RILEYGROUP

April 14, 2020

Mr. David Wartena
Asset Management Director
Security Properties
701 5th Avenue
Seattle, Washington 98104

Subject: **Groundwater Monitoring Well Installation and Remedial Fluid Pilot Test Work Plan**
Augusta Apartments
4041 Roosevelt Way Northeast
Seattle, Washington 98105
RGI Proposal 2012-171-2

Dear Mr. Wartena:

This proposed groundwater monitoring well installation and remedial fluid pilot test (Pilot Test Work Plan) scope of work is based on the following:

- RGI's recent subsurface investigation findings and the occurrence of groundwater concentrations of gasoline- and diesel-range total petroleum hydrocarbons (TPH) and benzene. These concentrations in the shallow water bearing zone are one to two orders of magnitude above the MTCA Method A Cleanup Levels for Groundwater (WAC 173-340-720).
- Depth to the shallowest water bearing zone at existing groundwater monitoring wells MW7 and MW9 range between 3- to 4-ft. and 5.3- to 6.3-ft. below the lower level parking garage concrete slab-on-grade, respectively.
- Strategic discussions with Regenesis®, an in-situ remedial technology firm, regarding their recommended remedial alternatives (i.e., product) and other pilot test recommendations – including treatment area, mixing ratios, number of injection points, and volume of product injected/point.

PROPERTY VISIT

RGI visited the Property on August 9, 2019 to evaluate site access, overhead clearance, underground utilities, and other general observations. Based on our site observations:

- Egress/ingress to/from the lower level parking garage is accessible to our limited access direct-push drill rig, forklift (for transporting remedial product and mixing totes), and our concrete coring and utility locating service providers.
- Underground utilities were evident in lower parking garage level. Some of the apparent underground utilities observed in the proposed Pilot Test area include floor, footing, and storm drains. These underground utilities are shown on the attached Figure 1 (from *Plan Level P1 Sheet S2.0, prepared by Wolfe Plumbing Waste System AsBuilts*, dated 12/14/2016).

- The distance between the lower level parking garage concrete slab-on-grade and the overhead concrete ceiling (where exposed) is approximately 8-ft. 2 inches. However, most of the parking garage concrete ceiling is covered with an approximate 0.5-ft. to 0.7-ft. thick sound barrier/insulation. This barrier/insulation is flexible, and conceals piping, drains, and other conduit. The distance between the concrete slab-on-grade and the barrier/insulation is approximately 7.5-ft. The overhead clearance decreases as you approach the eastern wall of the parking garage (an overhead clearance of approximately 7.3-ft.).

The Work Plan includes installing up to three groundwater monitoring wells and up to 11 pilot test injection point locations as illustrated in the attached Figure 1. The Work Plan includes the following:

- At least 48 hours prior to drilling, RGI will mark proposed groundwater monitoring well and pilot test/injection point locations with white paint and contact One-Call and a third-party underground utility locating firm to locate known publicly- and privately-owned underground utilities.
- Coordinate with the Client, or Client's representative, obtaining a secure area to stage equipment, tooling, mixing tanks, drums, remedial fluid product, and/or materials, required to complete the groundwater monitoring well installations and/or proposed Pilot Test scope of work. RGI assumes that the Client will provide access to water and power in the proposed work area.
- Obtain the necessary permits and signage to vacate up to 50-ft. of street parking along 9th Avenue Northeast as needed to stage trucks, trailers, and other support vehicles.
- Install up to three groundwater monitoring wells inside the lower level parking garage. Eight-inch diameter concrete cores will be cut at each proposed well location. Construction of each well consists 1-inch diameter pre-sand pack well screen manufactured by Geoprobe Systems®. Wells will consist of 5- to 8-ft. of well screen and 5-ft. or less of blank casing. The well seal will consist of neat cement grout. All wells will be completed with a lockable well cap and traffic-rated flush-mount steel monument.

  The objective of installing these wells is to: (1) better define the extent of groundwater with residual (elevated) concentrations of the contaminants of concern; and (2) verify our Geoprobe 54 direct-push probe rig (mounted on a MT55 Bobcat®) can reasonably drill to depths of approximately 10-ft. below the concrete slab-on-grade.

  During and/or following well installation, RGI will collect one soil sample above the shallow water bearing zone, and groundwater samples, for gasoline- and diesel-range TPH and BTEX laboratory analysis.
- Complete and submit Ecology's remedial injection permit application for review and approval.
- The pilot test consists of 11 injection points, located in the immediate vicinity of existing groundwater monitoring well MW9. Six-inch diameter concrete cores will be cut at each pilot test injection point location.

  Based on Regenesis' design, a total of approximately 1,500 gallons of a PetroFix®/water solution will be injected during the Pilot Test (or 134 gallons per

injection point). This remedial fluid includes a micron-activated carbon (1 to 2 microns), combined with both slow and quick-release inorganic electron acceptors (sulfate and nitrate combination). The micron-activated carbon removes hydrocarbons from the dissolved phase by adsorption, while the electron receptors stimulate hydrocarbon biodegradation.

Injection point locations will be spaced 5- to 7-ft. on center (where accessible) and will be advanced to depths of approximately 10-ft. below the underground parking garage concrete slab-on-grade. Injection of the remedial fluid will be applied to one or more injection point, under low pressure, using an air diaphragm pump (and compressor) and a manifold system consisting of delivery lines, pressure gauges, pressure release valves, and flow meters. Due to shallow groundwater conditions, and (potentially) low permeable soils, RGI will utilize packers to seal the borehole – which will prevent daylighting of the remedial fluid in the parking garage.

During the pilot test injections, RGI will collect one soil sample above the shallow water bearing zone, and groundwater samples, for gasoline- and diesel-range TPH and BTEX laboratory analysis at four down-gradient locations.

Following the completion of the injection points, the borehole will be properly decommissioned using hydrated bentonite and ready mix-concrete to match existing grade.

If you have any questions, or need additional information, please contact us at (425) 415-0551.

Sincerely,
THE RILEY GROUP, INC.

Paul D. Riley, LG, LHG
Principal

Attachments *Figure 1*
Regenesis Remedial Design Documentation

*Drawn from WP's Wolfe Plumbing Waste System Asbuilts - Augusta, 12/14/16 Sheet S2.0.

Footing Drains
Contaminated Fooling Drains
Sand/Oil
Waste/Sewer
Storm
Pump Discharge
Clean out
Floor Drain
Ball Valve
Back Water Valve

= Proposed pilot test injection point (11)
= Proposed additional groundwater monitoring wells (3)
= Proposed full scale injection point (27)

OUTSIDE FACE OF COL. AT FACE OF WALL

WOOD FRAMED STAIR PER S6.2

STORM SEWER PER CIVIL/PLUMBING/MECH'L

NOTE: EACH INJECTION LOCATION WILL BE CORED (6-inch diameter)

Inaccessible

Depth to groundwater 5'-6.5' below concrete slab

Pilot Test Area

Storm Vault

MW-10 MW-9 MW-7 MW-4 MW3A

SW-7 SW-8 SW-9

93'-6" 97'-0" 92'-6" 97'-11Ð" AT DRAIN

4'-6" cp. FOOTING

C1 TYP. U.O.N. 97'-0" TYP. U.O.N.

Approximate Scale: 1"=10'
0 5 10 20

27'-7" 15'-9" 9'-8" 11'-9" 24'-2" 25'-8" 26'-6" 14'-6"

N

RILEYGROUP
Corporate Office
17522 Bothell Way Northeast
Bothell, Washington 98011
Phone: 425.415.0551
Fax: 425.415.0311

RGI Project Number: 2012-171 Task 12

41st & Roosevelt, P.O. #10430-00030

Address: 4041 Roosevelt Way Northeast, Seattle, Washington 98105

Field Figure

Figure 1

Date Drawn: 08/2019

AUGUSTA APARTMENTS PILOT TEST

LAST UPDATED
07.29.19

Pilot Test

SOURCE AREA

Application Summary

PetroFix Amount	800 lbs
Treatment Surface Area	400.0 ft^2
Delivery Points	11
Point Spacing	6.0 ft
Top of Treatment Interval	3.0 ft bgs
Bottom of Treatment Interval	10.0 ft bgs
Vertical Treatment Interval Thickness	7.0 ft
Treatment Volume	104 yd^3
PetroFix Dose	7.71 lb/yd^3

Total Volume	1,474 gal
Product Volume	82 gal
Water Volume	1,392 gal
Injection Volume/Point	134 gal
Inject Volume/Vertical ft	19 gal
Product/Point	7.4 gal
Water/Point	126.5 gal
Soil Type	>75% silt/clay
Effective Pore Volume Fill %	47%

Mix Tank Volume	500 gal
Dilution Factor	18.0
PetroFix per Mix Tank	28 gal
Water per Mix Tank	472 gal
Number of Batches Required	2.95

AREA NOTES

REPORTED

Ground Water Concentrations (µg/L)

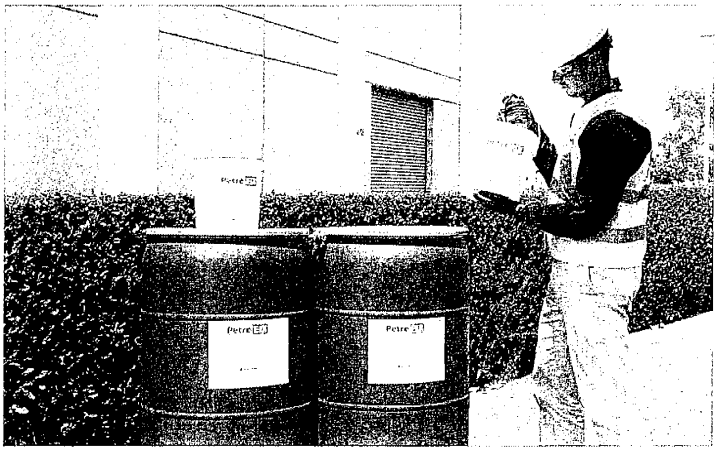
Benzene	20
Toluene	2
Ethylbenzene	30
Xylenes	50
Trimethylbenzenes	0
Butylbenzene	0

NAPL Present?	No
Isopropylbenzene	0
Naphthalenes	0
MTBE	0
TPH-GRO	1,600
TPH-DRO	2,200
Total Contaminant Mass:	3,800

PetroFix™ Specification Sheet

PetroFix Technical Description

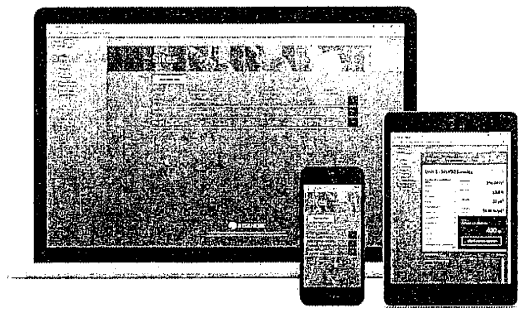
PetroFix is a new remedial technology designed to treat petroleum fuel spills in soil and groundwater. A simple-to-use fluid that can be applied under low pressure into the subsurface or simply poured into open excavations, PetroFix offers a cost-effective solution for environmental practitioners and responsible parties to address petroleum hydrocarbon contaminants quickly and effectively.



PetroFix has a dual function; quickly removing hydrocarbons from the dissolved phase, by adsorbing them onto the activated carbon particles, while added electron acceptors stimulate hydrocarbon biodegradation in-place. PetroFix does not require high pressure "fracking" for application and can be applied with ease using readily available equipment associated with direct push technology.

The remedial fluid is a highly concentrated water-based suspension consisting of micron-scale activated carbon and biostimulating electron acceptors. PetroFix has a viscosity higher than water and is black in apperance. Its environmentally-compatible formulation of micron-scale activated carbon (1-2 microns) is combined with both slow and quick-release inorganic electron acceptors. A blend of additional electron acceptors is included along with the PetroFix fluid. Practitioners can select between a sulfate and nitrate combination blend (recommended), or sulfate only for the additional electron acceptors required.

PetroFix Design Assistant



REGENESIS has developed a proprietary web-based design assistant called PetroFix Design Assistant™ that provides environmental professionals the ability to input their site parameters, determine the required product amount, and order the product through REGENESIS' customer service. The PetroFix Design Assistant includes defaults and warnings throughout the process to guide users toward effective designs that will offer best results.

To access the PetroFix Design Assistant, create an account and login at www.PetroFix.com

PetroFix Remediation Fluid

Chemical Composition

Activated Carbon - CAS 7440-44-0 >30%

Calcium Sulfate Dihydrate - CAS 10101-41-4 < 10%

Properties

Appearance: Black Fluid

Viscosity: 1500-3500 cP (corn syrup-like)

pH: 8-10

Storage and Handling Guidelines

Storage:

- Store away from incompatible materials
- Store in original closed container
- Store at temperatures below 95° F
- Dispose of waste and residues in accordance with local authority requirements

Handling:

- Never add additives to solution prior to mixing with water
- Wear appropriate personal protective equipment
- Do not taste or ingest
- Observe good industrial hygiene practices
- Wash hands after handling

Applications

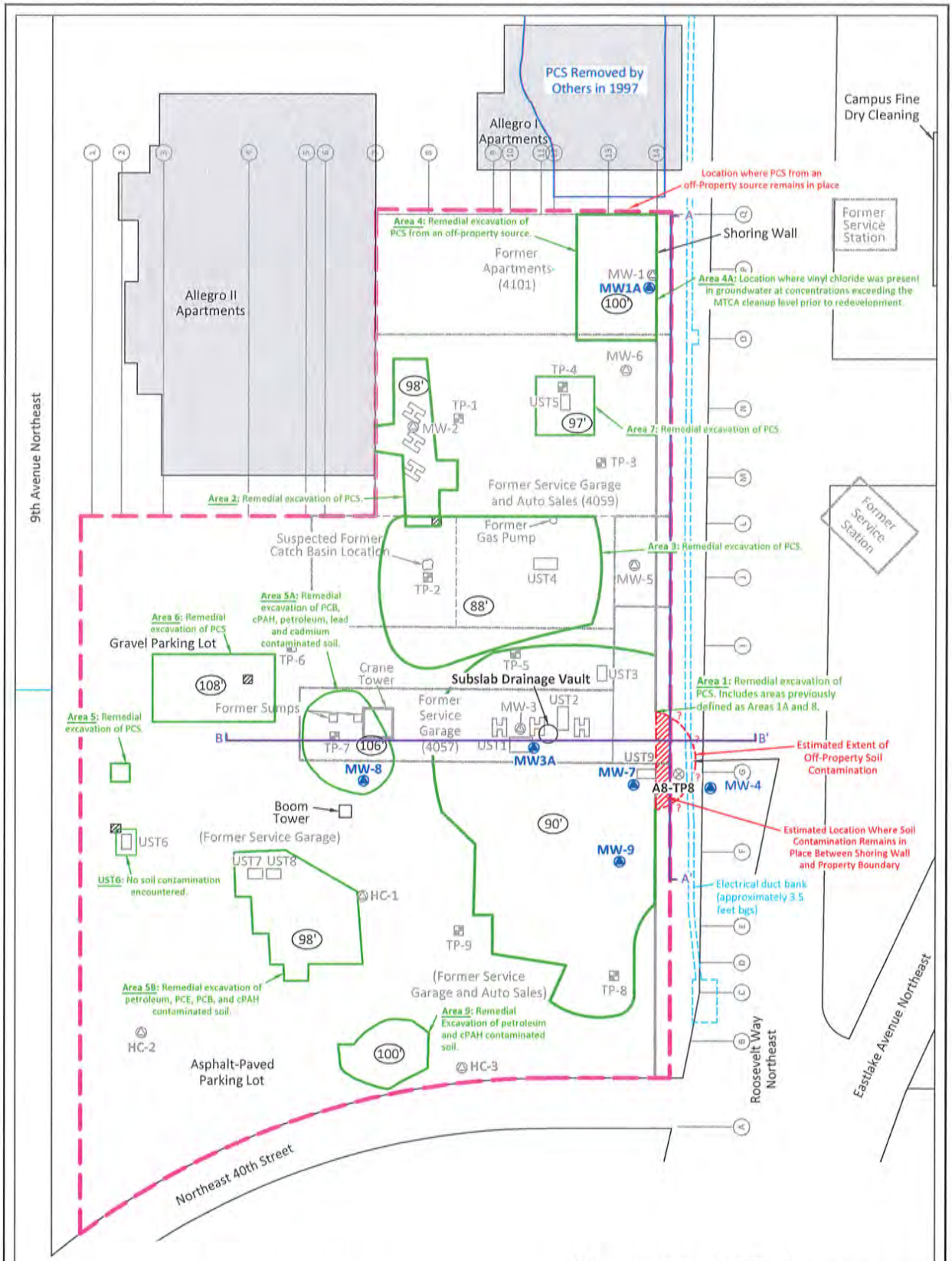
PetroFix is mixed with water on-site and easily applied into the sub-surface using low pressure injections, or mixed in excavations. PetroFix is compatible with and can be used with ORC Advanced® to expedite rates of biodegration. For more information about co-application with ORC Advanced, contact REGENESIS.

REGENESIS

Corporate Headquarters
1011 Calle Sombra, San Clemente CA 92673 USA
Tel: +1 949.366.8000

European Offices (UK, Ireland, Belgium and Italy)
Email: europe@regenesis.com
Tel: +44 (0)1225 61 81 61

www.regenesis.com



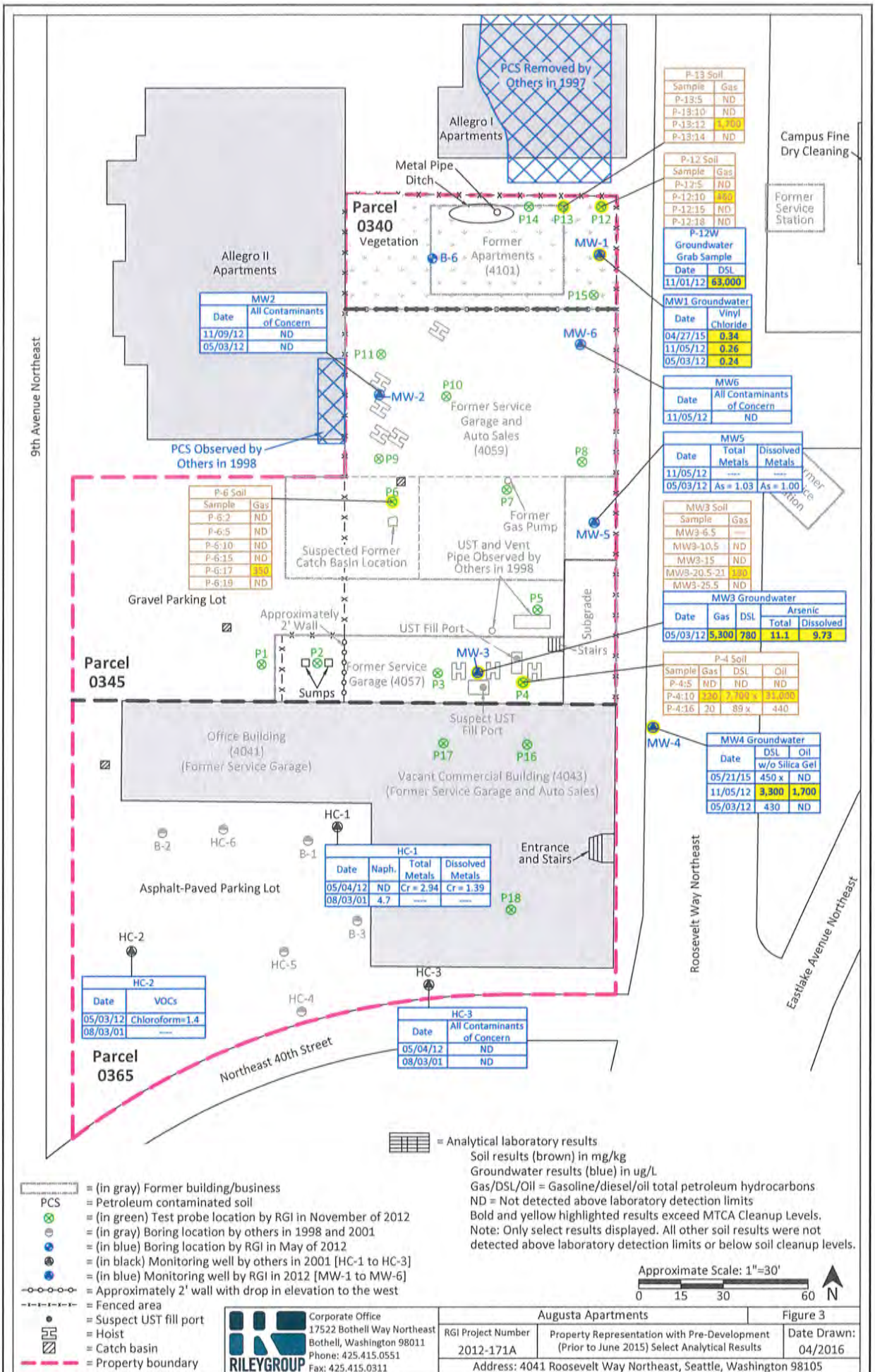
(90') = Maximum depth of remedial excavation
= (in gray) Former monitoring well location
= (in blue) Existing monitoring well location by RGI
= (in black) Test probe location by RGI
= (in gray) Test pit soil sample location by RGI
= (in gray) Construction grid per plans (Gridline)
= Former hoist
= Former catch basin
= (in pink) Cross section
= (in cyan) Duct bank Location
= Property boundary

UST = Underground storage tank
cPAHs = Carcinogenic polynuclear aromatic hydrocarbons
PCB = Polychlorinated biphenyls
PCE = Tetrachloroethene
PCS = Petroleum contaminated soil
COCs = Contaminants of concern

Approximate Scale: 1"=30'
0 15 30 60 N

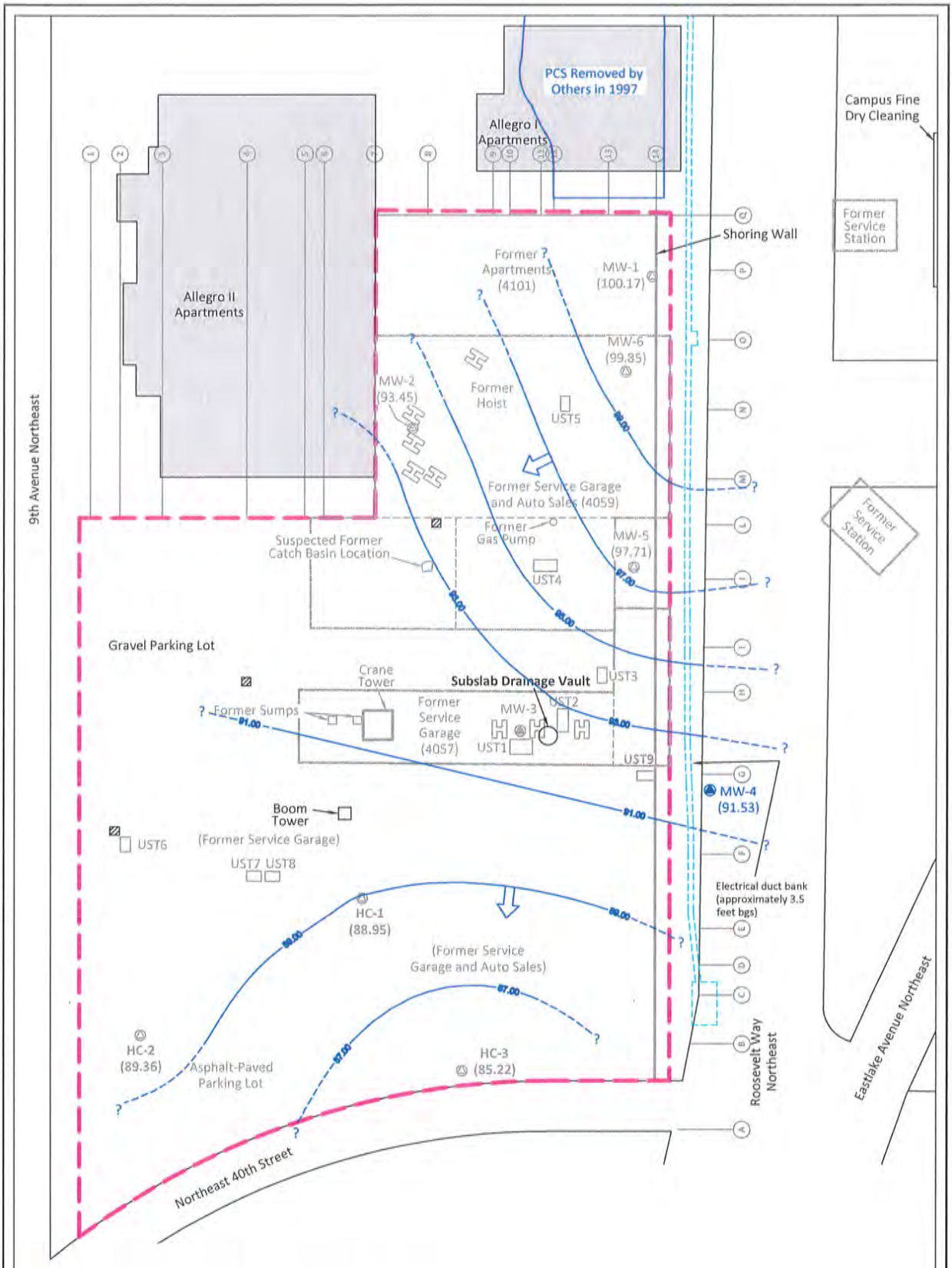
RILEYGROUP
Corporate Office
17522 Bothell Way Northeast
Bothell, Washington 98011
Phone: 425.415.0551
Fax: 425.415.0311

Augusta Apartments		Figure 2
RGI Project Number 2012-171A	Property Representation Map with Remedial Excavation Areas	Date Drawn: 04/2016
Address: 4041 Roosevelt Way Northeast, Seattle, Washington 98105		



RILEYGROUP
Corporate Office
17522 Bothell Way Northeast
Bothell, Washington 98011
Phone: 425.415.0551
Fax: 425.415.0311

Augusta Apartments		Figure 3
RGI Project Number: 2012-171A	Property Representation with Pre-Development (Prior to June 2015) Select Analytical Results	Date Drawn: 04/2016
Address: 4041 Roosevelt Way Northeast, Seattle, Washington 98105		



–(88.00)– = Groundwater contours generated using Surfer Software (based on Kriging method). Contours based on November 9, 2012 water level measurements.

= Groundwater Flow Direction

= (in gray) Former monitoring well location

= (in blue) Existing monitoring well location by RGI

= (in black) Test probe location by RGI

= (in gray) Gridline

= Former hoist

= Former catch basin

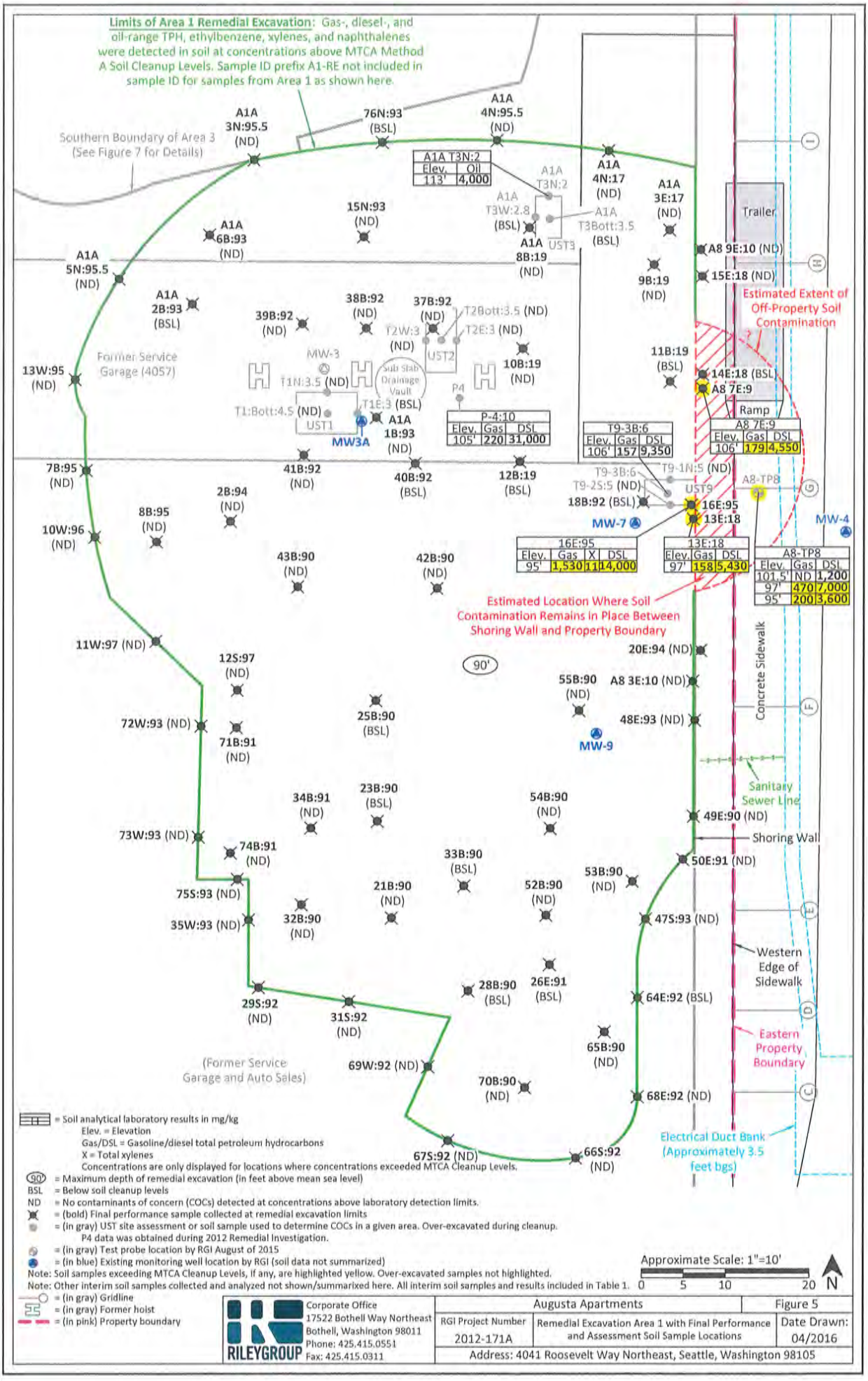
= Property boundary

Approximate Scale: 1"=30'

0 15 30 60 N

RILEYGROUP
Corporate Office
17522 Bothell Way Northeast
Bothell, Washington 98011
Phone: 425.415.0551
Fax: 425.415.0311

Augusta Apartments		Figure 4
RGI Project Number 2012-171A	Historical Pre-Development Groundwater Elevation Contours	Date Drawn: 04/2016
Address: 4041 Roosevelt Way Northeast, Seattle, Washington 98105		



RILEYGROUP Corporate Office 17522 Bothell Way Northeast Bothell, Washington 98011 Phone: 425.415.0551 Fax: 425.415.0311	Augusta Apartments	Figure 5
	RGI Project Number 2012-171A	Remedial Excavation Area 1 with Final Performance and Assessment Soil Sample Locations
		Date Drawn: 04/2016
	Address: 4041 Roosevelt Way Northeast, Seattle, Washington 98105	