



# Quality Assurance Project Plan

Section A: Planning Elements		
<b>A1. Title (Project Name):</b>	Stony Hill Road TCE Site	
EPA ID#:	NCN000410857	
Project Location:	Wake Forest, Wake Co., NC	
Project Requestor and Organization:	Harry Zinn, NC Superfund Section	
Project Manager's Name, Position, and Organization:	Harry Zinn, Environmental Engineer, Site Evaluation and Removal Branch, NC Superfund, 1646 Mail Service Center, Raleigh, NC, 27699-1646. (919) 707-8374. <a href="mailto:harry.zinn@ncdenr.gov">harry.zinn@ncdenr.gov</a>	
Project Manager's Signature:		Date: 3/21/2013
Technical Reviewer's Name and Position:	Melanie Bartlett, Quality Assurance Manager, NC Superfund	
Technical Reviewer's Signature:		Date: 3/21/2013
QA Reviewer's Name and Position:	Jim Bateson, Section Chief, NC Superfund	
QA Reviewer's Signature:		Date: 3/21/2013
DAO's Name, Position, and Organization:	Jennifer Wendel, Superfund Site Evaluation Section, EPA Region 4	
DAO's Signature:		Date:
<b>A2. Table of Contents</b>	<ul style="list-style-type: none"> <li>• Page i of the NC generic QAPP</li> <li>• Section No. TOC of NC Superfund Section Health and Safety SOP Manual (<a href="http://portal.ncdenr.org/web/wm/div/safety/program">http://portal.ncdenr.org/web/wm/div/safety/program</a>)</li> </ul>	
<b>A3. Distribution List</b>	Jennifer Wendel, US EPA Jim Bateson, NC Superfund Scott Ross (File Room), NC Superfund Harry Zinn, NC Superfund Section	
<b>A4. Project Personnel</b>	<b>Organization</b>	<b>Responsibilities</b>
Harry Zinn,	NC Superfund	<i>Project Lead/Sampler/GPS 919-810-9637</i>



# Quality Assurance Project Plan

Engineer		
Stuart Parker, Hydrogeologist	NC Superfund	<i>Sampler/GPS</i>
Jeanette Stanley, Chemist	NC Superfund	<i>Sampler/Scribe</i>
Melanie Bartlett, Engineer	NC Superfund	<i>Sampler</i>

Comments: The NC Superfund Section organizational chart and delegation of duties can be found in Section 3.1 and Appendix A of the NC generic QAPP.

**A5. Background:**

The site is located along Stony Hill Road, Bud Morris Road, Bent Road and Churchill Drive approximately 0.5 miles north of the intersection of Stony Hill Road and NC Highway 98. This is located approximately 3.75 miles west of Wake Forest. The coordinates of the site are 35.9895° north latitude and -78.6080° west longitude. They are based on the location of the shed that used degreasers during the operation of a circuit board assembling operation at 7303 Stony Hill Road.

In August, 2005, Charles Arnold (7305 Stony Hill Road) contacted Mr. Greg Bright of Wake County Environmental Services Department (WCESD) to report a petroleum smell in his water. The sample collected on August 25, 2005 from his well documented well contamination with tetrachloroethylene (PCE 39 microgram per liter (ug/l)); trichloroethylene (TCE 110 ug/l); 111- trichloroethane (1,1,1-TCA 19.2 ug/l) and 1,1-dichloroethene (1,1-DCE 7.7 ug/l) (Ref. 1). NC Division of Water Quality (NC DWQ) was contacted (Ref. 2) and re-sampled this well plus two other wells immediately south of the impacted well. The two new wells were not impacted. Four additional wells across Stony Hill Road (SHR) were sampled but no detections were documented. The house on the property at 7305 SHR was hooked up to the well serving 7303 SHR which was documented to be clean. Soil samples collected from the areas within 7303 and 7305 SHR properties were shown to be contaminated with PCE at level between 13 and 32 ug/kg and a trace amount of TCE.. Additional soil sampling by a contractor for the owner of 7303 SHR in June 2006 verified low levels of PCE and TCE in the soils around the building on 7303 SHR.

With no additional wells being impacted and the single affected house being supplied alternate water, efforts were made from 2006 until 2007 to identify all potentially responsible parties (PRPs) and have a Required Action Plan performed by those parties. In 2007 the site was transferred from NC DWQ to NC Division of Waste Management (NC DWM) Inactive Hazardous Sites Branch (IHSB). From 2007 until 2012 NC DWM continued to try to identify PRPs and have them develop a Site Assessment. In June, 2012, IHSB personnel contacted 10 residences within 1000 feet of the site to obtain access to sample their wells. Three of the resident granted access (7303, 7305 and 7333 SHR). Wells at 7305 and 7333 SHR have been impacted by PCE and TCE above the current MCL (5 ug/l).



# Quality Assurance Project Plan

	<p>On July 10, 2012 Jim Bateson of NC DWM referred the site to EPA Region 4 Emergency Response and Removal Branch (ERRB) via telephone and e-mail. Since that time ERRB has sampled over 100 residences in the area around the site, including 12 community wells. Of these, 14 private residences have TCE above it's Maximum Contaminant Level (MCL) of 5 ug/l. Currently, seven filter systems have been installed and bottled water is being supplied to the remaining private wells with TCE or PCE levels close to or above their MCL. To date, 21 residences have detections of TCE and/or PCE, 14 of which are above EPA's Removal Management Level (RML). Seven additional wells have detections of TCE just under the MCL. Water line hookups to 9 residences have occurred.</p>
<p><b>A6. Project Description:</b></p>	<p>Collecting potable well samples from over 74 residences within ¾ mile of the site. 19 wells have had previous documented impacts with TCE and/or PCE. 35 additional wells are in close proximity to the impacted wells, and 20 potable wells are located within a ¾ mile radius of the site and have not been previously sampled by NC DWM. GPS readings will be collected at locations that have not been previously located. This is a seasonally adjusted follow-up sampling of wells previously sampled during the Removal Action at this site. All potable wells will have samples collected for TVOA analysis. In addition, approximately 40 well in the vicinity of the north source area will also have SIMs analysis run for tetrachloroethene.</p>
<p>Decision(s) to be made based on data:</p>	<p>Based on findings, a decision will be made as to whether further action is needed under CERCLA. Data will be used to help characterize the nature and extent of groundwater contamination at the site, in order to determine which, if any, additional drinking water wells need to be replaced with alternative water, and to determine the scope of any needed additional future sampling of drinking water wells in neighborhoods surrounding the site.</p> <p>The primary decision in the DQO process for the site relating to potable well water is: are site-related contaminants found in private drinking water wells within three-quarter mile of the site at concentrations exceeding the associated health-based screening criteria?</p> <p>All potable well water samples will be submitted to a CLP laboratory for routine analytical services (RAS) for VOCs plus special analytical services (SAS) for VOCs plus approximately 40 wells will also be run for SIMS (specifically tetrachloroethene at a detection level of 0.015 ug/l) in accordance with the CLP Statement of Work (SOW) for Organics Analysis (SOM01.2). Analytical results will be compared to the associated federal drinking water Maximum Contaminant Levels (MCLs), Region 4 Regional Screening Levels (RSLs), SCDM values, and NC 2L groundwater standards. All data will be reviewed by the NC Project Manager and the NC Industrial Hygienist. Any wells in use with values exceeding the MCL, RSL, or NC 2L values may be potentially recommended to the US EPA Region 4 Emergency Response and Removal Branch (ERRB) for further action. EPA Region 4 will be notified of all exceedences of both MCL and RSL values in any of the potable well sample results.</p>
<p>Applicable regulatory</p>	<p>Data will be compared with regulatory benchmarks, including NC Groundwater Standards (15A NCAC 2L,</p>



# Quality Assurance Project Plan

<p>information, action levels, etc.</p>	<p><a href="http://portal.ncdenr.org/c/document_library/get_file?uuid=90e20026-1d67-45e0-90cc-a212707e79a3&amp;groupId=38364">http://portal.ncdenr.org/c/document_library/get_file?uuid=90e20026-1d67-45e0-90cc-a212707e79a3&amp;groupId=38364</a>) and SCDM values (<a href="http://www.epa.gov/superfund/sites/npl/hrsres/tools/scdm.htm">http://www.epa.gov/superfund/sites/npl/hrsres/tools/scdm.htm</a>). The Contract Required Quantitation Limits for Volatile Organics on the Target Compound List using the Trace Water analysis is 0.5 ug/L for most compounds. These quantitation limits will determine if any known or suspected contaminants exceed the Maximum Contaminant Levels (MCLs) for drinking water. Refer to CRQL Table attached to this QAPP.</p> <p>Analytical data results will be compared with the following comparison criteria:</p> <ol style="list-style-type: none"> <li>1) Non-detects of background concentrations;</li> <li>2) Three times detectable background concentrations;</li> <li>3) Sample quantitation limits (SQLs) or minimum reporting limits (MRLs) which are sample specific and correspond to the lowest quantitative point on the calibration curve.</li> <li>4) NC 2L Groundwater Standards (<a href="http://portal.ncdenr.org/web/wq/ps/csu/gwstandards">http://portal.ncdenr.org/web/wq/ps/csu/gwstandards</a>)</li> <li>5) Maximum Contaminant Levels (MCLs); (<a href="http://water.epa.gov/drink/contaminants/index.cfm#List">http://water.epa.gov/drink/contaminants/index.cfm#List</a>)</li> <li>6) US EPA Regional Screening Levels (RSLs); (<a href="http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/">http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/</a>)</li> </ol>
<p>Field Study Date:</p>	<p>April, 2013</p>
<p>Projected Lab Completion Date:</p>	<p>8-10 weeks after sample submittal</p>
<p>Final Report Completion Date:</p>	<p>July, 2013</p>
<p><b>A7. Quality Objectives and Criteria:</b></p>	<p>Identification of the seven steps of the data quality objectives (DQO) process: DQOs were established for the Stony Hill Road Site to define the quantity and quality of data to be collected to support the objectives of the sampling event. DQOs were developed using the seven-step process outlines in the following EPA guidance documents: “Guidance on Systematic Planning using the Data Quality Objectives Process,” EPA QA/G-4 (<a href="http://www.epa.gov/quality/qs-docs/g4-final.pdf">http://www.epa.gov/quality/qs-docs/g4-final.pdf</a>), February 2006; “Guidance for Quality Assurance Project Plans,” EPA QA/G-5 (<a href="http://www.epa.gov/quality/qs-docs/g5-final.pdf">http://www.epa.gov/quality/qs-docs/g5-final.pdf</a>), December 2002; and “EPA Requirements for Quality Assurance Project Plans,” EPA QA/R-5 (<a href="http://www.epa.gov/region8/qa/QAEPAr5-final.pdf">http://www.epa.gov/region8/qa/QAEPAr5-final.pdf</a>), March 2001.</p> <p><b>Step 1: State the Problem</b></p> <p>Previous sampling by various parties, including NC Superfund, NC Department of Environmental Management (NC Division of Water Quality), Wake County Department of Environmental Services, US EPA, and community water system owners, has documented the presence on contaminants in groundwater at and near the site. Groundwater is the only drinking water source within 3/4 mile of the site. This includes both private and community drinking water supply wells.</p>



# Quality Assurance Project Plan

## **Step 2: Identify the Goals of the Study**

The goal of this study is to determine the nature and extent of groundwater contamination at the site, in order to determine which, if any, residents are currently exposed to groundwater contaminants above federal and/or state health-based benchmarks, or could be potentially exposed to such contaminants in the future.

Evaluate analytical data for groundwater samples to identify the level of contamination in private drinking water wells and determine whether concentrations are present above the comparison criteria (background levels).

Analytical data results will be compared with the following comparison criteria:

- 1) Non-detects of background concentrations;
- 2) Three times detectable background concentrations;
- 3) Sample quantitation limits (SQLs) or minimum reporting limits (MRLs) which are sample specific and correspond to the lowest quantitative point on the calibration curve.

4) NC 2L Groundwater Standards

(<http://portal.ncdenr.org/web/wq/ps/csu/gwstandards>)

5) Maximum Contaminant Levels (MCLs;

<http://water.epa.gov/drink/contaminants/index.cfm#List>)

6) US EPA Regional Screening Levels (RSLs;

[http://www.epa.gov/reg3hwmd/risk/human/rb-concentration\\_table/](http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/))

US EPA Region 4 will be notified of all exceedences of MCL or RSL values in any of the potable well sample results.

## **Step 3: Identify Information Inputs**

The primary inputs needed to support the decision making process are contaminant levels in private drinking water well water samples collected from the groundwater in the vicinity of the site. Analytical results used in the decision-making process will come from laboratory analyses by a CLP laboratory for routine TCL VOC parameters. Trace-level TCL VOC contract required quantitation limits (CRQLs) will be requested for the water samples analyzed by the CLP laboratories. Additional SIM analysis for tetrachloroethene will be requested for well in closer proximity to the northern source area and areas where trichloroethene has been detected but no tetrachloroethene.

See Section A6. Project Description

See Section A5. Background of this Quality Assurance Project Plan.

## **Step 4: Define the Boundaries of the Study**

TCE and PCE have been documented in the regional groundwater. Two parcels have been identified as suspect source areas. The primary media of interest is groundwater from residential drinking water wells located within a three-quarter mile radius of these parcels. The study boundaries include the study area, well depths, temporal boundaries such as field investigation dates and turnaround times on analytical results, and physical boundaries. All individuals within 3/4 mile of these two parcels are supplied drinking



# Quality Assurance Project Plan

water via groundwater wells—either community wells or privately-owned wells. Community wells are currently on a quarterly sampling schedule by their operators. Nine previously impacted wells have been taken off-line but have remained as monitoring wells. Passive Diffusion Bag (PDB) samplers will be deployed into these wells at least two weeks prior to sampling. The remaining individual potable wells will be sampled at the wellhead when possible. If a wellhead is not accessible or no sample tap is available at the wellhead, the sample will be collected from an unfiltered tap closest to the wellhead. The collection point of each sample will be notated in the field logs (i.e. spigot on wellhead, spigot on front of house, etc.). Each potable well will be purged for at least 15 minutes prior to sample collection. Temperature, pH, conductivity, and turbidity readings will be collected a minimum of three times, at five-minute intervals, prior to sample collections.

Sampling is scheduled for April 2013. Field investigation activities are expected to take four days. A turnaround time of 21 days from sample submittal to a CLP laboratory will be requested. An additional turnaround time of approximately 30 days from receipt of laboratory results by SESD is expected for data validation.

## Step 5: Develop the Analytic Approach

Sample Collection Guidance for VOC's

Matrix	Sample Type	Container Type	Bottle Count	Minimum Volume	Important Notes	Preservative	Holding Time
Water	VOA Sample	40mL glass vial, 24 mm neck finish	3	Fill to capacity	Vials must be filled to capacity with no headspace or air bubbles.	Preserve to a pH of 2 with HCL and Cool to 4oC (+/-2oC) immediately after collection.	14 days
	VOA Sample with MS/MSD		6				
	VOA Sample with SIM		6				

<http://www.epa.gov/superfund/programs/clp/download/sampler/CLPSamp-01-2011.pdf>

Laboratory analysis will include: Target Compound List (TCL) volatile organic compounds (VOCs) using the EPA Contract Laboratory Program (CLP) Statement of Work (SOW) for Trace Water, “Multi-Media, Multi-Concentration Organics Analysis” (SOM01.2), June 2007 (<http://www.epa.gov/superfund/programs/clp/som1.htm>) or comparable methods. SIM analysis will be requested for tetrachloroethene in about 40 samples.



# Quality Assurance Project Plan

	<p><b>Step 6: Specify Performance or Acceptance Criteria</b> Analytical results for initial acceptance will be assessed during validation performed by US EPA Region 4 Science and Ecosystem Support Division (SESD) that evaluates the usability of the data defined. Any rejected data and the reasons for rejection will be summarized in the data validation report.</p> <p><b>Step 7: Develop the Plan for Obtaining Data</b> Proposed sampling includes up to 84 groundwater samples (including background and QA/QC samples). Access permission has been previously granted for the wells via email, phone calls, or in person.</p>
<b>A8. Special Training/Certifications:</b>	<ul style="list-style-type: none"> <li>• Section 3.3 of the NC generic QAPP.</li> <li>• Section 2.1 and Appendix A of NC Superfund Section Health and Safety SOP Manual (<a href="http://www.wastenotnc.org/SAFETY/WebSite/SFSafety.HTM">http://www.wastenotnc.org/SAFETY/WebSite/SFSafety.HTM</a>)</li> </ul>
<b>A9. Documents and Records:</b>	Section 3.4 of the NC generic QAPP.

<b>Section B: Data Generation and Acquisition</b>	
<b>B1. Sampling Design</b>	<p>An authoritative sampling design was chosen based on the data quality objectives of the study. Sample IDs, analysis, location and rationale can be found in Table 1 of the sampling plan.</p> <p>Volume, Holding time, and Preservation requirements are in accordance with: <i>SESD Analytical Support Branch Laboratory Operations and Quality Assurance Manual, Figure 3-1</i> (<a href="http://www.epa.gov/region4/sesd/asbsop/asb-logam.pdf">http://www.epa.gov/region4/sesd/asbsop/asb-logam.pdf</a>)</p>
<b>B2. Sampling Methods, General Procedures:</b>	<p><i>SESD Field Branches Quality System and Technical Procedures</i> (<a href="http://www.epa.gov/region4/sesd/fbqstp/index.html">http://www.epa.gov/region4/sesd/fbqstp/index.html</a>)</p> <ul style="list-style-type: none"> <li>• <a href="#">Field pH Measurement</a>, January 29, 2013</li> <li>• <a href="#">Field Specific Conductance Measurement</a>, August 30, 2012</li> <li>• <a href="#">Field Temperature Measurement</a>, February 4, 2011 <a href="#">Field Turbidity Measurement</a>, January 29, 2013</li> <li>• <a href="#">Global Positioning System</a>, April 20, 2011</li> <li>• <a href="#">Field Equipment Cleaning and Decontamination</a>, December 20,</li> </ul>



# Quality Assurance Project Plan

	<p>2011</p> <ul style="list-style-type: none"> <li>• <a href="#">Packing, Marking, Labeling and Shipping of Environmental and Waste Samples</a>, April 20, 2011, (PDF, 10pp, 351K)</li> <li>• <a href="#">Potable Water Supply Sampling</a>, January 29, 2013</li> <li>• <a href="#">Field Sampling and Measurement Procedures and Procedure Validation</a>, August 30, 2012</li> <li>• <a href="#">Field Sampling Quality Control</a>, February 5, 2013</li> <li>• <a href="#">Logbooks</a>, October 8, 2010</li> <li>• <a href="#">Sample and Evidence Management</a>, January 29, 2013</li> <li>• <a href="#">Groundwater Sampling</a>, October 28, 2011</li> </ul>
<b>B3. Sampling Handling and Custody:</b>	All samples will be handled and custody maintained in accordance with <i>SESD Operating Procedures for Sample Evidence Management</i> , SESDPROC-005-R1. ( <a href="http://www.epa.gov/region4/sesd/fbqstp/Sample-and-Evidence-Management.pdf">http://www.epa.gov/region4/sesd/fbqstp/Sample-and-Evidence-Management.pdf</a> )
<b>B4. Analytical Methods:</b>	
<b>CLP:</b>	Analytical methods for organic samples are in accordance with: <i>CLP Multi-Media, Multi-Concentration Organics Analysis, SOM01.2</i> ( <a href="http://www.epa.gov/superfund/programs/clp/som1.htm">http://www.epa.gov/superfund/programs/clp/som1.htm</a> )
<b>SESD:</b>	NA
<b>B5. Quality Control:</b>	
<b>Field:</b>	<ul style="list-style-type: none"> <li>• Rinsate blanks are collected on a quarterly basis on equipment used for sampling during that calendar quarter.</li> <li>• Rinsate blanks are collected on a quarterly basis on gloves utilized for sampling during that calendar quarter.</li> <li>• Rinsate blanks are collected on a quarterly basis on the DI water system maintained and utilized by the NC Division of Waste Management for decontamination of sampling equipment.</li> <li>• Organic-free water is obtained from the NC Public Health lab for VOC water trip blanks.</li> <li>• A minimum of one duplicate per twenty samples per media will be collected.</li> <li>• A minimum of one trip blank per shipping container will be collected for VOC water samples.</li> <li>• Section 3.5 of the NC generic QAPP</li> </ul>
<b>Laboratory:</b>	<ul style="list-style-type: none"> <li>• A minimum of one MS/MSD sample per twenty samples per media will be collected.</li> <li>• Section 3.5 of the NC generic QAPP</li> </ul>
<b>B6. Instrument/Equipment Testing, Inspection and Maintenance:</b>	<ul style="list-style-type: none"> <li>• Section 3.4 and Appendix B of the NC generic QAPP</li> <li>• Section 6 of NC Superfund Section Health and Safety SOP Manual (<a href="http://www.wastenotnc.org/SAFETY/WebSite/SFSafety.HTM">http://www.wastenotnc.org/SAFETY/WebSite/SFSafety.HTM</a>)</li> </ul>
<b>B7. Instrument/Equipment</b>	All monitoring equipment and instruments are calibrated a minimum of



# Quality Assurance Project Plan

<p><b>Calibration and Frequency:</b></p>	<p>once daily, at the start of the day, when field activities requiring use of the equipment occur. Serial numbers and calibration records are maintained in the field logbook for the project. Any inconsistencies and errors during calibration are also to be noted in the field logbook.</p> <p>Equipment to be used for this project and requiring calibration includes:</p> <ul style="list-style-type: none"> <li>• pH/Conductivity/Temperature Meter(s): pH is calibrated to three standards (pH 7, pH4, pH10); Conductivity is calibrated to one standard (1413 uS)</li> <li>• Turbidity Meter(s): Turbidity is calibrated to three standards (Low, Medium, and High ntu)</li> <li>• GPS Trimble XT/XM Units: Used for geolocating sampling locations. GPS Units do not require calibration.</li> </ul>
<p><b>B8. Inspection/Acceptance for Supplies and Consumables:</b></p>	<p>All critical supplies and consumables for this field investigation are inspected and maintained by the QAO and designated staff, as discussed in Section 3.2 of the NC generic QAPP. A list of these supplies is included in Appendix B of the NC generic QAPP.</p>
<p><b>B9. Non-direct Measurements:</b></p>	<p>Not applicable.</p>
<p><b>B10. Data Management:</b></p>	<p>The project manager will be responsible for ensuring that all requirements for data management are met. All data generated for this field investigation, whether hand-recorded or obtained using an electronic data logger, will be recorded, stored, and managed according to the following procedures:</p> <p><i>SESD Operating Procedure for Control of Records</i>, SESDPROC-002-R5. (<a href="http://www.epa.gov/region4/seed/fbqstp/Control-of-Records.pdf">http://www.epa.gov/region4/seed/fbqstp/Control-of-Records.pdf</a>)</p> <p><i>SESD Operating Procedures for Logbooks</i>, SESDPROC-010-R4. (<a href="http://www.epa.gov/region4/seed/fbqstp/Logbooks.pdf">http://www.epa.gov/region4/seed/fbqstp/Logbooks.pdf</a>)</p>

## Section C: Assessment/Oversight

<p><b>C1. Assessments and Response Actions:</b></p>	<p>Assessments will be conducted during the field investigation according to <i>SESD Operating Procedure for Project Planning</i>, SESDPROC-016-R2 (<a href="http://www.epa.gov/region4/seed/fbqstp/Project-Planning.pdf">http://www.epa.gov/region4/seed/fbqstp/Project-Planning.pdf</a>) to ensure the QAPP is being implemented as approved. The Project Manager is responsible for all corrective actions while in the field.</p> <p>Section 3.2.4 of the NC generic QAPP.</p>
<p><b>C2. Reports to Management:</b></p>	<p>The Project Manager will report to their immediate supervisor if any circumstances arise during the field investigation that may adversely impact the quality of the data collected. The Project Manager and/or their immediate supervisor will also be responsible for notifying the EPA Project Manager if any circumstances arise during the field investigation that may adversely impact the quality of the data collected.</p> <p>Section 3.2.4 of the NC generic QAPP</p>

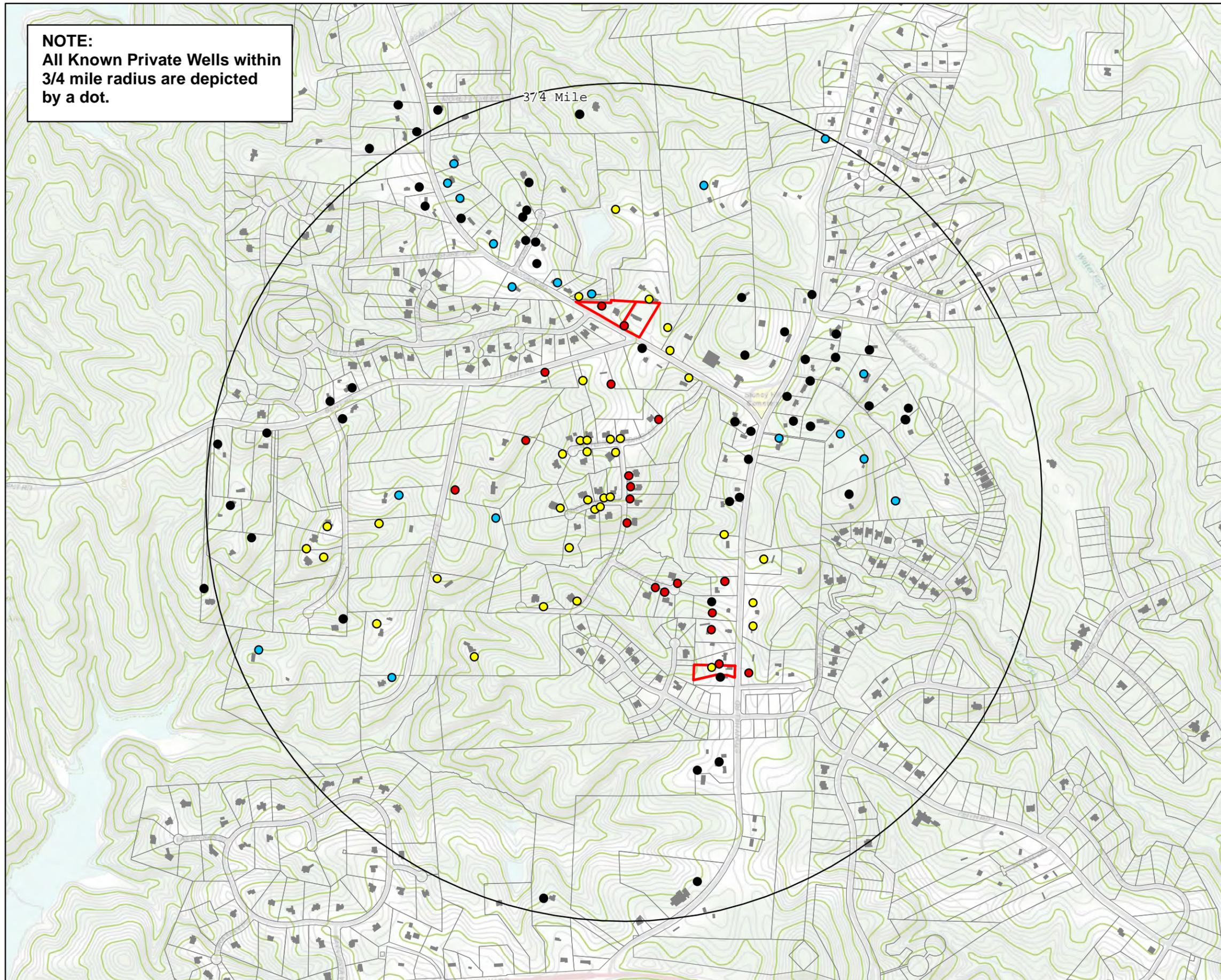


# Quality Assurance Project Plan

Section D: Data Validation and Usability	
<b>D1. Data Review, Verification, and Validation:</b>	Section 3.2.4 of the NC generic QAPP.
<b>D2. Verification and Validation Methods:</b>	Section 3.2.4 of the NC generic QAPP.
<b>D3. Reconciliation with User Requirements:</b>	<p>Review of blanks is evaluated by the Project Manager using the following guidelines:</p> <ul style="list-style-type: none"> <li>• <i>USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, EPA-540-R-08-01, June 2008</i>  <a href="http://www.epa.gov/superfund/programs/clp/download/somnfg.pdf">(<a href="http://www.epa.gov/superfund/programs/clp/download/somnfg.pdf">http://www.epa.gov/superfund/programs/clp/download/somnfg.pdf</a>)</a></li> </ul> <p>Review of data is evaluated by the Project Manager using the following guidelines:</p> <ul style="list-style-type: none"> <li>• <i>USEPA Using Qualified Data to Document an Observed Release and Observed Contamination, EPA 540-F-94-028, Exhibit 3 and Tables 1-4</i>  <a href="http://www.epa.gov/superfund/sites/npl/hrsres/fact/docoroc.pdf">(<a href="http://www.epa.gov/superfund/sites/npl/hrsres/fact/docoroc.pdf">http://www.epa.gov/superfund/sites/npl/hrsres/fact/docoroc.pdf</a>)</a></li> </ul> <p>Section 3.2 of the NC generic QAPP</p>



**NOTE:**  
All Known Private Wells within  
3/4 mile radius are depicted  
by a dot.

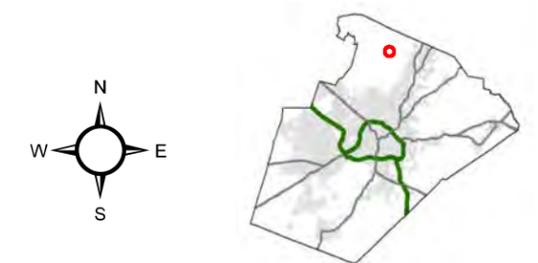


**STONY HILL ROAD TCE SITE  
PROPOSED GROUNDWATER  
SAMPLE LOCATIONS APRIL 2013**

<b>Fig:</b>	1
<b>Site:</b>	NCN 000 410 857
<b>City:</b>	Wake Forest, NC
<b>County:</b>	Wake
<b>Date:</b>	03/13/2013
<b>Drawn By:</b>	SMM

**April 2013 Residential  
Sample Locations**

- Impacted Wells, 3rd Sampling Event
- Non-Detect for two previous sampling events
- Non-Detect for one previous sampling event
- Non-Detect for two previous sampling events but not slated for April 2013 sampling



North American Datum 1983  
North Carolina State Plane (3200)  
Contour Interval 4 Feet



April 2013 Sampling Access

Name	Mail	City	Samp ID	Contact	Access Grante	GPS Needed	longitude	latitude	
Charles Arnold	4220 Purnell Rd	Wake Forest NC 27587	7305SHRb	V 4/2/13	V 4/2/2013	N	-78.60806	35.98959	
W Graham Cawthorne, Jr	6112 Cresent Knoll Dr	Wake Forest NC 27587	7337SHRSb	open ended	open ended	Y	-78.60950277	35.99270269	Monitoring Well shallow
Robert & Karen Earnhardt	7412 Churchill Dr	Wake Forest NC 27587	7412CDB	L 3/21/13	L 3/24/13	N	-78.61649843	35.99413114	
Wade Harrison	PO Box 814	Wake Forest NC 27588	7312SHRb	V 4/2/13	V 4/2/2013	N	-78.6071211	35.98935135	
Robert & Kathleen Westdyke	1021 Settlers Landing Ct	Wake Forest NC 27587	1021SLCb	L 3/21/13	V 3/25/13	Y	-78.60997288	35.99594085	
W Graham Cawthorne, Jr	6112 Cresent Knoll Dr	Wake Forest NC 27587	7337SHRDb	open ended	open ended	Y	-78.60950277	35.99270269	Monitoring Well deep
W Graham Cawthorne, Jr	6112 Cresent Knoll Dr	Wake Forest NC 27587	7337SHRDDb	open ended	open ended	Y	-78.60950277	35.99270269	Monitoring Well deep duplicate
Justin and Tamara Alexander	1008 High Trail Ct	Wake Forest NC 27587	1008HTCb	L 3/21/13	V 3/25/13	N	-78.61009455	35.99157565	
"	1008 High Trail Ct	Wake Forest NC 27587	10080HTCb	L 3/21/13	V 3/25/13	N	-78.61009455	35.99157565	Duplicate of 1008HTCb
Michele & William Hamilton	1012 High Trail Ct	Wake Forest NC 27587	1012HTCb	L 3/21/13	V 3/25/13	N	-78.60980613	35.99145612	
John & Jo Anne Quaranto	7604 Trail Blazer Trl	Wake Forest NC 27587	7604TBTb	L 3/21/13	L 3/23/13	N	-78.61087697	35.99419603	
Brenda Ray	7645 Bud Morris Rd	Wake Forest NC 27587	7645BMRb	L 3/21/13	L 3/25/13	N	-78.61046017	35.99738009	MS/MSD
Edward & Michelle Wright	7600 Trail Blazer Trl	Wake Forest NC 27587	7600TBTb	L 3/21/13	V 4/3/13	N	-78.61089691	35.99387976	
Wayne & Susan Lavrack	7420 Churchill Dr	Wake Forest NC 27587	74201CDB	L 3/21/13	V 3/25/13	Y	-78.61528	35.9955	Well at front of house
"	1009 High Trail Ct	Wake Forest NC 27587	10090HTCb	L 3/21/13	V 3/25/13	N	-78.60938495	35.99168661	Duplicate of 1009HTCb
Mark & Monica Stonefield	1009 High Trail Ct	Wake Forest NC 27587	1009HTCb	L 3/21/13	V 3/25/13	N	-78.60938495	35.99168661	
Danny and Charlene Perry	7327 Stony Hill Rd	Wake Forest NC 27587	7327SHRb	V 4/8/13	V 4/8/2013	Y	-78.60828	35.99091	Monitoring Well Rear Residence
W Graham Cawthorne, Jr	6112 Cresent Knoll Dr	Wake Forest NC 27587	7333SHRDb	open ended	open ended	Y	-78.60788	35.99173	Monitoring Well deep
"	1421 Bent Rd	Wake Forest NC 27587	14210BRb	L 3/21/13	V 3/28/13	N	-78.61148819	35.99686387	Duplicate of 1421BRb
Anna Daoust	1421 Bent Rd	Wake Forest NC 27587	1421BRb	L 3/21/13	V 3/28/13	N	-78.61148819	35.99686387	
Michele & Bradley Kennon	7708 Bud Morris Rd	Wake Forest NC 27587	7708BMRsb	L 3/21/13	V 4/2/2013	N	-78.61178	35.99889	Monitoring Well shallow
Frank & Patricia Cuda	7317 Stony Hill Rd	Wake Forest NC 27587	7317SHRb	V 4/2/13	V 4/2/2013	N	-78.60831	35.99048	Monitoring Well
"	7420 Churchill Dr	Wake Forest NC 27587	7420CDB	L 3/21/13	V 3/25/13	N	-78.61422339	35.9954086	
"	7708 Bud Morris Rd	Wake Forest NC 27587	7708BMRDb	L 3/21/13	V 4/2/2013	N	-78.61178	35.99889	Monitoring Well deep
Robert Reasoner	7648 Bud Morris Rd	Wake Forest NC 27587	7648BMRb	L 3/21/13	V 4/2/2013	N	-78.61106158	35.99838123	Monitoring Well shallow
W Graham Cawthorne, Jr	6112 Cresent Knoll Dr	Raleigh NC 27614	7333SHRSb	open ended	open ended	Y	-78.60788	35.99173	Monitoring Well shallow
Joseph H Martin Jr	7516 Trail Blazer Trl	Wake Forest NC 27587	75160TBTb	L 3/21/13	V 3/25/13	N	-78.61099402	35.9932629	7516TBTb and Duplicate
Stanley & Amy Joyner	1000 Settlers Landing Ct	Wake Forest NC 27587	1000SLCb	L 3/21/13	V 3/25/13	N	-78.61305354	35.99505689	
Scott & Theresa Haven	1001 Hidden Trail Ct	Wake Forest NC 27587	1001HTCTb	L 3/21/13	V 4/3/13	N	-78.61312926	35.99365234	
Bob & Abigail French	1001 Settlers Landing Ct	Wake Forest NC 27587	1001SLCb	L 3/21/13	E 4/3/13	N	-78.61248968	35.99540292	MS/MSD
Christopher Davis Boster	1004 Hidden Trail Ct	Wake Forest NC 27587	1004HTCTb	L 3/21/13	V 3/25/13	N	-78.61285461	35.99261882	
Karen Pemberton	1004 Settlers Landing Ct	Wake Forest NC 27587	1004SLCb	L 3/21/13	V 4/3/13	N	-78.61226465	35.99511369	
Jonathan & Jacqueline Roth	1005 Hidden Trail Ct	Wake Forest NC 27587	1005HTCTb	L 3/21/13	V 3/25/13	N	-78.61225971	35.99385838	
Michael & Michelle Merritt	1005 Settlers Landing Ct	Wake Forest NC 27587	1005SLCb	L 3/21/13	V 3/25/13	N	-78.6122699	35.99540803	
Janis & John Stollmeyer	1008 Hidden Trail Ct	Wake Forest NC 27587	1008HTCTb	L 3/21/13	V 3/25/13	N	-78.61202746	35.99361462	
Edward & Stacy Milburn	1009 Hidden Trail Ct	Wake Forest NC 27587	1009HTCTb	L 3/21/13	V 4/3/13	N	-78.61173652	35.99390987	
Glenn Klaus	PO Box 1215	Wake Forest NC 27588	1009TTb	L 3/21/13	E 4/1/13	N	-78.60349007	35.99733677	
Dick Martin	1012 Traders Trl	Wake Forest NC 27587	1012TTb	L 3/21/13	L 3/25/13	N	-78.60416144	35.99554045	
Christopher & Julianna Brown	1013 Settlers Landing Ct	Wake Forest NC 27587	1013SLCb	L 3/21/13	V 3/25/13	N	-78.61151827	35.99543075	
Brian & Cinthia Williford	1017 Settlers Landing Ct	Wake Forest NC 27587	1017SLCb	L 3/21/13	V 3/25/13	N	-78.61120399	35.99544352	
William A Wilkinson	1020 Traders Trl	Wake Forest NC 27587	1020TTb	L 3/21/13	L 3/25/13	N	-78.6036092	35.99512869	
W Keith & Brenda Walker	1032 Traders Trl	Wake Forest NC 27587	1032TTb	L 3/21/13	V 4/29/13	N	-78.6027	35.9941	
Frank Gammon	1425 Bent Rd	Wake Forest NC 27587	1425BRb	L 3/21/13	V 3/25/13	N	-78.61239526	35.99696036	
Brenda Harrison Ray	1437 Bent Rd	Wake Forest NC 27587	1437BRb	L 3/21/13	V 4/2/13	N	-78.61360242	35.99717366	MS/MSD (9 VOAs)
Dustin & Megan Daniel	1613 Bent Rd	Wake Forest NC 27587	1613BRb	L 3/21/13	V 5/2/13	N	-78.6235842	35.99441676	
Lawrence Kusan	1625 BENT RD	Wake Forest NC 27587	1625BRb	L 3/21/13	V 3/25/13	N	-78.62454348	35.99160078	
R T Bailey, Jr	2000 Rubicon Ln	Wake Forest NC 27587	2000Rlb	L 3/21/13	V 3/25/13	N	-78.61026303	35.99906334	
Joel & Lisa Bailey	2020 Rubicon Ln	Wake Forest NC 27587	2020Rlb	L 3/21/13	V 3/25/13	N	-78.61131943	36.00139277	
Teresa & Stuart Doring	2728 Durham Rd	Wake Forest NC 27587	2728DRb	L 3/21/13	V 4/29/13	N	-78.61542648	35.9832655	
Leslie & David Fowlkes	7121 Churchill Dr	Wake Forest NC 27587	7121CDB	L 3/21/13	V 4/3/13	N	-78.61854587	35.98926397	
Gary & Patricia George	7217 Churchill Dr	Wake Forest NC 27587	7217CDB	L 3/21/13	L 4/1/13	N	-78.61902911	35.99066832	

David &Deborah Martin	7220 Churchill Dr	Wake Forest NC 27587	7220Cdb	L 3/21/13	V 4/3/13	N	-78.61590207	35.9898055	MS/MSD
R Wayne Bailey	7225 Churchill Dr	Wake Forest NC 27587	7225Cdb	L 3/21/13	L 3/23/13	N	-78.62279843	35.99000403	
Donald & Catherine Albright	7303 Stony Hill Rd	Wake Forest NC 27587	7303SHRb	L 3/21/13	V 4/3/13	N	-78.6083	35.9895	MS/MSD
John & Jewel Eason	7304 Churchill Dr	Wake Forest NC 27587	7304Cdb	L 3/21/13	V 3/25/13	N	-78.61707654	35.99183022	
Wade Harrison	7320 Stony Hill Rd	Wake Forest NC 27587	7320SHRb	L 3/21/13	L 3/25/13	N	-78.6069751	35.9905695	
Wade Harison	7324 Stony Hill Rd	Wake Forest NC 27587	7324SHRb	L 3/21/13	L 3/25/13	N	-78.606848	35.9911486	
Danny & Charlene Perry	7325 Stony Hill Rd	Wake Forest NC 27587	7325SHRb	L 3/21/13	V 4/8/13	N	-78.60785267	35.99091564	Monitoring Well Front Residence
Wade Harison	7328 Stony Hill Rd	Wake Forest NC 27587	7328SHRb	L 3/21/13	L 3/25/13	N	-78.606730	35.990840	
David & Mary Eckstine	7333 Churchill Dr	Wake Forest NC 27587	7333Cdb	L 3/21/13	E 4/4/13	N	-78.61893857	35.99327058	
James & Leah Judge	7341 Churchill Dr	Wake Forest NC 27587	7341Cdb	L 3/21/13	V 4/3/13	N	-78.61829671	35.99400229	
Jason Wright	7409 Trail Blazer Trl	Wake Forest NC 27587	7409TBTb	L 3/21/13	V 4/3/13	N	-78.61368134	35.99108931	
James & Gwendolyn Noble	7417 Trail Blazer Trl	Wake Forest NC 27587	7417TBTb	L 3/21/13	V 3/25/13	N	-78.61261135	35.99123096	
William & Frances Arnold	7444 Stony Hill Rd	Wake Forest NC 27587	7444SHRb	L 3/21/13	E 4/1/13	N	-78.60611211	35.99543929	
Roy & Gloria Dean	7605 Trail Blazer Trl	Wake Forest NC 27587	7605TBTb	L 3/21/13	E 4/4/13	N	-78.61153293	35.99393379	
Sherrie & Jason Smith	7613 Trail Blazer Trl	Wake Forest NC 27587	7613TBTb	L 3/21/13	V 3/25/13	N	-78.61135325	35.99508987	
Lawrence & Susan Misenheimer	7625 Bud Morris Rd	Wake Forest NC 27587	7625BMRb	L 3/21/13	V 4/3/13	N	-78.60900103	35.9970152	
Ernest & Linda Baker	7636 Bud Morris Rd	Wake Forest NC 27587	7636BMRb	L 3/21/13	V 4/3/13	N	-78.60959505	35.99772849	
Donald & Catherine Albright	7644 Bud Morris Rd	Wake Forest NC 27587	7644BMRb	L 3/21/13	V 4/3/13	N	-78.60967142	35.99832114	
Newman Baily	7649 Stony Hill Rd	Wake Forest NC 27587	7649SHRb	L 3/21/13	V 3/26/13	N	-78.60849747	36.00201505	
Jerry & Sandra Keith	7705 Stony Hill Rd	Wake Forest NC 27587	7705SHRb	L 3/21/13	V 4/29/13	N	-78.6046	36.00308	
Richard Scheuerle	7716 Benthill Ct	Wake Forest NC 27587	7716BHCb	L 3/21/13	V 3/25/13	N	-78.62044	35.9934	
Robert & Snezhana Johnson	7720 Benthill Ct	Wake Forest NC 27587	7720BHCb	L 3/21/13	E 3/29/13	N	-78.62127236	35.99262545	
Elaine Owens	7724 Benthill Ct	Wake Forest NC 27587	7724BHCb	L 3/21/13	E 3/25/13	N	-78.62071733	35.99239888	
Darin & Lori Ray	7804 Bud Morris Rd	Wake Forest NC 27587	7804BMRb	L 3/21/13	V 3/25/13	N	-78.61251212	35.9991382	
Paul T Morris, Jr.	7921 Fairlake Dr	Wake Forest NC 27587	7821BMRb	L 3/21/13	V 4/4/13	N	-78.61464784	35.99940069	
Gregory & Julia Schmid	7904 Bud Morris Rd	Wake Forest NC 27587	7904BMRb	L 3/21/13	E 4/1/13	Y	-78.61523662	36.00052143	
Christopher Pittman	7916 Bud Morris Rd	Wake Forest NC 27587	7916BMRb	L 3/21/13	V 4/29/16	Y	-78.61657023	36.00151134	
Carl & Christine Martin	7928 Bud Morris Rd	Wake Forest NC 27587	7928BMRb	L 3/21/13	E 4/1/13	Y	-78.61678295	36.00187572	
Jeffrey Harrison	7936 Bud Morris Rd	Wake Forest NC 27587	7936BMRb	L 3/21/13	V 4/29/16	Y	-78.61622839	36.00274312	
Tracy and Wanda Perry	7409 Stony Hill Road	Wake Forest NC 27587	7409SHRb	L 3/21/13	V 3/23/13	N	-78.607888	35.992945	
Jeff and Natalie Conrad	7441 Stony Hill Road	Wake Forest NC 27587	7441SHRb	L 3/21/13	V 3/23/13	N	-78.6071	35.9949	

Letter, voice e-mail