PARSONS

Phone: 315.451.9560
301 Plainfield Road, Suite 350 | Syracuse, New York 13212

October 19, 2020

Ms. Nancy Grosso
Principal Technical Consultant
Corteva Agriscience™
Chestnut Run Plaza 735 / 1115-1
P.O. Box 2915
974 Centre Road
Wilmington, DE 19805

RE: Emerging Contaminants Groundwater Sampling Summary at Corteva Agriscience Driving Park Site (NYSDEC Site # C828142) – June 4, 2020 Sampling Event

Dear Ms. Grosso,

Parsons is pleased to provide this letter report summarizing the analytical results of groundwater sampling activities completed for emerging contaminants on June 4, 2020, at the Corteva Driving Park Avenue Site (NYSDEC ID #C828142) in Rochester, New York.

At the request of the New York State Department of Environmental Conservation (NYSDEC), groundwater sampling was completed at the site in October 2019 at four (4) monitoring wells (MW-2, MW-3, MW-6, and MW-9) for emerging contaminants, including per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane. Analytical results indicated multiple detections of PFAS compounds in wells, including Perfluorooctanoic acid (PFOA), with PFOA concentrations exhibiting lower concentration values compared to the 2009 sampling event. 1,4-dioxane was detected in the four (4) wells at concentrations below the New York State Drinking Water Quality Council (NYSDWQC) proposed maximum contaminant level (MCL) of 1.0 micrograms per liter (ug/L). Upon review of results, NYSDEC, per an email to Corteva dated April 20, 2020, requested further groundwater sampling at the site for PFAS, including sampling of downgradient monitoring wells MW-1 and MW-5, to confirm previous results from 2008 and 2009 and to determine if PFAS constituents are potentially migrating offsite. In addition, Parsons also recommended re-sampling of well MW-9 to provide comparison of results between the sampling events.

Groundwater sampling was conducted in accordance with the NYSDEC approved Emerging Contaminant Sampling Work Plan prepared by Parsons (Parsons, 2019), the United States Environmental Protection Agency (USEPA) Region 1 Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells (USEPA, 2010), and the NYSDEC Guidelines for Sampling and Analysis of PFAS (NYSDEC, 2020).

1.0 Site Background

1.1 Site Location and Physical Setting

The Corteva Driving Park site is located at 666 Driving Park Avenue, Rochester, New York (Figure 1), and comprises approximately ten (10) acres. The site was previously used for the production of photographic film and paper beginning in the early 1900s up until 1995, when operations ceased (URS, 2009).

The site is currently vacant and is bound by an 8-foot tall chain link fence. The site is bound to the east and north by a residential neighborhood and to the west by a railroad line. The area to the south of the site and further west of the railroad track is primarily industrial. A site plan is provided as Figure 2.

The site lies at an average elevation of approximately 500 feet above mean sea-level (amsl). The land surface slopes downward to the north, with approximately thirteen (13) feet difference in elevation between the north and south end edges of the site. Overburden materials in the subsurface consist of variable thickness of fill material which overlays glacial till deposits consisting primarily of silt with trace amount of sand. Below the native soil, several feet of weathered bedrock is encountered, followed by moderately to highly fractured bedrock consisting of fossilized and shaley dolostone. Depth to bedrock ranges from approximately five (5) feet in the southern area of the site to approximately fifteen (15) feet in the northern area of the site, based on previously completed soil borings and bedrock well logs.

Based on previous remedial investigation activities at the site, groundwater was not encountered in the overburden material, but rather, within the bedrock at depths generally ranging between eight (8) to twenty (20) feet below ground surface (bgs), depending on location and season. A summary of historical and recent groundwater level measurements from monitoring wells is provided in Table 1. The predominant flow direction is generally to the north-northeast. On the southern part of the parcel, the highest groundwater elevations are observed in the vicinity of monitoring wells MW-03 and MW-07. This area with higher groundwater elevations may be attributed to storm sewers located beneath Driving Park Avenue. As stated in the 2009 remedial investigation report (RIR), these local storm sewers are constructed in bedrock and may influence groundwater flow at and near the site (AECOM, 2009). Hydraulic conductivity testing (slug tests) completed in 2008 at site wells indicated hydraulic conductivity values of the bedrock aquifer range between 0.09 feet per day (ft/day) to 0.13 ft/day.

Stormwater at the site is conveyed into drainage features such as catch basins, which discharge into the City of Rochester sewer system (URS, 2009). The closest major surface water body is the Genesee River, which is located approximately one (1) mile east of the site. Use of any water for drinking purposes other than the City's potable water supply is prohibited in the City of Rochester.

1.2 Summary of Previous Groundwater Investigations

Previous groundwater investigation activities at the site consisted of the installation and sampling of eight (8) monitoring wells, which were sampled in September 2008 and again in May 2009. The results of sampling indicated the presence of chlorinated solvents (specifically cis-1,2-dichloroethene, trichloroethene, and vinyl chloride, which are attributable to an off-site, up-gradient source) and several metals (iron, magnesium, and sodium), which were detected above the NYSDEC Division of Water Technical and Operational Guidance Series

(1.1.1) Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations (TOGS 1.1.1) (NYSDEC, 1998).

A fluoropolymer slip agent was reportedly utilized in small quantities at the site for a brief period late in the plant's manufacturing history, and therefore, perfluorooctanoic acid (PFOA) was included as a site compound of concern and was also included in the groundwater analyses for the sampling events completed in 2008 and 2009. Analytical results from the sampling events indicated that PFOA was present in site groundwater at detectable concentrations ranging from 40 nanograms per liter (ng/L) to 1,500 ng/L but was below the analytical detection limits at well MW-5. PFOA was also detected in some soil samples, with detected concentrations in soil ranging from 3.6 micrograms per kilogram (ug/kg) to 540 ug/kg. Some of the detectable concentrations of PFOA were likely removed from the site during remedial hot-spot excavation activities completed in 2012 to remove soils with metals and polychlorinated biphenyls (PCBs) concentrations above the NYSDEC Restricted Residential Soil Cleanup Objectives (SCOs).

At the request of NYSDEC, follow-up groundwater sampling was completed at the site in October 2019 to further evaluate for PFAS and 1,4-dioxane. Monitoring wells MW-2, MW-3, MW-6, and MW-9 were re-developed on October 10 and 11, 2019, and subsequently sampled between October 24 and 25, 2019, for PFAS and 1,4-dioxane. Thirteen (13) or more PFAS compounds were detected in each of the four (4) monitoring wells sampled. 1,4-dioxane was not detected at concentrations greater than the NYSDWQC proposed MCL of 1.0 ug/L. However the concentrations of PFOA and Perfluorooctanesulfonic Acid (PFOS) were each detected at concentrations greater than 10 ng/L in the wells, which exceeds the latest NYSDEC guideline criteria for these compounds (NYSDEC, 2020). PFOA concentrations in the four (4) wells exhibited lower concentrations compared with the 2009 sampling event. Based on the results of the October 2019 sampling, NYSDEC requested additional sampling for PFAS in downgradient monitoring wells.

2.0 Summary of 2020 Groundwater Sampling Activities

2.1 Monitoring Well Re-Development

On May 12, 2020, Parsons mobilized to the site to complete re-development of existing wells MW-1 and MW-5. Monitoring well MW-9 was not re-developed during this mobilization, since re-development was already completed at this well in October 2019.

Redevelopment consisted of removal of fine sediment from the wells using PFAS-free equipment, and was continued, where possible, until turbidity was less than 50 nephelometric turbidity units (NTU), as measured by a water quality instrument or until a maximum of 10 well volumes of water had been removed from the well. Turbidity of less than 50 NTU was achieved at monitoring well MW-1 after purging approximately 60 gallons of water. Monitoring well MW-5 was only partially re-developed, since neither of the aforementioned criteria were met during the re-development attempt. Upon deploying the downhole well development equipment at this well location, the well was purged dry after purging one (1) gallon. Upon letting the well recharge and removing the equipment from the well, it was noted that the downhole development equipment (which consisted of high density polyethylene (HDPE) tubing and poly vinyl chloride (PVC) check valve and surge block) had only reached a depth of approximately 19 feet bgs, whereupon the actual depth of the well, per well records, should be closer to 31 feet bgs. Attempts were made to re-deploy the downhole equipment further down the well but were not

successful due to the obstruction. Nonetheless, well development was continued for approximately 2.7 hours with downhole equipment deployed to approximately 19 feet bgs and after pumping the well dry three (3) times.

Well development logs are provided in Attachment A.

2.2 Monitoring Well Sampling

Parsons completed sampling of monitoring wells MW-1, MW-5, and MW-9 on June 4, 2020.

Prior to collecting groundwater samples, each monitoring well was gauged with a PFAS-free electronic water measuring tape, and water levels were recorded to an accuracy of one-hundredth of a foot. Water levels were also obtained from wells MW-2, MW-3, MW-4, MW-6, and MW-7, which were not sampled. Monitoring wells MW-1, MW-5, and MW-9 were sampled using low-flow sampling methods. Groundwater sampling was conducted in accordance with the Work Plan and Quality Assurance Project Plan (QAPP) which outlined specific equipment and procedures for collecting groundwater samples for emerging contaminants.

Groundwater monitoring wells were purged until water quality parameters (temperature, conductivity, pH, dissolved oxygen, oxidation-reduction potential (ORP), salinity, total dissolved solids (TDS), and turbidity), which were collected every five (5) minutes, stabilized within the thresholds prescribed Work Plan, with the exception of dissolved oxygen levels in well MW-01, which experienced an unexpected slight increase in readings beginning approximately 30 minutes into purging. Water quality parameter measurements and observations recorded during sampling are documented in the groundwater sampling records provided in Attachment B.

Laboratory analysis of groundwater samples was conducted by Alpha Analytical, a New York State Department of Health (NYSDOH) Environmental Laboratory Program (ELAP)-approved laboratory certified for analyses using Analytical Services Protocol (ASP). Groundwater samples were submitted for the analysis of PFAS Target Analyte List via Environmental (USEPA) Method 537. Please note that although a sample was obtained from monitoring well MW-05, the sample was not analyzed. Although groundwater quality parameters stabilized in this well, turbidity values were still greater than 50 NTU in the well at the time of sampling, even after purging for nearly 115 minutes. Such elevated levels in turbidity were likely due to the obstruction observed in the well during development, which did not allow the well development equipment to be lowered deep enough in the well to remove sufficient sediment. Likewise, the sampling equipment was also unable to be lowered to the desired sampling depth interval (approximate middle of open rock interval). A determination was made after samples were submitted to not analyze the sample from MW-05 due to potential bias in PFAS results from the presence of sediment in the well.

Data validation was performed in accordance with USEPA Region II Standard Operating Procedure for organic and inorganic data review. Validation included the following:

- Verification of 100% of all quality control (QC) sample results (both qualitative and quantitative);
- Verification of the identification of 100% of all sample results (both positive hits and non-detects);
- Re-calculation of 10% of all investigative sample results; and
- Preparation of a Data Usability Summary Report (DUSR) for groundwater samples collected, presented in Attachment C.

2.3 IDW Management

Liquid investigation-derived waste generated from monitoring well development and sampling were containerized in Department of Transportation (DOT) 55-gallon steel drums for off-site disposal.

3.0 Results Summary

3.1 Groundwater Flow

Historic groundwater depth to water and elevation data from 2008 to 2020 are summarized in Table 1, and potentiometric surface maps for the June 2020 gauging event is presented in Figure 3. The predominant groundwater flow direction during the June 2020 sampling event was to the north-northeast and consistent with previous groundwater gauging events. The average site groundwater hydraulic gradient, as measured between wells MW-1 and MW-7 was 0.011 foot/foot. The localized groundwater mounding situated in the vicinity of MW-7, also consistent with previous monitoring events, was observed during the June 2020 gauging event and is potentially attributable to storm sewers located beneath Driving Park Avenue, as discussed in Section 1.1.

3.2 Analytical Results

Laboratory analytical results for the June 2020 sampling event are summarized in Table 2. Analytical results for PFAS are compared with the following criteria/guidelines:

- USEPA Lifetime Health Advisory Level of 70 ng/L (USEPA, 2018), which includes combined or individual concentrations PFOA and PFOS;
- PFOA and PFOS were compared against the NYSDEC's screening criteria of 10 ng/L for each compound, as set forth in NYSDEC's Guidelines for Sampling and Analysis of PFAS (NYSDEC, 2020); and,
- NYSDEC's screening criteria for other individual PFAS (other than PFOA and PFOS) detected in water at or above 100 ng/L or total concentrations of PFAS (21 total analytes; includes PFOA and PFOS) detected in water at or above 500 ng/L, as set forth in NYSDEC's Guidelines for Sampling and Analysis of PFAS (NYSDEC, 2020).

Eight (8) to 13 PFAS compound were detected in the groundwater samples collected from the two (2) wells sampled. PFAS results are outlined below:

- PFOA was detected in wells MW-01 and MW-09 at concentrations of 28.9 ng/L and 1,920 ng/L, respectively. Such concentrations exceeded the NYSDEC Guideline of 10 ng/L for PFOA.
- PFOS was detected in well MW-01 at an estimated concentration of 1.81 ng/L, which did not exceed the NYSDEC Guideline of 10 ng/L for PFOS. However, PFOS was detected in well MW-09 at a concentration of 438 ng/L, which exceeded the NYSDEC Guideline.
- The combined concentrations of PFOA and PFOS exceeded the USEPA Lifetime Health Advisory Level of 70 ng/L in well MW-09 but were not in exceedance in well MW-01.
- Other PFAS compounds (other than PFOA and PFOS) were detected in both wells MW-01 and MW-09. Of these compounds, the following were detected above the NYSDEC Guideline of 100 ng/L:
    - Perfluoroheptanoic Acid (PFHpA): 243 ng/L in well MW-09;

  - Perfluorohexanoic Acid (PFHxA): 194 ng/L in well MW-09; and,
  - N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA): 407 ng/L in well MW-09.

- The combined concentrations of PFAS (i.e., 21 total analytes) in the wells MW-01 and MW-09 were 92 ng/L and 3,510 ng/L, respectively. Therefore, the combined PFAS concentrations in MW-09 exceeded the NYSDEC Guideline of 500 ng/L in well MW-09, but not in well MW-01.

A historic comparison of PFOA and PFOS groundwater results for the site from the 2008, 2009, 2019, and 2020 sampling events is provided in Table 3 and Figure 4. Please note that PFOS was sampled beginning in 2019 and was not analyzed in the 2008 and 2009 sampling events. Groundwater concentrations of PFOA from the June 2020 sampling event were slightly lower in well MW-01 compared with previous sampling events in 2008 and 2009. Groundwater PFOA concentrations in MW-09 were slightly higher in 2020 than in the 2019 sampling event.

3.3 Data Usability Summary

Based on the DUSR prepared (Attachment C), the reported PFAS results were considered usable. The laboratory analytical precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS) requirements were also met.

4.0 Conclusions

Eight (8) to 13 PFAS compound were detected in the groundwater samples collected from the two (2) wells sampled. Of these compounds:

- PFOA exceeded the NYSDEC Guideline value of 10 ng/L (NYSDEC, 2020) in both monitoring MW-01 and MW-09.
- PFOS exceeded the NYSDEC Guideline value of 10 ng/L (NYSDEC, 2020) in monitoring well MW-09, but not in well MW-01.
- The combined concentrations of PFOA and PFOS exceeded the USEPA Lifetime Health Advisory Level of 70 ng/L in well MW-09 but were not in exceedance in well MW-01.
- Other PFAS compounds (other than PFOA and PFOS) were detected in exceedances of the NYSDEC Guideline value of 100 ng/L (NYSDEC, 2020) in monitoring well MW-09 but were not in exceedance in well MW-01.
- The combined concentrations of PFAS (i.e., 21 total analytes) in MW-09 exceeded the NYSDEC Guideline of 500 ng/L (NYSDEC, 2020), but not in well MW-01.

With the exception of MW-09, which exhibited higher PFOA concentrations in June 2020 than in previous events, groundwater concentrations of PFOA in wells sampled during the two events in 2019 and 2020 are consistent with or lower than historic sampling results conducted in 2008 and 2009. Although PFOA has not been demonstrated to readily degrade in the environment, the PFOA plume has likely attenuated over time by processes such as dilution, dispersion, retardation, and removal of source concentrations in soil by prior excavation activities, as evidenced by the generally consistent or lower concentrations temporally observed in site wells. Use of groundwater for drinking purposes is prohibited in the City of Rochester, and therefore, potential exposure pathways of PFAS compounds via groundwater are not a concern.

Please feel free to contact me at (606) 345-2147 or email me at james.mikochik@parsons.com should you have any questions or comments on the above groundwater sampling summary.

Sincerely,

PARSONS

James Mikochik
Senior Geologist

Eric Felter
Principal Geologist

cc: Heather Philip, Parsons

References

City of Rochester, NY, 2019. City of Rochester, NY Code, Part II General Ordinances, Chapter 59, Article III, 59-27 – Water Supply. Retrieved from https://ecode360.com/8676501 on January 31, 2020.

NYSDEC, 2020. Guidelines for Sampling and Analysis of PFAS Under NYSDEC's Part 375 Remedial Programs. January 2020. http://www.dec.ny.gov/docs/remediation_hudson_pdf/pfassampanaly.pdf

NYSDOH, 2018. *Drinking Water Quality Council Recommends Nation's Most Protective Maximum Contaminant Levels for Three Unregulated Contaminants in Drinking Water*. Retrieved from https://www.health.ny.gov/press/releases/2018/2018-1218_drinking_water_quality_council_recommendations.htm on August 6, 2019.

Parsons, 2010. DuPont Driving Park Facility – Addendum to Remedial Investigation Report. April 2010.

Parsons, 2019. Work Plan for Sampling of Emergent Contaminants at DuPont Rochester Driving Park Site (NYSDEC Site #C828142). October 2019.

Parsons. 2019. New York State Emergent Contaminant Field Sampling Plan and Quality Assurance Project Plan. October 2019.

Parsons, 2020. Emerging Contaminants Groundwater Sampling Summary at Corteva Agriscience (formerly known as DuPont) Driving Park Site (NYSDEC Site # C828142). February 2020.

URS, 2009. DuPont Driving Park Facility – Remedial Investigation Report. February 2009.

USEPA, 2010. Region 1 Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells. January 2010.

USEPA, 2018. 2018 Edition of Drinking Water Standards and Health Advisories. March 2018.

TABLES

Table 1
Groundwater Elevation Data Summary (2008 - 2020) Table
Corteva Driving Park Site
Rochester, NY

Monitoring Well ID	Elevation (TOC)[1,2,3]	9/10/2008		9/16/2008		10/16/2008		10/30/2008		11/14/2008		12/16/2008	
		Depth to Water[4]	Groundwater Elevation[3]	Depth to Water[4]	Groundwater Elevation[3]	Depth to Water[4]	Groundwater Elevation[3]	Depth to Water[4]	Groundwater Elevation[3]	Depth to Water[4]	Groundwater Elevation[3]	Depth to Water[4]	Groundwater Elevation[3]
MW-01	494.01	NM	NM	13.78	480.23	13.96	480.05	12.71	481.30	17.47	476.54	12.03	481.98
MW-02	503.32	19.00	484.32	18.40	484.92	18.91	484.41	13.84	489.48	20.76	482.56	12.75	490.57
MW-03	508.49	21.22	487.27	21.66	486.83	21.97	486.52	19.56	488.93	20.85	487.64	18.61	489.88
MW-04	508.38	21.87	486.51	20.82	487.56	22.08	486.30	19.62	488.76	12.51	495.87	18.68	489.70
MW-05	494.5	13.18	481.32	20.35	474.15	13.46	481.04	11.04	483.46	19.68	474.82	11.55	482.95
MW-06	507.85	20.88	486.97	20.77	487.08	20.99	486.86	18.55	489.30	19.09	488.76	17.65	490.20
MW-07	507.57	20.88	486.69	20.62	486.95	20.65	486.92	17.63	489.94	16.76	490.81	15.06	492.51
MW-09	504.41	17.95	486.46	17.72	486.69	18.16	486.25	14.19	490.22	13.54	490.87	12.59	491.82

Monitoring Well ID	Elevation (TOC)[1,2,3]	5/19/2009		8/8/2019		10/24/2019		6/4/2020		
		Depth to Water[4]	Groundwater Elevation[3]	Depth to Water[4]	Groundwater Elevation[3]	Depth to Water[4]	Groundwater Elevation[3]	Depth to Water[4]	Groundwater Elevation[3]	Depth to Bottom[4]
MW-01	494.01	12.77	481.24	13.76	480.25	12.69	481.32	12.22	481.79	26.39
MW-02	503.32	15.58	487.74	16.69	486.63	14.65	488.67	14.67	488.65	27.03
MW-03	508.49	18.02	490.47	21.02	487.47	19.23	489.26	19.05	489.44	26.58
MW-04	508.38	19.81	488.57	21.11	487.27	19.32	489.06	18.78	489.60	26.98
MW-05	494.5	11.87	482.63	13.06	481.44	11.44	483.06	10.99	483.51	18.9*
MW-06	507.85	18.70	489.15	19.75	488.10	17.98	489.87	17.47	490.38	26.48
MW-07	507.57	11.49	496.08	11.18	496.39	10.10	497.47	10.87	496.70	27.26
MW-09	504.41	14.51	489.90	15.36	489.05	14.65	489.76	13.88	490.53	22.13

1. Obtained from survey data dated 9/15/2008.
2. TOC: Top of casing
3. Elevation relative to mean sea level.
4. Depth in feet below top of casing (TOC)
NM = not measured
*Measured depth to bottom likely to be obstruction and not actual bottom of well

Table 2
Validated Groundwater Analytical Data Summary Table
June 2020 Sampling Event
Corteva Driving Park Site
Rochester, New York

						Duplicate of MW-01				
Location ID				USEPA Lifetime Health Advisory Level[1]	NYSDEC Guidelines for Sampling and Analysis of PFAS[2]	MW-01	MW-01	MW-09	EQUIPMENT BLANK	FIELD BLANK
Field Sample ID						GW0620-MW-01D	GW0620-MW-01	GW0620-MW-09	GW0620-EB-01	GW0620-FB-01
Date Sampled						06/04/2020	06/04/2020	06/04/2020	06/04/2020	06/04/2020
Lab Sample ID						L2023258-02	L2023258-01	L2023258-06	L2023258-04	L2023258-03
Sample Delivery Group (SDG)						L2023258	L2023258	L2023258	L2023258	L2023258
Sample Purpose						DUP	FS	FS	EB	FB
Parameter Name	Analytical Method	Filtered	Report Units							
Perfluorobutane Sulfonic Acid (PFBS)	537 Modified	N	NG/L		100	**2.02**	**2.2**	**64.9**	<0.224	<0.228
Perfluorobutanoic Acid (PFBA)	537 Modified	N	NG/L		100	**38.5**	**40.3**	**47.6**	<0.384	<0.392
Perfluorodecanoic Acid (PFDA)	537 Modified	N	NG/L		100	<0.295	<0.285	**0.371 J**	<0.286	<0.292
Perfluorododecanoic Acid (PFDoA)	537 Modified	N	NG/L		100	<0.361	<0.348	<0.345	<0.35	<0.357
Perfluoroheptanoic Acid (PFHpA)	537 Modified	N	NG/L		100	**4.31**	**4.72**	**243**	<0.212	<0.216
Perfluorohexane Sulfonic Acid (PFHxS)	537 Modified	N	NG/L		100	**3.73**	**4.31**	**68.5**	<0.354	<0.361
Perfluorohexanoic Acid (PFHxA)	537 Modified	N	NG/L		100	**5.06**	**5.35**	**194**	**0.38 J**	<0.315
Perfluorononanoic Acid (PFNA)	537 Modified	N	NG/L		100	<0.303	<0.292	**9.44**	<0.294	<0.3
Perfluoropentanoic Acid (PFPeA)	537 Modified	N	NG/L		100	**3.73**	**4.07**	**78.3**	<0.373	<0.38
Perfluoroundecanoic Acid (PFUnA)	537 Modified	N	NG/L		100	<0.252	<0.244	<0.241	<0.245	<0.25
Perfluorooctanoic Acid (PFOA)	537 Modified	N	NG/L		10	**26.2**	**28.9**	**1920**	<0.222	<0.227
Perfluorooctanesulfonic Acid (PFOS)	537 Modified	N	NG/L		10	**1.62 J**	**1.81 J**	**438**	<0.474	<0.484
Perfluorodecane Sulfonic Acid (PFDS)	537 Modified	N	NG/L		100	<0.951	<0.918	<0.91	<0.923	<0.941
Perfluorotetradecanoic Acid (PFTA)	537 Modified	N	NG/L		100	<0.241	<0.232	<0.23	<0.233	<0.238
Perfluorotridecanoic Acid (PFTrDA)	537 Modified	N	NG/L		100	<0.318	<0.306	<0.304	<0.308	<0.314
1H,1H,2H,2H-perfluorodecanesulfonate (8:2 FTS)	537 Modified	N	NG/L		100	<1.18	<1.14	<1.12	<1.14	<1.16
6:2 Fluorotelomer sulfonate (6:2 FTS)	537 Modified	N	NG/L		100	<1.29	<1.25	**1.78 J**	<1.25	<1.28
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	537 Modified	N	NG/L		100	<0.780	<0.753	**407**	<0.757	<0.772
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	537 Modified	N	NG/L		100	<0.629	<0.607	**1.10 J**	<0.610	<0.622
Perfluoroheptane sulfonic acid (PFHpS)	537 Modified	N	NG/L		100	<0.668	<0.645	**13.4**	<0.648	<0.66
Perfluorooctane Sulfonamide (FOSA)	537 Modified	N	NG/L		100	<0.563	<0.543	**26.2**	<0.546	<0.557
Total PFOA and PFOS	537 Modified	N	NG/L	70		**27.8**	**30.7**	**2360**	0	0
Total PFAS	537 Modified	N	NG/L		500	**85.2**	**91.7**	**3514**	**0.38**	0

Notes:
ng/L = nanograms per liter
NA = Not analyzed for indicated compound.
FS = field sample
DUP = field duplicate
EB = equipment blank
FB = field blank
USEPA = United State Environmental Proection Agency
NYSDEC = New York State Department of Environmental Conservation
[1]USEPA, 2018. 2018 Edition of Drinking Water Standards and Health Advisories. March, 2018. https://www.epa.gov/sites/production/files/2018-03/documents/dwtable2018.pdf
[2]NYSDEC Guidelines for Sampling and Analysis of PFAS, Under NYSDEC's Part 375 Remedial Programs, January 2020
Blue Highlighting = Exceeds USEPA Lifetime Health Advisory.
Gray Highlighting = Compound is greater than the NYSDEC Guidance Value.
Qualifiers: "J" = Estimated value, "<" = Not Detected at the Detection Limit shown
Results validated.

Table 3
Historic PFOA/PFOS Data Comparison Table (2008 - 2020)
Corteva Driving Park Site
Rochester, New York

	USEPA Lifetime Health Advisory Level[1]	NYSDEC Guidelines for Sampling and Analysis of PFAS[2]	Area:	UPGRADIENT WELLS				
			Well ID:	MW-07	MW-07	MW-03	MW-03	MW-03
			Matrix:	Water	Water	Water	Water	Water
			Sampled:	9/16/2008	5/19/2009	9/16/2008	5/19/2009	10/24/2019
COMPOUND			UNITS:					
Perfluorooctanoic Acid (PFOA)		10	ng/l	51	71	340	280	229
Perfluorooctanesulfonic Acid (PFOS)		10	ng/l	NA	NA	NA	NA	150
PFOA + PFOS	70		ng/l	51	71	340	280	379

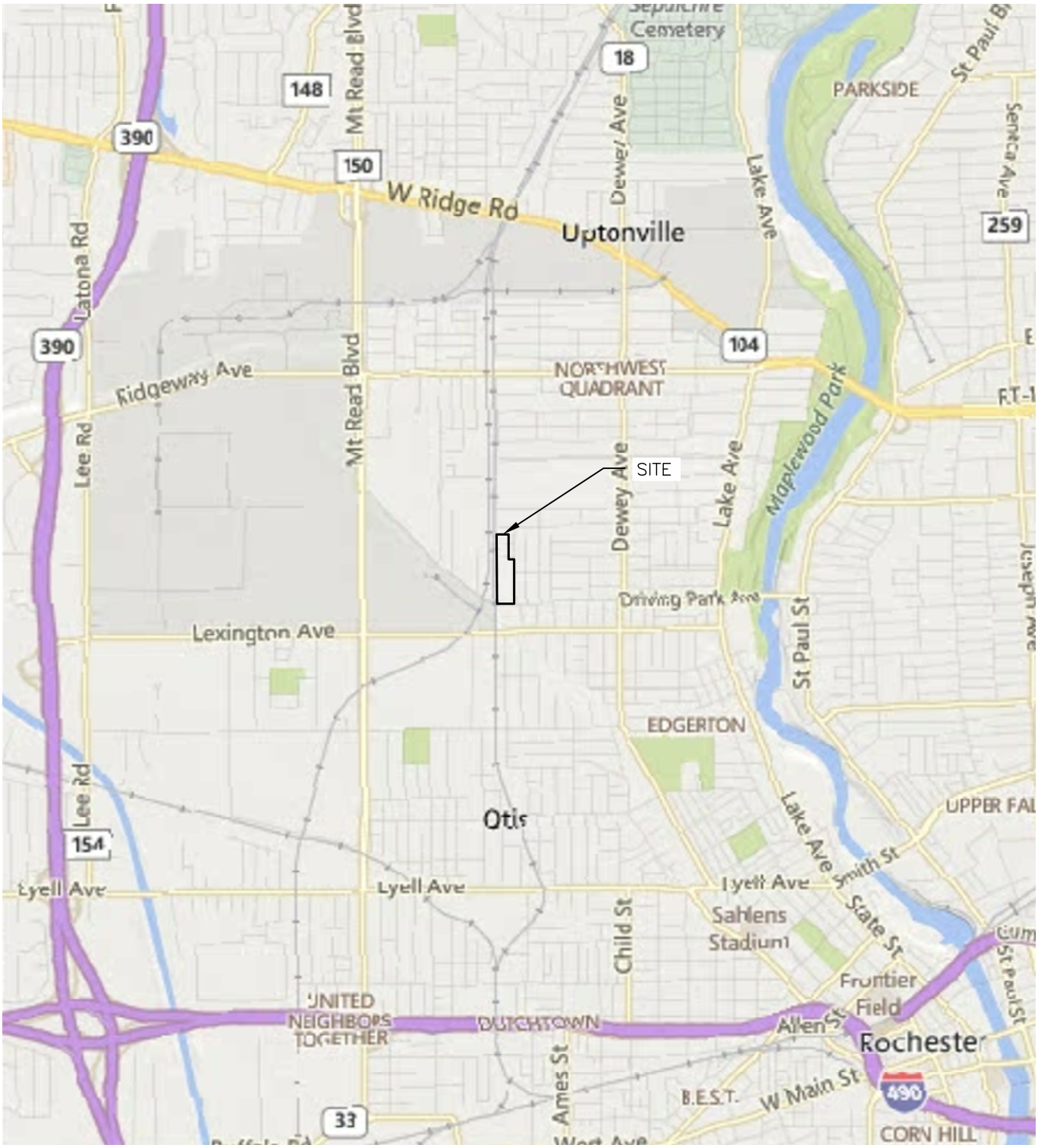
	USEPA Lifetime Health Advisory Level[1]	NYSDEC Guidelines for Sampling and Analysis of PFAS[2]	Area:	FORMER MANUFACTURING AREA WELLS						
			Well ID:	MW-02	MW-02	MW-02	MW-02 (DUP)	MW-04	MW-04	MW-04 (DUP)
			Matrix:	Water	Water	Water	Water	Water	Water	Water
			Sampled:	9/16/2008	5/19/2009	10/24/2019	10/24/2019	9/15/2008	5/20/2009	5/20/2009
COMPOUND			UNITS:							
Perfluorooctanoic Acid (PFOA)		10	ng/l	280	240	197	197	10	12	12
Perfluorooctanesulfonic Acid (PFOS)		10	ng/l	NA	NA	146	139	NA	NA	NA
PFOA + PFOS	70		ng/l	280	240	343	336	10	12	12

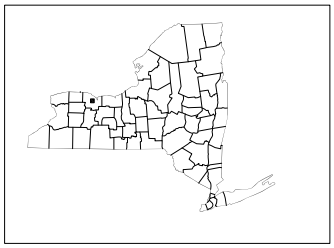
	USEPA Lifetime Health Advisory Level[1]	NYSDEC Guidelines for Sampling and Analysis of PFAS[2]	Area:	FORMER MANUFACTURING AREA WELLS							
			Well ID:	MW-06	MW-06	MW-06	MW-09	MW-09 (DUP)	MW-09	MW-09	MW-09
			Matrix:	Water	Water	Water	Water	Water	Water	Water	Water
			Sampled:	9/18/2008	5/20/2009	10/24/2019	9/15/2008	9/15/2008	5/20/2009	10/25/2019	6/4/2020
COMPOUND			UNITS:								
Perfluorooctanoic Acid (PFOA)		10	ng/l	170	170	125	400 J	430	1500	1090	1920
Perfluorooctanesulfonic Acid (PFOS)		10	ng/l	NA	NA	60.5	NA	NA	NA	282	438
PFOA + PFOS	70		ng/l	170	170	186	400 J	430	1500	1370	2360

	USEPA Lifetime Health Advisory Level[1]	NYSDEC Guidelines for Sampling and Analysis of PFAS[2]	Area:	DOWNGRADIENT WELLS					
			Well ID:	MW-05	MW-05	MW-01	MW-01	MW-01	MW-01 (DUP)
			Matrix:	Water	Water	Water	Water	Water	Water
			Sampled:	9/17/2008	5/19/2009	9/16/2008	5/21/2009	6/4/2020	6/4/2020
COMPOUND			UNITS:						
Perfluorooctanoic Acid (PFOA)		10	ng/l	NQ (0.9)	NQ (< 10)	64	40	28.9	26.2
Perfluorooctanesulfonic Acid (PFOS)		10	ng/l	NA	NA	NA	NA	1.81 J	1.62 J
PFOA + PFOS	70		ng/l	NQ (0.9)	NQ (< 10)	64	40	30.7	27.8

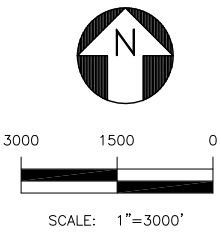
Notes:
ng/L = nanograms per liter
NA = Not analyzed for indicated compound.
NYSDEC = New York State Department of Environmental Conservation
USEPA = United State Environmental Proection Agency
[1]USEPA, 2018. 2018 Edition of Drinking Water Standards and Health Advisories. March, 2018. https://www.epa.gov/sites/production/files/2018-03/documents/dwtable2018.pdf
[2]NYSDEC Guidelines for Sampling and Analysis of PFAS, Under NYSDEC's Part 375 Remedial Programs, January 2020
Blue Highlighting = Exceeds USEPA Lifetime Health Advisory.
Gray Highlighting = Compound is greater than the NYSDEC Guidance Value.
Qualifiers: J = Estimated value, "NQ" = Compound detected at a level between the Limit of Detection (LOD) and the Limit of Quantitation (LOQ). Result is not quantifiable.

FIGURES





NEW YORK STATE



SCALE: 1"=3000'

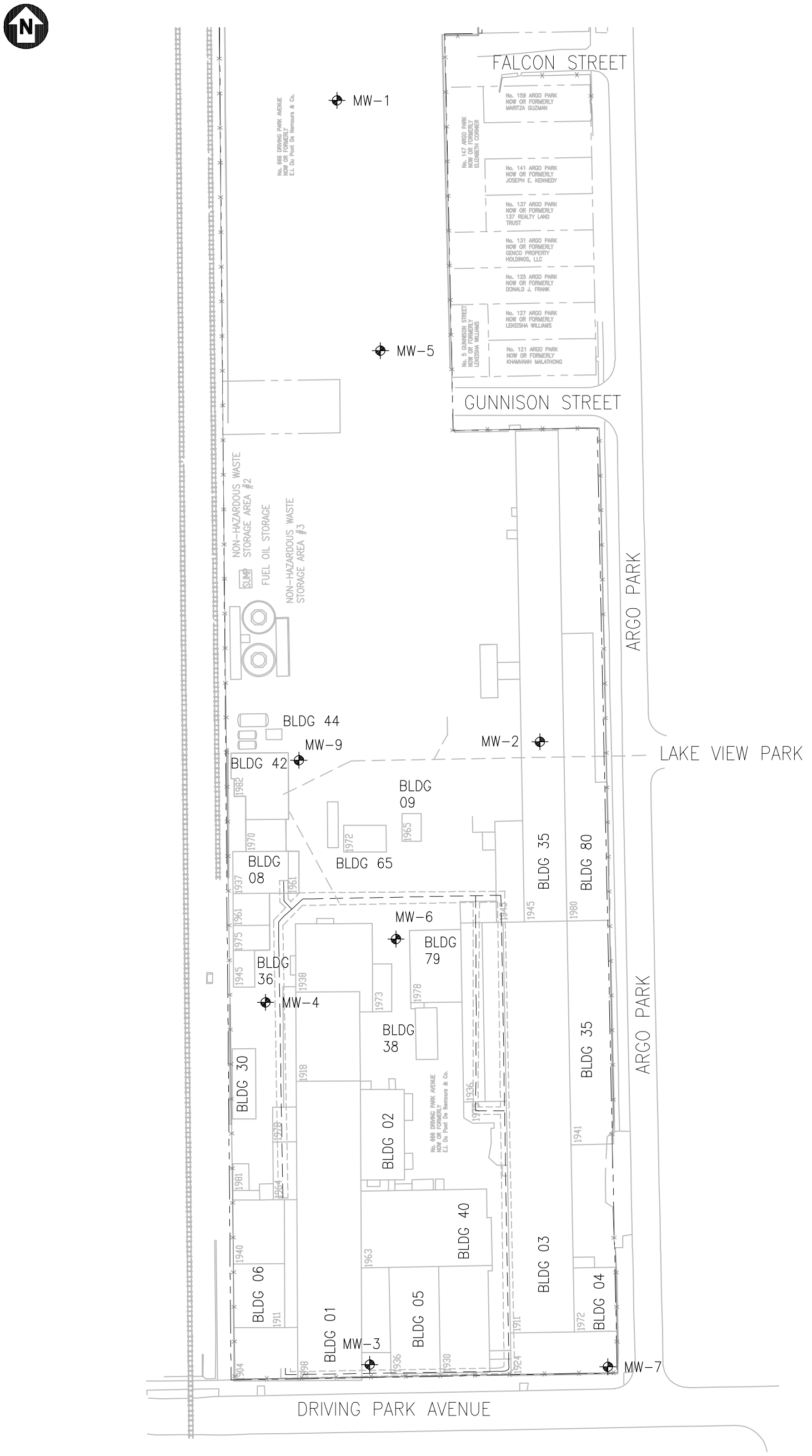
FIGURE 1

CORTEVA
666 DRIVING PARK SITE
ROCHESTER, NEW YORK

SITE LOCATION MAP

PARSONS
301 PLAINFIELD ROAD * SUITE 350 * SYRACUSE, NY 13212 * 315/451-9560
OFFICES IN PRINCIPAL CITIES

FILE NAME: P:\DUPONT PROGRAM\ROCHESTER DRIVING PARK\CAD\CORTEVA\FIGURE\451928-SLM-001.DWG
PLOT DATE: 1/15/2020 2:41 PM PLOTTED BY: RUSSO, JILL



MONITORING WELL LOCATION

SITE BOUNDARY

100 50 0 100 200

SCALE: 1"=100'

FIGURE 2

CORTEVA
666 DRIVING PARK SITE
ROCHESTER, NEW YORK

SITE PLAN

PARSONS
301 PLAINFIELD ROAD * SUITE 350 * SYRACUSE, NY 13212 * 315/451-9560
OFFICES IN PRINCIPAL CITIES

FILE NAME: P:\DUPONT PROGRAM\ROCHESTER DRIVING PARK\CAD\CORTEVA\FIGURE\451928-SK001.DWG
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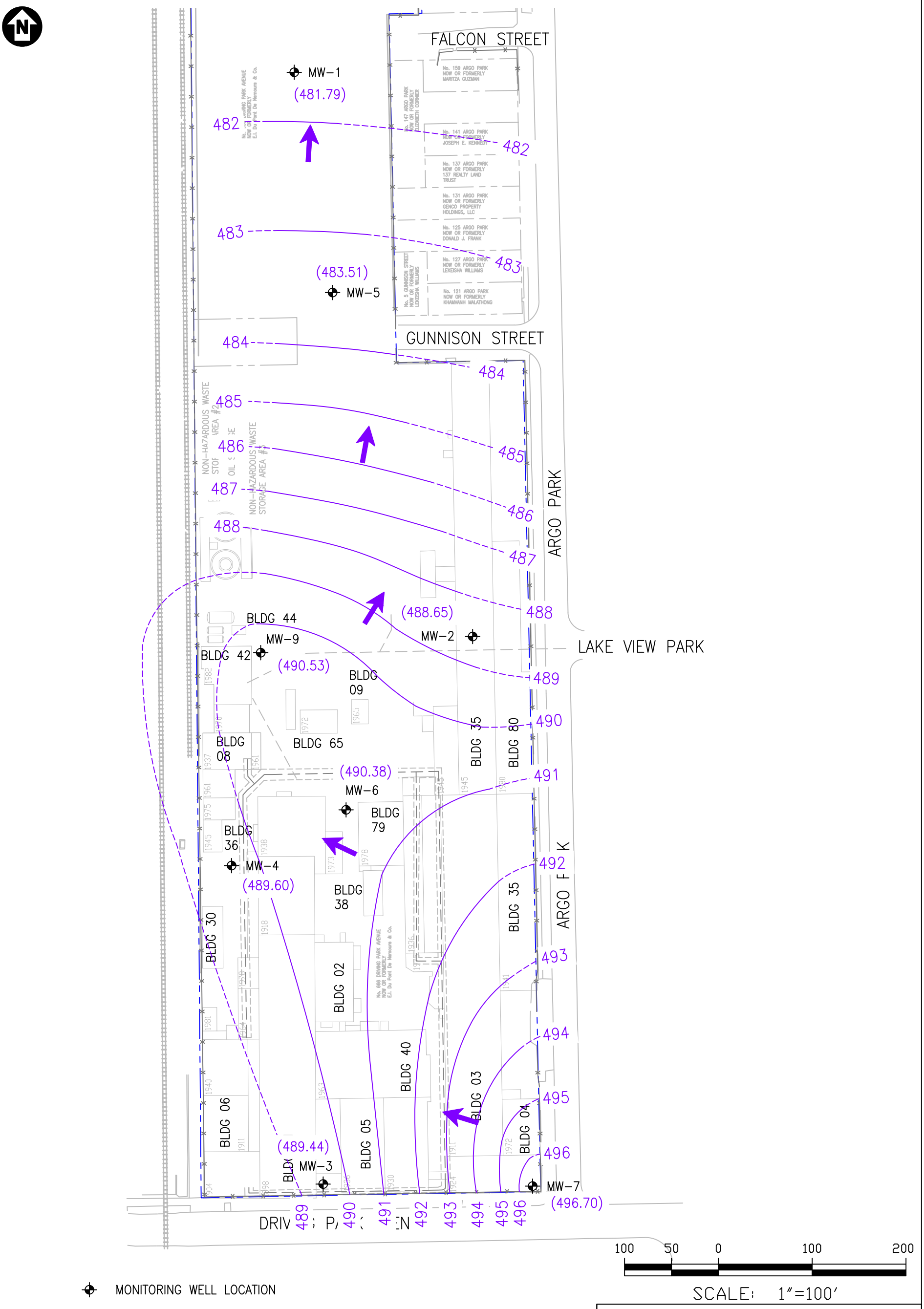


SCALE: 1"=100'

MONITORING WELL LOCATION

SITE BOUNDARY

GROUNDWATER ELEVATION CONTOUR (AMSL)

INFERRED GROUNDWATER ELEVATION CONTOUR (AMSL)

(489.44) GROUNDWATER ELEVATION (FT AMSL)

APPARENT GROUNDWATER FLOW DIRECTION

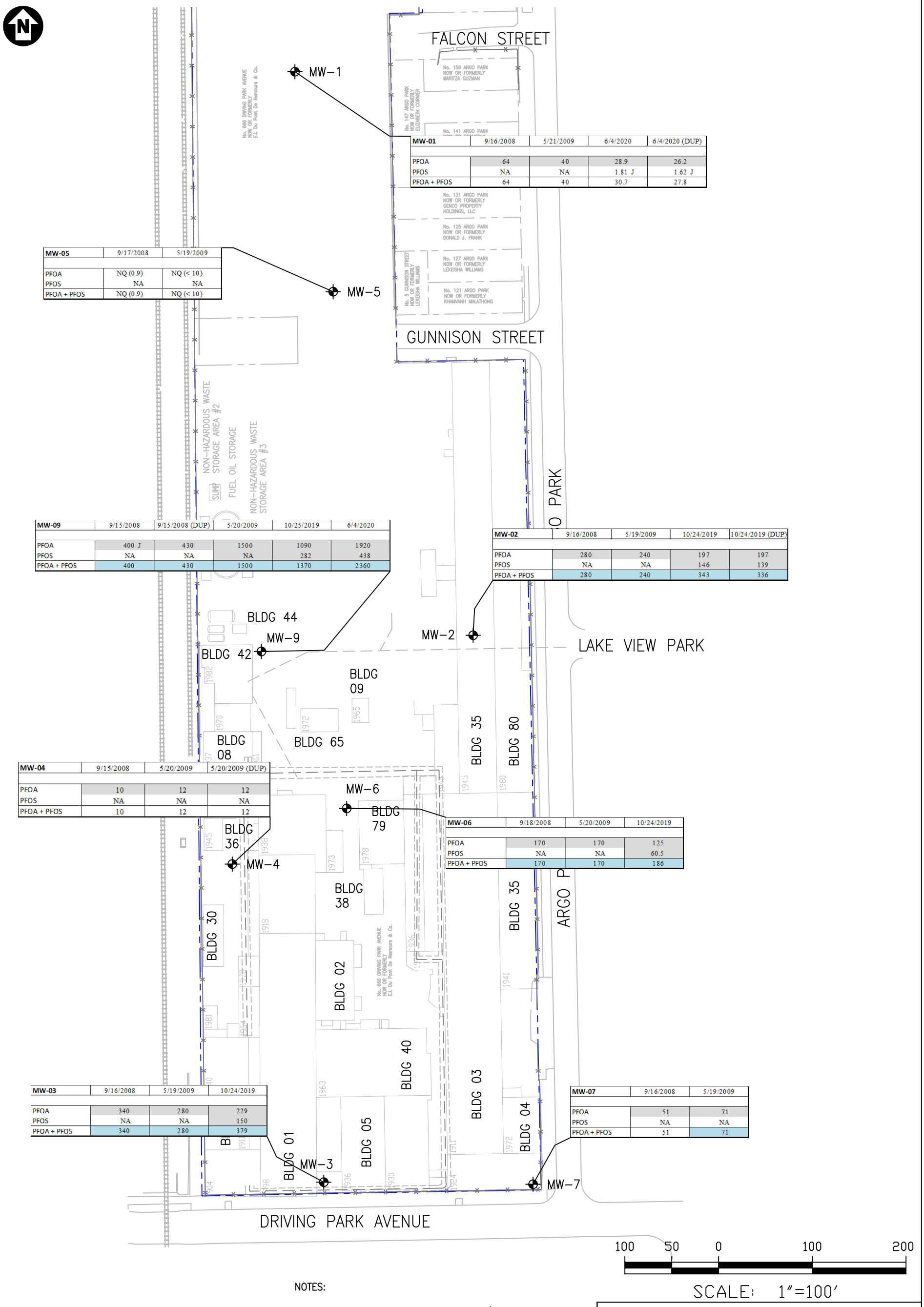
FIGURE 3

CORTEVA
666 DRIVING PARK SITE
ROCHESTER, NEW YORK

POTENTIOMETRIC SURFACE MAP
JUNE 04, 2020

PARSONS
301 PLAINFIELD ROAD * SUITE 350 * SYRACUSE, NY 13212 * 315/451-9560
OFFICES IN PRINCIPAL CITIES

FILE NAME: P:\DUPONT PROGRAM\ROCHESTER DRIVING PARK\CAD\CORTEVA\FIGURE\452278-SK003.DWG
PLOT DATE: 07/24/2020 PLOTTED BY: MIKOCHIK, JAMES



MW-01	9/16/2008	5/21/2009	6/4/2020	6/4/2020 (DUP)
PFOA	64	40	28.9	26.2
PFOS	NA	NA	1.81 J	1.62 J
PFOA + PFOS	64	40	30.7	27.8

MW-05	9/17/2008	5/19/2009
PFOA	NQ (0.9)	NQ (< 10)
PFOS	NA	NA
PFOA + PFOS	NQ (0.9)	NQ (< 10)

MW-09	9/15/2008	9/15/2008 (DUP)	5/20/2009	10/25/2019	6/4/2020
PFOA	400 J	430	1500	1090	1920
PFOS	NA	NA	NA	282	438
PFOA + PFOS	400	430	1500	1370	2360

MW-02	9/16/2008	5/19/2009	10/24/2019	10/24/2019 (DUP)
PFOA	280	240	197	197
PFOS	NA	NA	146	139
PFOA + PFOS	280	240	343	336

MW-04	9/15/2008	5/20/2009	5/20/2009 (DUP)
PFOA	10	12	12
PFOS	NA	NA	NA
PFOA + PFOS	10	12	12

MW-06	9/18/2008	5/20/2009	10/24/2019
PFOA	170	170	125
PFOS	NA	NA	60.5
PFOA + PFOS	170	170	186

MW-03	9/16/2008	5/19/2009	10/24/2019
PFOA	340	280	229
PFOS	NA	NA	150
PFOA + PFOS	340	280	379

MW-07	9/16/2008	5/19/2009
PFOA	51	71
PFOS	NA	NA
PFOA + PFOS	51	71

MONITORING WELL LOCATION

SITE BOUNDARY

NOTES:

1. ALL ANALYTICAL RESULTS ARE IN ng/L
SCREENING CRITERIA – A) USEPA LIFETIME HEALTH ADVISORY, B) NYSDEC GUIDELINES FOR SAMPLING AND ANALYSIS OF PFAS, JAN 2020.

PFOA – PERFLUOROOCTANOIC ACID
PFOS – PERFLUOROOCTANESULFONIC ACID
DUP – DUPLICATE SAMPLE
NA – NOT ANALYZED FOR INDICATED COMPOUND
NQ – NOT QUANTIFIABLE, DETECTED BETWEEN LOD AND LOQ
J – ESTIMATED VALUE
RESULT EXCEEDS USEPA LIFETIME HEALTH ADVISORY
RESULT EXCEEDS NYSDEC GUIDANCE VALUE

FIGURE 4

CORTEVA
666 DRIVING PARK SITE
ROCHESTER, NEW YORK

PFOA AND PFOS GROUNDWATER SAMPLE RESULTS 2008 – 2020

PARSONS
301 PLAINFIELD ROAD * SUITE 350 * SYRACUSE, NY 13212 * 315/451-9560
OFFICES IN PRINCIPAL CITIES

FILE NAME: P:\DUPONT PROGRAM\ROCHESTER DRIVING PARK\CAD\CORTEVA\FIGURE\452278-SK004.DWG
PLOT DATE: 10/20/2020 2:17 PM PLOTTED BY: MIKOCHIK, JAMES

ATTACHMENT A - Monitoring Well Development Records

Monitoring Well Development Log

			Zack Cornish, Peter		
Date	05/12/20	Personnel	Scharfschwerdt	Weather	Sunny, 40's°
Site Name	Corteva Driving Park	Evacuation Method	Waterra	Well #	MW-1
Site Location	Rochester, NY	Sampling Method	N/A	Project #	452278.02020

Well information:

Depth of Well	26.85 ft.	*Measurements taken from:	
Depth to Water	11.14 ft.	x	Top of Well Casing
H_{wc}	15.71 ft.		Top of Protective Casing
Depth to Intake	~1 ft from bottom		(Other, Specify)

One Well Volume:					10 Volumes	
2-Inch Casing:		Ft. of Water x 0.16 =		Gal		
3-Inch Casing:		Ft. of Water x 0.36 =		Gal		
4-Inch Casing:	15.71	Ft. of Water x 0.65 =	10.21	Gal	102.1	Gal

Start Purge Time: 0845

Approx. Well Volumes	Volume Removed (gallons)	Temperature (celsius)	pH (s.u)	Conductivity (ms/cm)	Turbidity	Approximate Flow Rate (L/min)	Depth To Water (ft.)	Appearance of water
Start	2	10.79	4.62	1.14	255	1.0	13.1	Brown
1	10	9.24	4.42	0.883	61.2	1.0	13.51	Brown Tint
2	20	9.03	4.11	0.637	22.6	0.75	11.60	Clear
3	30	10.54	4.39	1.24	21.3	1.0	11.77	Clear
4	40	10.54	4.39	1.24	21.3	1.0	11.70	Clear
5	50	12.72	4.58	1.46	14.3	1.0	11.68	Clear
6	60	12.58	4.69	1.49	12.1	1.0	11.69	Clear

End Purge Time: 1245

Comments: At 12 gallons purged, moved check valve up one foot. At 24 gallons purged, moved check valve up one foot.

Observations:

Total volume of purged water removed: 60 (gallons)

Physical appearance at start:		Physical appearance at start:	
Color	silty brown	Color	clear
Odor	none	Odor	none
Sheen/Free Product	none	Sheen/Free Product	none

Monitoring Well Development Log

Date	05/12/20	Personnel	Zack Cornish, Peter Scharfschwerdt	Weather	Sunny, 40's°
Site Name	Corteva Driving Park	Evacuation Method	Waterra	Well #	MW-5
Site Location	Rochester, NY	Sampling Method	N/A	Project #	452278.02020

Well information:

Depth of Well	26.7 ft.	*Measurements taken from:		
Depth to Water	9.6 ft.		x	Top of Well Casing
H_{wc}	17.1 ft.			Top of Protective Casing
Depth to Intake	~19 ft.*			(Other, Specify)

One Well Volume:					10 Volumes	
2-Inch Casing:		Ft. of Water x 0.16 =		Gal		
3-Inch Casing:		Ft. of Water x 0.36 =		Gal		
4-Inch Casing:	17.1	Ft. of Water x 0.65 =	11.12	Gal	111.2	Gal

Start Purge Time: 0845

Approx. Well Volumes	Volume Removed (gallons)	Temperature (celsius)	pH (s.u)	Conductivity (ms/cm)	Turbidity	Approximate Flow Rate (L/min)	Depth To Water (ft.)	Appearance of water
Start	1	12.12	4.68	1.92	>1000	1.0	9.6	Brown
1	8	NA	NA	NA	NA	NA	18	Brown
2								
3								
4								
5								
6								

End Purge Time: 1600

Comments: Pumped well dry, gave well time to recharge 2 feet. Pumped well dry again, well recharged 1.5 feet. Pumped well dry for third time, 8 gallons purged total.
*Unable to move HDPE tubing and check valve beyond ~19 ft - encountered obstruction at depth.

Observations:

Total volume of purged water removed: 8 (gallons)

Physical appearance at start:		Physical appearance at start:	
Color	silty brown	Color	silty brown
Odor	none	Odor	none
Sheen/Free Product	none	Sheen/Free Product	none

ATTACHMENT B - Groundwater Sampling Records

Low Flow Ground Water Sampling Log

Date	06/04/20	Personnel	Zack Cornish, Jim Mikochik	Weather	sunny, low 80s, wind 5mph
Site Name	Corteva Driving Park	Evacuation Method	peristalic pump	Well #	MW-01
Site Location	Rochester, NY	Sampling Method	low flow	Project #	452278.02021

Well information:

Depth of Well	26.39 ft.	*Measurements taken from:		
Depth to Water	12.22 ft.		x	Top of Well Casing
H_{wc}	14.17 ft.			Top of Protective Casing
Depth to Intake	~20 ft.			(Other, Specify)

Start Purge Time: 0920

		10%	0.1	3%	10 mV	10%	10%	100 - 500 mL/min
Elapsed Time (min)	**Depth to Water (ft)**	**Temperature (celsius)**	**pH**	**Conductivity (ms/cm)**	**Oxidation Reduction Potential**	**Dissolved Oxygen (mg/L)**	**Turbidity (NTU)**	**Flow Rate (mL/min)**
5	12.43	--	--	--	--	--	--	200
10	12.62	20.66	7.09	0.928	-119	0.00	5.49	150
15	12.57	20.93	7.17	0.939	-136	0.00	4.98	150
20	12.56	21.12	7.18	0.936	-138	0.00	4.18	150
25	12.62	21.20	7.19	0.932	-135	0.00	4.73	175
30	12.58	21.30	7.21	0.927	-142	0.25	5.76	175
35	12.59	21.37	7.21	0.922	-142	0.40	6.45	175
40	12.63	21.35	7.22	0.916	-143	0.35	6.39	175
45	12.65	21.32	7.20	0.912	-140	0.30	6.15	175

End Purge Time: 1005

Water Sample

Time Collected: 1015

Total volume of purged water removed: ~3.5 (gallons)

Physical appearance at start:

Color clear

Odor none

Sheen/Free Product none

Physical appearance at start:

Color clear, faint orange color

Odor none

Sheen/Free Product none

Samples:

GW0620_MW-01	Standard Sample
GW0620_MW-01D	Duplicate sample
GW0620_MW-01MS	Matrix spike
GW0620_MW-01MSD	Matrix spike duplicate

Comments:

PID reading from well headspace = 0.0 ppm

Sample	Container Type	# Collected	Field Filtered	Preservative	Container pH
PFAS - EPA 537	Plastic 250mL	8	no	None	N/A

Low Flow Ground Water Sampling Log

Date	06/04/20	Personnel	Zack Cornish, Jim Mikochik	Weather	sunny, low 80s, wind 5mph
Site Name	Corteva Driving Park	Evacuation Method	peristalic pump	Well #	MW-05
Site Location	Rochester, NY	Sampling Method	low flow	Project #	452278.02021

Well information:

Depth of Well	18.9 ft.	*Measurements taken from:		
Depth to Water	10.99 ft.		x	Top of Well Casing
H_{wc}	7.91 ft.			Top of Protective Casing
Depth to Intake	18.5 ft.			(Other, Specify)

Start Purge Time: 1115

		10%	0.1	3%	10 mV	10%	10%	100 - 500 mL/min
Elapsed Time (min)	**Depth to Water (ft)**	**Temperature (celsius)**	**pH**	**Conductivity (ms/cm)**	**Oxidation Reduction Potential**	**Dissolved Oxygen (mg/L)**	**Turbidity (NTU)**	**Flow Rate (mL/min)**
5	11.4	--	--	--	--	--	--	250
10	11.66	24.09	7.61	1.47	-247	0.00	472	150
15	11.81	24.62	7.65	1.52	-260	0.00	218	150
20	12.05	24.56	7.70	1.51	-270	0.00	176	150
25	12.32	24.28	7.75	1.50	-278	0.00	144	150
30	12.71	24.23	7.81	1.49	-289	0.00	148	150
35	13.00	24.15	7.85	1.48	-296	0.00	129	150
40	13.18	23.95	7.86	1.49	-298	0.00	123	150
45	13.39	24.06	7.88	1.49	-301	0.00	105.7	150
50	13.74	24.30	7.88	1.49	-304	0.00	87.1	150
55	14.01	24.38	7.89	1.50	-306	0.00	199	150
60	14.25	25.08	7.85	1.49	-296	0.00	192	150
65	14.28	26.43	7.76	1.51	-300	0.00	182	150
70	14.41	27.15	7.76	1.57	-300	0.00	213	150
75	14.72	27.54	7.80	1.52	-304	0.00	90.5	150
80	14.91	27.63	7.78	1.52	-300	0.00	72.4	150
85	15.00	27.64	7.79	1.51	-303	0.00	64.1	150
90	15.35	28.23	7.83	1.47	-308	0.00	62.6	150
95	15.45	28.24	7.82	1.47	-306	0.00	62.9	150
100	15.69	28.36	7.82	1.47	-309	0.00	56.7	150
105	15.85	28.47	7.80	1.46	-306	0.00	54.2	150
110	16.02	28.64	7.79	1.49	-309	0.00	51.6	150
115	16.24	28.92	7.77	1.50	-308	0.00	51.7	150

End Purge Time: 1310

Water Sample

Time Collected: 1315

Total volume of purged water removed: ~3.75 (gallons)

Physical appearance at start:

Color brown, turbid

Odor none

Sheen/Free Product none

Physical appearance at start:

Color brown to orange, cloudy to clear

Odor none

Sheen/Free Product none

Samples:

GW0620_MW-05 Standard Sample

Comments:

PID reading from well headspace = 0.0 ppm

Water level meter and tubing will not reach past 18.9 ft. Per well records, should be ~31 ft.

Sample	Container Type	# Collected	Field Filtered	Preservative	Container pH
PFAS - EPA 537	Plastic 250mL	2	no	None	N/A

Low Flow Ground Water Sampling Log

Date	06/04/20	Personnel	Zack Cornish, Jim Mikochik	Weather	sunny, low 80s, wind 5mph
Site Name	Corteva Driving Park	Evacuation Method	peristalic pump	Well #	MW-09
Site Location	Rochester, NY	Sampling Method	low flow	Project #	452278.02021

Well information:

Depth of Well	22.13 ft.	*Measurements taken from:		
Depth to Water	13.88 ft.		x	Top of Well Casing
H_{wc}	8.25 ft.			Top of Protective Casing
Depth to Intake	18 ft.			(Other, Specify)

Start Purge Time: 1340

		10%	0.1	3%	10 mV	10%	10%	100 - 500 mL/min
Elapsed Time (min)	**Depth to Water (ft)**	**Temperature (celsius)**	**pH**	**Conductivity (ms/cm)**	**Oxidation Reduction Potential**	**Dissolved Oxygen (mg/L)**	**Turbidity (NTU)**	**Flow Rate (mL/min)**
5	14.68	21.20	7.84	0.966	-26	0.00	4.97	150
10	14.69	20.95	7.80	1.01	-44	0.00	3.94	150
15	14.70	21.29	7.79	1.01	-53	0.00	5.33	150
20	14.70	21.58	7.78	1.01	-56	0.00	4.58	150
25	14.71	21.17	7.75	1.01	-63	0.00	4.01	150
30	14.72	20.94	7.73	1.01	-65	0.00	3.86	150
35	14.72	20.58	7.67	1.01	-65	0.00	4.12	150
40	14.72	20.32	7.65	1.02	-65	0.00	4.57	150
45	14.72	20.22	7.64	1.02	-67	0.00	4.40	150

End Purge Time: 1425

Water Sample

Time Collected: 1430

Total volume of purged water removed: ~1.5 (gallons)

Physical appearance at start:

Color: slightly turbid
Odor: none
Sheen/Free Product: none

Physical appearance at start:

Color: clear
Odor: none
Sheen/Free Product: none

Samples:

GW0620_MW-09 Standard Sample

Comments:

PID reading from well headspace = 0.0 ppm

Sample	Container Type	# Collected	Field Filtered	Preservative	Container pH
PFAS - EPA 537	Plastic 250mL	2	no	None	N/A

ATTACHMENT C - Data Usability Summary Report

DATA USABILITY SUMMARY REPORT

JUNE 2020 GROUNDWATER SAMPLING ROCHESTER DRIVING PARK AVENUE SITE

NYSDEC SITE # C828142

Prepared For:

Corteva Agriscience™

Chestnut Run Plaza 735 / 1115-1974 Centre Road

Wilmington, DE 19805

Prepared By:

PARSONS

301 Plainfield Road, Suite 350
Syracuse, New York 13212

AUGUST 2020

TABLE OF CONTENTS

LIST OF ATTACHMENTS

SECTION 1 DATA USABILITY SUMMARY

Groundwater samples were collected from the Corteva Driving Park Avenue site on June 4, 2020. Analytical results from these samples were validated and reviewed by Parsons for usability with respect to the following requirements:

- Project Work Plan,
- USEPA analytical methodologies, and
- NYSDEC Guidelines for Sampling and Analysis of PFAS, dated January 2020.

The analytical laboratory for this project was Alpha Analytical. This laboratory is certified to perform project analyses through the New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP).

1.1 Laboratory Data Packages

The laboratory data package turnaround time, defined as the time from sample receipt by the laboratory to receipt of the analytical data packages by Parsons, was 14 days for the project samples. The data packages received from Alpha Analytical were paginated, complete, and overall were of good quality. Comments on specific quality control (QC) and other requirements are discussed in detail in the attached data validation report which is summarized in Section 2.

1.2 Sampling and Chain-of-Custody

The samples were collected, properly preserved, shipped under a chain-of-custody (COC) record, and received at Alpha Analytical within one day of sampling. All samples were received intact and in good condition at the laboratory.

1.3 Laboratory Analytical Methods

Groundwater samples that were collected from the site were analyzed for per- and poly-fluorinated alkyl substances (PFAS). Summaries of issues concerning these laboratory analyses are presented in Subsection 1.3.1. The data qualifications resulting from the data validation review and statements on the laboratory analytical precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS) are discussed in Section 2. The laboratory data were reviewed and may be qualified with the following validation flags:

"U" - not detected at the value given,
"UJ" - estimated and not detected at the value given,
"J" - estimated at the value given,
"J+" - estimated biased high at the value given,
"J-" - estimated biased low at the value given,
"N" - presumptive evidence at the value given, and
"R" - unusable value.

The validated laboratory data were tabulated and are presented in Attachment A.

1.3.1 PFAS Organic Analysis

The project samples were analyzed for PFAS using the modified USEPA 537.1 analytical method. The reported results for these samples did not require qualification resulting from data validation. The reported PFAS analytical results were considered 100% complete (i.e., usable) for the project data presented by Alpha Analytical. PARCCS requirements were met.

SECTION 2.0 DATA VALIDATION REPORT

2.1 GROUNDWATER

Data review has been completed for data packages generated by Alpha Analytical containing groundwater samples collected from the site. Analytical results from these samples were contained within sample delivery group (SDG) L2023258. All of these samples were properly preserved, shipped under a COC record, and received intact by the analytical laboratory. The validated laboratory data are presented in Attachment A.

Data validation was performed for all samples in accordance with the analytical methodology and the NYSDEC Guidelines for Sampling and Analysis of PFAS. This data validation and usability report is presented by analysis type.

2.1.1 PFAS

The following items were reviewed for compliancy in the PFAS analysis:

- Custody documentation
- Holding times
- Surrogate recoveries
- Matrix spike/matrix spike duplicate (MS/MSD) precision and accuracy
- Laboratory control sample (LCS) recoveries
- Laboratory method blank and equipment/field blank contamination
- Instrument performance
- Initial and continuing calibrations
- Internal standard responses
- Field duplicate precision
- Sample result verification and identification
- Quantitation limits
- Data completeness

These items were considered compliant and acceptable in accordance with the validation protocols with the exception of surrogate recoveries, MS/MSD precision and accuracy, blank contamination, and continuing calibrations as discussed below.

Surrogate Recoveries

All sample surrogate recoveries were considered acceptable and within QC limits with the exception of the high M2-8:2 FTS (QC limit 7-170%R) in sample GW0620-MW-09 (195%R). Validation qualification was not required for this sample.

MS/MSD Precision and Accuracy

All MS/MSD precision (relative percent difference; RPD) and accuracy (percent recovery; %R) measurements were considered acceptable and within QC limits for designated spiked project samples with the exception of the high MS/MSD precision results for NEtFOSAA (40%RPD; QC limit 0-30%RPD) and NMeFOSAA (32%RPD; QC limit 0-30%RPD) during the spiked analyses of sample GW0620-MW-01. Validation qualification of the parent sample was not required.

Blank Contamination

The QC equipment blank associated with the samples contained PFHxA below the reporting limit at a concentration 0.38 ng/L. Validation qualification was not required for the affected samples.

Continuing Calibrations

All continuing calibration compounds were considered acceptable with percent recoveries within 70-130% with the exception of PFHpS (132.5%R) and PFDS (133.1%R) in the continuing calibration associated with all samples with the exception of GW0620-MW-09. Validation qualification of these samples was not required.

It was noted that PFOA, PFOS, and NEtFOSAA exceeded instrument calibration ranges in sample GW0620-MW-09. Therefore, this sample was reanalyzed at a dilution and results for these compounds from the reanalysis are reported in the validated laboratory data in Attachment A.

Usability

All PFAS sample results were considered usable following data validation.

Summary

The quality assurance objectives for measurement data included considerations for precision, accuracy, representativeness, completeness, comparability, and sensitivity. The PFAS data presented by Alpha Analytical were 100% complete (i.e., usable). The validated PFAS laboratory data are tabulated and presented in Attachment A.

ATTACHMENT A – VALIDATED LABORATORY DATA

			Location ID	EB	FIELD BLANK	MW-01	MW-01	MW-09
			Field Sample ID	GW0620-EB-01	GW0620-FB-01	GW0620-MW-01-D	GW0620-MW-01	GW0620-MW-09
			Date Sampled	06/04/2020	06/04/2020	06/04/2020	06/04/2020	06/04/2020
			Lab Sample ID	L2023258-04	L2023258-03	L2023258-02	L2023258-01	L2023258-06
			Sample Delivery Group (SDG)	L2023258	L2023258	L2023258	L2023258	L2023258
			Sample Purpose	EB	FB	DUP	FS	FS
Parameter Name	Analytical Method	Filtered	Report Units	Report Result	Report Result	Report Result	Report Result	Report Result
Perfluorobutane Sulfonic Acid	537 Modified	N	NG/L	<0.224	<0.228	**2.02**	**2.2**	**64.9**
Perfluorobutanoic Acid	537 Modified	N	NG/L	<0.384	<0.392	**38.5**	**40.3**	**47.6**
Perfluorodecanoic Acid	537 Modified	N	NG/L	<0.286	<0.292	<0.295	<0.285	**0.371 J**
Perfluorododecanoic Acid	537 Modified	N	NG/L	<0.35	<0.357	<0.361	<0.348	<0.345
Perfluoroheptanoic Acid	537 Modified	N	NG/L	<0.212	<0.216	**4.31**	**4.72**	**243**
Perfluorohexane Sulfonic Acid	537 Modified	N	NG/L	<0.354	<0.361	**3.73**	**4.31**	**68.5**
Perfluorohexanoic Acid	537 Modified	N	NG/L	**0.38 J**	<0.315	**5.06**	**5.35**	**194**
Perfluorononanoic Acid	537 Modified	N	NG/L	<0.294	<0.3	<0.303	<0.292	**9.44**
Perfluoropentanoic Acid	537 Modified	N	NG/L	<0.373	<0.38	**3.73**	**4.07**	**78.3**
Perfluoroundecanoic Acid	537 Modified	N	NG/L	<0.245	<0.25	<0.252	<0.244	<0.241
PFOA	537 Modified	N	NG/L	<0.222	<0.227	**26.2**	**28.9**	**1920**
PFOS	537 Modified	N	NG/L	<0.474	<0.484	**1.62 J**	**1.81 J**	**438**
Total PFOA and PFOS	537 Modified	N	NG/L	<0.222	<0.227	**27.8**	**30.7**	**2360**
Perfluorodecane Sulfonic Acid	537 Modified	N	NG/L	<0.923	<0.941	<0.951	<0.918	<0.91
Perfluorotetradecanoic Acid	537 Modified	N	NG/L	<0.233	<0.238	<0.241	<0.232	<0.23
Perfluorotridecanoic Acid	537 Modified	N	NG/L	<0.308	<0.314	<0.318	<0.306	<0.304
1H,1H,2H,2H-perfluorodecanesulfonate (8:2 FTS)	537 Modified	N	NG/L	<1.14	<1.16	<1.18	<1.14	<1.12
6:2 Fluorotelomer sulfonate	537 Modified	N	NG/L	<1.25	<1.28	<1.29	<1.25	**1.78 J**
N-ethyl perfluorooctane sulfonamidoacetic acid	537 Modified	N	NG/L	<0.757	<0.772	<0.780	<0.753	**407**
N-methyl perfluorooctane sulfonamidoacetic acid	537 Modified	N	NG/L	<0.610	<0.622	<0.629	<0.607	**1.10 J**
Perfluoroheptane sulfonic acid (PFHpS)	537 Modified	N	NG/L	<0.648	<0.66	<0.668	<0.645	**13.4**
Perfluorooctane Sulfonamide	537 Modified	N	NG/L	<0.546	<0.557	<0.563	<0.543	**26.2**