day
DAY ENVIRONMENTAL, INC.

ENVIRONMENTAL CONSULTANTS
AN AFFILIATE OF DAY ENGINEERING, P.C.

July 13, 2015

Mr. Eugene Melnyk
Division of Environmental Remediation
New York State Department of Environmental Conservation
270 Michigan Avenue
Buffalo, New York 14203-2899

Re: Remedial Action Work Plan Supplement: Preferential Contaminant Flow Pathway
Anderson Cleaners Site
Jamestown, New York
Brownfield Cleanup Program Site #C907027

Dear Mr. Melnyk:

Day Environmental, Inc. (DAY) prepared this letter on behalf of Anderson Cleaners (Anderson) describing supplemental remedial measures to address the apparent preferential contaminant flow pathway identified in the vicinity of a 21-inch storm sewer line at the Anderson Cleaners facility located on 5 Hunt Road, Jamestown, New York (the Site). A project locus map is included as Figure 1.

In accordance with the staged remediation program developed under the NYSDEC-approved Remedial Action Work Plan (RAWP, dated March 2013) for this Site, the proposed supplemental remedial measures described herein are intended to assist in remediation of groundwater in an area of apparent preferential flow that has the potential to migrate away from the Site through a gap in the permeable reactive barrier (PRB) that was installed in July 2013.

Background

The Site consists of approximately 2.4 acres of land located partially in the City of Jamestown and partially in the Town of Ellicott, New York. As described in the RAWP, dry cleaning operations at the Site were conducted using Stoddard solvent (1947-1978) and perchloroethene (1978-2002). The Remedial Investigation (RI) conducted at the Site identified the contaminants of concern (COC) to include Dense Non-Aqueous Phase Liquid (DNAPL), or undissolved perchloroethene (PCE), that acts as a source material for PCE and the following breakdown products detected within the groundwater:

- trichloroethene (TCE);
- 1,1-dichloroethene (1,1 DCE);
- trans-1, 2-dichloroethene (trans-1, 2 DCE);
- cis-1, 2-dichloroethene (cis-1,2 DCE); and
- vinyl chloride (VC).

The March 2013 RAWP describes a staged remediation approach that includes the following:

- DNAPL Extraction intended to physically remove undissolved PCE that serves as a source material for dissolved phase PCE and associated breakdown products that migrate through the groundwater, and potentially other media.

- Plume Containment via a PRB installed with the DNAPL Extraction to preclude off-site contaminant migration of COC.

- Chemical Oxidation used as a polishing step after DNAPL is extracted to the extent possible to remove the PCE source.

- If deemed necessary, In-Situ Bioremediation after the DNAPL source zone is adequately addressed.

To date, DNAPL Extraction has been completed to the extent possible and Plume Containment activities have been initiated. This supplement to the RAWP describes the installation of injection wells and subsequent treatment of groundwater via chemical oxidation in the apparent preferential contaminant flow pathway area described below.

Based on previous studies, a zone of coarse grained soil (i.e., gravel and coarse sand) is present in the vicinity of containment well CW-4 at depths starting around 10 feet (ft.) below ground surface (bgs) and extending to depths of approximately 15 ft. bgs. It is suspected that this coarse grained soil layer may be a depositional feature of a former drainage channel/stream that extends along the path of the 21-inch diameter storm sewer that crosses the Site from the northwest (Hunt Road) to southeast (Huxley Street). It is further suspected that the coarse grained soil may be the cause of the apparent preferential contaminant flow pathway identified by the elevated chlorinated volatile organic compound (VOC) concentrations measured in samples collected from CW-4 subsequent to the remedial activities conducted in July 2013.

Injection Well Installation and Development

Eight one-inch diameter overburden injection wells (i.e., designated IW-through IW-8) will be installed in the approximate locations depicted on Figure 2. The field locations of injection wells IW-1 through IW-8 will be dependent upon access limitations, buried utilities, etc. The boreholes for these injection wells will be advanced to depths of approximately 15 ft. bgs.

A subcontractor will be retained to provide a direct push drill-rig, crew and materials to install the injection wells. The wells will be advanced using direct push methods, and macrocore samples will be collected in four-foot intervals to evaluate soil types and the presence of contamination. Each injection well will be constructed of one-inch diameter PVC riser connected to a 5 ft. long flush-coupled, No. 10 slot well screen of the same diameter. The well screen will be installed between depth of 10 ft. and 15 ft. bgs, or to intersect the zone of coarse grained soil described above, if identified at different depths. The well screen will be surrounded

by a sand pack extending approximately 2 ft. above the top of the screen. A minimum two-foot thick bentonite seal will be installed above the sand pack, and cement/grout will be placed above the bentonite seal extending to at least one foot below grade. Each injection well will be completed at the surface with a flush-mounted road box.

Information recorded during the advancement of the injection wells will include:

- Date, boring identification, and project identification.
- Name of individual developing the log.
- Name of drilling company.
- Drill rig make and model.
- Identification of any alternative drilling methods used.
- Depths recorded in feet and fractions thereof (tenths of feet) referenced to ground surface.
- The length of the sample interval and percentage of sample recovered.
- The depth of the first encountered water table, along with the method of determination, referenced to the ground surface.
- Drilling and borehole characteristics.
- Sequential stratigraphic boundaries.
- Photoionization Detector (PID) screening results of ambient headspace air above selected samples.

Re-usable drilling equipment will be decontaminated between wells by washing using a detergent wash and potable water rinse. The decontamination liquids will be pumped into the activated carbon treatment system (i.e., installed at the Site as part of the DNAPL extraction system), and subsequently discharged into the sanitary sewer system.

Approximately one week after well installation, injection wells IW-1 through IW-8 will be developed to remove sediment that may have accumulated in the wells during installation. Well development will be performed utilizing a gasoline powered pump. The well development will continue until the turbidity of the water improves and/or stabilized water levels are maintained during development. Groundwater generated during the development process will be stored in a labeled 55-gallon drum, treated via the activated carbon treatment system, and subsequently discharged into the sanitary sewer system.

Groundwater Treatment Injections

In-situ chemical oxidation will be used to address residual contamination in the area of the injection wells described above. A solution of potassium permanganate (i.e., a minimum 2.5% solution) will be injected into injection wells IW-1 through IW-8. Potassium permanganate is a strong oxidizer that breaks down organic compounds such as contaminants of concern at the Site, including PCE, TCE, DCE, and VC, into their elemental components.

Prior to the injections, the United States Environmental Protection Agency (USEPA) will be contacted, and an Underground Injection Control (UIC) program inventory of injection wells

form (EPA Form 7520-16) will be submitted. In addition, the City of Jamestown Board of Public Utilities will be contacted to inform them of the proposed injections. Assuming the necessary approvals are obtained and the injections are allowed, the actions described below will be completed.

The potassium permanganate solution will be mixed onsite in a 300-gallon tote, using methodologies to minimize personnel contact and respiratory exposure risks. Personnel health and safety procedures will be the same as those approved for use in handling and management of PCE recovered during completion of the DNAPL extraction activities, and as described in the Health and Safety Plan (HASP) provided as part of the RAWP for these activities. In addition to the RAWP HASP protocols, the following precautions will also be implemented for this stage work:

- To respond to potential personnel exposure emergencies, a neutralizer solution of water, hydrogen peroxide and white distilled vinegar will be maintained on site in spray bottles for emergency application to skin exposure as needed.

- Sodium thiosulfate will also be maintained onsite for neutralization of potassium permanganate spills that may occur.

Initially, the chemical injections will be introduced using a passive (non-pressurized) process wherein an aqueous solution of soluble potassium permanganate is slowly released into each of the injection wells shown in Figure 2. To assure even distribution of the chemical, the permanganate solution will be gravity applied and the application rate of the solution will be controlled through use of a needle valve to slowly release the chemical through tubing into each well, until a minimum amount of 47.5 lbs of potassium permanganate has been applied to each of the eight injection wells (i.e., a total of 380 lbs). The chemical applied at each well will passively diffuse into the groundwater table, oxidizing any organic content that it contacts. [Note: In the event that the required amount of potassium permanganate solution cannot be introduced via a passive process, alternative methods to inject the potassium permanganate will be utilized (e.g., pumping the solution under pressure, placing a stronger solution of potassium permanganate into the wells, installing larger diameter wells, etc.). If such methods, are required a revision to this work plan will be prepared and submitted to the NYSDEC.]

It is anticipated that three rounds of the injection event described above will be needed to sufficiently treat the preferential contaminant flow pathway. A period of two months is proposed between the completion of each injection event, in order to evaluate the effectiveness of the prior injection event.

Effectiveness Monitoring

Prior to completing each subsequent injection event, a sample of groundwater will be collected from containment well CW-4. The sample will be observed for evidence of potassium permanganate (i.e., as indicated by a purple discoloration). In-situ measurements of groundwater level, pH, dissolved oxygen (DO), oxygen reduction potential (ORP), and specific conductance

will be collected, and a sample will be collected and submitted to an analytical laboratory and tested for halogenated volatile organic compounds (VOCs) using United States Environmental Protection Agency (USEPA) Method 8260. The results of the testing will be provided to the NYSDEC, along with recommendations for modification of subsequent injections events (as necessary). In addition, the long-term groundwater monitoring program described in the RAWP will be implemented to evaluate the cumulative effectiveness of the remedial actions.

Should you have questions or require further information, please feel free to call.

Very truly yours,
Day Environmental, Inc.

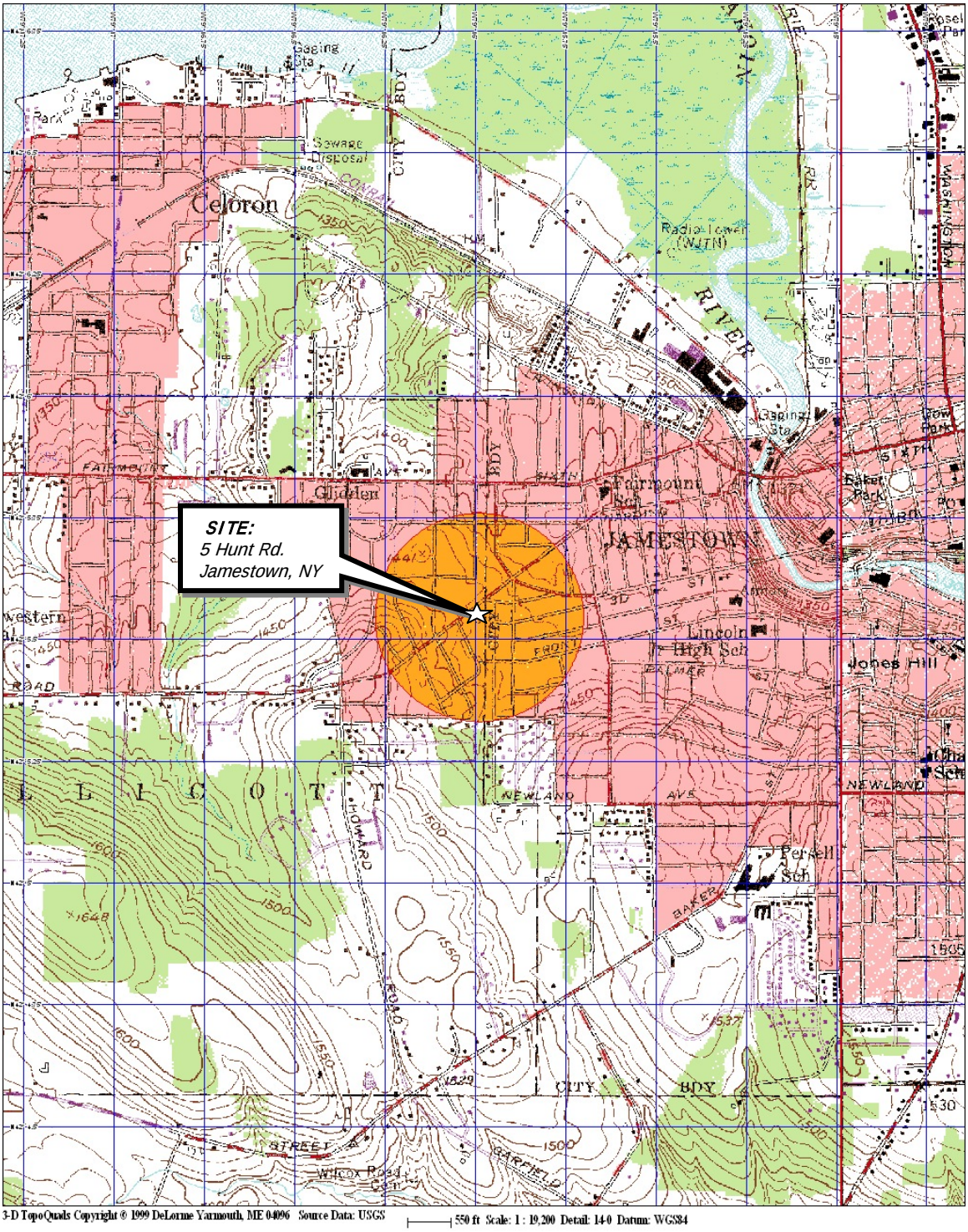
Raymond L. Kampff
Associate Principal

RLK/CAH0965

Figures

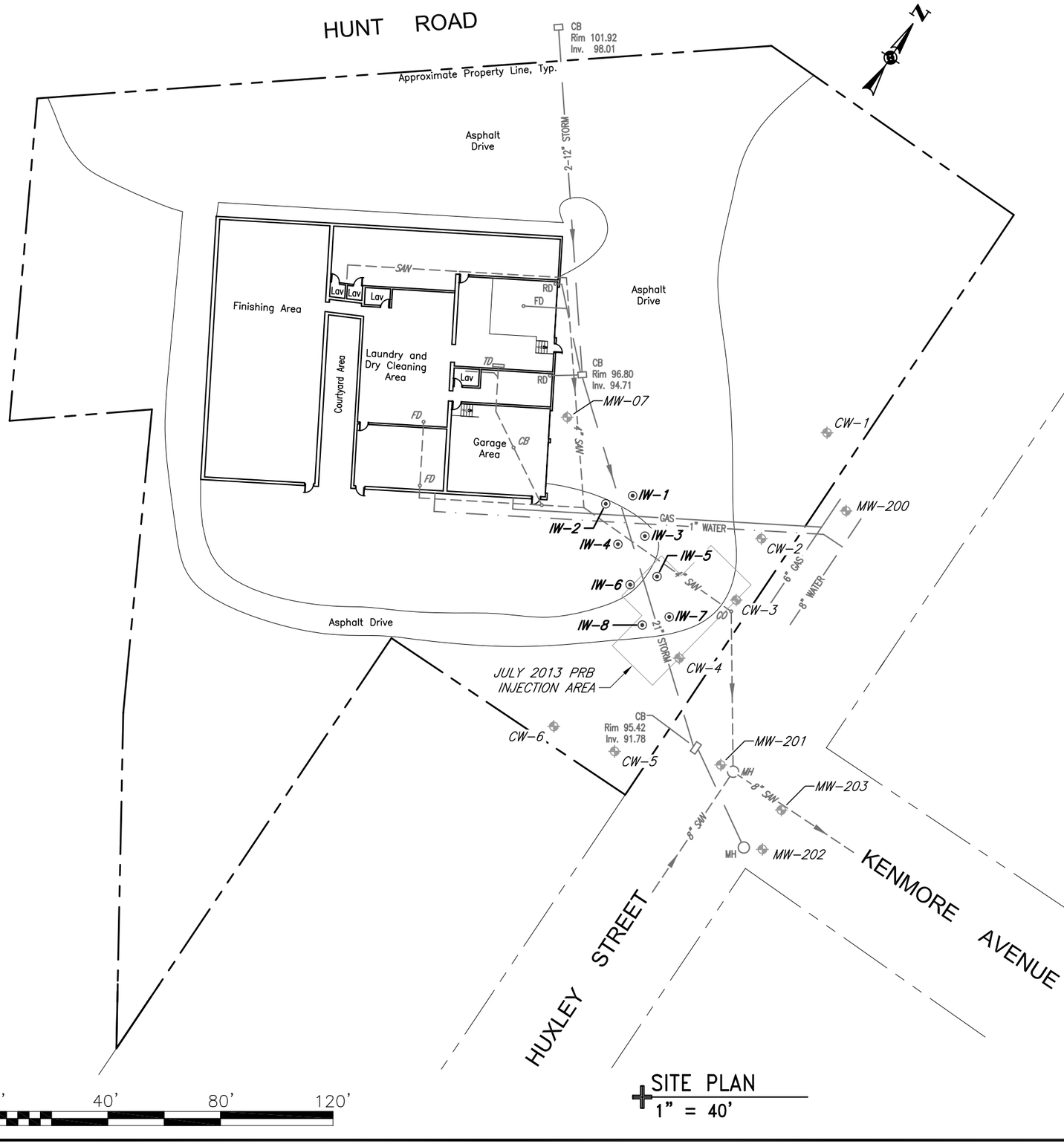
Figure 1 Project Locus Map
Figure 2 Site Plan – Proposed Preferential Containment Flow Pathway Injection Well Locations

cc: M. Lyons



Drawing Produced From: 3-D TopoQuads, DeLorme Map Co., referencing USGS quad map Lakewood (NY) 1979 and Jamestown (NY) 1979. Site Lat/Long: N42°05.55'– W79°16.00'

DATE **07-13-2015** DRAWN BY **RJM** SCALE **1" = 2000'**	day DAY ENVIRONMENTAL, INC. ENVIRONMENTAL CONSULTANTS ROCHESTER, NEW YORK 14606	PROJECT TITLE **5 HUNT ROAD** **JAMESTOWN, NEW YORK** **REMEDIAL ACTION WORK PLAN** **BCP #C907027** DRAWING TITLE **PROJECT LOCUS MAP**	PROJECT NO. **3563S-04** **FIGURE 1**



SITE PLAN
1" = 40'

LEGEND:

IW-1	Proposed Injection Well
CW-1	Overburden/Top of Till Monitoring Well
CB	Catch Basin
FD	Floor Drain
MH	Manhole
Rim 100.83	Rim Elevation In Feet
Inv. 95.55	Invert Elevation In Feet
RD	Roof Drain
TD	Trench Drain
6" GAS	Gas Line (Approx 2.5 feet below grade)
8" SAN	Sanitary Sewer (Approx 5–7 feet below grade)
STORM	Storm Sewer (Approx 4–6 feet below grade)
8" WATER	Water Line (Approx 5–7 feet below grade)

NOTES:

1. Site Plan produced from drawings by Habiterra Associates, Thorsell, Kennedy, Casker, Arnone & Hedin. P.C. entitled "Addition and Renovations, Anderson Cleaners, Inc", drawings A–1 Floor Plan dated October 22, 1985 and L–1 Grading Plan and from notes of site visits by representatives of Day Environmental, Inc.
2. Well locations MW–04, MW–06, MW–07 and MW–08 were obtained in the field by a Trimble GeoXT GPS. Other well and test boring locations were obtained by tape measurement from existing site structure. Locations should be considered accurate to the degree implied by the method used.
3. Utility locations were obtained in the field by a Trimble GeoXT GPS, from drawings referenced in Note 1, A 1967 map from Jamestown DPW showing the proposed location of a permanent easement for the purpose of constructing and maintaining a storm sewer from the existing catch basin on the west side of Huxley Street to the west city line, and from a 1951 DPW storm sewer filed book number 438S, page 107. Locations should be considered accurate to the degree implied by the method used.
4. Elevation survey data determined by Michael J. Rodgers, LS, PC, and referenced to an arbitrary site wide datum. Elevations should be considered accurate to the degree implied by the method used.
5. Approximate depths of gas line, sanitary sewer, storm sewer and water line were obtained from a hand drawn plan from "Jamestown Board of Public Utilities, Anderson Cleaners Sewer Connection Map", dated October 2, 1985.

PROJECT MANAGER	CAH
DRAWN BY	RJM
SCALE	As Noted
DATE	7-2015
DATE DRAWN	7-6-2015
DATE ISSUED	7-6-2015

DAY ENVIRONMENTAL, INC.
ENVIRONMENTAL CONSULTANTS
ROCHESTER, NEW YORK 14606
NEW YORK, NEW YORK 10170

PROJECT TITLE
5 HUNT ROAD
JAMESTOWN, NEW YORK

REMEDIAL ACTION WORK PLAN SUPPLEMENT

DRAWING TITLE
Site Plan Depicting Proposed Preferential Containment Flow Pathway Injection Well Locations

PROJECT NO.
3563S-04

FIGURE 2

Ref1:
Ref2:
Ref3:
Xerox432AnsiB–2; 11 x 17
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Pen Setting File: 80OpsFullcolor.ctb
Time Plotted: Monday, July 13, 2015 12:27:51 PM
File Name: U:\McPhee\Drawings\Brownfield\3563\EMR\Injection Well Site Plan.dwg