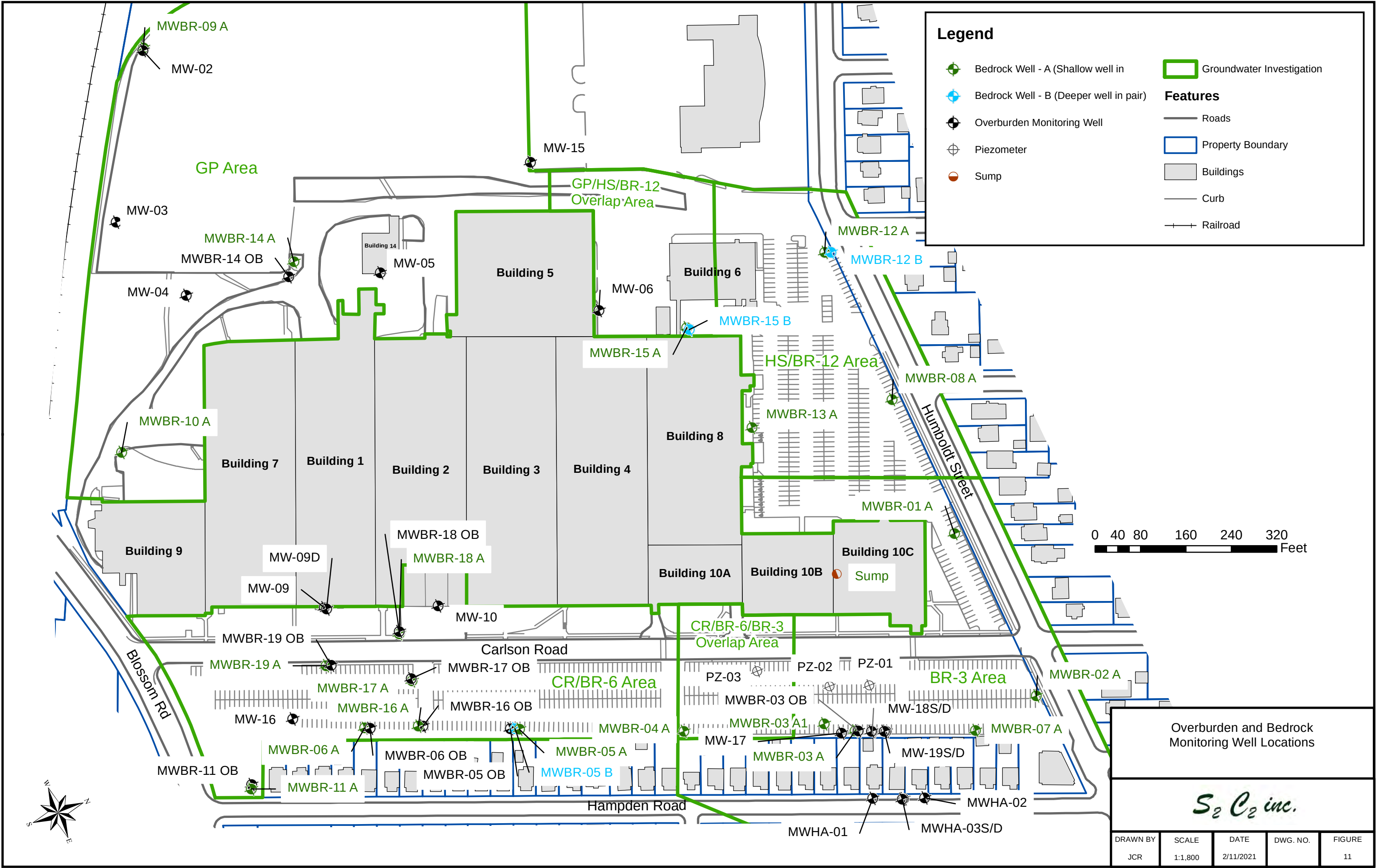


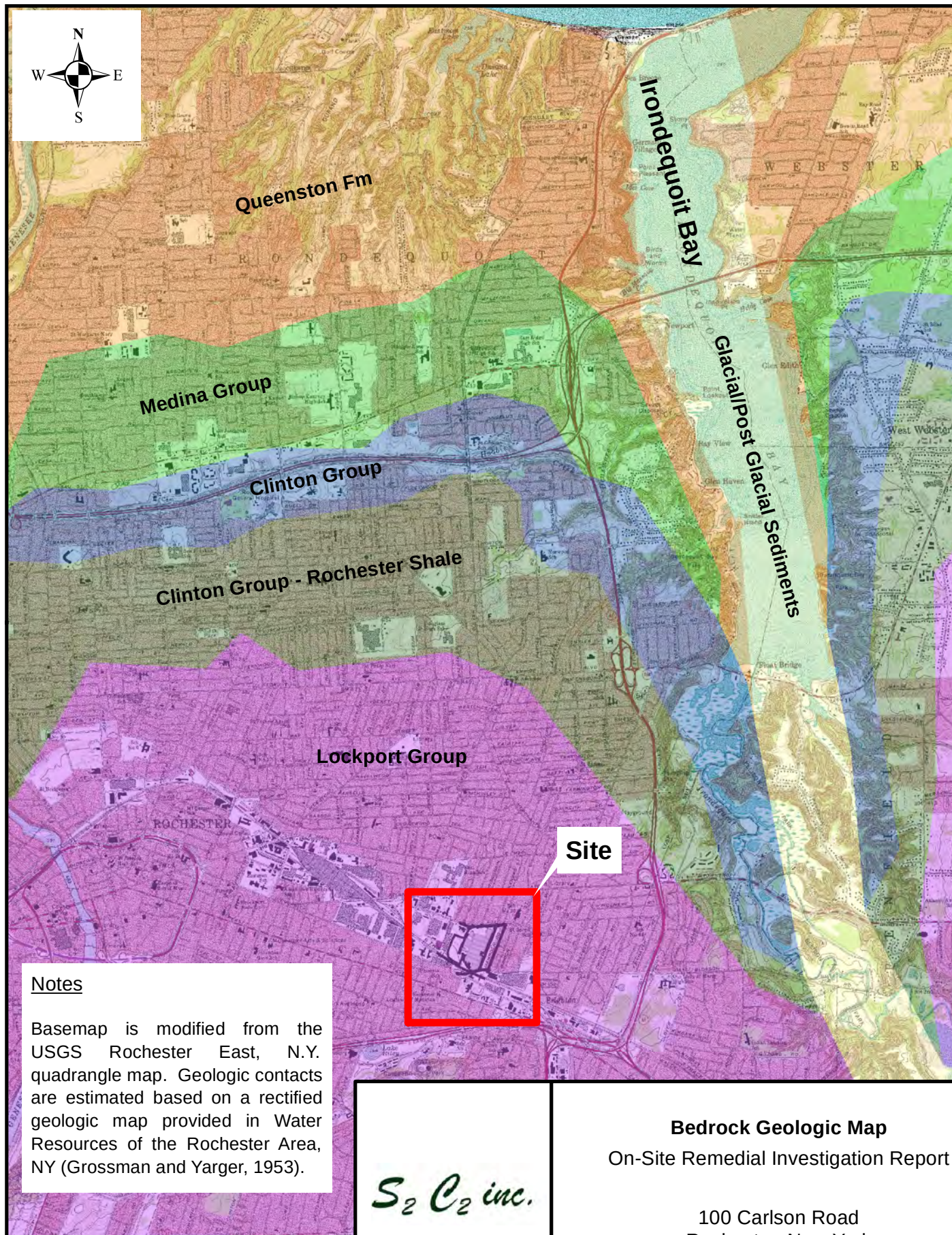












Notes

Basemap is modified from the USGS Rochester East, N.Y. quadrangle map. Geologic contacts are estimated based on a rectified geologic map provided in Water Resources of the Rochester Area, NY (Grossman and Yarger, 1953).

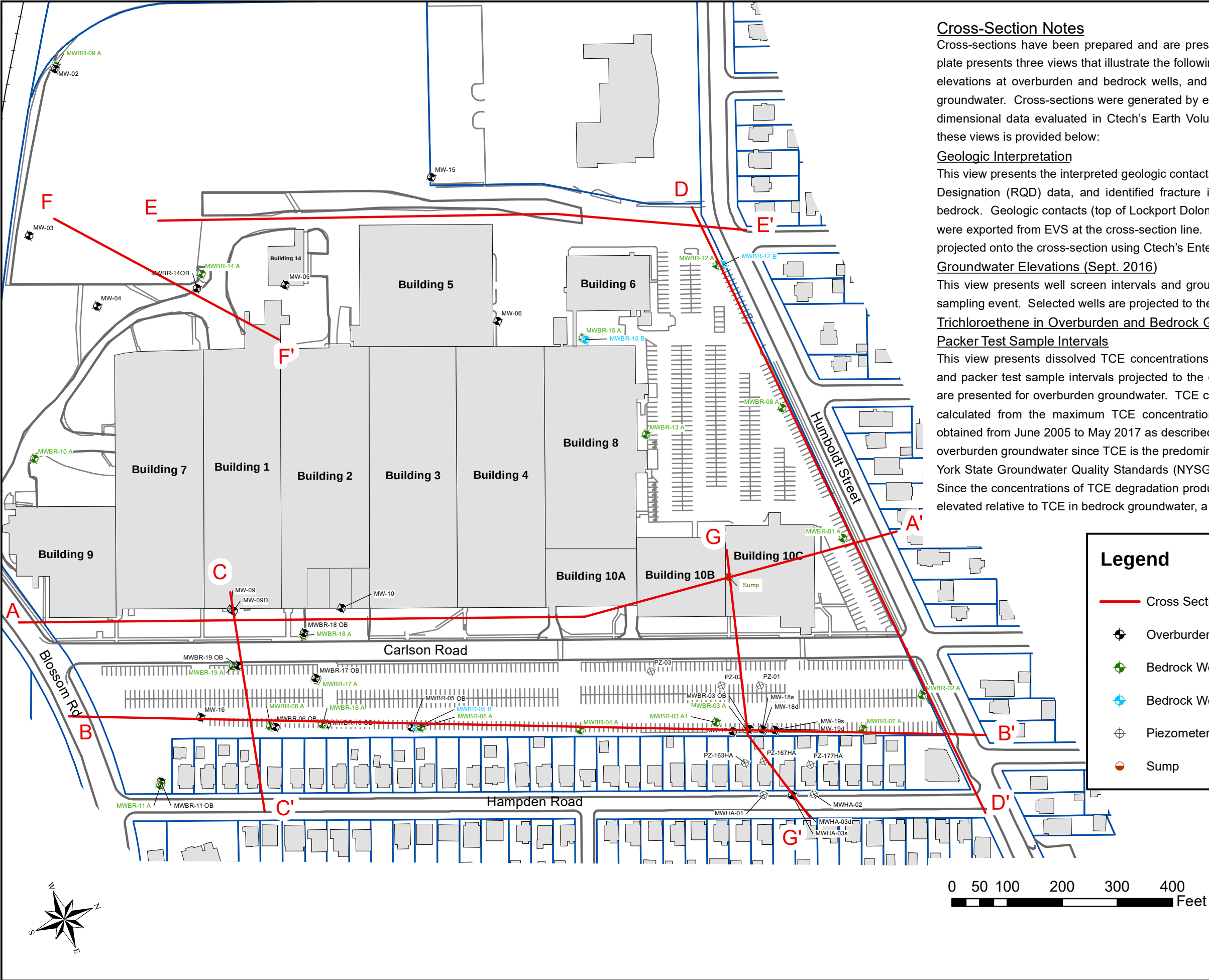
0 2,250 4,500 9,000 Feet

S₂ C₂ inc.

Bedrock Geologic Map On-Site Remedial Investigation Report

100 Carlson Road
Rochester, New York

DATE: 12/22/2009	DRAWN BY: JCR	SCALE: 1:51,930	FIGURE: 14
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Cross-Section Notes
Cross-sections have been prepared and are presented on the following Plates (12-18). Each cross-section plate presents three views that illustrate the following (from top to bottom): geologic interpretation, groundwater elevations at overburden and bedrock wells, and dissolved TCE concentrations in overburden and bedrock groundwater. Cross-sections were generated by exporting 2-dimensional data sets directly from interpreted 3-dimensional data evaluated in Ctech's Earth Volumetric Studio to ESRI's ArcGIS. A description of each of these views is provided below:

Geologic Interpretation
This view presents the interpreted geologic contacts as well as borehole geophysics gamma data, Rock Quality Designation (RQD) data, and identified fracture intervals that are potentially open and/or water bearing in bedrock. Geologic contacts (top of Lockport Dolomite and two bedding horizons within the Lockport Dolomite) were exported from EVS at the cross-section line. Data from selected borings adjacent to the section line were projected onto the cross-section using Ctech's Entervol.

Groundwater Elevations (Sept. 2016)
This view presents well screen intervals and groundwater elevations from the September 2016 groundwater sampling event. Selected wells are projected to the cross-section line.

Trichloroethene in Overburden and Bedrock Groundwater from Temporary Groundwater Points and Packer Test Sample Intervals
This view presents dissolved TCE concentrations in groundwater at selected temporary groundwater points and packer test sample intervals projected to the cross-section line. In addition, TCE concentration contours are presented for overburden groundwater. TCE contours were exported from the 3D kriging results that were calculated from the maximum TCE concentration observed at an individual sampling location from data obtained from June 2005 to May 2017 as described in the notes above. Only TCE data is presented within the overburden groundwater since TCE is the predominant Volatile Organic Compound (VOC) detected above New York State Groundwater Quality Standards (NYSGQS) in overburden groundwater as presented on Plate 19. Since the concentrations of TCE degradation products (e.g., 1,2-dichloroethenes and vinyl chloride) are locally elevated relative to TCE in bedrock groundwater, a calculated TCE equivalent concentration is provided for

Legend

- Cross Section Lines

Overburden Monitoring Well

Bedrock Well - A (Shallow well in pair)

Bedrock Well - B (Deeper well in pair)

Piezometer

Sump
- Features**

Roads

Railroad

Buildings

Curb

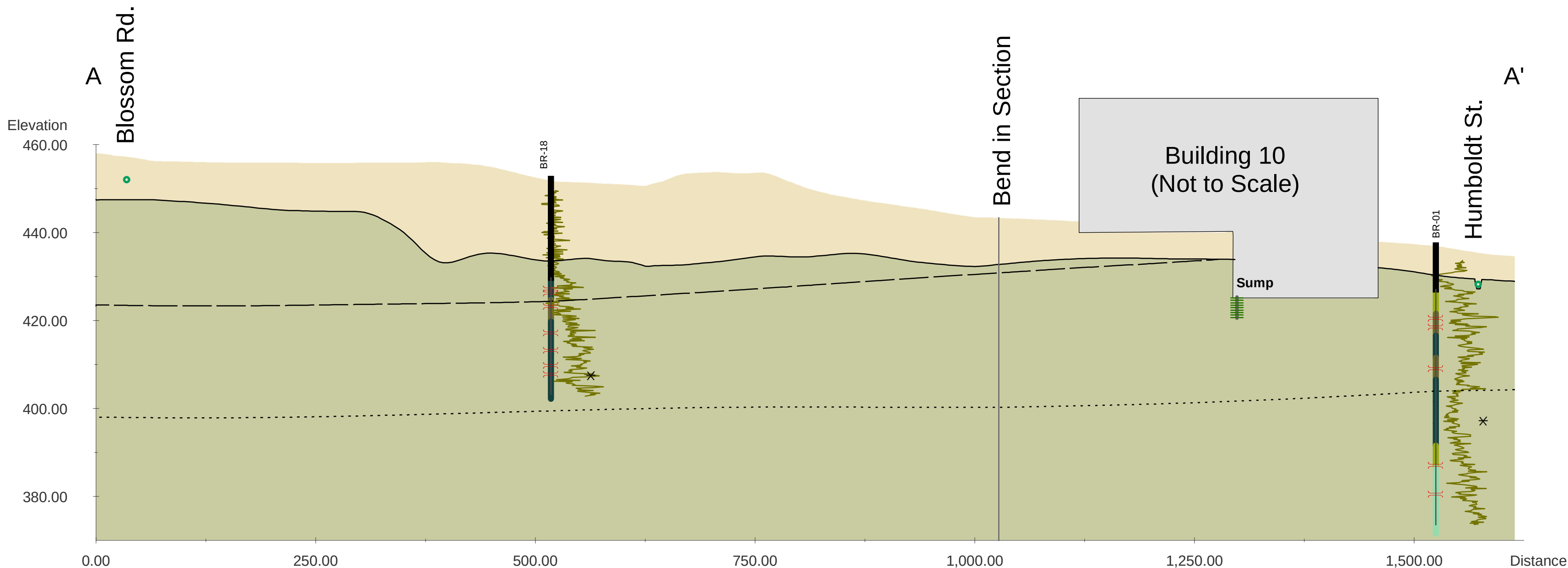
Property Boundary

Cross Section Locations and Notes

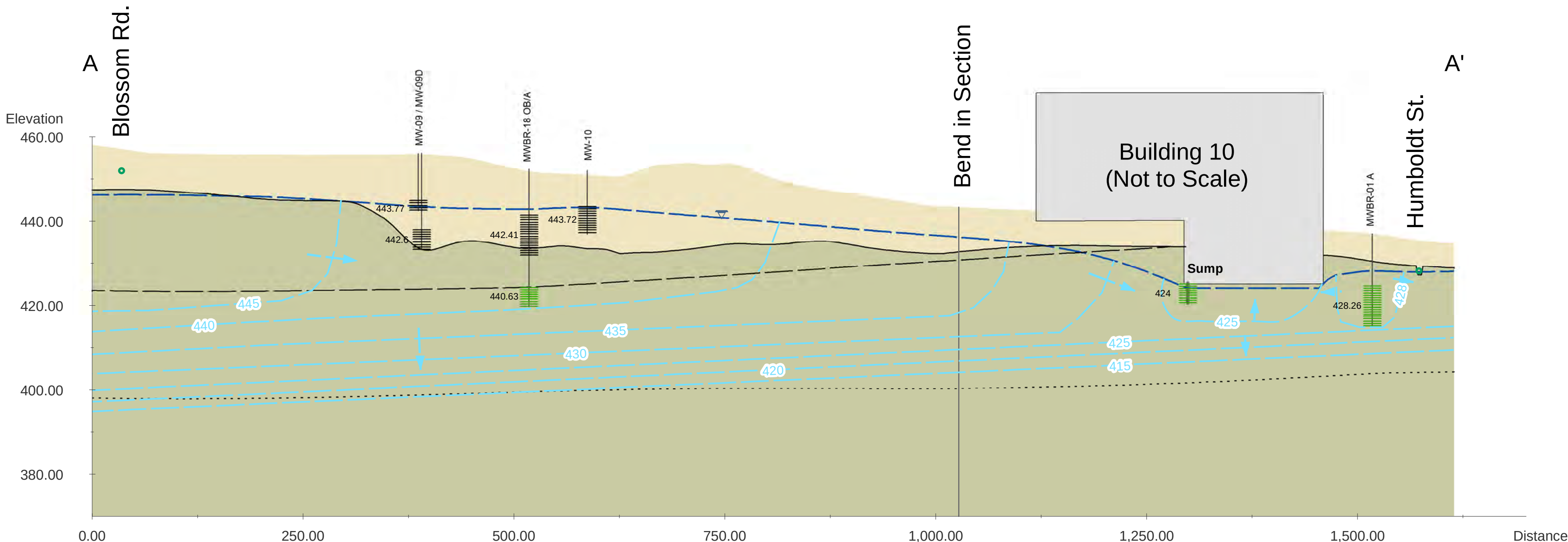
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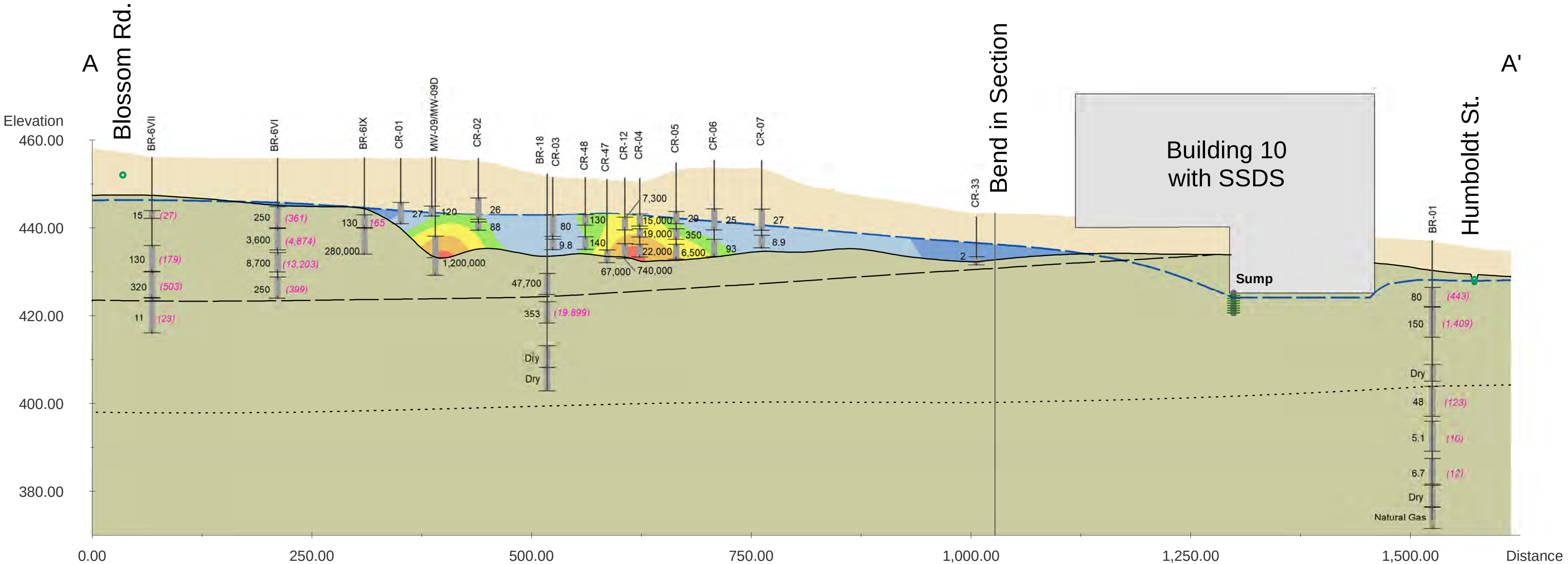
Geologic Interpretation



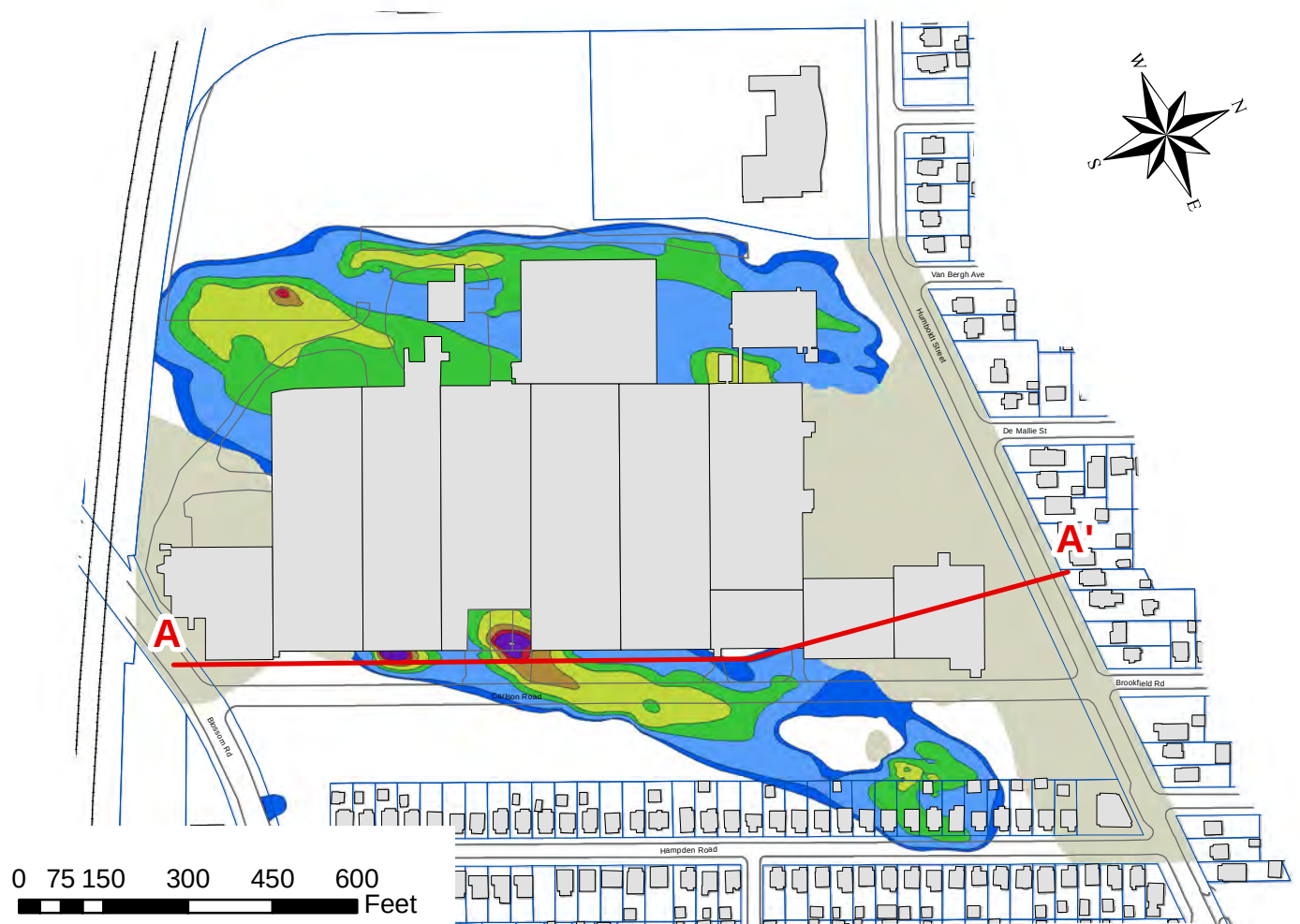
Well Screen Placement and Groundwater Elevations (Sept. 2016)



**Trichloroethene in Overburden and Bedrock
Groundwater from Temporary Groundwater Points and Packer Test Sample Intervals**



Legend



- ### Projection of Borings to Section

- Steel Casing
 Total Borehole Depth
- Rock Quality Designation (RQD - %)**
- <25
 25 - 50
 50 - 75
 >75
- ✖ Gypsum - First Observation
 Borehole Geophysics - Gamma (cps)

Identified Fractures

- (Core Logs, Caliper, Temp. or Fluid Resistivity Logs)
 Water Table - September 2016
 Equipotential Contour Line (Estimated)
 Equipotential Flow Direction (Estimated)

See Figure 15 for notes concerning the above cross-sections.

Well Screens - Projected to Section Line

-  Overburden Well
 -  Shallow Bedrock (Bedrock A)
 -  Deeper Bedrock (Bedrock B)
- Temp. Groundwater Point Screen Or Packer Interval**
-  with Trichloroethene concentration (ug/L)
- (1,026)** Calculated TCE equivalent in Lockport Dolomite (ug/L)
- *Sample collected when water table was higher.

Trichloroethene in Overburden Groundwater (ug/L)

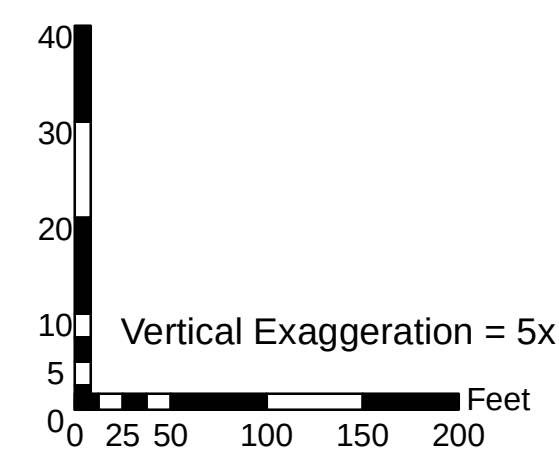
-  < 10 ug/L
 10 - 100 ug/L
 100 - 500 ug/L
 500 - 5,000 ug/L
 5,000 - 30,000 ug/L
 30,000 - 100,000 ug/L
 100,000 - 1,100,000 ug/L
 >1,100,000 ug/L (DNAPL present)

Geologic Interpretation

-  Overburden - Fill and Glacial Sediments
 Lockport Dolomite
 Top of Rock
 Bedrock Horizon I
 Bedrock Horizon II

Features

-  Building
 Sewer - Projected (Not to Scale)
 Storm Drain - Projected (Not to Scale)



FIGURE

15A

SCALE

1:1,200

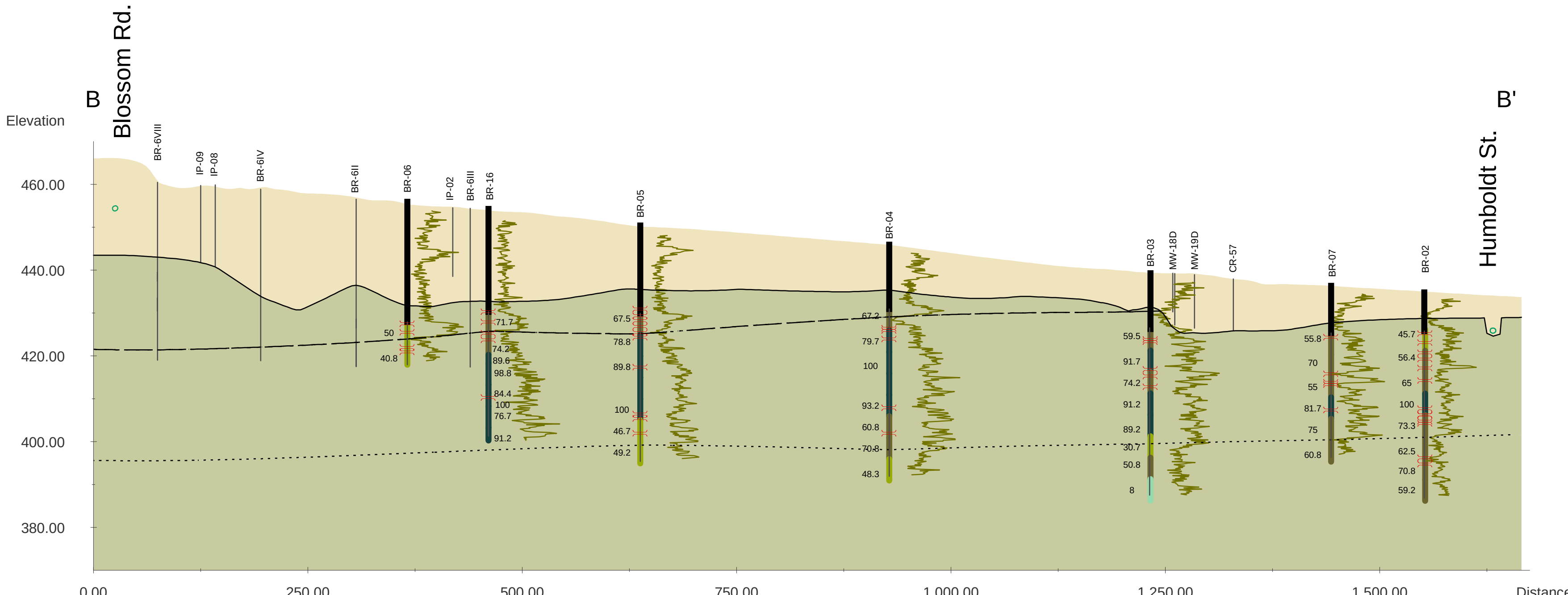
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CROSS-SECTION AA

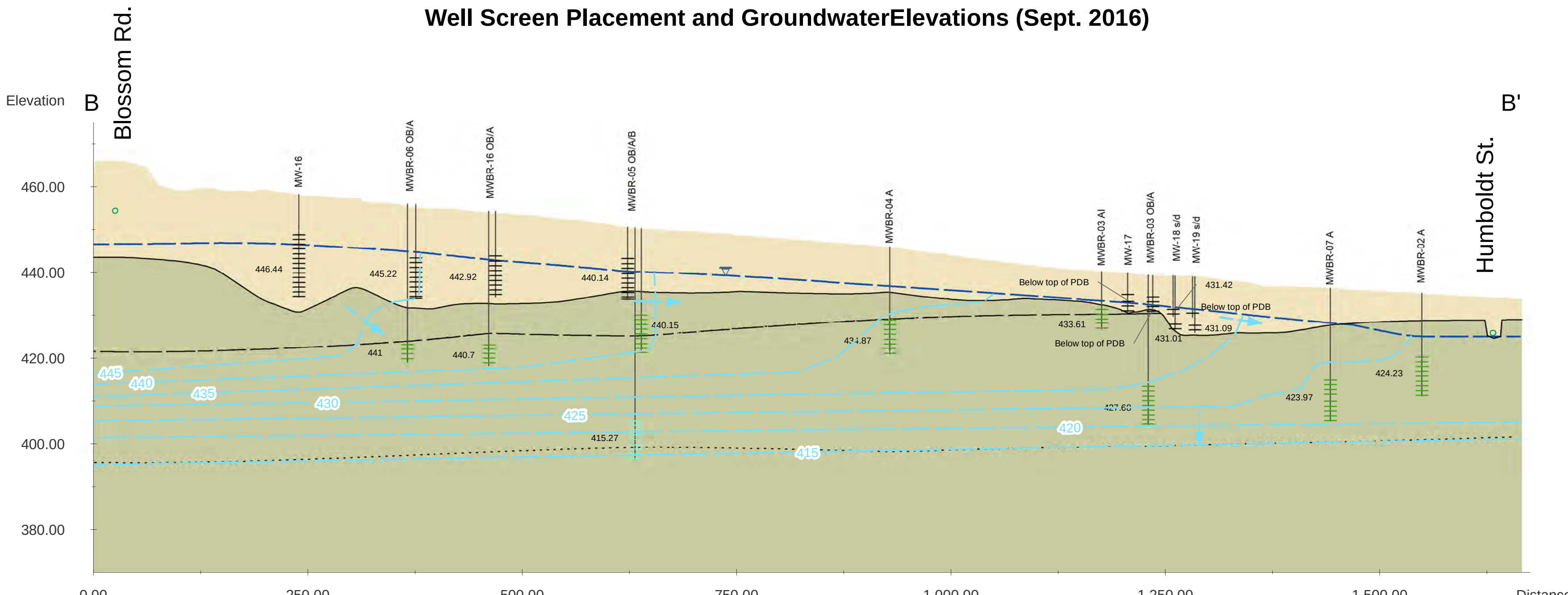
CARLSON PARK FACILITY
CARLSON ROAD
ROCHESTER, NEW YORK

$S_2 C_2 inc$

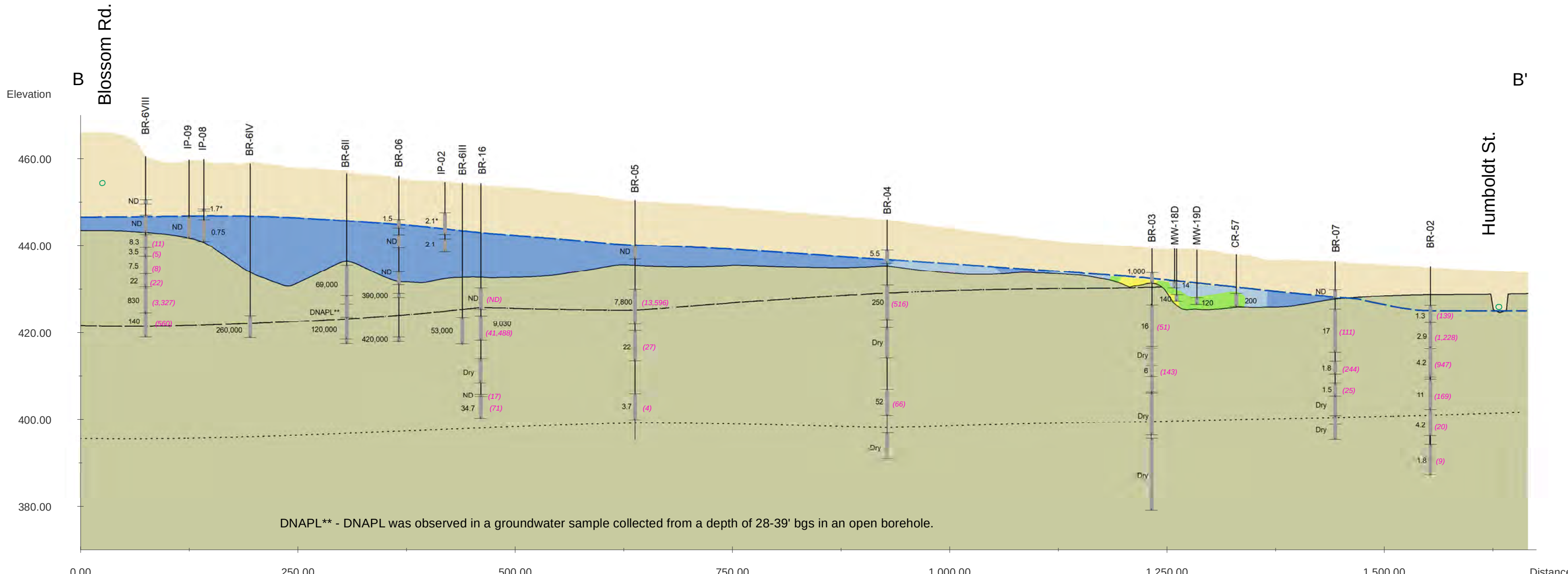
Geologic Interpretation



Well Screen Placement and Groundwater Elevations (Sept. 2016)



Trichloroethene in Overburden and Bedrock
Groundwater from Temporary Groundwater Points and Packer Test Sample Intervals



Legend



- ### Projection of Borings to Section

-  Steel Casing
 Total Borehole Depth
- Rock Quality Designation (RQD - %)**
-  <25
 25 - 50
 50 - 75
 >75
- ✱ Gypsum - First Observation
 Borehole Geophysics - Gamma (cps)
- Identified Fractures**
-  (Core Logs, Caliper, Temp. or Fluid Resistivity Logs)
 - - - Water Table - September 2016
 Equipotential Contour Line (Estimated)
 Equipotential Flow Direction (Estimated)

See Figure 15 for notes concerning the above cross-sections.

- ### Well Screens - Projected to Section Line

-  Overburden Well
 -  Shallow Bedrock (Bedrock A)
 -  Deeper Bedrock (Bedrock B)
- Temp. Groundwater Point Screen Or Packer Interval**
 with Trichloroethene concentration (ug/L)
- (1.026)** Calculated TCE equivalent in Lockport Dolomite (ug/L)
- *Sample collected when water table was higher.

- Trichloroethene in Overburden Groundwater (ug/L)**
- | | |
|---|---------------------------------|
|  | <10 ug/L |
|  | 10 - 100 ug/L |
|  | 100 - 500 ug/L |
|  | 500 - 5,000 ug/L |
|  | 5,000 - 30,000 ug/L |
|  | 30,000 - 100,000 ug/L |
|  | 100,000 - 1,100,000 ug/L |
|  | >1 100,000 ug/L (DNAPI present) |

- ## Geologic Interpretation

- Overburden - Fill and Glacial Sediments
 Lockport Dolomite
 Top of Rock
 Bedrock Horizon I
 Bedrock Horizon II

- ## Features

-  Building
 Sewer - Projected (Not to Scale)
 Storm Drain - Projected (Not to Scale)

Vertical Exaggeration = 5x

25 50 100 150 200 Feet

FIGURE

15B

SCALE

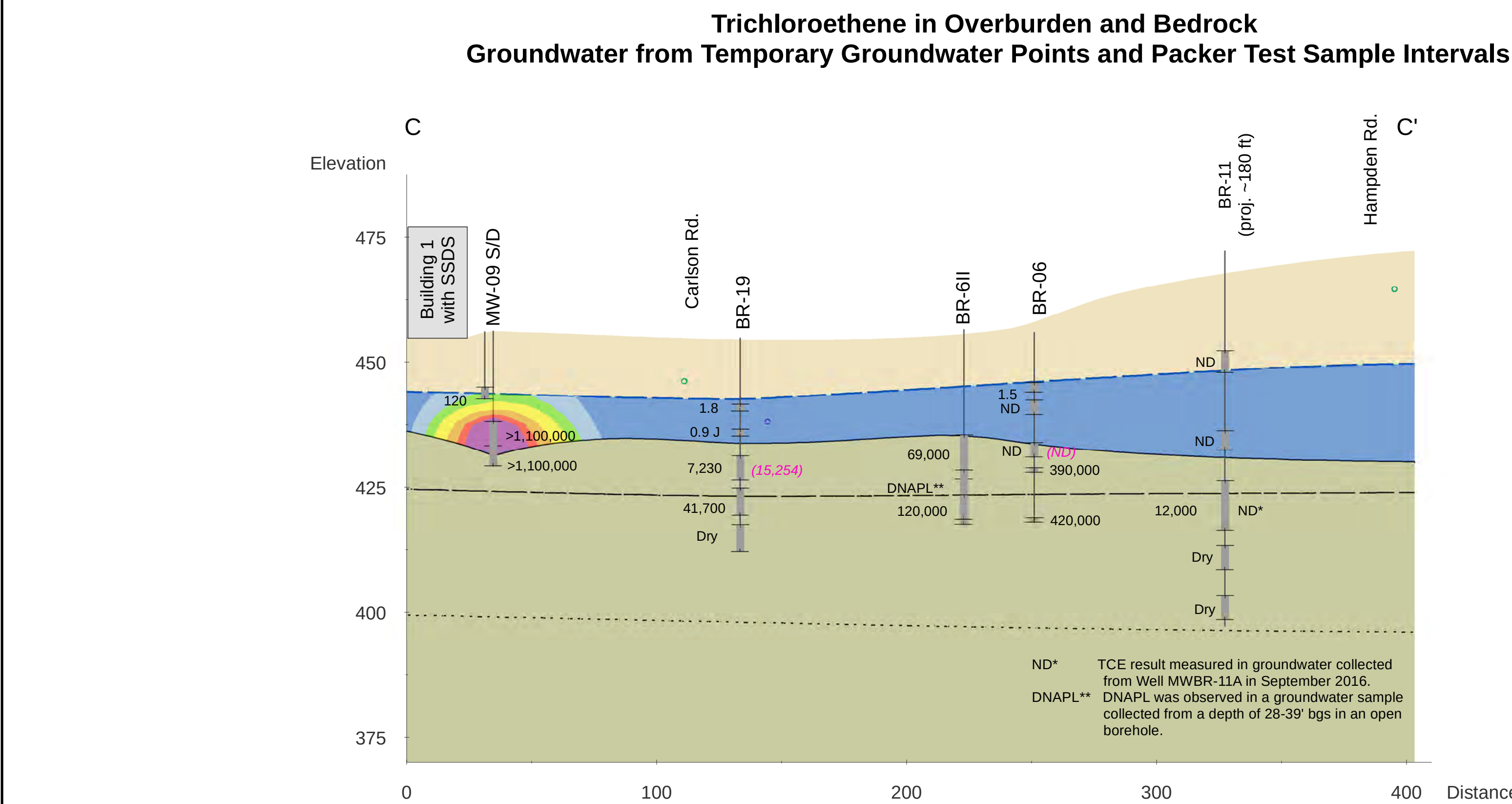
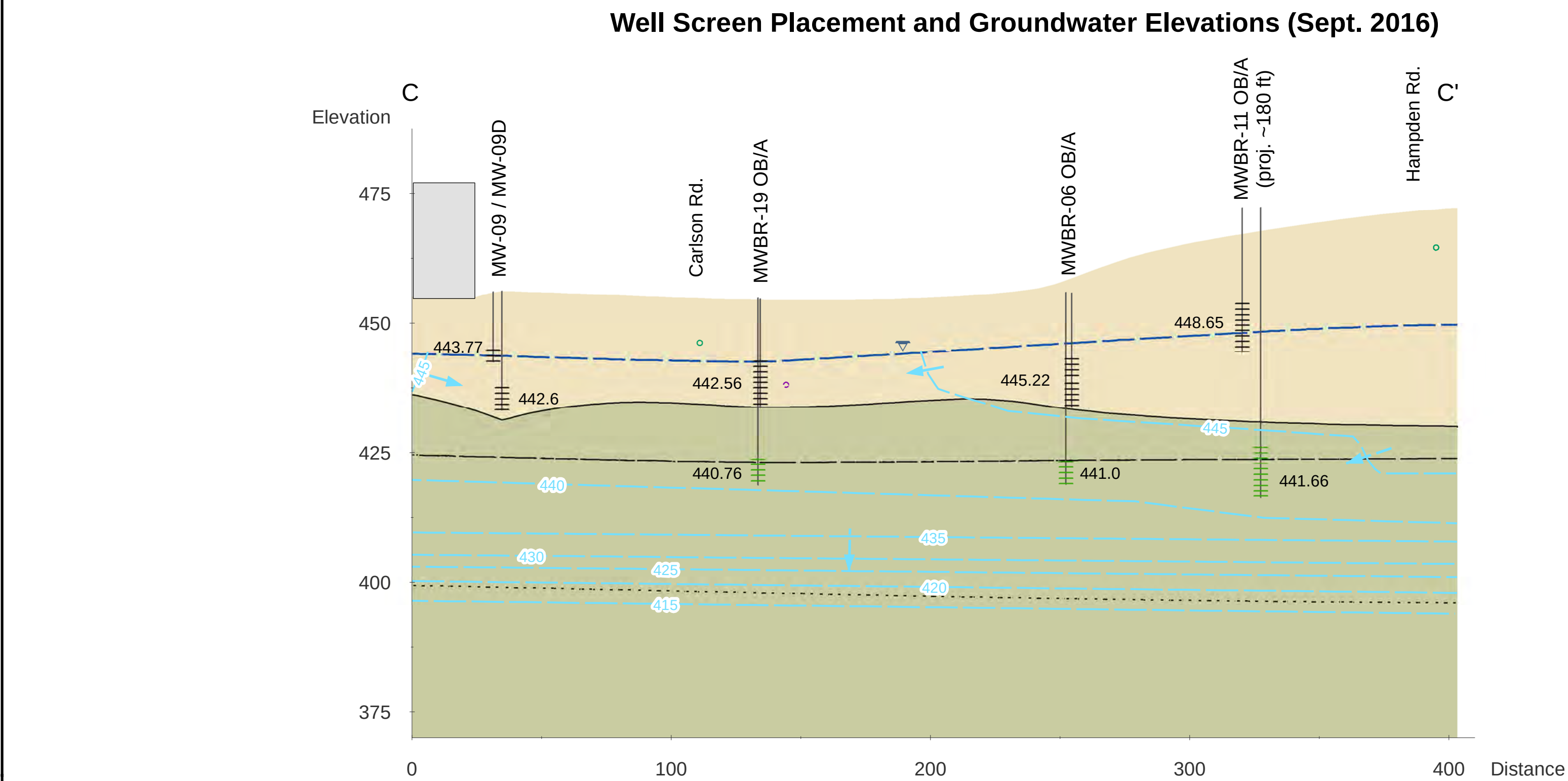
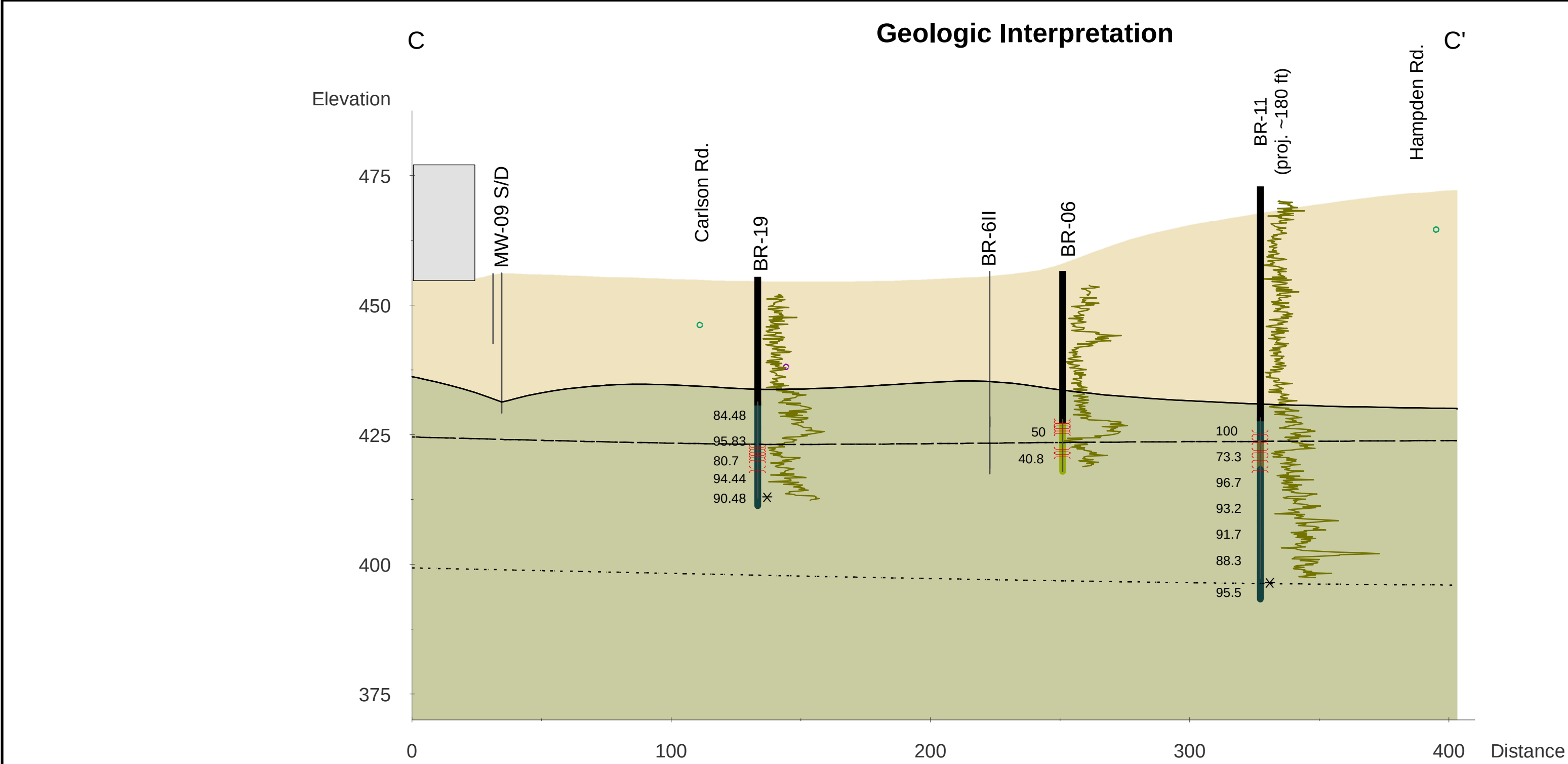
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TITLE

CROSS-SECTION BB

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ROCHESTER, NEW YORK

S₂ C₂ inc



Legend

Projection of Borings to Section

- Steel Casing
- Total Borehole Depth

Rock Quality Designation (RQD - %)

- <25
- 25 - 50
- 50 - 75
- >75

Identified Fractures

- (Core Logs, Caliper, Temp. or Fluid Resistivity Logs)

Well Screens - Projected to Section Line

- Overburden Well
- Shallow Bedrock (Bedrock A)
- Deeper Bedrock (Bedrock B)

Temp. Groundwater Point Screen Or Packer Interval

- with Trichloroethene concentration (ug/L)
- (1,026) Calculated TCE equivalent in Lockport Dolomite (ug/L)
- *Sample collected when water table was higher.

Trichloroethene in Overburden Groundwater (ug/L)

- <10 ug/L
- 10 - 100 ug/L
- 100 - 500 ug/L
- 500 - 5,000 ug/L
- 5,000 - 30,000 ug/L
- 30,000 - 100,000 ug/L
- 100,000 - 1,100,000 ug/L
- >1,100,000 ug/L (DNAPL present)

Geologic Interpretation

- Overburden - Fill and Glacial Sediments
- Lockport Dolomite
- Top of Rock
- Bedrock Horizon I
- Bedrock Horizon II

Features

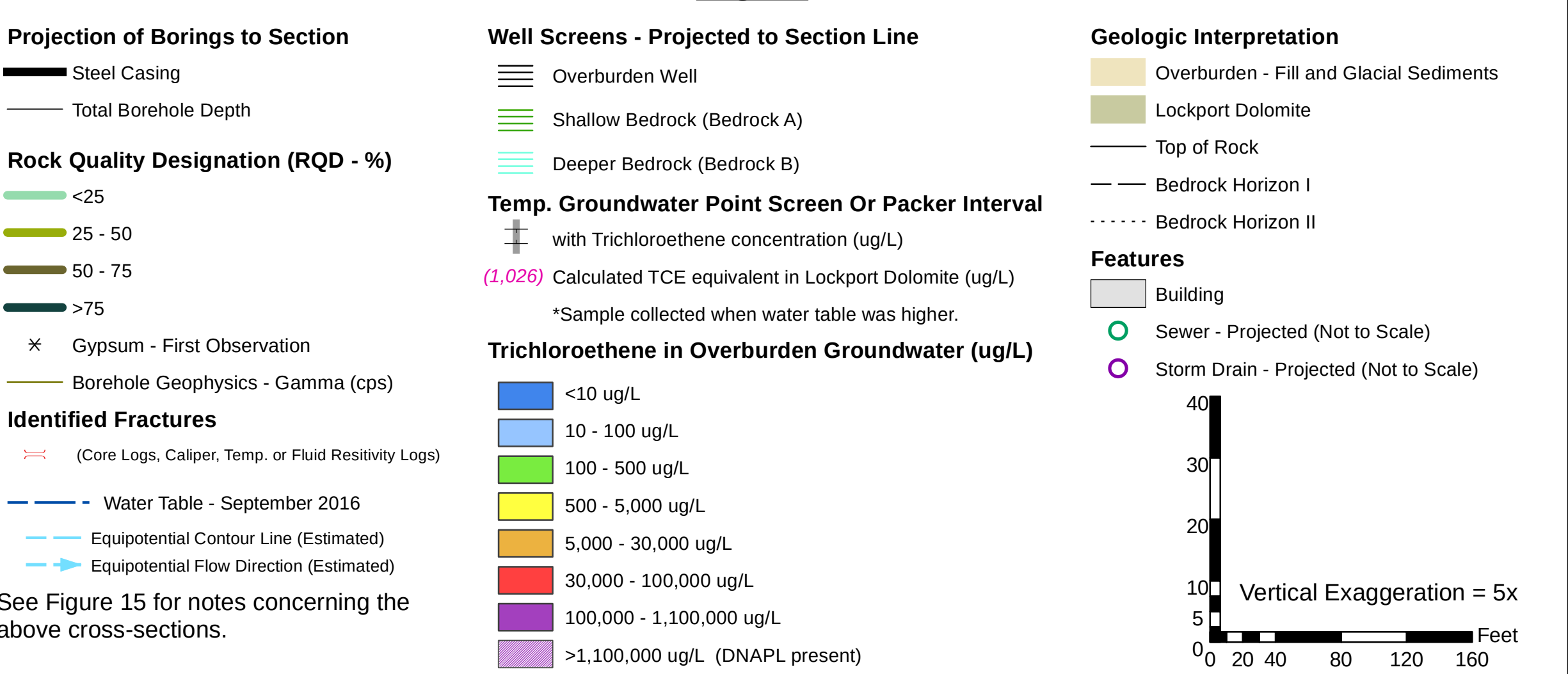
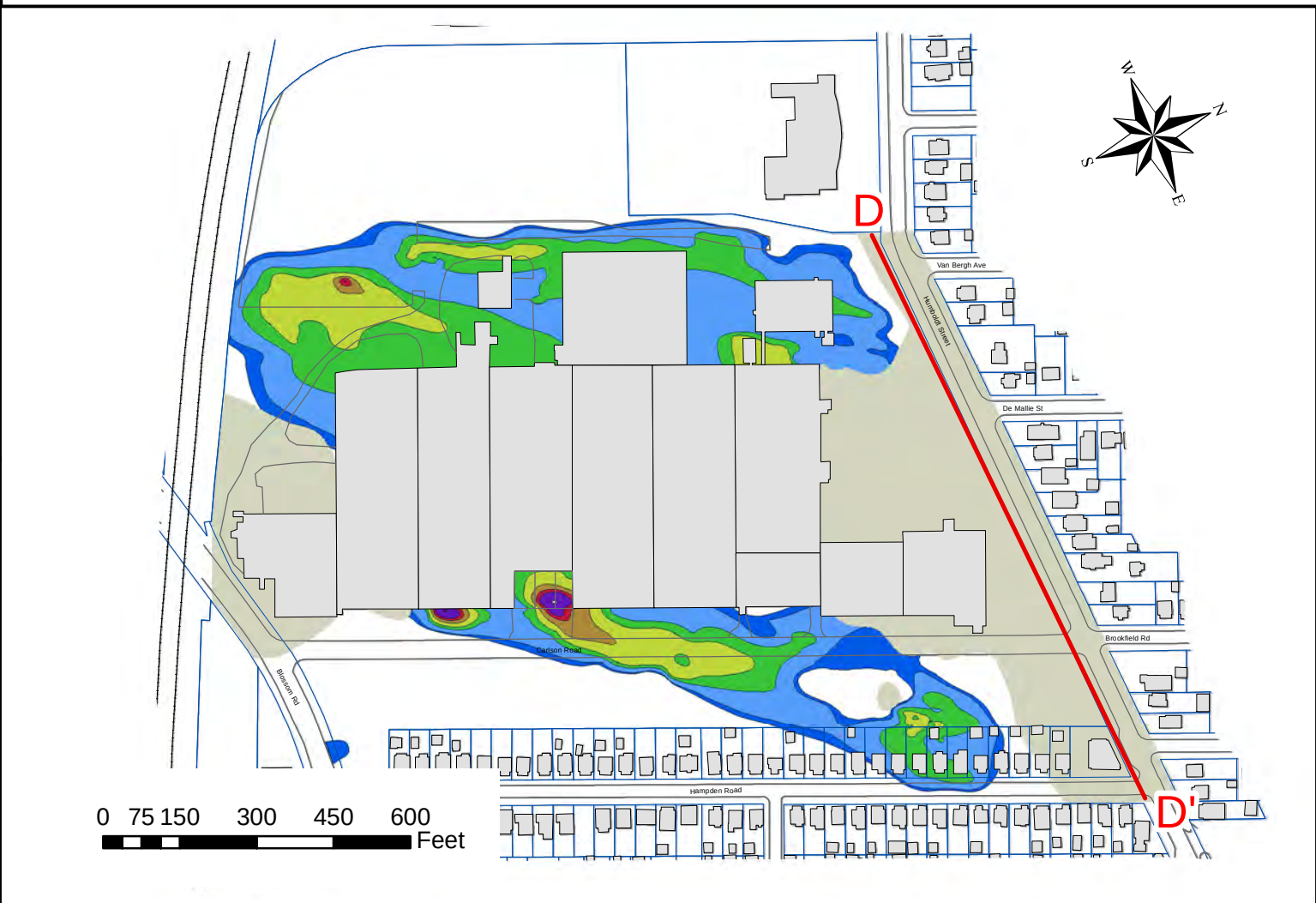
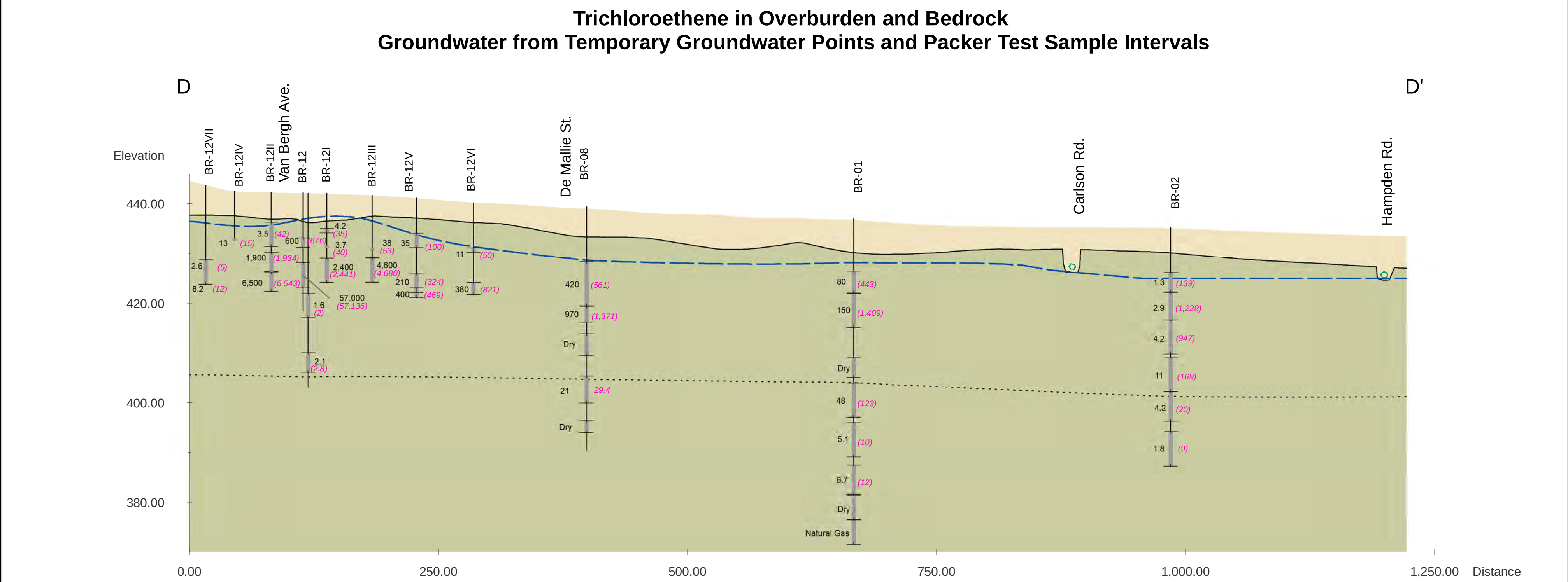
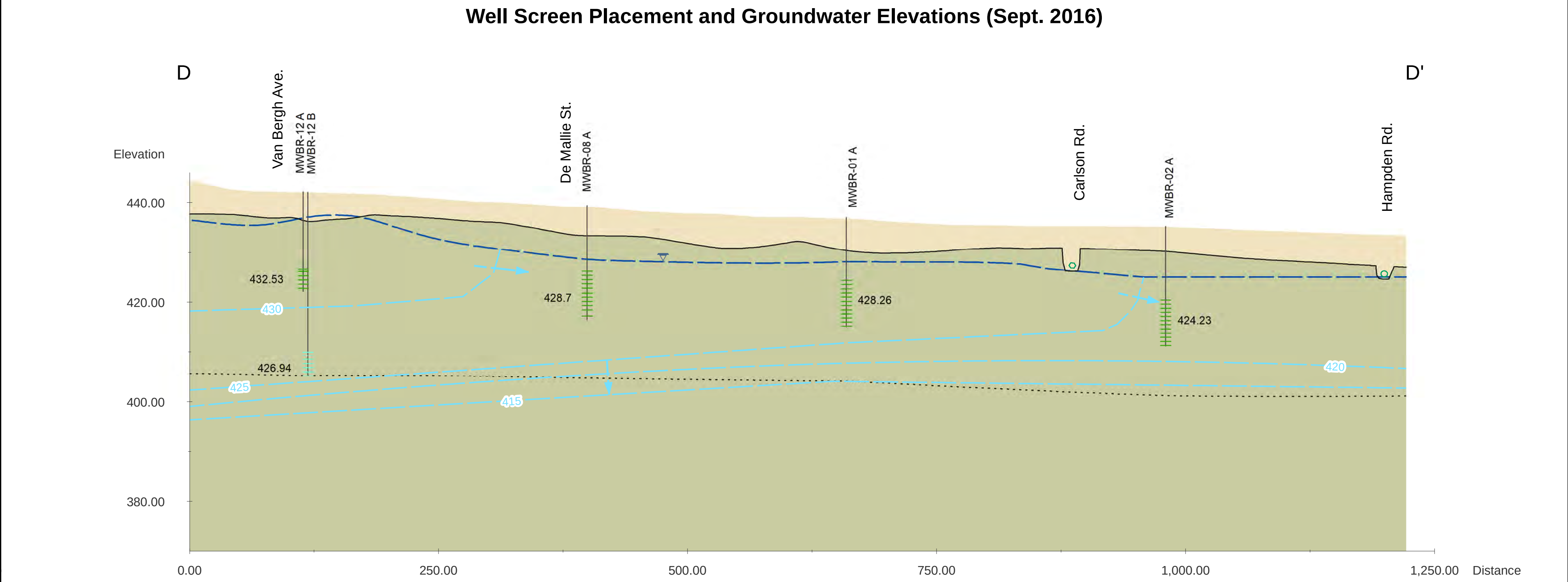
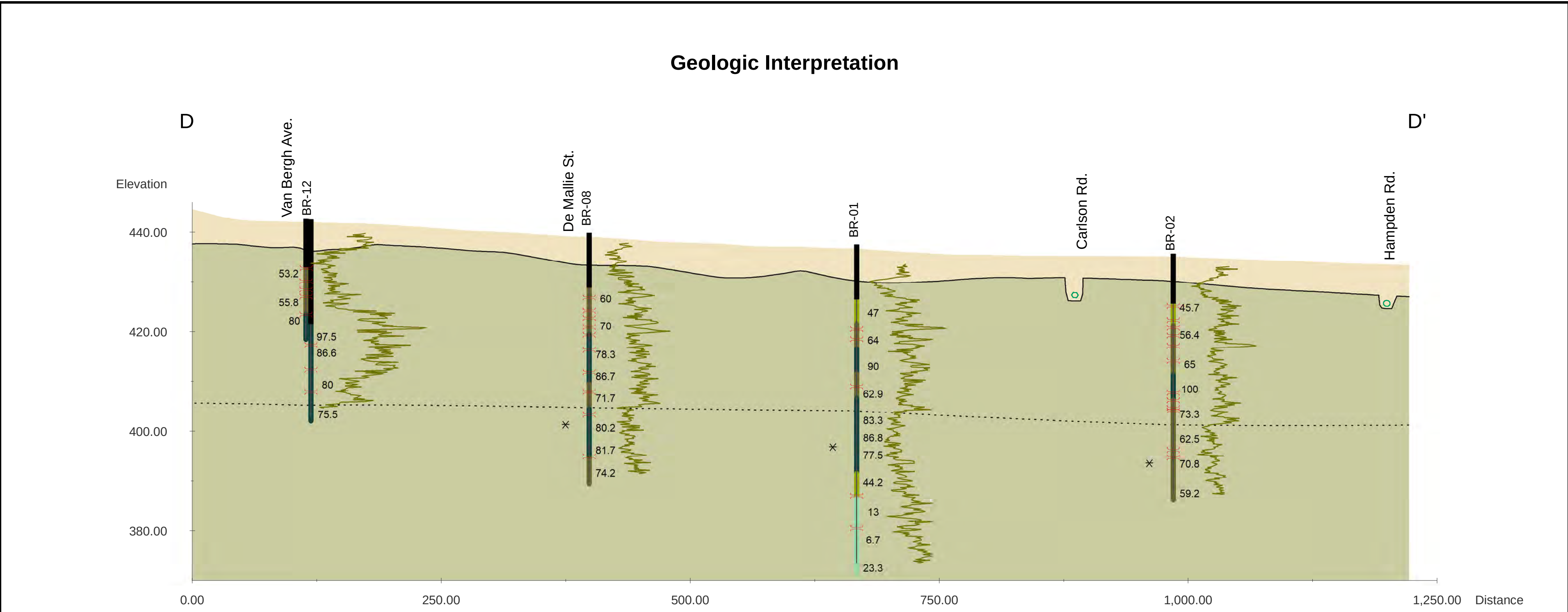
- Building
- Sewer - Projected (Not to Scale)
- Storm Drain - Projected (Not to Scale)

Scale

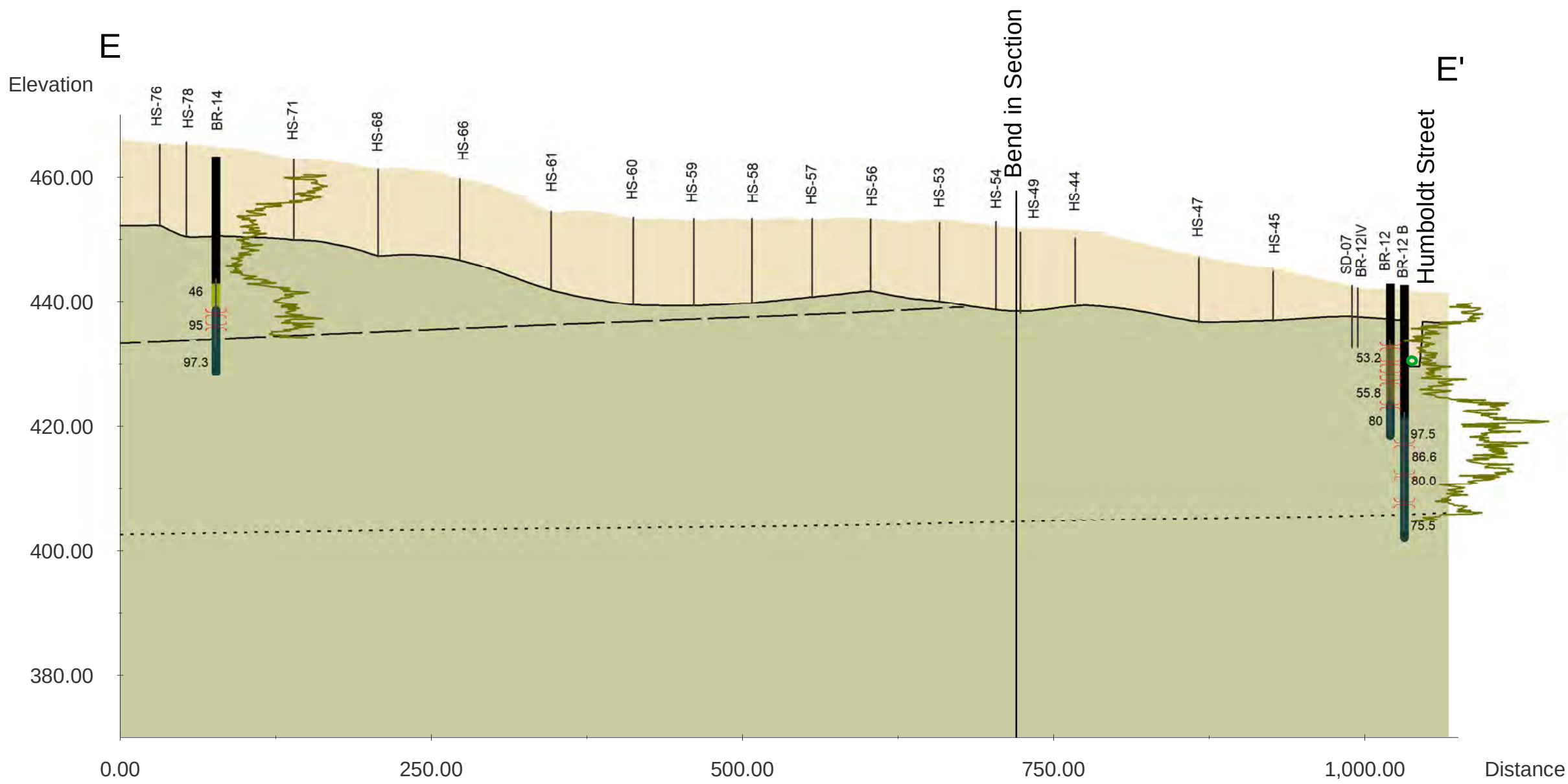
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Vertical Exaggeration = 2x

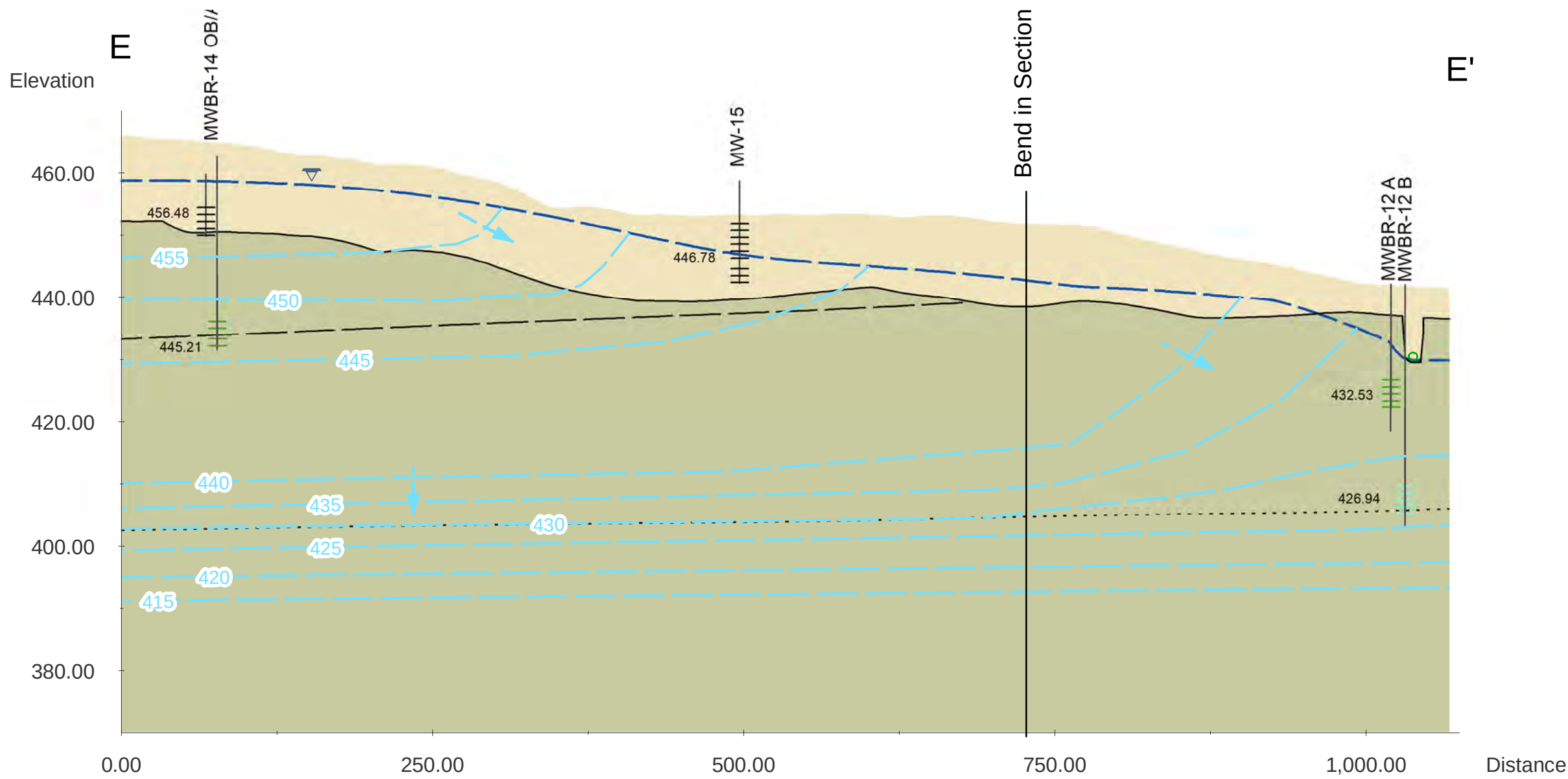
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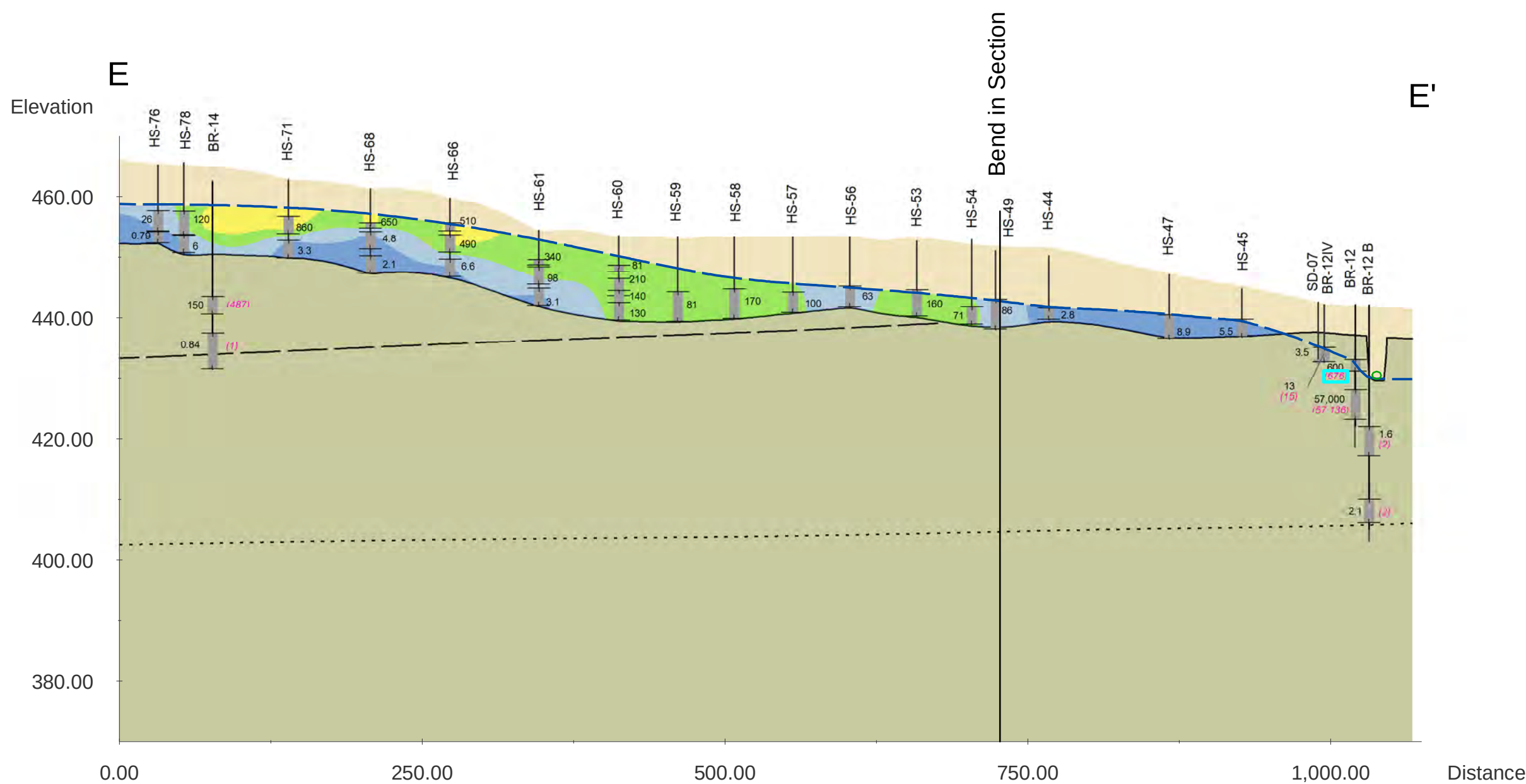
Geologic Interpretation



Well Screen Placement and Groundwater Elevations (Sept. 2016)



Trichloroethene in Overburden and Bedrock
Groundwater from Temporary Groundwater Points and Packer Test Sample Intervals



Legend

Projection of Borings to Section

- Steel Casing
- Total Borehole Depth
- Rock Quality Designation (RQD - %)
 - <25
 - 25 - 50
 - 50 - 75
 - >75
- Gypsum - First Observation
- Borehole Geophysics - Gamma (cps)
- Identified Fractures
 - (Core Logs, Caliper, Temp. or Fluid Resistivity Logs)
- Water Table - September 2016
- Equipotential Contour Line (Estimated)
- Equipotential Flow Direction (Estimated)

See Figure 15 for notes concerning the above cross-sections.

Well Screens - Projected to Section Line

- Overburden Well
- Shallow Bedrock (Bedrock A)
- Deeper Bedrock (Bedrock B)
- Temp. Groundwater Point Screen Or Packer Interval
 - with Trichloroethene concentration (ug/L)
 - (1,026) Calculated TCE equivalent in Lockport Dolomite (ug/L)
 - *Sample collected when water table was higher.

Trichloroethene in Overburden Groundwater (ug/L)

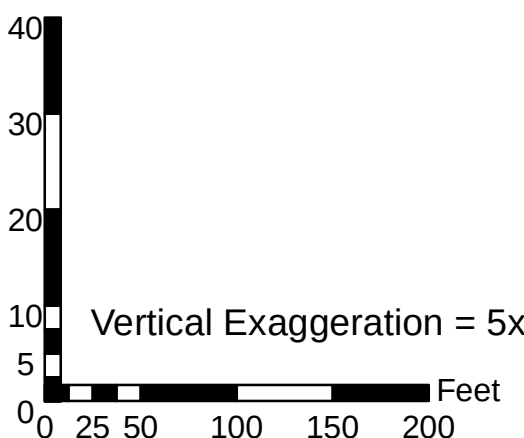
- <10 ug/L
- 10 - 100 ug/L
- 100 - 500 ug/L
- 500 - 5,000 ug/L
- 5,000 - 30,000 ug/L
- 30,000 - 100,000 ug/L
- 100,000 - 1,100,000 ug/L
- >1,100,000 ug/L (DNAPL present)

Geologic Interpretation

- Overburden - Fill and Glacial Sediments
- Lockport Dolomite
- Top of Rock
- Bedrock Horizon I
- Bedrock Horizon II

Features

- Building
- Sewer - Projected (Not to Scale)
- Storm Drain - Projected (Not to Scale)



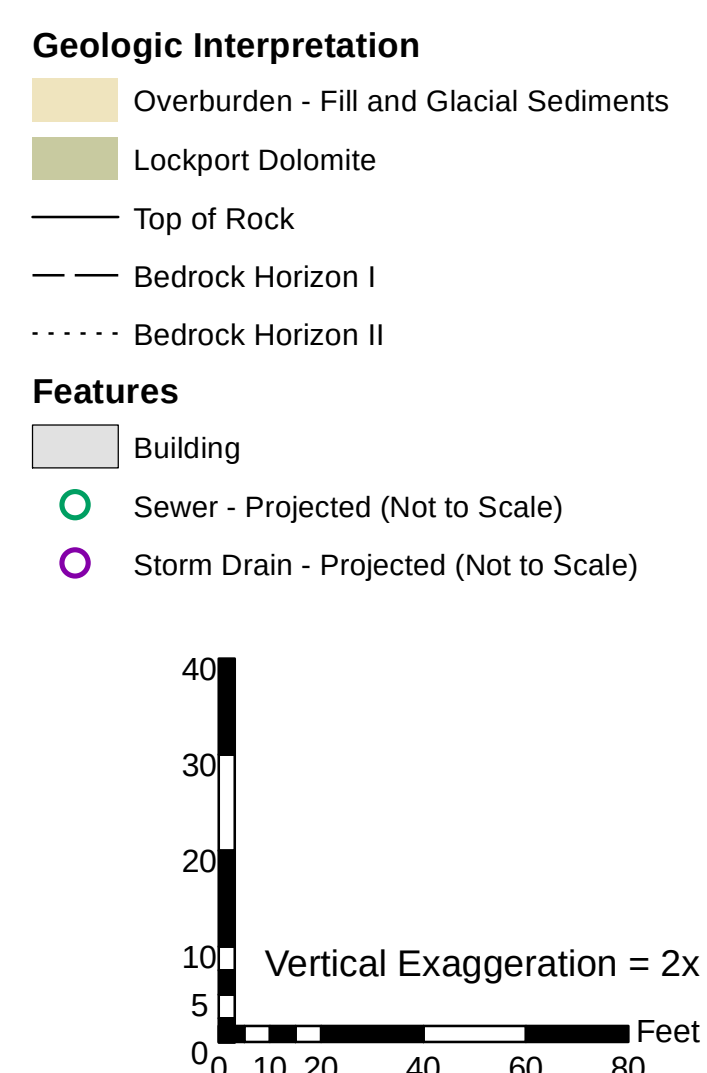
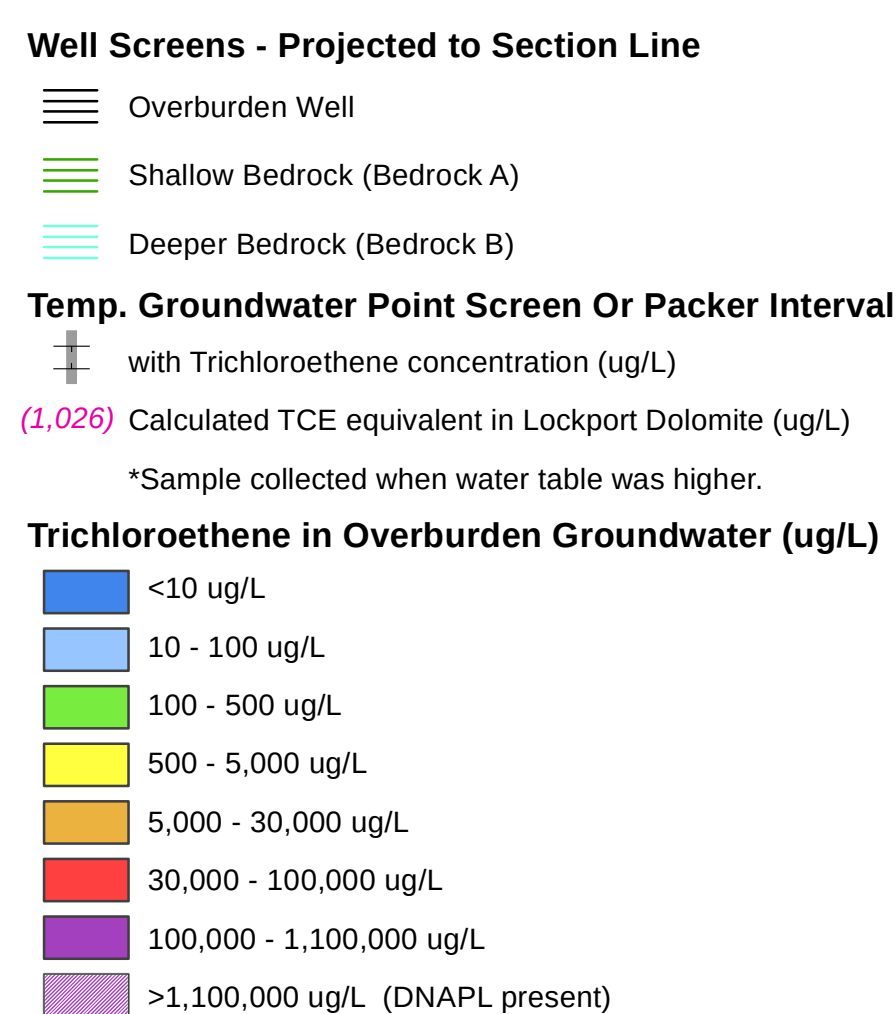
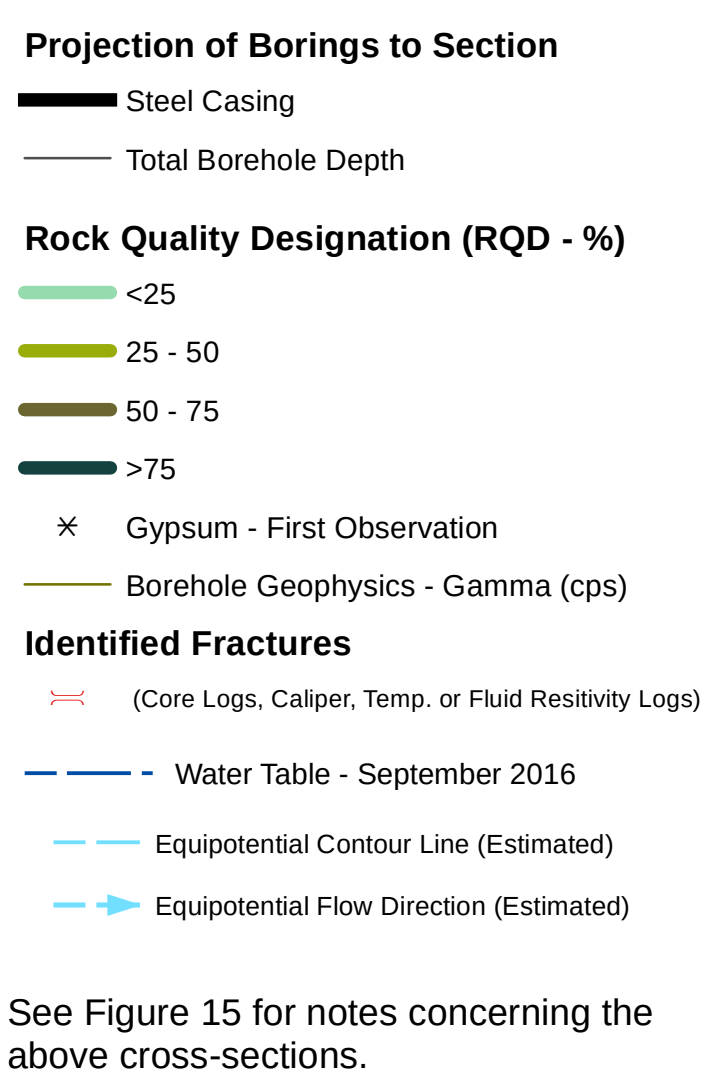
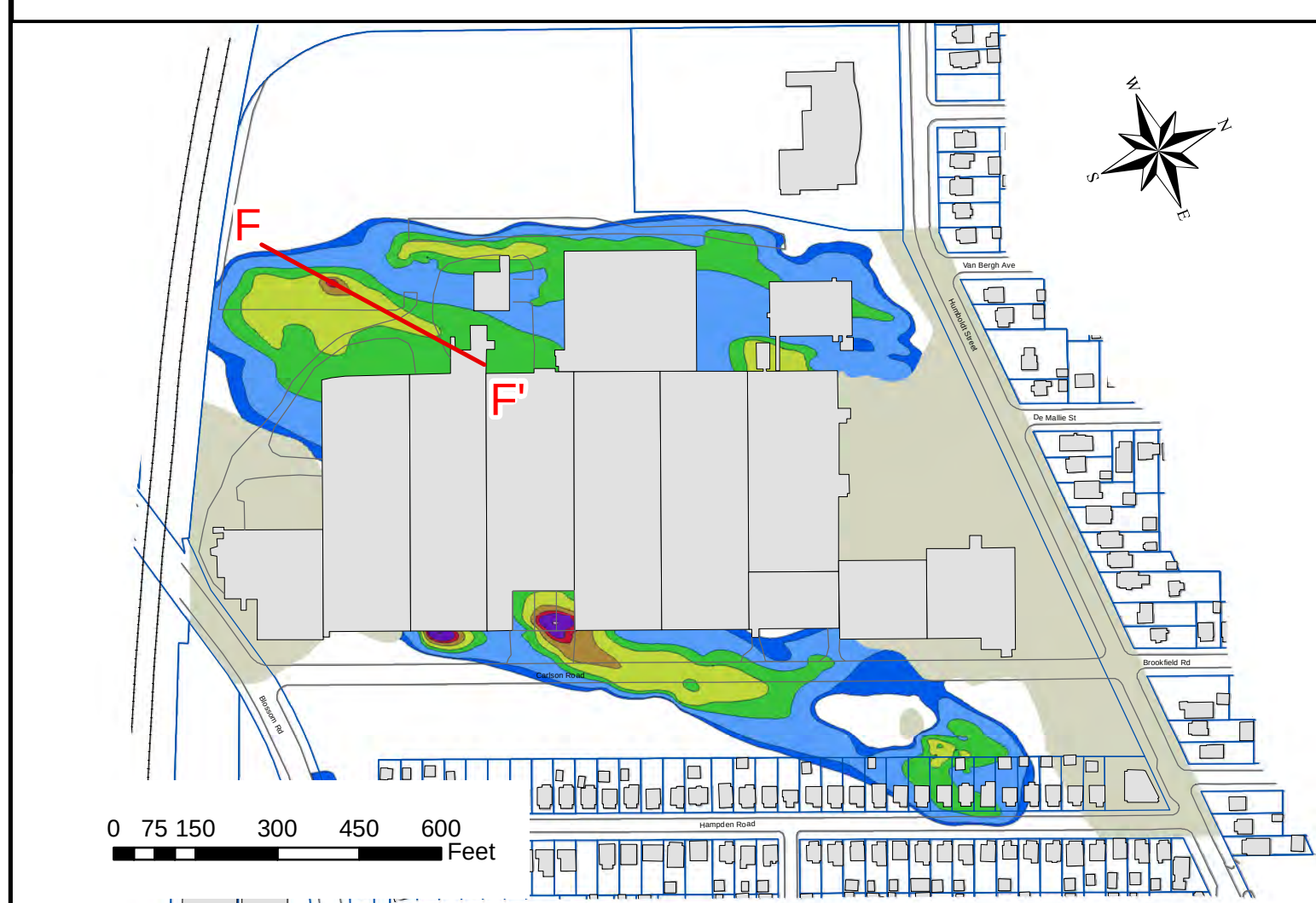
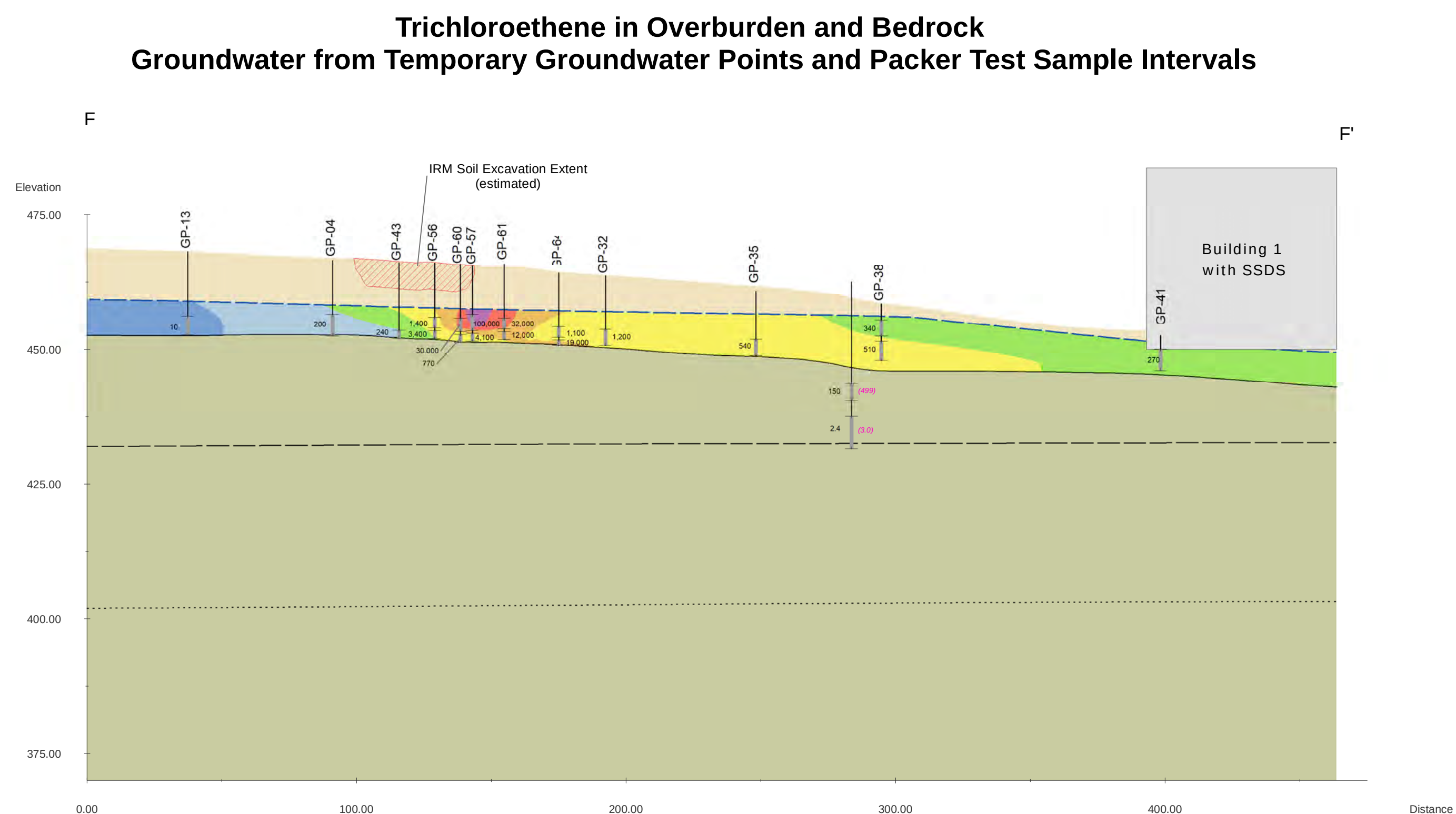
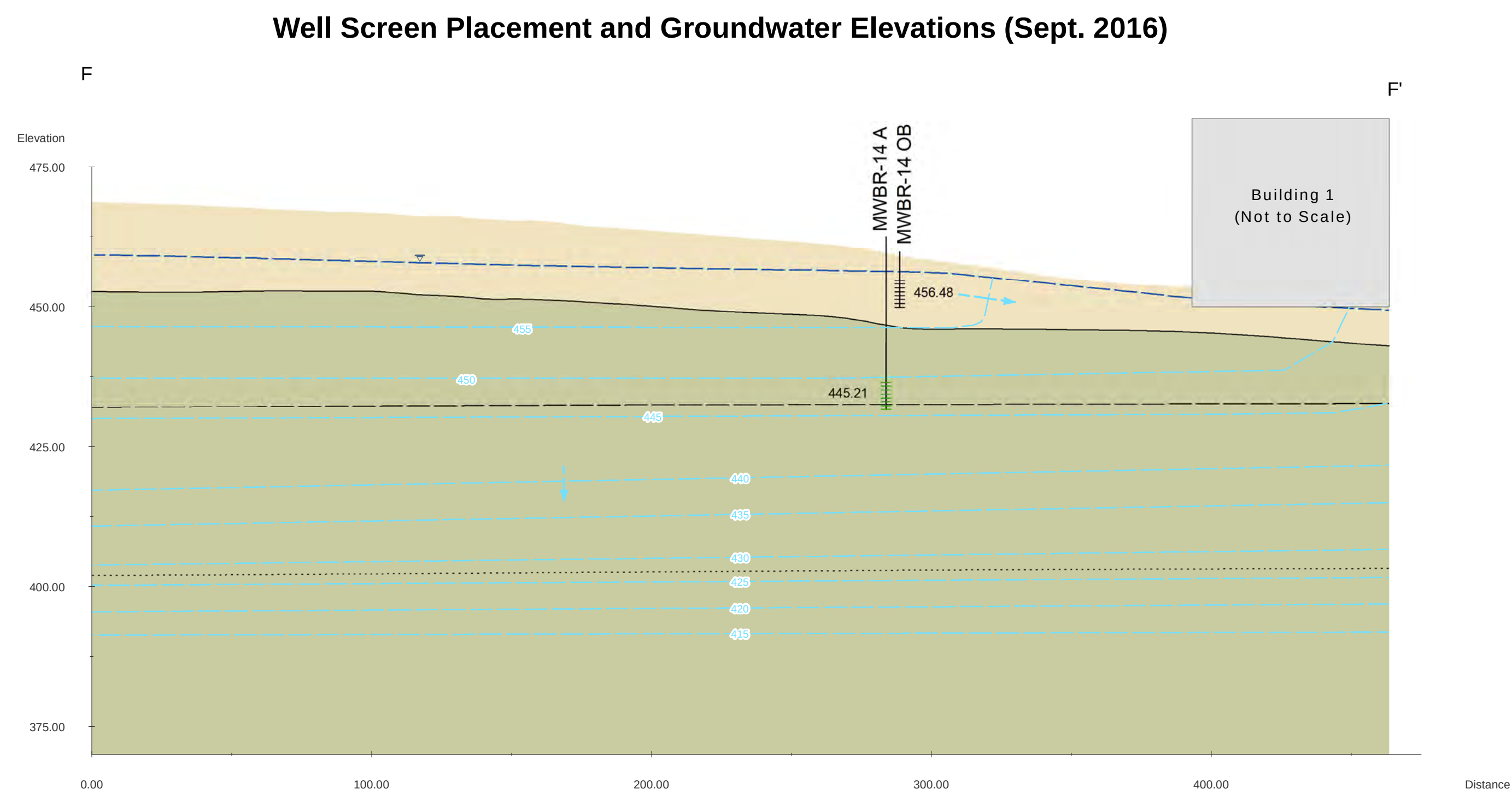
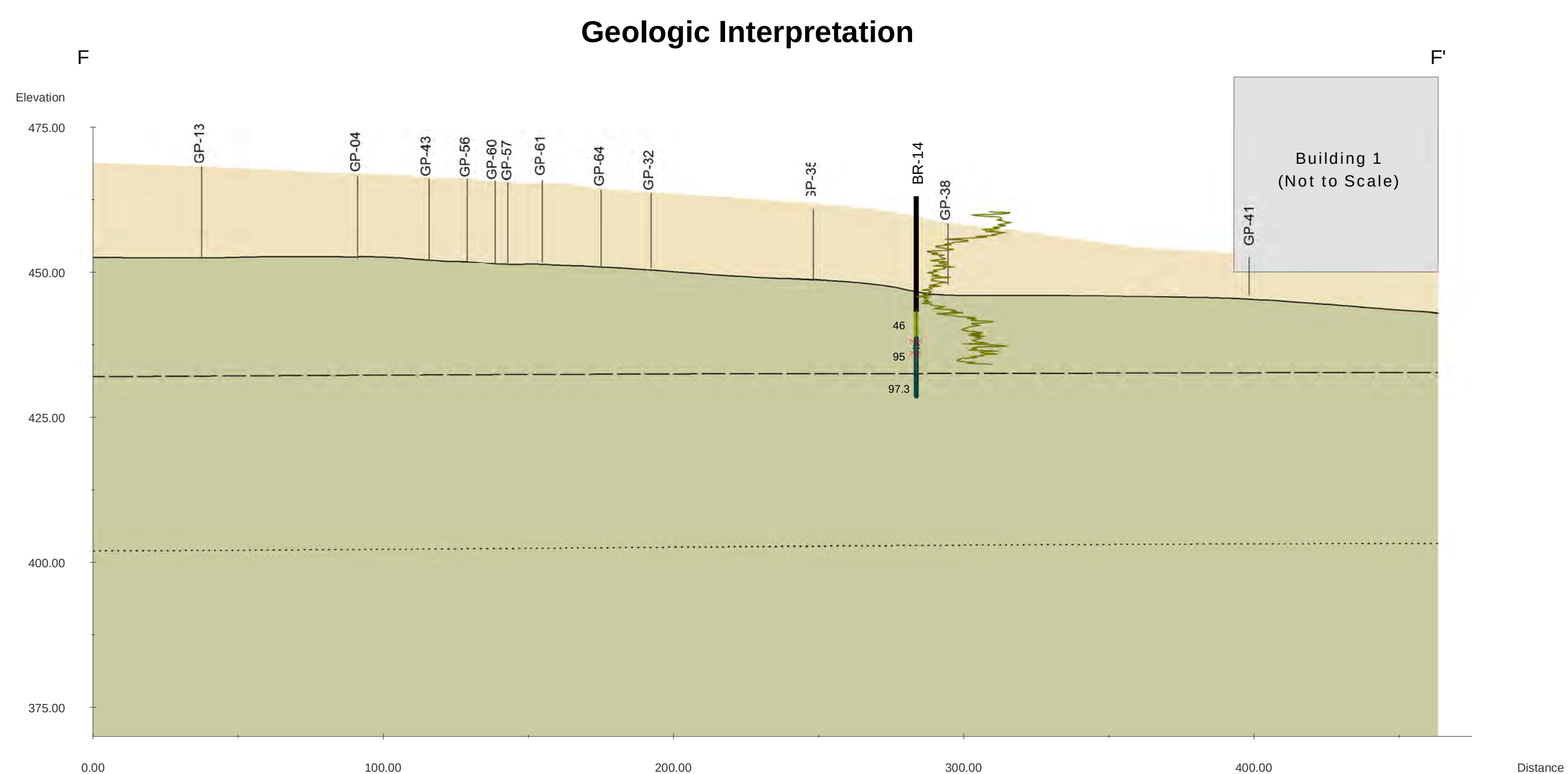


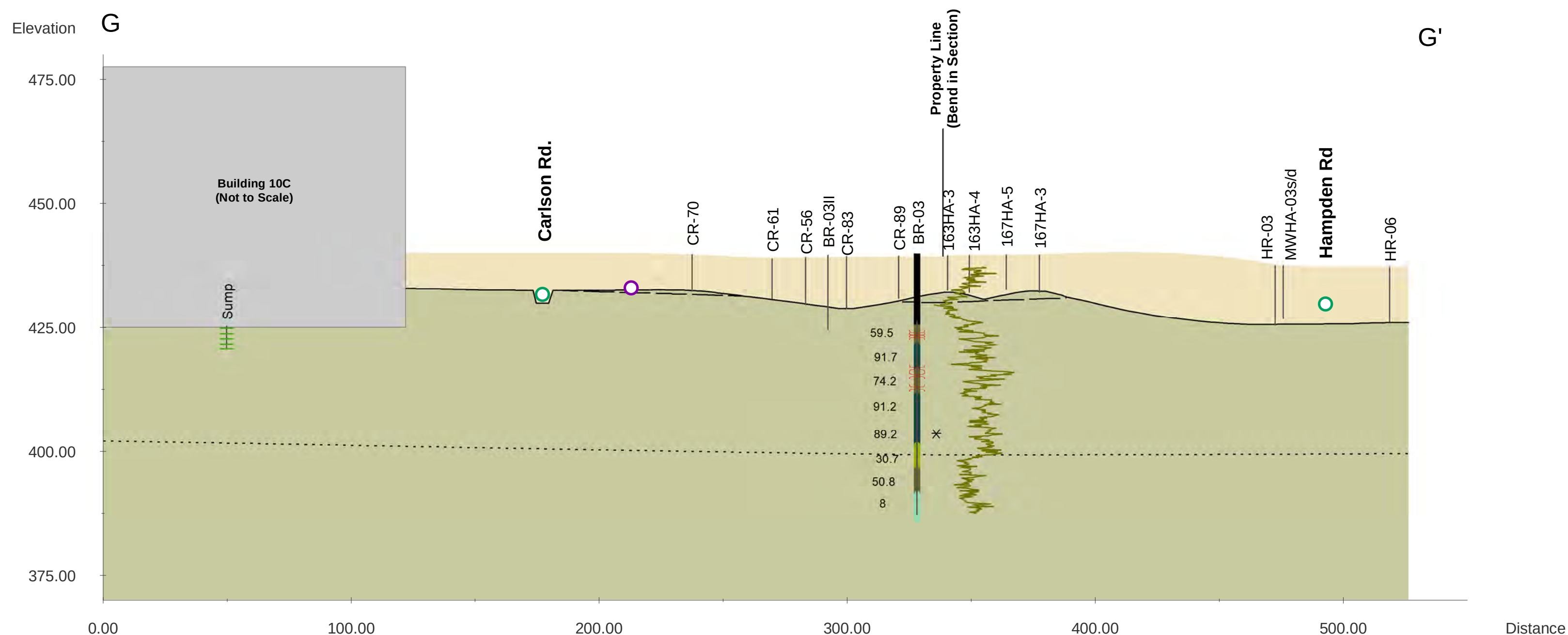
FIGURE	TITLE
15F	
SCALE	
1:1,200	

TITLE
CROSS-SECTION FF'

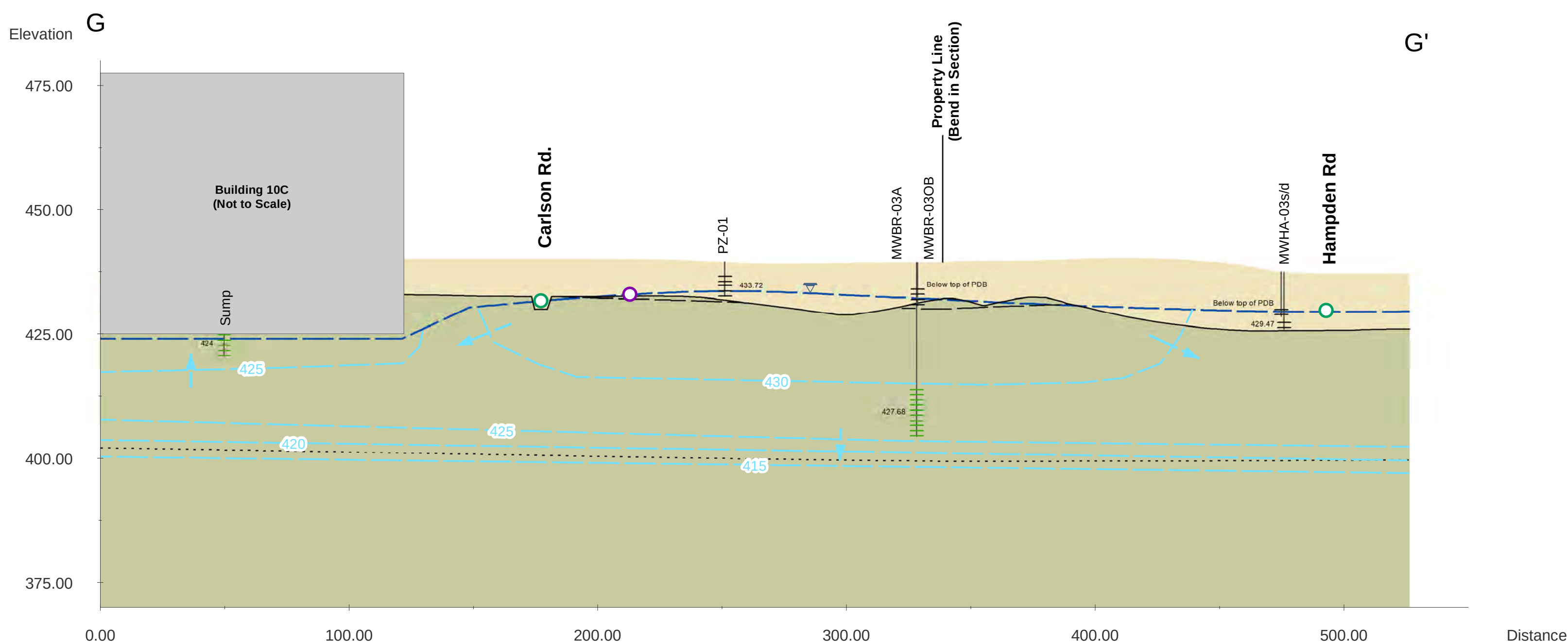
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CARLSON ROAD
ROCHESTER, NEW YORK

S₂ C₂ inc.

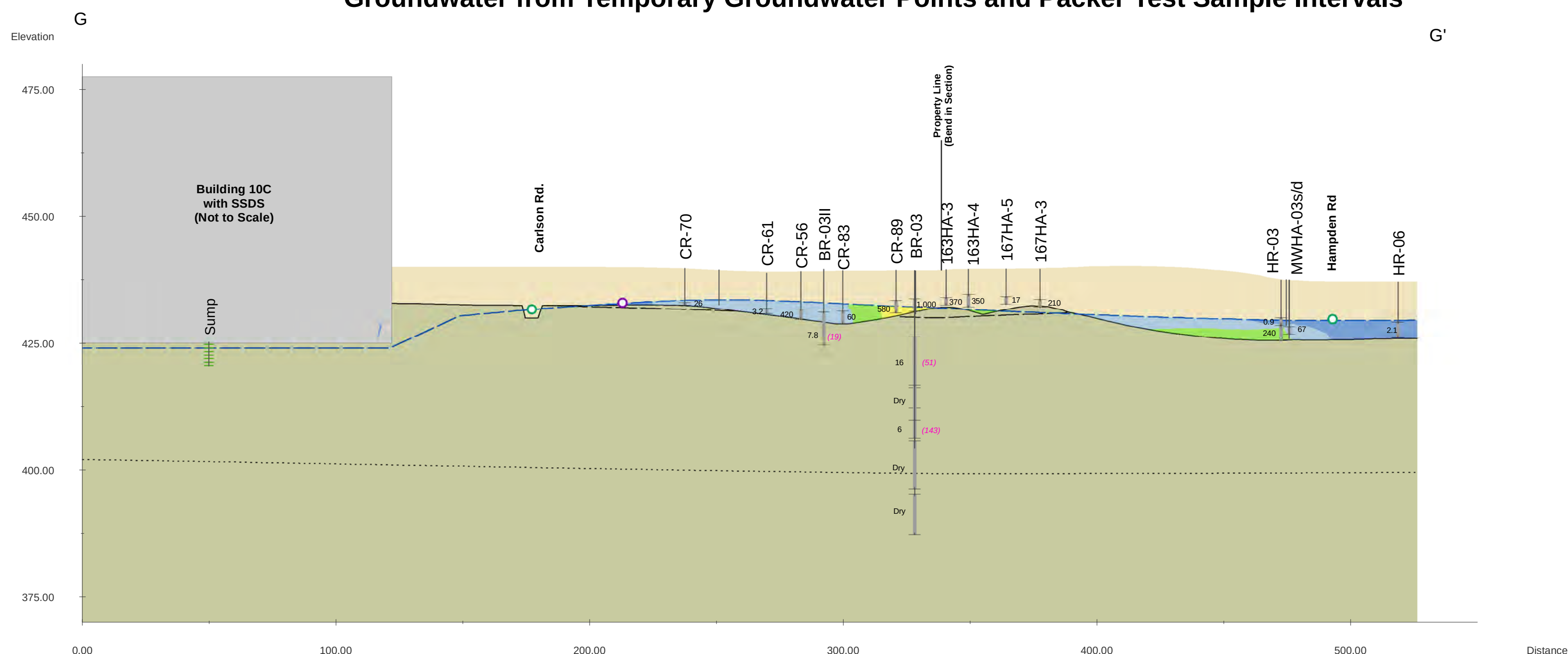
Geologic Interpretation



Well Screen Placement and Groundwater Elevations (Sept. 2016)



**Trichloroethene in Overburden and Bedrock
Groundwater from Temporary Groundwater Points and Packer Test Sample Intervals**



Legend



Projection of Borings to Section AA'

-  Steel Casing
 Total Borehole Depth
- Rock Quality Designation (RQD - %)**
 <25
 25 - 50
 50 - 75
 >75
-  Gypsum - First Observation
 Borehole Geophysics - Gamma (cps)
- Identified Fractures**
 (Core Logs, Caliper, Temp. or Fluid Resistivity Logs)
-  - Water Table - September 2016
 Equipotential Contour Line (Estimated)
 Equipotential Flow Direction (Estimated)

See Figure 15 for notes concerning the above cross-sections.

Well Screens - Projected to Section Line

-  Overburden Well
 Shallow Bedrock (Bedrock A)
 Deeper Bedrock (Bedrock B)
- Temp. Groundwater Point Screen Or Packer Interval**
-  with Trichloroethene concentration (ug/L)
 (1,026) Calculated TCE equivalent in Lockport Dolomite (ug/L)
- *Sample collected when water table was higher.

Trichloroethene in Overburden Groundwater (ug/L)

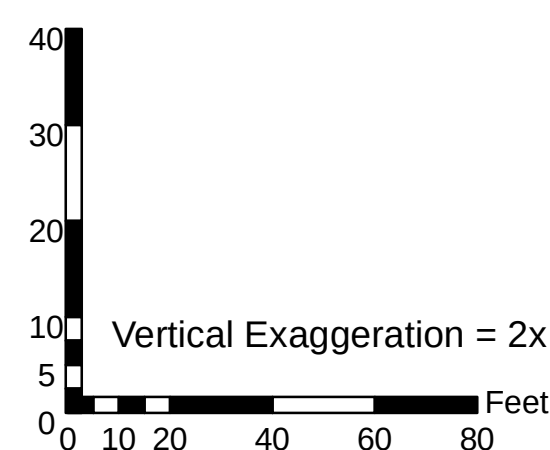
- | | |
|---|---------------------------------|
|  | <10 ug/L |
|  | 10 - 100 ug/L |
|  | 100 - 500 ug/L |
|  | 500 - 5,000 ug/L |
|  | 5,000 - 30,000 ug/L |
|  | 30,000 - 100,000 ug/L |
|  | 100,000 - 1,100,000 ug/L |
|  | >1,100,000 ug/L (DNAPL present) |

Geologic Interpretation

-  Overburden - Fill and Glacial Sediments
 Lockport Dolomite
 Top of Rock
 Bedrock Horizon I
 Bedrock Horizon II

Features

-  Building
 Sewer - Projected (Not to Scale)
 Storm Drain - Projected (Not to Scale)



FIGURE

15G

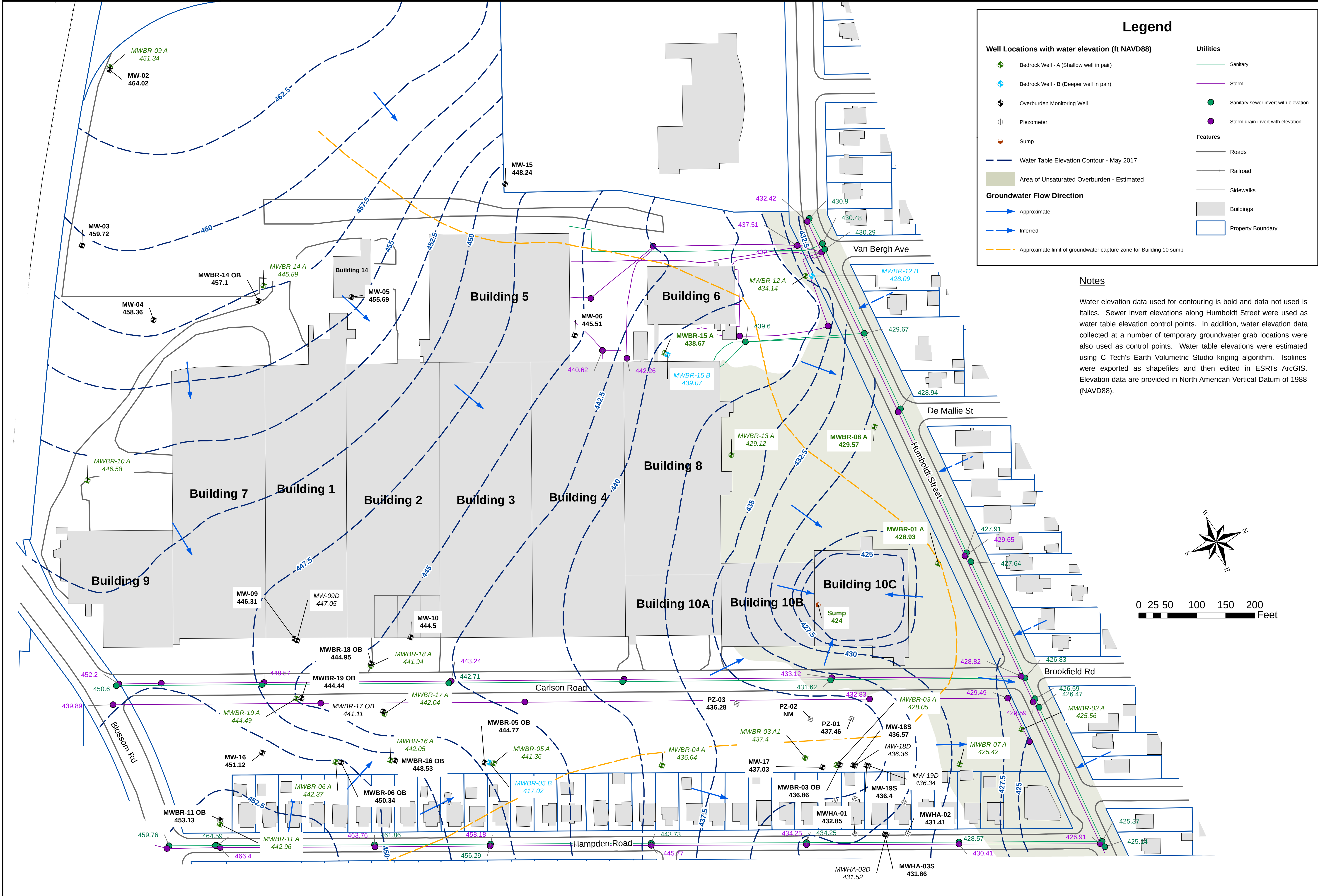
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1:450

CROSS-SECTION GG'

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CARLSON ROAD
ROCHESTER, NEW YORK

$S_2 C_2$ inc.



Well ID	MWBR-09 A	MWBR-09 A
Sample ID	BR-9A (32-33.5)	BR-9A (37-38.5)
Sample Date	9/20/2016	9/20/2016
	<NYGWQS	<NYGWQS

Well ID	MW-15
Sample ID	MW-15 (13.5-15)
Sample Date	9/19/2016
	<NYGWQS

	Well ID Sample ID Sample Date	MWBR-15 A BR-15A (11.5-13) 9/19/2016	MWBR-15 A BR-15A (8-9.5) 9/19/2016	MWBR-15 B BR-15B (44-45.5) 9/19/2016
Benzene		<NYGWQS	<NYGWQS	47
cis-1,2-Dichloroethene		540	240	<NYGWQS
Ethylbenzene		<NYGWQS	<NYGWQS	5
o-Xylene		<NYGWQS	<NYGWQS	7.3
Toluene		<NYGWQS	<NYGWQS	15
trans-1,2-Dichloroethene		28 J	15 J	<NYGWQS
Trichloroethene		2,600	730	<NYGWQS
Vinyl Chloride		28 J	12 J	<NYGWQS

Well ID	MWBR-12 A	MWBR-12 B
Sample ID	BR-12A (17-18.5)	BR-12B (34-35.5)
Sample Date	9/21/2016	9/21/2016
Benzene	<NYGWQS	3.8 J
Trichloroethene	22	<NYGWQS

Legend

Well Locations	Features
 Bedrock Well - A (Shallow well in pair)	 Roads
 Bedrock Well - B (Deeper well in pair)	 Railroad
 Overburden Monitoring Well	 Sidewalks
 Sump	 Buildings
	 Property Boundary

Chemical Name	NYS GW Standards (ug/L)
1,1,1-Trichloroethane	5
1,1-Dichloroethane	5
1,1-Dichloroethene	5
1,2-Dichloroethane	0.6
Benzene	1
Chloroform	7
cis-1,2-Dichloroethene	5
Ethylbenzene	5
Methyl-tert-Butyl Ether (MTBE)	10
o-Xylene	5
Tetrachloroethene	5
Toluene	5
trans-1,2-Dichloroethene	5
Trichloroethene	5
Vinyl Chloride	2

Notes:

All concentrations are in ug/L.

Sample ID includes well name and sample depth (e.g. (16-17.5)) of passive diffusion bag (PDB). For wells where field duplicate samples were collected, the highest value between the sample and duplicate is reported.

At locations where samples were collected in both 2016 and 2017 the sample date will be labeled as 2016/2017 and results from the two sampling events are separated by a forward slash.

Well ID Sample ID Sample Date	MWBR-18 OB BR-180B (12.5-14) 9/21/2016	MWBR-18 OB BR-180B (17.5-19) 9/21/2016	MWBR-18 A BR-18A (29.30-5) 9/23/2016
1,1-Dichloroethene	<NGWQS	<NGWQS	16
1,2-Dichloroethane	12	11	2.1 J
cis-1,2-Dichloroethene	<NGWQS	<NGWQS	6,500
trans-1,2-Dichloroethene	<NGWQS	<NGWQS	69
Trichloroethene	12	11	140
Vinyl Chloride	<NGWQS	<NGWQS	370 J

Well ID	MW-9D	MW-9D
Sample ID	MW-9D (18.5-20)	MW-9D (21.5-23)
Sample Date	9/23/2016	9/23/2016
1,1-Dichloroethene	410	640 J
cis-1,2-Dichloroethene	87,000	93,000
Ethylbenzene	12 J	<NYGWQS
o-Xylene	12 J	<NYGWQS
Tetrachloroethene	79 J	140 J
Toluene	69 J	140 J
trans-1,2-Dichloroethene	3,200	3,000
Trichloroethene	150,000	390,000
Vinyl Chloride	62 J	<NYGWQS

Well ID	MWBR-19 OB	MWBR-19 A
Sample ID	BR-19OB (13-14.5) & 18-19.5	BR-19A (33-34.5)
Sample Date	9/23/2016	9/23/2016
1,1-Dichloroethene	<NYGWQS	39 J
cis-1,2-Dichloroethene	<NYGWQS	15,000
trans-1,2-Dichloroethene	<NYGWQS	170 J
Trichloroethene	<NYGWQS	10,000
Vinyl Chloride	<NYGWQS	350

Well ID	MWBR-17 OB	MWBR-17 A
Sample ID	MWBR-17 OB (13.5-15)	BR-17A (31.5-33)
Sample Date	5/3/2017	9/23/2016
1,1-Dichloroethane	<NGWQS	8.1 J
1,1-Dichloroethene		90 J
cis-1,2-Dichloroethene	<NGWQS	59.000
Toluene		21.000
trans-1,2-Dichloroethene	<NGWQS	380
Trichloroethene	<NGWQS	3,400
Vinyl Chloride	<NGWQS	1,300

Well ID	MW-16	MW-16
Sample ID	MW-16 (16-17.5)	MW-16 (21-22.5)
Sample Date	9/21/2016	9/21/2016
Chloroform	13	13

Well ID	MWBR-11 OB	MWBR-11 A	MWBR-11 A
Sample ID	BR-11OB (24.5-26)	BR-11A (48-49.5)	BR-11A (53-54.5)
Sample Date	9/20/2016	9/20/2016	9/20/2016
	<NYGWQS	<NYGWQS	<NYGWQS

Well ID	MWB-14 OB	MWB-14 A
Sample ID	BR-14OB (6-9.5)	BR-14A (28-29.5)
Sample Date	9/19/2016	9/19/2016
1,1,1-Trichloroethane	7.0 J	<NYGWQS
1,1-Dichloroethane	7.9 J	<NYGWQS
cis-1,2-Dichloroethene	220	<NYGWQS
Trichloroethene	340	<NYGWQS

Well ID	MWBR-10 A	MWBR-10 A
Sample ID	BR-10A (26-27.5)	BR-10A (31-32.5)
Sample Date	9/19/2016	9/19/2016
	<NYGWQS	<NYGWQS

Well ID	MW-17
Sample ID	MW-17 (7-8.5)
Sample Date	5/3/2017
cis-1,2-Dichloroethene	410
Trichloroethene	45

	Well ID	MWBR-03 A1
	Sample ID	BR-3A1 (10.5-12)
	Sample Date	9/21/2016
	cis-1,2-Dichloroethene	2.100
	trans-1,2-Dichloroethene	20 J
	Trichloroethene	170

Well ID	MWBR-08 A	MWBR-08 A
Sample ID	BR-8A (15-16.5)	BR-8A (20-21.5)
Sample Date	9/20/2016	9/20/2016
1,1-Dichloroethene	<NYGWQS	18
cis-1,2-Dichloroethene	710	5,600
trans-1,2-Dichloroethene	11 J	47
Trichloroethene	80	400
Vinyl Chloride	32	160

Well ID	MWBR-13 A	MWBR-13 A
Sample ID	BR-13A (20-21.5)	BR-13A (25-26.5)
Sample Date	9/19/2016	9/19/2016
1,1-Dichloroethane	5.8 J	6.3 J
cis-1,2-Dichloroethene	3,000	3,700
trans-1,2-Dichloroethene	79 J	100 J
Vinyl Chloride	1,100	1,300

Well ID	MWBR-01 A	MWBR-01 A
Sample ID	BR-1A (14-15.5)	BR-1A (19-20.5)
Sample Date	9/20/2016	9/20/2016
1,1-Dichloroethene	16 J	15 J
cis-1,2-Dichloroethene	3,700	4,000
trans-1,2-Dichloroethene	55 J	61 J
Trichloroethene	460	980
Vinyl Chloride	250	210

Well ID Sample ID Sample Date	MWBR-02 A BR-2A (16-7.5) 9/20/2016	MWBR-02 A BR-2A (21-22.5) 9/20/2016
cis-1,2-Dichloroethene	690	680
trans-1,2-Dichloroethene	8.8 J	9.1 J
Vinyl Chloride	220	220

Well ID	MW-18s	MW-18d
Sample ID	MW-18S (7.5-9)	MW-18D (10.5-12)
Sample Date	2016/2017	2016/2017
cis-1,2-Dichloroethene	7.8/<NYGWQS	140/54
Trichloroethene	14/<NYGWQS	140/94

Well ID	MW-19s	MW-19d
Sample ID	MW-19s (8-9.5)	MW-19D (11-12.5)
Sample Date	2016/2017	2016/2017
cis-1,2-Dichloroethene	Dryl <NYGWQS	54/40
Trichloroethene	Dryl <NYGWQS	120/62

Well ID	MWBR-07 A	MWBR-07 A
Sample ID	BR-7A (23-24.5)	BR-7A (28-29.5)
Sample Date	9/20/2016	9/20/2016
cis-1,2-Dichloroethene	2,600	350
trans-1,2-Dichloroethene	69 J	15
Trichloroethene	9.8 J	<NYGWQS
Vinyl Chloride	870	450

Well ID	MWHA-02
Sample ID	HA-2 (8-9.5)
Sample Date	2016/2017
cis-1,2-Dichloroethene	7.6/7
Trichloroethene	7.6/7.1

Well ID	MWHA-03s	MWHA-03d
Sample ID	MWHA-3s (7-9)	HA-3d (9.25-10.75)
Sample Date	2016/2017	2016/2017
cis-1,2-Dichloroethene	Dry/<NYGWQS	24/22
Trichloroethene	Dry/53	67/81

	Well ID	MWBR-06 OB	MWBR-06 A	MWBR-06 A
	Sample ID	BR-06OB (14-15.5) & (18-19.5)	BR-6A (32.5-34)	BR-6A (35.5-37)
	Sample Date	9/23/2016	9/23/2016	9/23/2016
1,1-Dichloroethene		<NYGWQS	33 J	88 J
cis-1,2-Dichloroethene		<NYGWQS	29,000	100,000
Ethylbenzene		<NYGWQS	5.0 J	35 J
o-Xylene		<NYGWQS	5.3 J	45 J
Tetrachloroethene		<NYGWQS	<NYGWQS	41 J
Toluene		<NYGWQS	14 J	120 J
trans-1,2-Dichloroethene		<NYGWQS	220	930
Trichloroethene		<NYGWQS	14,000	81,000
Vinyl Chloride		<NYGWQS	450	570

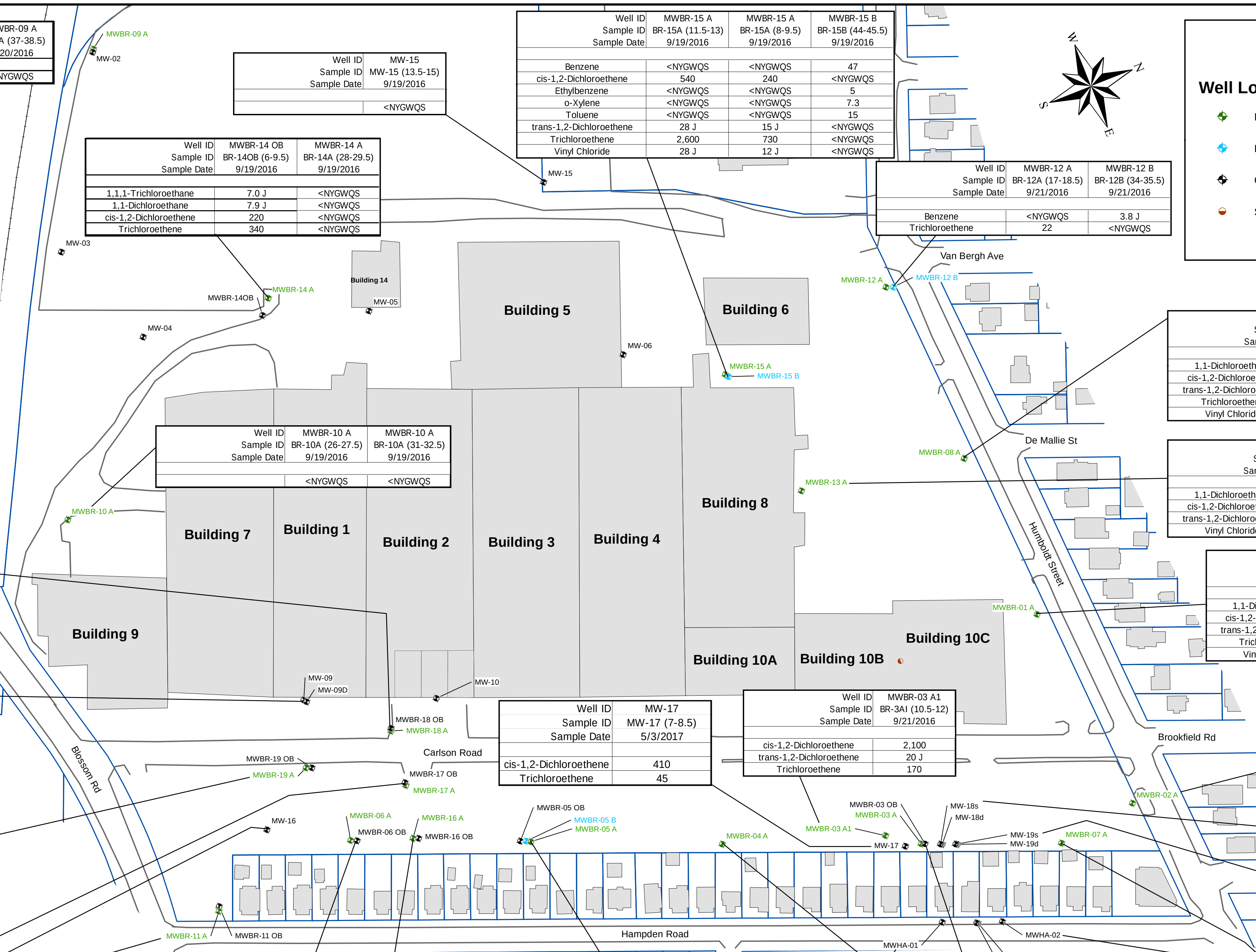
Well ID Sample ID Sample Date	MWBR-05 OB BR-50B (15.5-17) 9/20/2016	MWBR-05 A BR-5A (26.5-28) 9/20/2016	MWBR-05 B BR-5B (46.47-5) 9/20/2016	MWBR-05 B BR-5B (50-51.5) 9/20/2016
Benzene	<NGWQS	<NGWQS	1.1 J	56
cis-1,2-Dichloroethene	<NGWQS	<NGWQS	1.5	<NGWQS
Methyl-tert-Butyl Ether (MTBE)	31	31	<NGWQS	<NGWQS
Toluene	<NGWQS	<NGWQS	<NGWQS	27
Vinyl Chloride	<NGWQS	<NGWQS	6.6	<NGWQS

Well ID	MWBR-03 OB	MWBR-03 A	MWBR-03 B
Sample ID	MWBR-03 OB (7-8.5)	BR-3A (27-28.5)	BR-3A (32-33.5)
Sample Date	2016/2017	9/20/2016	9/20/2016
cis-1,2-Dichloroethene	Dryl<NYGWQS	1,400	1,300
trans-1,2-Dichloroethene	Dryl<NYGWQS	46 J	44 J
Trichloroethene	Dryl15	<NYGWQS	<NYGWQS
Vinyl Chloride	Dryl<NYGWQS	930	940

Well ID	MWHA-01
Sample ID	HA-1 (10-11.5)
Sample Date	2016/2017
cis-1,2-Dichloroethene	29/22
Trichloroethene	31/26

	Well ID	MWBR-04 A	MWBR-04 A
	Sample ID	BR-4A (18.5-20)	BR-4A (22.5-24)
	Sample Date	9/20/2016	9/20/2016
cis-1,2-Dichloroethene		460	1,200
trans-1,2-Dichloroethene		5.4 J	12 J
Trichloroethene		44	110

Well ID	MWBR-16 OB	MW-BR-16 OB	MWBR-16 A
Sample ID	BR-16OB (12-13.5)	BR-16OB (17-18.5)	BR-16A (33-34.5)
Sample Date	9/23/2016	9/23/2016	9/22/2016
cis-1,2-Dichloroethene	<NYGWQS	<NYGWQS	2,100
trans-1,2-Dichloroethene	<NYGWQS	<NYGWQS	15
Trichloroethene	<NYGWQS	<NYGWQS	960
Vinyl Chloride	<NYGWQS	<NYGWQS	33



0 50 100 200 300 400 Feet

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CARLSON PARK FACILITY
CARLSON ROAD
ROCHESTER, NEW YORK

EXCEEDENCES OF NEW YORK
GROUNDWATER QUALITY STANDARDS
SEPTEMBER 2016 AND MAY 2017 SAMPLING EVENTS

TITLE	DATE	TIME	LOCATION	STATUS
1. [Illegible]	10/10/2023	14:30	Room 101	Completed
2. [Illegible]	10/11/2023	10:00	Room 102	In Progress
3. [Illegible]	10/12/2023	09:00	Room 103	Not Started
4. [Illegible]	10/13/2023	11:00	Room 104	Completed
5. [Illegible]	10/14/2023	13:00	Room 105	In Progress
6. [Illegible]	10/15/2023	15:00	Room 106	Not Started
7. [Illegible]	10/16/2023	16:00	Room 107	Completed
8. [Illegible]	10/17/2023	17:00	Room 108	In Progress
9. [Illegible]	10/18/2023	18:00	Room 109	Not Started
10. [Illegible]	10/19/2023	19:00	Room 110	Completed

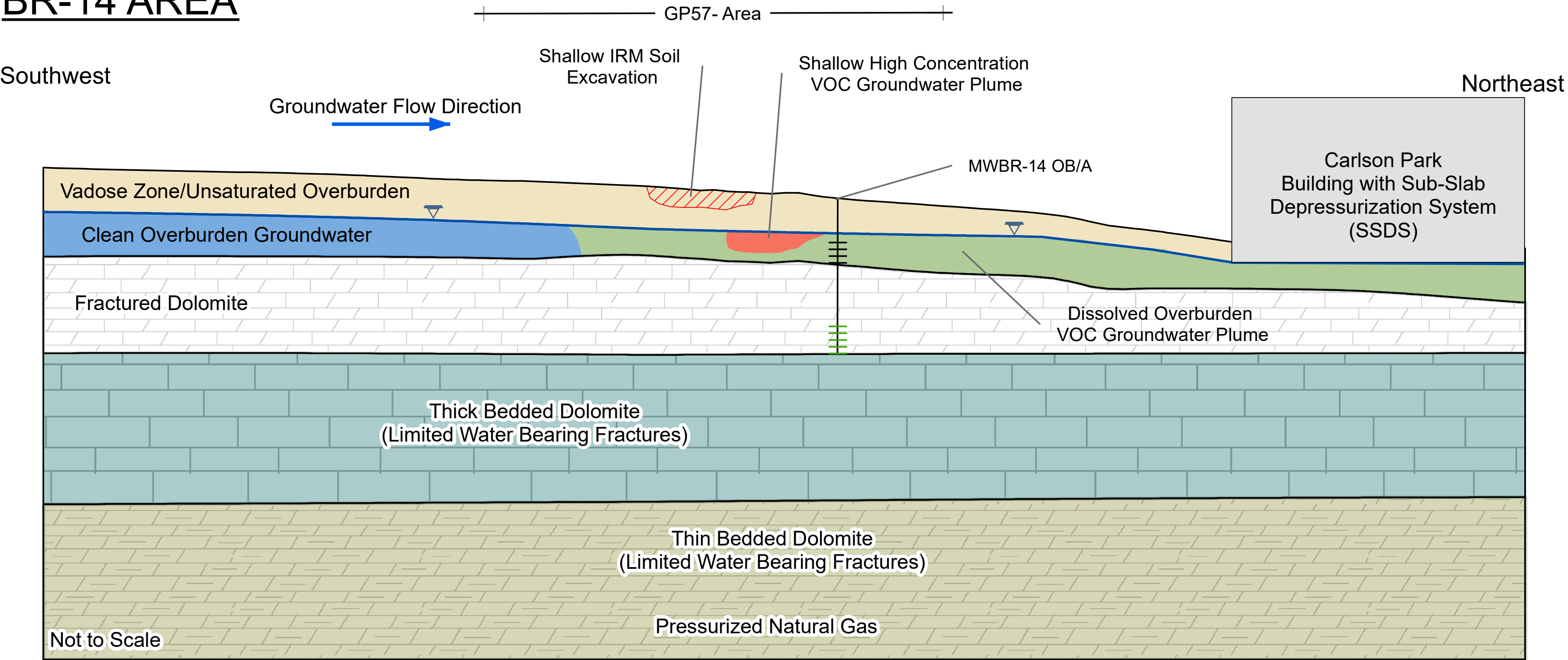
21

SCALE
1:1,200

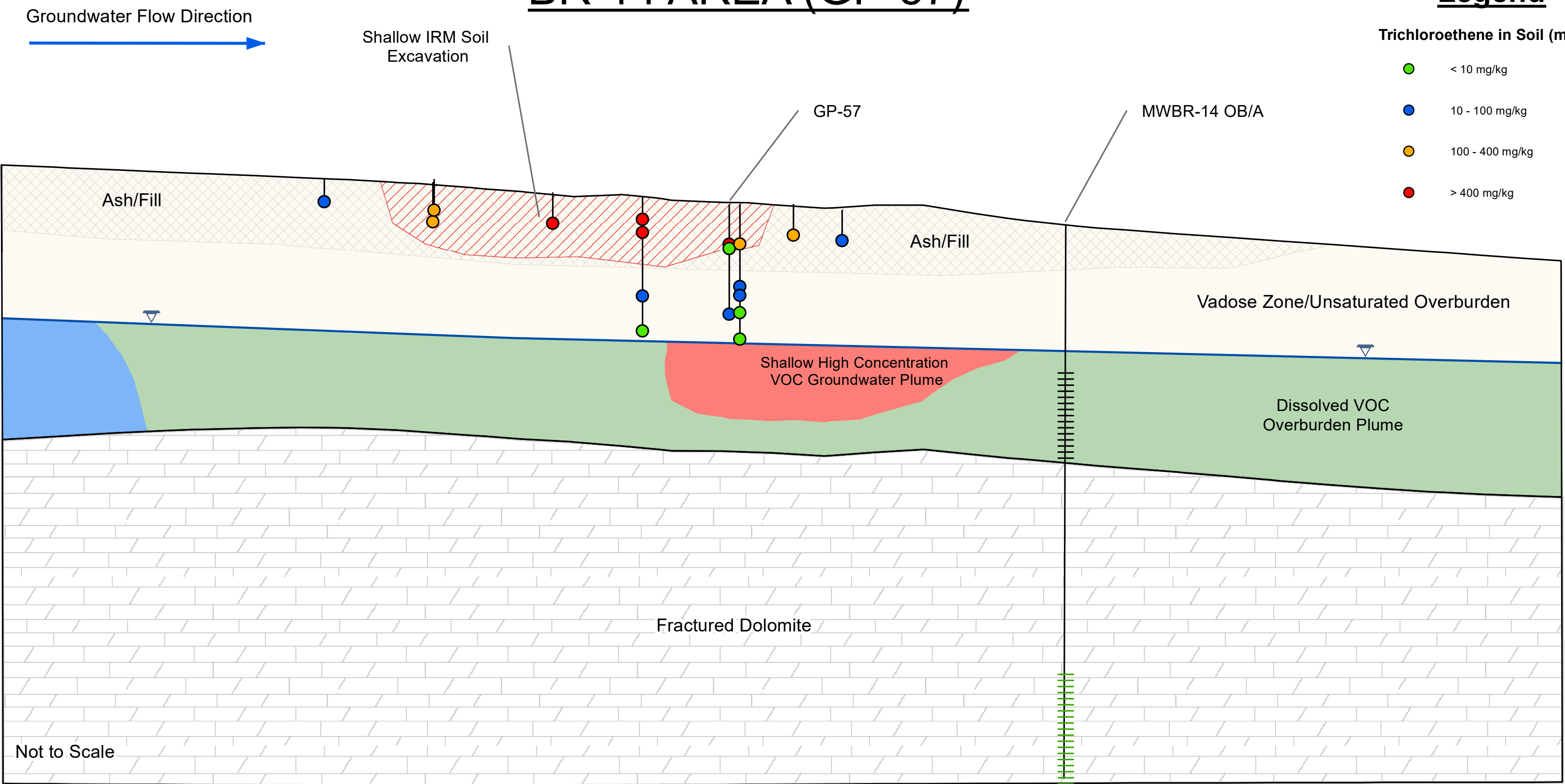
C:\Users\iruf\Dropbox (S2C2 inc.)\Projects\Rochester\ArcMap\Carlson RI Report - 2021\Figure 21 Sept 2016 Box PlotsNoLowFlow.mxd

Note: These figures display conceptual representations/interpretations at select areas of the Site based on information obtained during on-site Remedial Investigation activities.

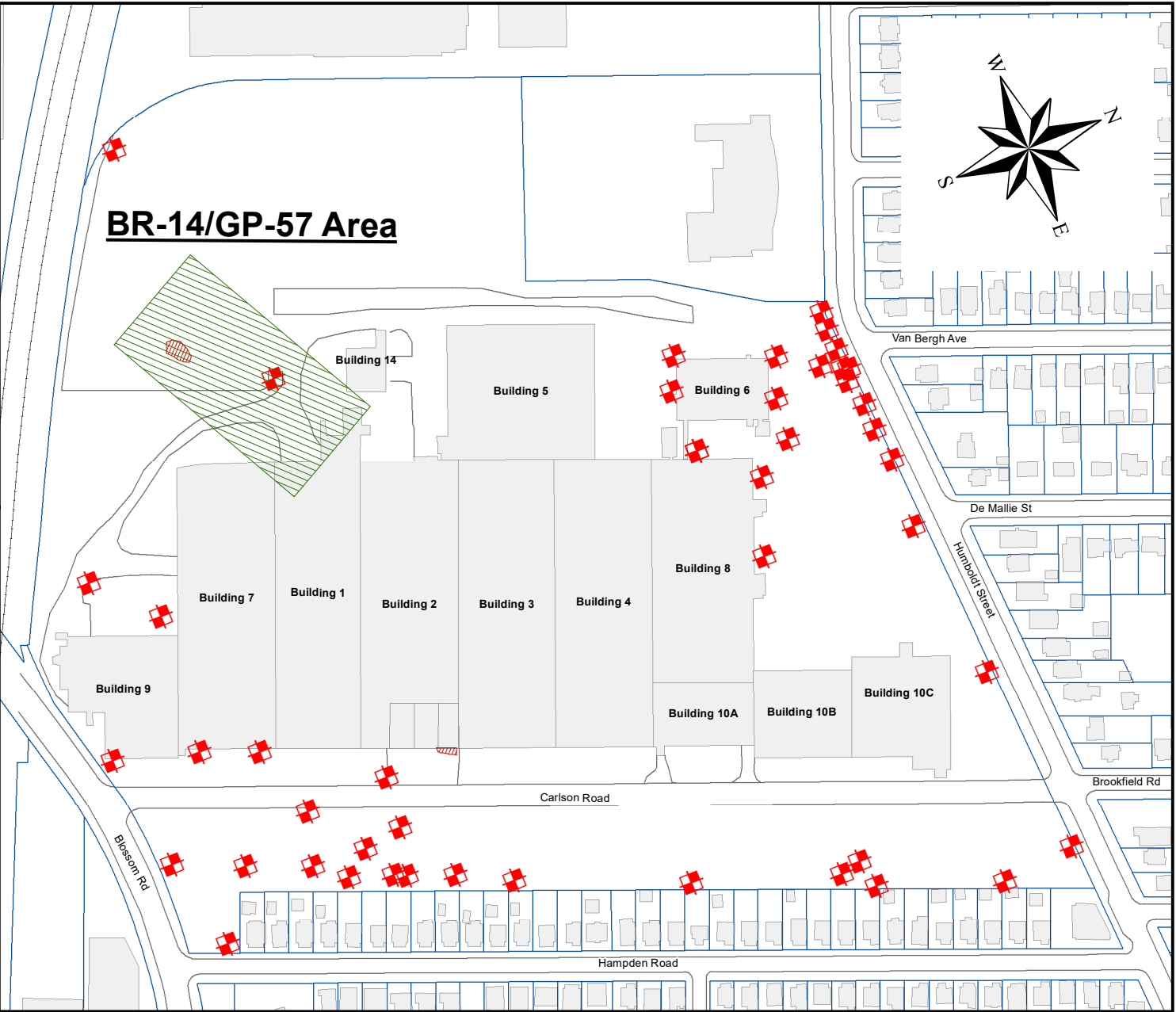
BR-14 AREA



BR-14 AREA (GP-57)



Area Represented in Schematic



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CARLSON PARK FACILITY
CARLSON ROAD
ROCHESTER, NEW YORK

CONCEPTUALIZED SCHEMATIC
BR-14/GP-57 AREA

TITLE

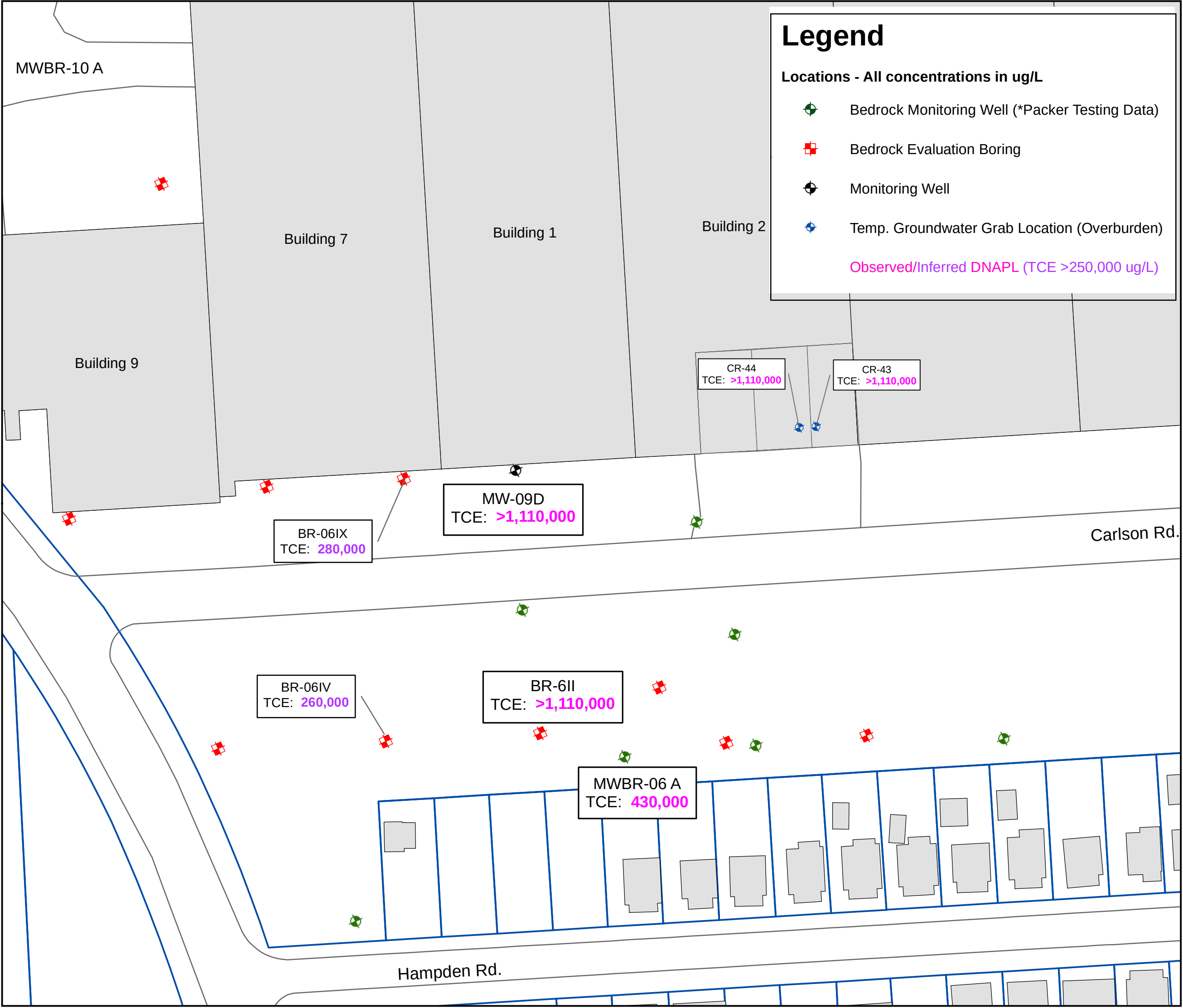
22A

FIGURE

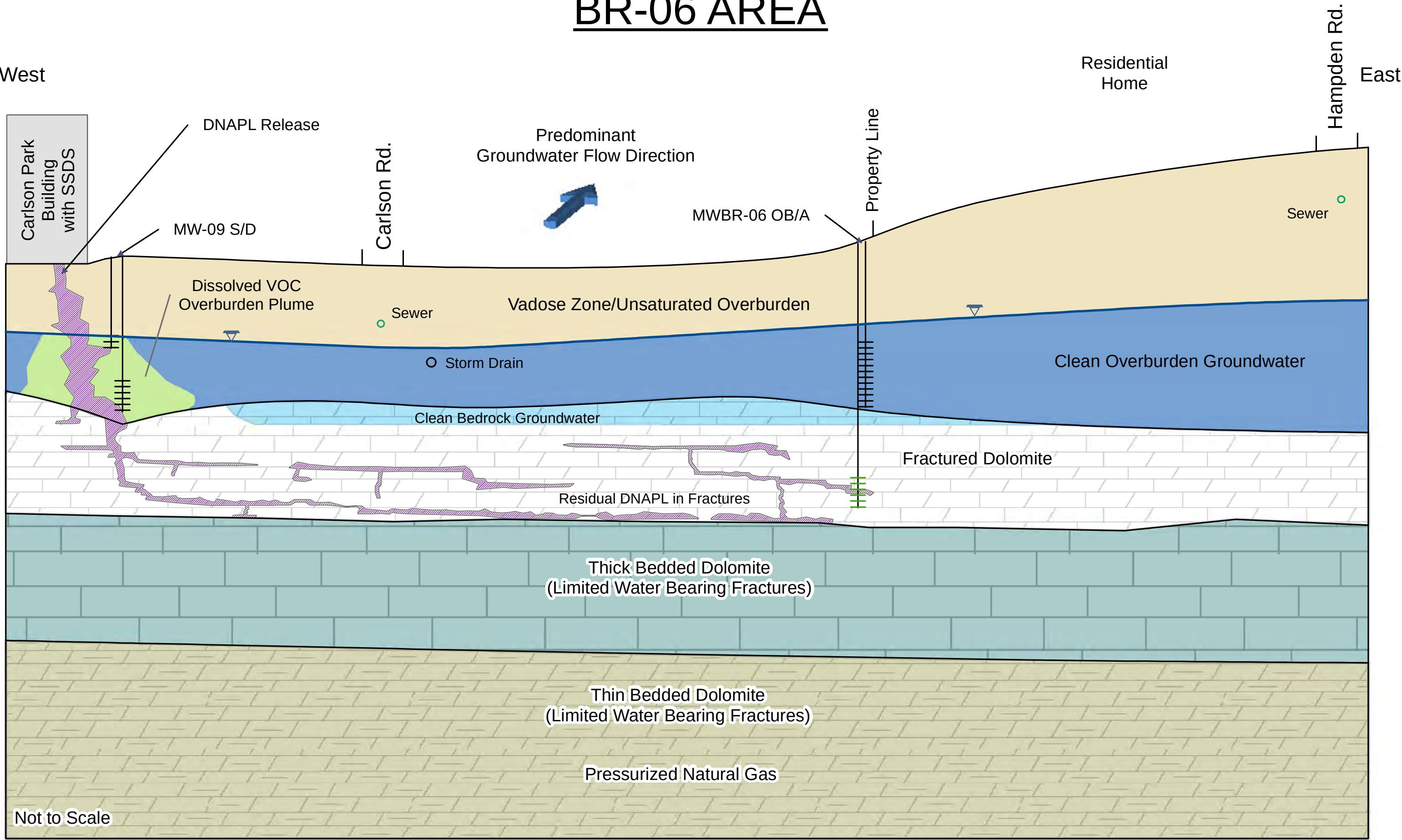
SCALE

Note: These figures display conceptual representations/interpretations at select areas of the Site based on information obtained during on-site Remedial Investigation activities.

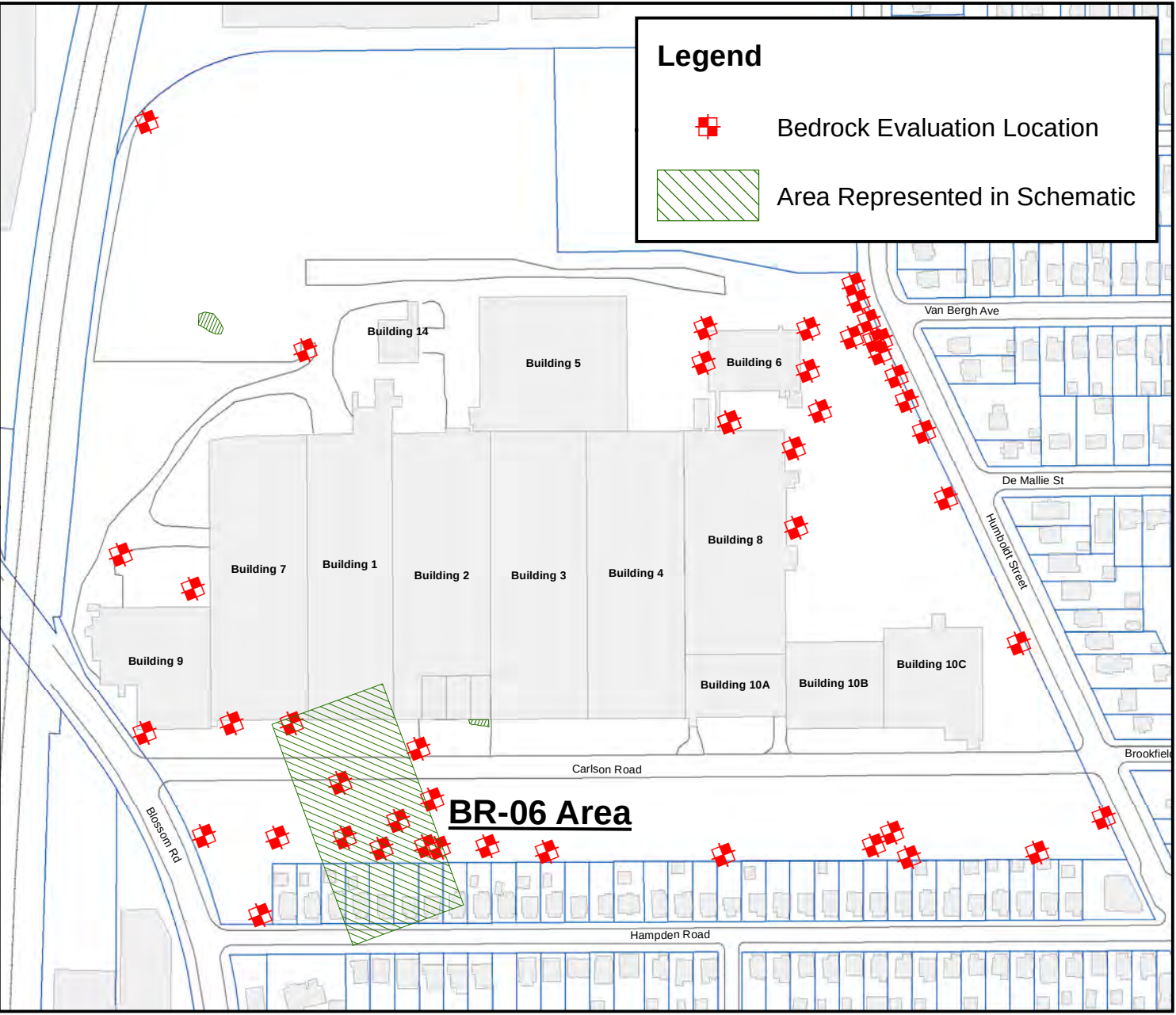
BR-06 AREA
Locations with Observed/Inferred DNAPL



BR-06 AREA



Area Represented in Schematic



TITLE

CONCEPTUALIZED SCHEMATIC AND
LOCATIONS WITH OBSERVED/INFERRED DNAPL
BR-06 AREA

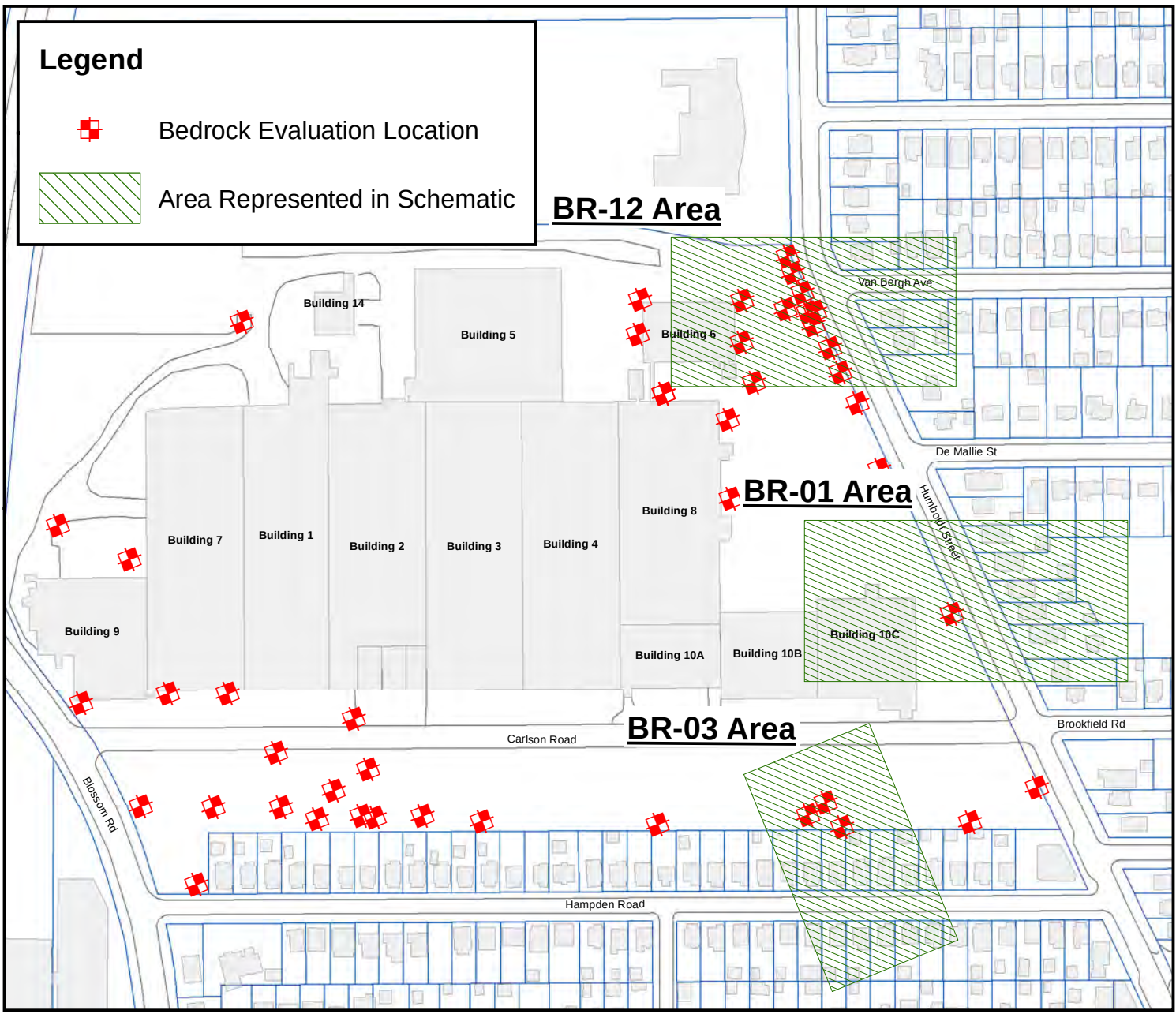
FIGURE

22B

SCALE

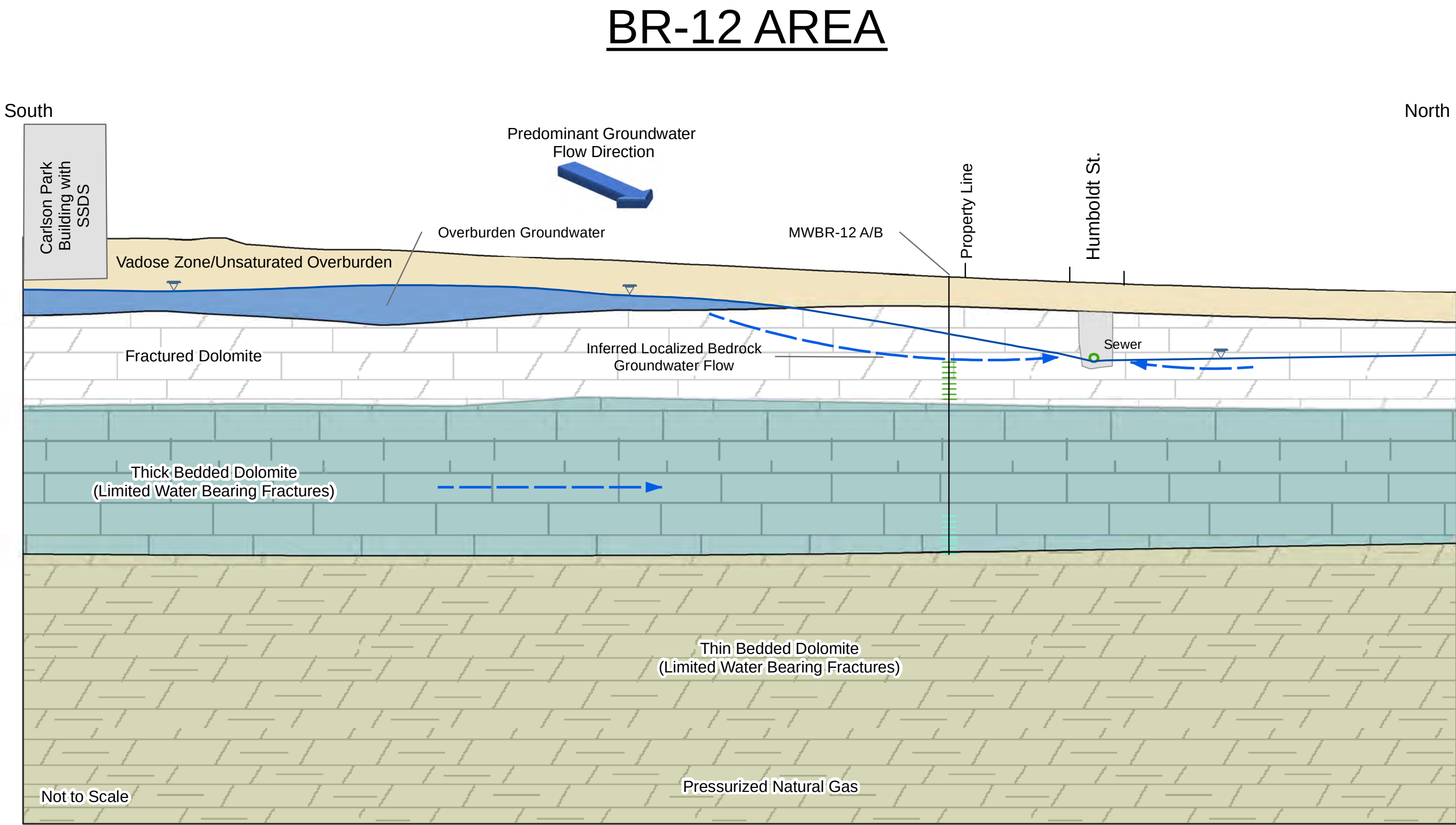
CARLSON PARK FACILITY
CARLSON ROAD
ROCHESTER, NEW YORK

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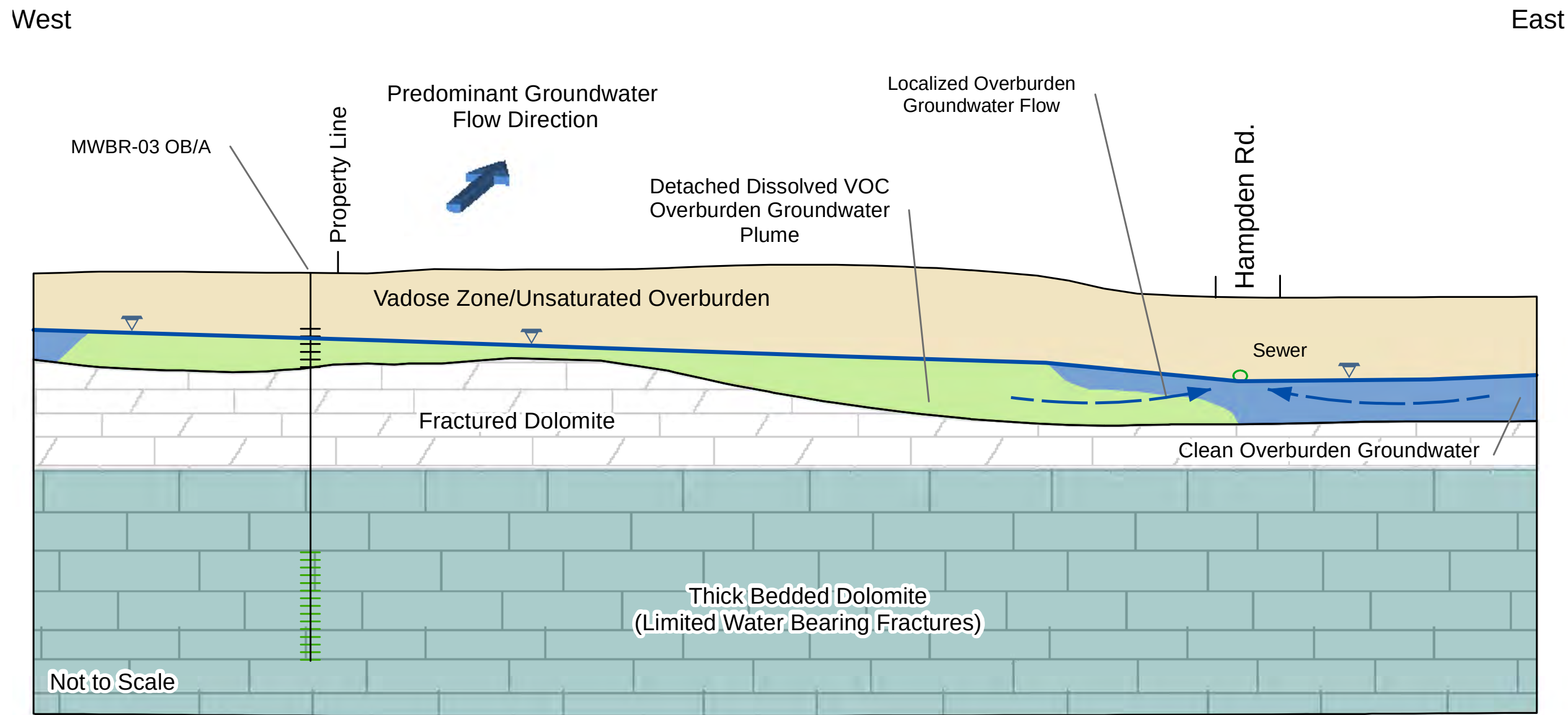


Area Represented in Schematic

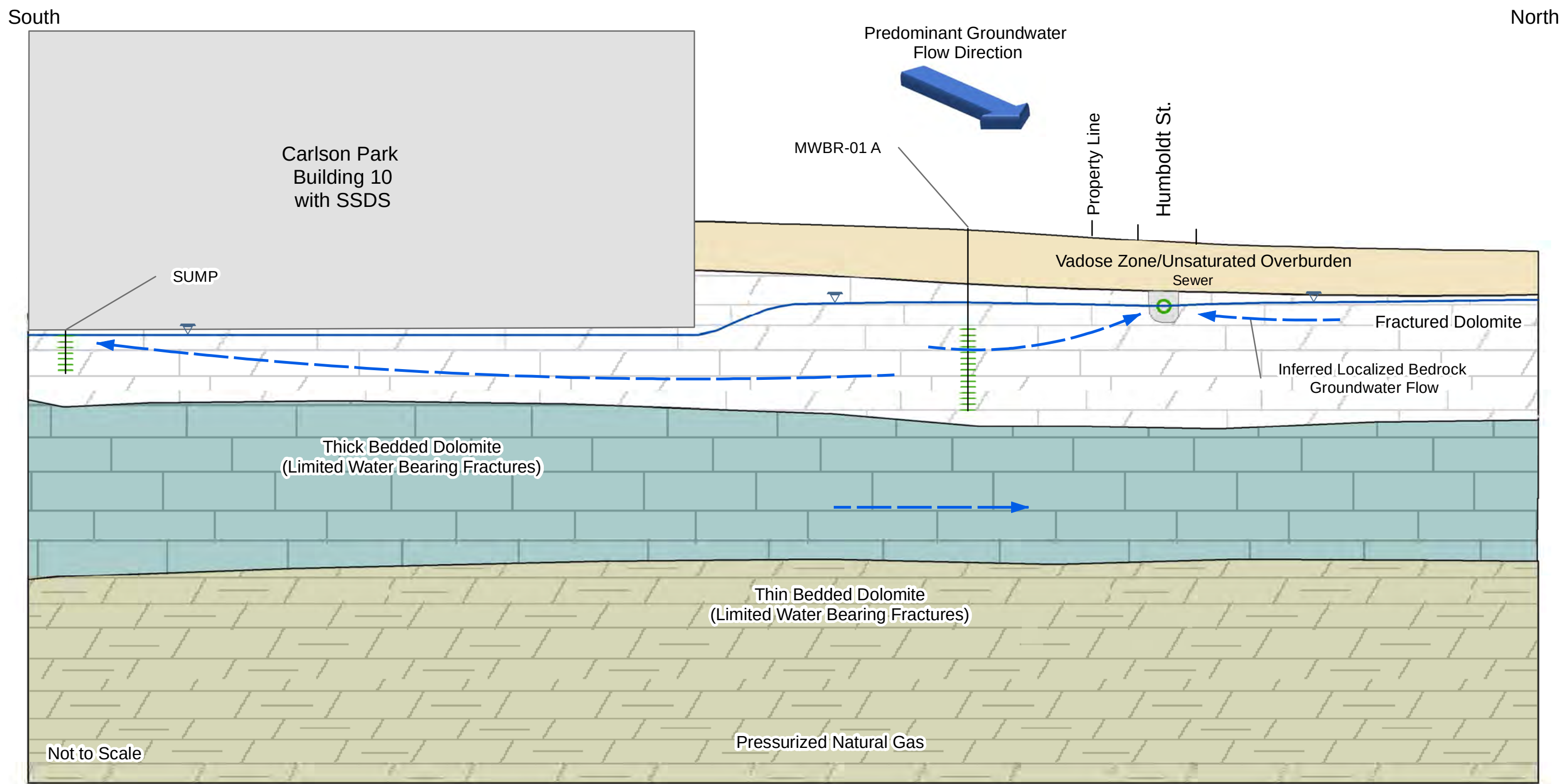
Note: These figures display conceptual representations/interpretations at select areas of the Site based on information obtained during on-site Remedial Investigation activities.



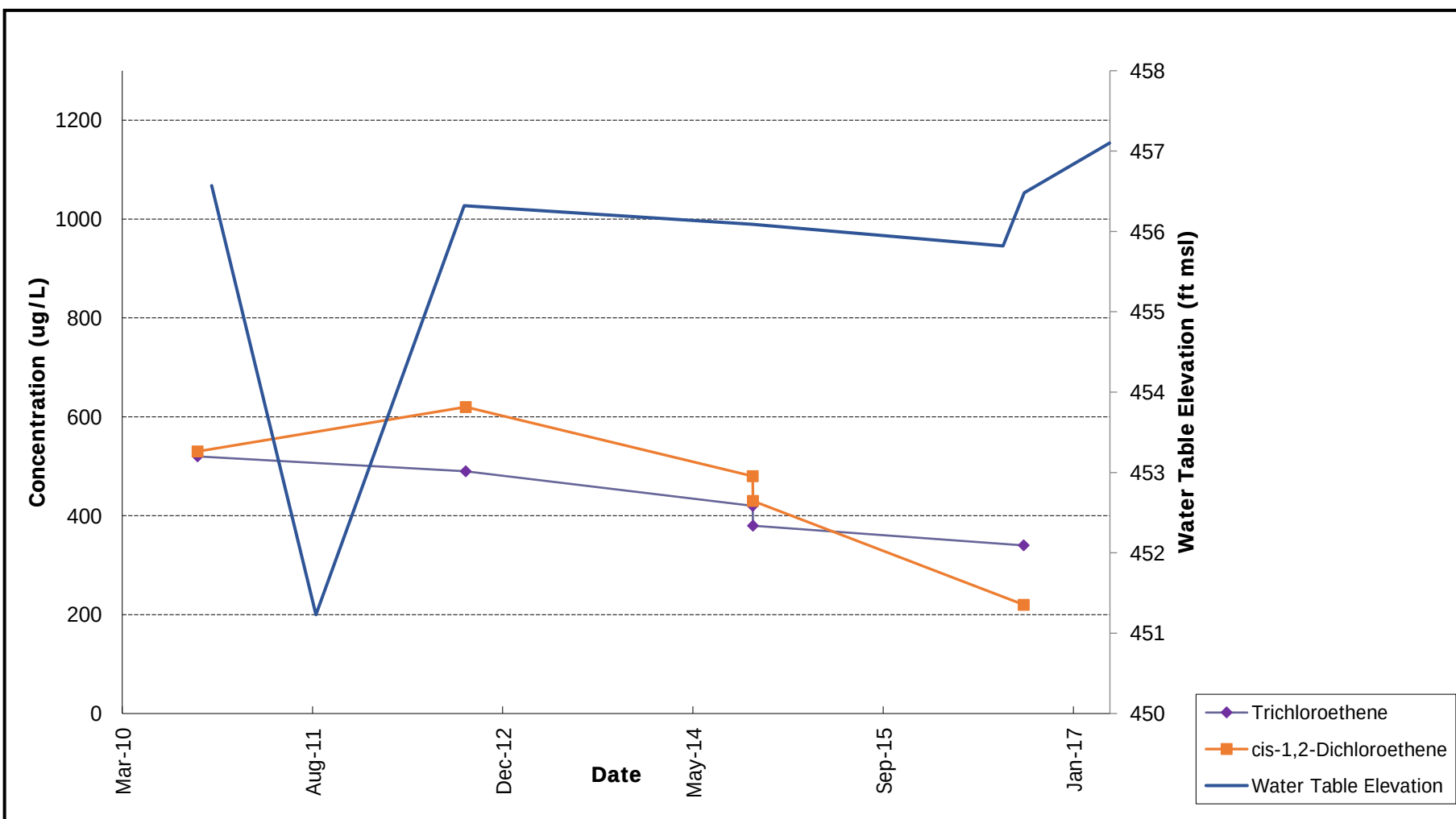
BR-03 AREA



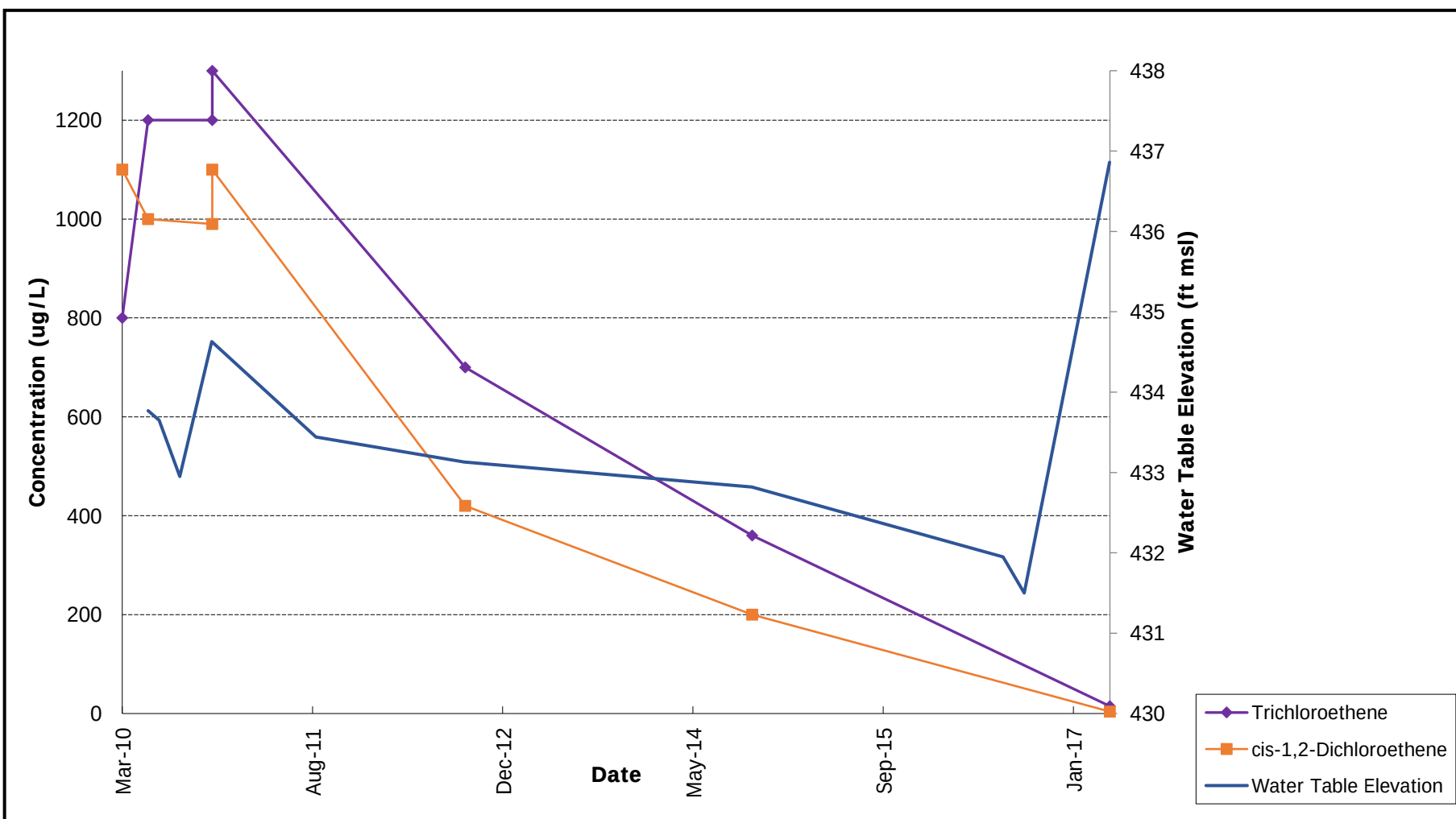
BR-01 AREA



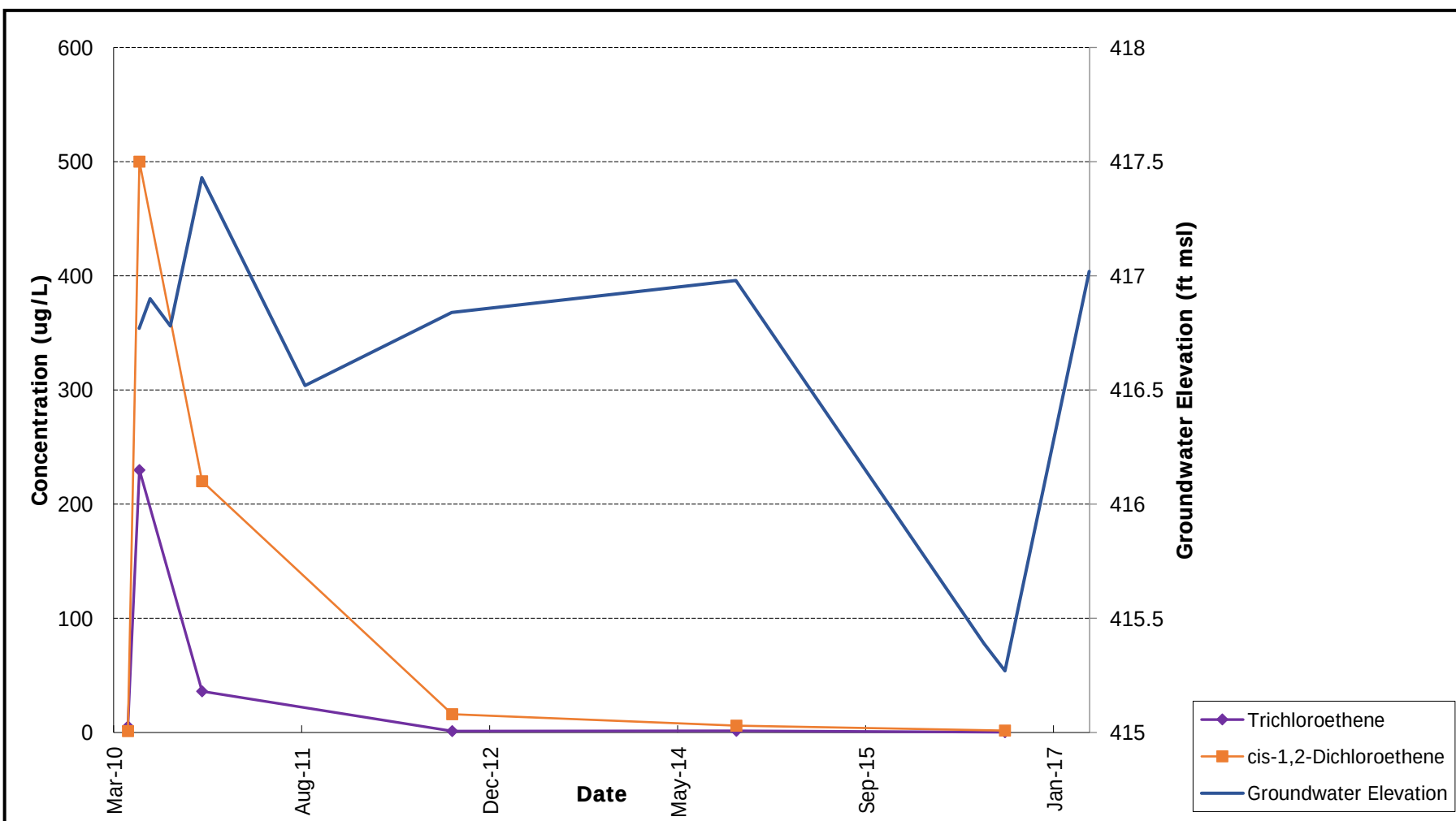
S ₂ C ₂ inc.	
CARLSON PARK FACILITY CARLSON ROAD ROCHESTER, NEW YORK	
CONCEPTUALIZED SCHEMATICS BR-01, BR-03 AND BR-12 AREAS	
FIGURE	TITLE
22C	
SCALE	



<i>S₂ C₂ inc.</i>	CARLSON PARK FACILITY CARLSON ROAD ROCHESTER, NEW YORK	FIGURE 23A MWBR-14 OB CVOC Chemical Trends and Water Table Elevation Trends
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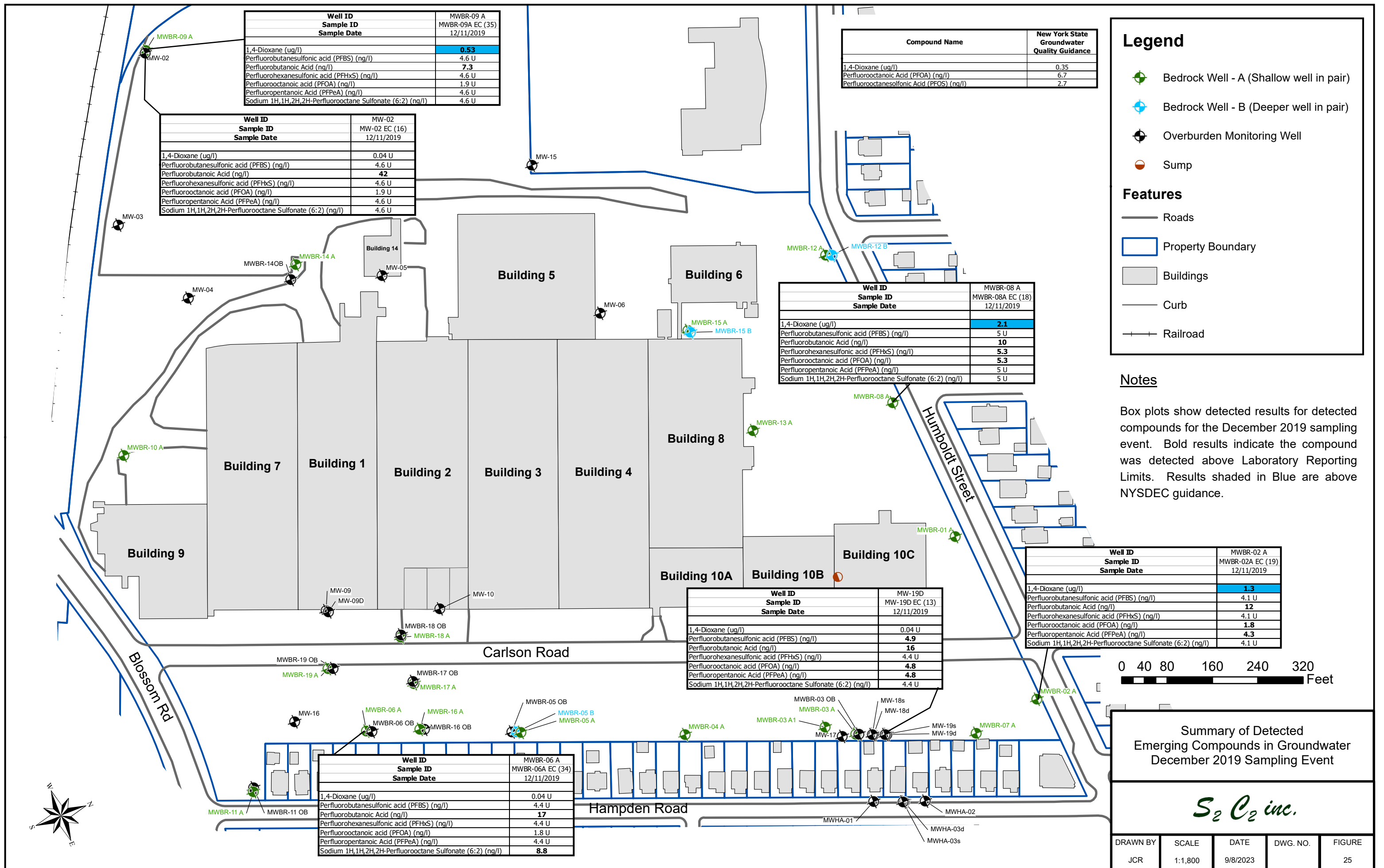
<i>S₂ C₂ inc.</i>	CARLSON PARK FACILITY CARLSON ROAD ROCHESTER, NEW YORK	FIGURE 23B MWBR-03 OB CVOC Chemical Trends and Water Table Elevation Trends
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S₂ C₂ inc.

CARLSON PARK FACILITY
CARLSON ROAD
ROCHESTER, NEW YORK

FIGURE 23C
MWBR-05 B CVOC Chemical Trends and
Groundwater Elevation Trends



Appendix B: Cost Estimates for Remedial Action Alternatives



**Cost Estimate Summary
Alternatives Analysis
Carlson Park Site
Rochester, New York
April 2025**

Alternative		Capital Cost	Annual O&M Cost	O&M Period (years)	Net Present Worth (2.3% discount)
1	Track 4 Commercial Use Remedy	\$6,650,000	\$236,000	30	\$11,730,000
2	Track 1 Unrestricted Use Remedy	\$167,390,000	\$232,000	5	\$168,480,000

We have provided herein our opinion of probable costs. Client understands that construction cost estimates, financial analyses and feasibility projections are subject to many influences including, but not limited to, price of labor and materials, unknown or latent conditions of existing equipment or structures, and time or quality of performance by third parties. Further, such influences may not be precisely forecasted and are beyond the control of Brown and Caldwell Associates (BC). Actual costs incurred may vary substantially from the estimates prepared by BC. BC does not warrant or guarantee the accuracy of construction or development cost estimates.

General Notes and Assumptions:

1. Estimate is based on the conceptual plans described in the Alternatives Analysis Report (AAR) for the Site.
2. Estimates are based on BC experience and vendor/contractor cost information, including contractor bids, for similar projects. Costs are in 2025 dollars.
3. This is a Class 4 estimate, which, in accordance with the Association for the Advancement of Cost Engineering International (AACE) criteria, is defined as a Planning Level or Design Technical Feasibility Estimate. Typically, engineering is from 1% to 15% complete. The target expected accuracy for Class 4 estimates typically range from -30% to +50%.
4. Present worth estimates are based on extending the annual costs over the O&M period using a 2.3% discount factor. Discount rate was obtained from US Office of Management and Budget OMB Circular No. A-94 (Revised November 14, 2024).

Cost Estimate
Alternative 1 - Track 4 Commercial Use Remedy
Alternatives Analysis
Carlson Park Site
Rochester, New York
April 2025

Item	Cost Component	Quantity	Units	Unit Costs	Line Item Costs
CONSTRUCTION CAPITAL COST					
1	MOBILIZATION	1	LS	\$ 100,000	\$100,000
2	SITE PREPARATION, TEMP FACILITIES, AND TEMP CONTROLS	12	MO	\$ 80,000	\$960,000
3	EXCAVATION OF OIL-IMPACTED AREA				
a	Surface Cover Demolition and Removal	(addressed under Item 6)			\$0
b	Excavation to Visual Delineation (sloped/benched sidewalls)	1,400	CY	\$ 15	\$21,000
c	Backfilling with Imported Fill Material	1,400	CY	\$ 25	\$35,000
d	Surface Restoration	(addressed under Item 6)			\$0
e	Excavation Dewatering and Frac Tanks	1	LS	\$ 20,000	\$20,000
4	HYDRAULIC CONTROL SYSTEM				
a	Bedrock Groundwater Extraction Well Installation and Wellhead Construction	3	EACH	\$ 38,000	\$114,000
b	Building 10 Sump Modifications/Upgrades	1	LS	\$ 10,000	\$10,000
c	Forcemain (Trenching, Backfilling, Pipe Installation)	1,900	LF	\$ 42	\$79,800
d	Electrical, Instrumentation, and Controls	20	%	\$ 40,800	\$ 40,800
5	GROUNDWATER TREATMENT SYSTEM				
a	Treatment Building Upgrades (assume system housed in Building 10C)	1	LS	\$ 50,000	\$50,000
b	Treatment System	1	LS	\$ 62,000	\$62,000
c	Interconnecting Piping	1	LS	\$ 20,000	\$20,000
d	Electrical, Instrumentation, and Controls	20	%	\$ 26,400	\$ 26,400
6	SITE COVER AND RESTORATION	25% of asphalt assumed to be replaced			
a	Asphalt Pavement Site Cover				
i	Asphalt Demolition and Recycling (assume 4")	137,000	SF	\$ 1.40	\$192,400
ii	Asphalt Pavement (assume 2" base, 2" top)	137,000	SF	\$ 3.89	\$532,800
b	Soil Vegetated Site Cover				
i	Removal of Existing Surface Soil (assume 12")	126,000	SF	\$ 0.93	\$116,700
ii	Demarcation Layer (orange 4 oz/yd geotextile fabric)	126,000	SF	\$ 0.20	\$25,200
iii	Topsoil (assume 12")	126,000	SF	\$ 1.63	\$205,300
iv	Seeding and Plantings	126,000	SF	\$ 0.50	\$63,000
7	MONITORING WELL INSTALLATION				
a	Overburden Groundwater Monitoring Well	23	EACH	\$ 3,600	\$82,800
b	Bedrock Groundwater Monitoring Well	9	EACH	\$ 15,000	\$135,000
8	WASTE MANAGEMENT				
a	On-Site Management and Handling	7,200	CY	\$ 5	\$36,000
b	Waste Conditioning	120	TON	\$ 350	\$42,000
c	Waste Characterization	12	SAMPLE	\$ 1,000	\$11,500
d	Transportation and Disposal at Non-Hazardous Landfill	9,280	TON	\$ 70	\$649,600
e	Transportation and Disposal at Low-Temperature Thermal Desorption Facility	2,240	TON	\$ 100	\$224,000
f	Transportation and Disposal at Wastewater Treatment Facility	40,000	GALLON	\$ 1	\$40,000
9	MONITORED NATURAL ATTENUATION ASSESSMENT	1	LS	\$ 92,000	\$92,000
10	DEMOBILIZATION AND CLOSEOUT	1	LS	\$ 50,000	\$50,000
				SUBTOTAL:	\$4,037,000
	CONTINGENCY: (20% of subtotal capital cost)	20	%	\$807,000	\$807,000
	TOTAL CONSTRUCTION CAPITAL COST:				\$4,840,000

Cost Estimate
Alternative 1 - Track 4 Commercial Use Remedy
Alternatives Analysis
Carlson Park Site
Rochester, New York
April 2025

Item	Cost Component	Quantity	Units	Unit Costs	Line Item Costs
ENGINEERING, PERMITTING, AND DOCUMENTATION CAPITAL COST					
11	ENGINEERING, PERMITTING, AND CONSTRUCTION MANAGEMENT				
a	Pre-Design Investigation (Well Installations in Item 7)	1	LS	\$ 450,000	\$450,000
b	Remedial Design (Design, Modeling, Drawings, Specs, Remedial Action Work Plan)	1	LS	\$ 300,000	\$300,000
c	Permitting Support	1	LS	\$ 20,000	\$20,000
d	Bidding and Procurement Assistance	1	LS	\$ 20,000	\$20,000
e	Pre-Construction Engineering Support (Submittals, Coordination)	1	LS	\$ 20,000	\$20,000
f	Construction Engineering Support (Full-time Inspector, Office Support)	12	MO	\$ 49,000	\$588,000
g	Institutional Control (Engineering Support)	1	LS	\$ 20,000	\$20,000
h	Site Management Plan	1	LS	\$ 40,000	\$40,000
i	Final Engineering Report	1	LS	\$ 50,000	\$50,000
				SUBTOTAL:	\$1,508,000
	CONTINGENCY: (20% of subtotal capital cost)	20	%	\$302,000	\$302,000
	TOTAL ENGINEERING, PERMITTING, AND DOCUMENTATION CAPITAL COST:				\$1,810,000
	TOTAL CAPITAL COST:				\$6,650,000
ANNUAL O&M COST					
12	O&M				
a	Groundwater Monitoring and Data Evaluation	2	ROUND	\$23,000	\$46,000
b	Groundwater Extraction and Treatment System O&M	1	LS	\$92,000	\$92,000
c	SSDS Inspection and Monitoring	12	EVENT	\$2,500	\$30,000
d	Site Cover Inspection	1	EVENT	\$4,000	\$4,000
e	Periodic Review Report	1	LS	\$25,000	\$25,000
				SUBTOTAL:	\$197,000
	CONTINGENCY: (20% of O&M annual cost)	20	%	\$39,000	\$39,000
	TOTAL ANNUAL O&M COST:				\$236,000
TOTAL PRESENT NET WORTH					
		Yearly	Number	O&M Present	Total Present
		Interest Rate	Years	Worth	Worth
	30 - Year Present Worth	2.3%	30	\$5,074,000	\$11,730,000

Refer to notes below Cost Estimate Summary table.

Cost Estimate
Alternative 2 - Track 1 Unrestricted Use Remedy
Alternatives Analysis
Carlson Park Site
Rochester, New York
April 2025

Item	Cost Component	Quantity	Units	Unit Costs	Line Item Costs
CONSTRUCTION CAPITAL COST					
1	MOBILIZATION	1	LS	\$ 200,000	\$200,000
2	SITE PREPARATION, TEMP FACILITIES, AND TEMP CONTROLS	60	MO	\$ 80,000	\$4,800,000
3	BUILDING DEMOLITION AND DEBRIS DISPOSAL	885,000	SF	\$ 8.00	\$7,080,000
4	EXCAVATION OF OVERBURDEN SOIL	10% of excavated soil assumed eligible for re-use			
a	Asphalt Surface Cover Demolition and Removal	548,000	SF	\$ 1.40	\$769,700
b	Excavation to Bedrock Surface (sloped/benched sidewalls)	788,000	CY	\$ 15	\$11,820,000
c	Backfilling with Excavated Fill Material (Re-Use)	79,000	CY	\$ 10	\$790,000
d	Backfilling (to -1 foot) with Imported Fill Material	646,000	CY	\$ 25	\$16,150,000
e	Temporary Dewatering and Treatment System	60	MONTH	\$ 40,000	\$2,400,000
5	HYDRAULIC CONTROL SYSTEM				
a	Bedrock Groundwater Extraction Well Installation and Wellhead Construction	4	EACH	\$ 38,000	\$152,000
b	Forcemain (Trenching, Backfilling, Pipe Installation)	2,100	LF	\$ 42	\$88,200
c	Electrical, Instrumentation, and Controls	20	%	\$ 48,000	\$ 48,000
6	GROUNDWATER TREATMENT SYSTEM				
a	Treatment Building	1	LS	\$ 300,000	\$300,000
b	Treatment System	1	LS	\$ 62,000	\$62,000
c	Interconnecting Piping	1	LS	\$ 20,000	\$20,000
d	Electrical, Instrumentation, and Controls	20	%	\$ 76,400	\$ 76,400
7	SURFACE RESTORATION				
a	Crushed Stone Cover (assume 12")	1,688,000	SF	\$ 1.30	\$2,188,100
8	MONITORING WELL INSTALLATION				
a	Overburden Groundwater Monitoring Well	6	EACH	\$ 3,600	\$21,600
b	Bedrock Groundwater Monitoring Well	9	EACH	\$ 15,000	\$135,000
9	WASTE MANAGEMENT				
a	On-Site Soil Management and Handling	709,000	CY	\$ 5	\$3,545,000
b	Waste Characterization	227	SAMPLE	\$ 1,000	\$226,900
c	Transportation and Disposal at Non-Hazardous Landfill	1,132,200	TON	\$ 70	\$79,254,000
d	Transportation and Disposal at Low-Temperature Thermal Desorption Facility	2,240	TON	\$ 100	\$224,000
10	IN SITU TREATMENT	1	LS	\$ 5,000,000	\$5,000,000
11	MONITORED NATURAL ATTENUATION ASSESSMENT	1	LS	\$ 92,000	\$92,000
12	DECOMMISSION HYDRAULIC CONTROLS SYSTEM AND TREATMENT SYSTEM	1	LS	\$ 50,000	\$50,000
13	DEMOBILIZATION AND CLOSEOUT	1	LS	\$ 100,000	\$100,000
				SUBTOTAL:	\$135,590,000
	CONTINGENCY: (20% of subtotal capital cost)	20	%	\$27,118,000	\$27,118,000
				TOTAL CONSTRUCTION CAPITAL COST:	\$162,710,000

Cost Estimate
Alternative 2 - Track 1 Unrestricted Use Remedy
Alternatives Analysis
Carlson Park Site
Rochester, New York
April 2025

Item	Cost Component	Quantity	Units	Unit Costs	Line Item Costs
ENGINEERING, PERMITTING, AND DOCUMENTATION CAPITAL COST					
14	ENGINEERING, PERMITTING, AND CONSTRUCTION MANAGEMENT				
a	Pre-Design Investigation (Well Installations in Item 8)	1	LS	\$ 450,000	\$450,000
b	Remedial Design (Design, Modeling, Drawings, Specs, Remedial Action Work Plan)	1	LS	\$ 400,000	\$400,000
c	Permitting Support	1	LS	\$ 20,000	\$20,000
d	Bidding and Procurement Assistance	1	LS	\$ 20,000	\$20,000
e	Pre-Construction Engineering Support (Submittals, Coordination)	1	LS	\$ 20,000	\$20,000
f	Construction Engineering Support (Full-time Inspector, Office Support)	60	MO	\$ 49,000	\$2,940,000
g	Final Engineering Report	1	LS	\$ 50,000	\$50,000
				SUBTOTAL:	\$3,900,000
	CONTINGENCY: (20% of subtotal capital cost)	20	%	\$780,000	\$780,000
	TOTAL ENGINEERING, PERMITTING, AND DOCUMENTATION CAPITAL COST:				\$4,680,000
	TOTAL CAPITAL COST:				\$167,390,000
ANNUAL O&M COST					
15	O&M				
a	Groundwater Monitoring and Data Evaluation	2	ROUND	\$23,000	\$46,000
b	Groundwater Extraction and Treatment System O&M	1	LS	\$92,000	\$92,000
c	SSDS Inspection and Monitoring	12	EVENT	\$2,500	\$30,000
d	Periodic Review Report	1	LS	\$25,000	\$25,000
				SUBTOTAL:	\$193,000
	CONTINGENCY: (20% of O&M annual cost)	20	%	\$39,000	\$39,000
	TOTAL ANNUAL O&M COST:				\$232,000
TOTAL PRESENT NET WORTH					
		<u>Yearly Interest Rate</u>	<u>Number Years</u>	<u>O&M Present Worth</u>	<u>Total Present Worth</u>
	5 - Year Present Worth	2.3%	5	\$1,085,000	\$168,480,000

Refer to notes below Cost Estimate Summary table.