BAE Systems
Building No. 2, Greenlawn, New York
NYSDEC Site #: 1-52-005

PWGC Project No. BAE 1001

SUBSURFACE INVESTIGATION WORK PLAN

January 2011

Submitted to:

New York State Department of Environmental Conservation

Prepared for:
BAE Systems
Greenlawn, New York

Prepared by:

PWGC
Strategic Environmental Engineering Solutions

P.W. Grosser Consulting, Inc • P.W. Grosser Consulting Engineer & Hydrogeologist, PC
630 Johnson Avenue, Suite 7 • Bohemia, NY 11716
New York, NY • Seattle, WA •Syracuse, NY
PH 631.589.6353 • FX 631.589.8705 • zeby@pwgrosser.com • www.pwgrosser.com

P.W. GROSSER CONSULTING INC.

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BAE SYSTEMS
BUILDING 2
GREENLAWN, NEW YORK

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

P.W. Grosser Consulting, Inc. (PWGC) has prepared this Subsurface Investigation Work Plan on behalf of BAE Systems (BAE) in order to detail an investigation to define the extent of chlorinated volatile organic compounds (VOCs) in the soil and soil vapor at BAE Building 2 in Greenlawn, New York (site). The location of the site is shown on **Figure 1**.

1.1 Site Description

BAE Building 2 is one of five main buildings located at a facility which covers approximately 23 acres in Greenlawn, New York. It is located southeast of the intersection of Cuba Hill Road and the Port Jefferson Branch of the Long Island Railroad.

The site was owned by Republic Aviation in the 1940s which manufactured aircraft equipment. Hazeltine Corporation obtained the property in 1957 and manufactured sheet metal, machine parts, and electronic systems. A metal degreasing tank containing tetrachloroethene (PCE) was formerly used in the "Alodine Room" of Building 2 as part of these historical operations. The site is currently occupied by BAE which utilizes Building 2 for metal machining and finishing, painting, and de-burring. The "Alodine Room" is indicated on **Figure 2**.

In April and May 1990, Radian Corporation of Herndon, Virginia conducted a subsurface investigation at the subject site which included the performance of five soil borings in the "Alodine Room" and one boring in the adjacent Paint Room. PCE was detected in the soil at three of the six boring locations at concentrations exceeding the New York State Department of Environmental Conservation's (NYSDEC) Recommended Soil Cleanup Objectives (RSCOs). It should be noted that the PCE concentrations are within NYSDEC Part 375 Industrial Soil Cleanup Objectives. Based on the findings of the investigation, Radian recommended no further investigation or remediation, citing that the degreasing tank had been removed, PCE concentrations decrease significantly with depth, the floor of the room should act as a barrier to the mechanism of hydraulic transport preventing migration, and that groundwater is unlikely to be impacted due to its depth. According to Radian, a perched groundwater zone exists at approximately 90 feet below ground surface (bgs). Based on a review of USGS groundwater elevation and surface elevation maps, the surface of the Upper Glacial Aquifer is approximately 160 feet bgs. Radian

recommended that the floor and the base of the walls of the "Alodine Room" be sealed with an impervious material to prevent migration of vapors into the room and to prevent liquids from permeating the floor. The Radian Investigation is documented in their *Alodine Metal Finishing Room Investigation Report*, February 1991.

Since the Radian Investigation, the floor of the "Alodine Room" has been resurfaced and sealed. In March 1994 the site was classified by the NYSDEC as a Class 2 Inactive Hazardous Waste Site. The site was reclassified as a Class 4 site in May 1995, and was delisted in September 1997.

In February 2008, the NYSDEC informed BAE in a letter that, "Although previous activities were performed at the site to address environmental impacts, improvements in analytical techniques and knowledge gained from other site investigations has led to an increased awareness of soil vapor as a medium of concern and of the potential pathways for exposures. Based on this additional information, the Department has decided to re-evaluate previous assumptions and decisions regarding the potential for soil vapor intrusion exposures pertaining to this site".

On March 31 and April 1, 2010, AECOM Technical Services Northeast, Inc. of Bloomfield, New Jersey (AECOM) performed a soil vapor and indoor air investigation at the subject site on behalf of the NYSDEC. Results of the investigation indicated a concentration of PCE in one of the sub-slab vapor samples which may warrant mitigation according to the NYSDOH Soil Vapor/Indoor Air Matrix. Elevated concentrations of PCE were detected in the two soil samples. However, these concentrations were well within NYSDEC Industrial SCOs. Elevated PCE concentrations were also present in the soil vapor samples collected in the vicinity of the "Alodine Room" and the compactor room located on the eastern end of Building 2.

On September 14, 2010, a meeting was held at NYSDEC Headquarters which was attended by representatives of the NYSDEC, the NYSDOH, BAE, and PWGC. It was agreed in the meeting that:

- The soil conditions beneath the "Alodine Room" will not result in the site being re-listed as an Inactive Hazardous Waste Site. BAE will not be required to enter into binding agreement (i.e., Order on Consent) with the State in order to perform additional work.

- Based on the data generated during the NYSDEC's recent site investigation, no threat to the groundwater exists. The NYSDEC is therefore not requiring future groundwater characterization.
- The NYSDEC accepted BAE's comment to the Draft Soil Vapor Investigation Report regarding the use of the Part 375 Industrial SCO for soil quality.

2.0 SCOPE OF WORK

In light of the NYSDEC policy set forth in DER-13 concerning evaluation of soil vapor intrusion into buildings, the scope of work will focus on Building 2 and adjacent areas. The Subsurface Investigation of Building 2 will include a geophysical survey of the open area to the north and east of Building 2, a soil boring program in the vicinity of the "Alodine Room", sub-slab vapor and indoor air sampling, and soil vapor sampling in areas surrounding Building 2.

2.1 Geophysical Survey

A geophysical survey will be performed to the north and east of Building 2 utilizing a metal detector and ground-penetrating radar (GPR). Anomalies detected during the surveys will be marked on the ground and further investigated through excavation or other methods.

2.2 Geoprobe

In order to delineate the extent of VOC impacted soils adjacent to Building 2, soil borings will be performed in and adjacent to the "Alodine Room". Proposed sampling locations are indicated in **Figure 2**. The number and locations of the samples indicated on **Figure 2** may be modified based on field conditions.

Subsurface sampling will be performed utilizing a Geoprobe® direct-push drill rig to drive soil samplers to desired sampling depths. Soil samples will be characterized by a PWGC hydrogeologist and field-screened for VOCs with a photo-ionization detector (PID). Soil borings may be extended depending on the PID response.

2.3 Sub-Slab Vapor and Indoor Air Sampling

In order to further define the extent of vapor intrusion at Building 2, sub-slab vapor samples, indoor air samples, and outdoor air samples will be collected.

If permanent soil vapor probes are installed, the sampling ports will be finished to grade with solid covers, flush-mounted to the floor. Proper sampling conditions, procedures, equipment, purging, etc. will be followed and documented during these sampling events. This includes a QA/QC tracer gas test to verify the integrity of the probe seals. Proposed sampling locations are indicated in **Figure 2**. The number and locations of the samples indicated on **Figure 2** may be modified based on field conditions.

One outdoor air sample adjacent to Building 2 will be collected to characterize site-specific background outdoor air conditions from a representative upwind location away from wind obstructions. A representative sample is one that is not biased toward obvious sources of volatile chemicals.

The outdoor air sample will be collected in the same manner as the indoor air samples. Weather conditions and ventilation conditions will be recorded, as well as pertinent observations such as odors, readings from field instrumentation, and significant activities in the vicinity.

For at least 24 hours prior to and during sampling, the heating systems will be operating to maintain normal indoor air temperatures (i.e., 65 to 75 degrees F) and sampling personnel will avoid lingering in the immediate area of the sampling devices while samples are being collected.

A sample log sheet will be maintained summarizing sample identification, date and time of sample collection, sampling depth, identity of samplers, sampling methods and devices, soil vapor purge volumes, volume of soil vapor extracted, vacuum of canisters before and after samples are collected, apparent moisture content of the sampling zone, and chain of custody protocols.

The sub-slab vapor, indoor air, and outdoor air samples will be submitted to an NYSDOH ELAP-certified laboratory for analysis of PCE, TCE, cis-1,2-DCE, and vinyl chloride by USEPA Method TO-15.

2.4 Soil Vapor Sampling (Outdoor)

Soil vapor probes will be installed adjacent to Building 2 in order to determine soil vapor quality in the vicinity of Building 2 and to assess the results of the previous investigation. Proper sampling procedures, equipment, purging, etc. will be followed and documented during these sampling events. This includes a QA/QC tracer gas test to verify the integrity of the probe seals.

A sample log sheet will be maintained summarizing sample identification, date and time of sample collection, sampling depth, identity of samplers, sampling methods and devices, soil vapor purge volumes, volume of soil vapor extracted, vacuum of canisters before and after samples are collected, apparent moisture content of the sampling zone, and chain of custody protocols.

The soil vapor samples will be submitted to an NYSDOH ELAP-certified laboratory for analysis of PCE, TCE, cis-1,2-DCE, and vinyl chloride by USEPA Method TO-15.

2.5 Equipment Decontamination and IDW Disposal

Non-dedicated equipment and tools will be decontaminated using a scrub wash with a laboratory grade detergent such as Alconox, and a tap water rinse. General trash generated during the investigation will be bagged and disposed as ordinary solid waste. Soil collected during the soil boring program will be returned to their respective boreholes (with the exception of soils submitted to the laboratory). If space is insufficient in the boreholes, investigation derived waste (IDW) will be containerized and disposed of properly, if necessary. Decontamination fluids will be containerized and disposed of properly.

2.6 Field Documentation

The field notebook will include the following daily information for site activities:

- Date
- Weather conditions
- Site conditions
- Identification of pertinent personnel

- Description of field activities
- Work locations
- Problems encountered and corrective actions taken
- Modifications to the scope of work
- Summa Canister Sampling Data
- Soil Boring Logs

The NYSDOH Indoor Air Quality Questionnaire and Building Inventory form will be completed.

3.0 QUALITY ASSURANCE / QUALITY CONTROL

Samples collected during the Subsurface Investigation will be analyzed by a NYSDOH ELAP certified laboratory. The laboratory will provide analytical data in a NYSDEC Analytical Services Protocol (ASP) Category B data deliverable format. A minimum of ten percent of the laboratory data will be validated by a third party that is independent of the laboratory which performed the analyses and the consultant which performed the field work. A data usability summary report (DUSR) will be submitted to the NYSDEC as part of the Subsurface Investigation Report. The analytical methods are summarized on **Table 1**. The sampling and analysis QC requirements are summarized on **Table 2**. The estimated number of samples for this investigation is shown on **Table 3**.

TABLE 1
ANALYTICAL METHODS

Sample Matrix	Sample Designations	Sample Type	Parameters	EPA Method	Sample Preservation	Holding Time	Sample Container	Laboratory
Soil	SB-Soil Borings	Grab	PCE TCE cis-1,2-DCE Vinyl Chloride	8260	Cool to 4°C	7 days	2 oz. wide mouth glass	To be determined
Soil Vapor	SV-Soil Vapor	Grab	PCE TCE cis-1,2-DCE Vinyl Chloride	TO-15	None	None	Summa Canister	To be determined
Sub-Slab Vapor	SS-Sub-Slab Vapor	Grab	PCE TCE cis-1,2-DCE Vinyl Chloride	TO-15	None	None	Summa Canister	To be determined
Ambient Air	IA-Indoor Air OA–Outdoor Air	Grab	PCE TCE cis-1,2-DCE Vinyl Chloride	TO-15	None	None	Summa Canister	To be determined

TABLE 2

FIELD/LABORATORY QC REQUIREMENTS

Sample Type	Frequency	Purpose
Field Duplicate	One duplicate sample, or One per 20 samples of the same matrix.	To evaluate the precision of the field sampling and laboratory analyses.
Trip Blank	One VOA (volatile organic analysis) trip blank per sample cooler that contains site samples to be analyzed for VOA.	To detect VOC cross-contamination during sample shipping and handling.
Method Blank	One per 20 samples of same matrix	To document contamination resulting from the analytical process.
Matrix Spike	One per 20 samples of same matrix	To measure the efficiency of the steps of the sampling and analytical methods in recovering the target analytes from the sample. It is a sample spiked with known quantities of analytes and subjected to the entire analytical procedure.
Matrix Spike Duplicate	One per 20 samples of same matrix.	To reinforce the matrix spike information. It is a second aliquot of the same sample as the matrix spike.

TABLE 3

ESTIMATED NUMBER OF SAMPLES

Sample Type	Estimated # of samples to be collected
Subsurface soil samples	7
Sub-Slab Soil Vapor	5
Soil Vapor Samples	6
Indoor Air Samples	5
Outdoor Air Samples	1

Notes:
Does not include QC samples
The number and locations of the samples may be modified based on field conditions

4.0 REPORTING AND SCHEDULE

When site work is completed, a Subsurface Investigation Report will be prepared to document investigation activities and results. Sub-slab vapor and indoor air sampling results will be evaluated utilizing the Soil Vapor / Indoor Air Matrices specified in the NYSDOH *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*. Soil sampling analytical results will be compared to the Industrial SCOs specified in NYSDEC 6 NYCRR Part 375.

The schedule for this project has not been defined to allow flexibility to accomplish the project tasks and goals.

5.0 REFERENCES

29 CFR Part 1910.120 - Hazardous Waste Operations and Emergency Response

NYSDEC, Division of Environmental Remediation, December 2002, *Draft DER-10, Technical Guidance for Site Investigation and Remediation.*

NYSDEC, Division of Technical and Administrative Guidance, January 24, 1994, *Memorandum # 4046, Determination of Soil Cleanup Objectives and Soil Cleanup Levels.*

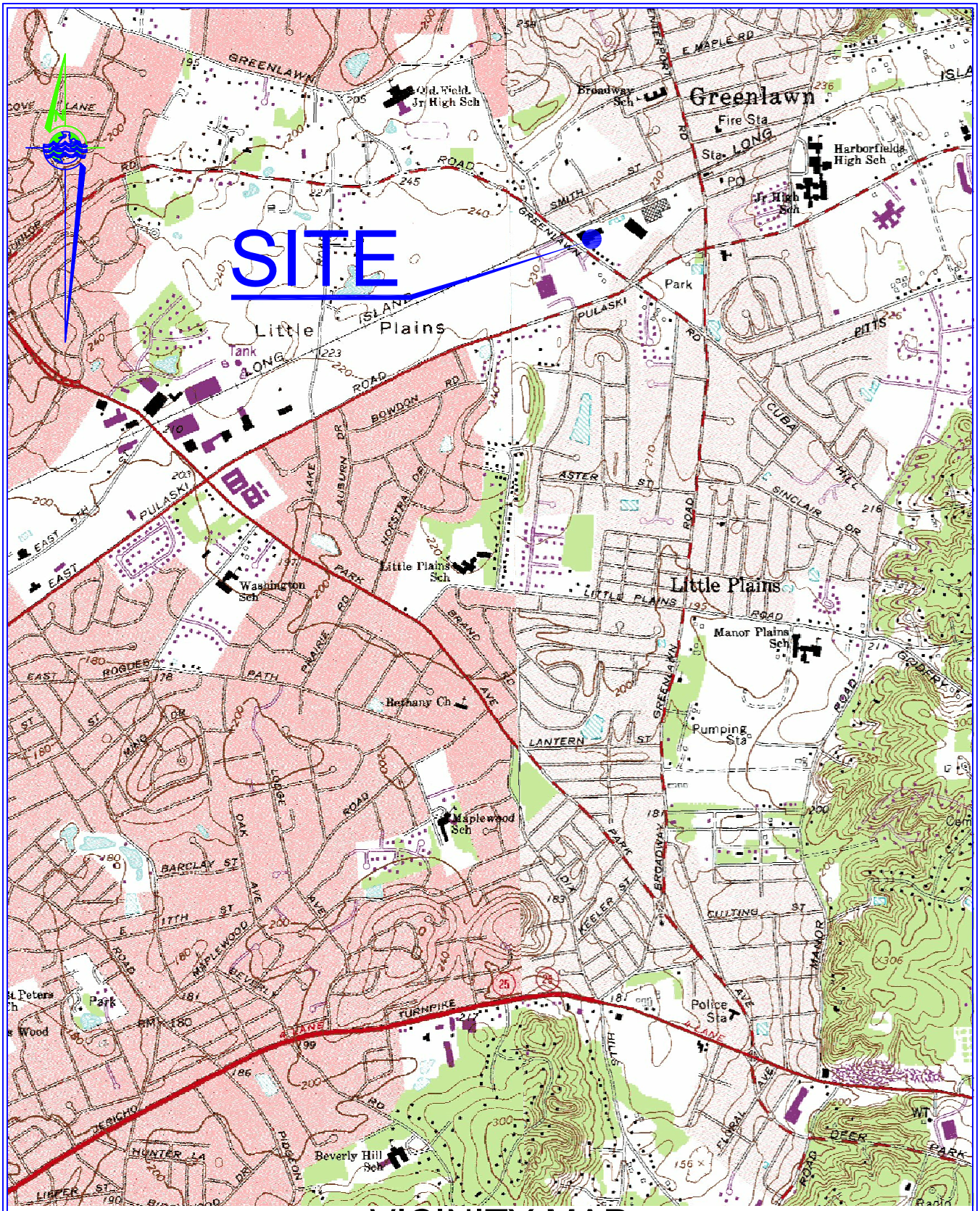
NYSDEC, Division of Water, June 1998, Addendum April 2000, *Technical and Administrative Guidance Series 1:1:1, Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations.*

NYSDEC, Division of Environmental Remediation, December 2006, *6 NYCRR Part 375, Environmental Remediation Programs.*

USEPA, Environmental Response Team, August 11, 1994. SOP # 2001, *Field Sampling Guidelines.*

USEPA, Environmental Response Team, August 11, 1994. SOP # 2006, *Sampling Equipment Decontamination.*

USEPA, Environmental Response Team, February 18, 2000. SOP # 2012, *Soil Sampling.*



VICINITY MAP

SCALE: 1:24000

Mapped, edited, and published by the Geological Survey
Revised in cooperation with New York
Department of Transportation
Control by USGS, USC&GS, and New Jersey Geodetic Survey

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PWGC
Strategic Environmental & Engineering Solutions
630 Johnson Ave, Suite 7 Bohemia, N.Y. 11716-2618
Ph: 631 589-6353 Fx: 631 589-8705 E-mail: Info@pwgrosser.com

BAE BUILDING 2
GREENLAWN, NY

Project:	BAE1001
Designed by:	RWW
Approved By:	PWG
Drawn By:	LLG
Figure No:	1
Date:	10/20/09

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9 4.5 0 9 18

Feet

Legend

- Proposed OutdoorAir Samples
- Proposed Soil Vapor Samples
- Proposed Soil Boring Samples
- Proposed Sub-Slab Vapor & Indoor Air Samples
- Proposed GPR Survey Area

The number and locations of the samples may be modified based on field conditions.

Figure 2

Site Plan - Subsurface Investigation
BAE Systems - Building 2
5 Cuba Hill Road
Greenlawn, NY 11740