



**Subject: Final Minutes, Quarterly Restoration Advisory Board (RAB) Meeting
Longhorn Army Ammunition Plant (LHAAP)
Location of Meeting: Karnack Community Center, Karnack, Texas
Date of Meeting: January 18, 2018, 6:00 – 7:00 PM**

Meeting Participants:

USACE: Aaron Williams
USAEC: Nick Smith
Bhate: Kim Nemmers and Sally Smith
APTIM: William (Bill) Foss
USEPA Region 6: Rich Mayer, Dorelle Harrison
USGS: Kent Becher
RAB: Present: Paul Fortune; Judy VanDeventer; Tom Walker
Absent: Ken Burkhalter; Lee Guice; Ted Kurz; Terry Britt; Charles Dixon;
James Lambright; Richard Le Tourneau; John Pollard, Jr.; Nigel R. Shivers;
Carol Fortune
Public: Dan Murphy, Laura-Ashley Overdyke, Hattie Hackler, Beth Morgan,
George Rice

An agenda for the RAB meeting, a color copy of the Bhate Environmental Associates, Inc. (Bhate) slide presentation, and handouts (see list at end of meeting minutes) were provided for meeting attendees.

Welcome and Introduction

Mr. Paul Fortune, RAB Co-Chair, called the meeting to order. Mr. Fortune noted two new persons were at the RAB Meeting. Ms. Beth Morgan is from Karnack, Texas and Hattie Hackler lives in Jefferson, Texas. Ms. Laura-Ashley Overdyke asked how Ms. Morgan and Ms. Hackler had found out about the meeting to which the response was Facebook.

Open Items

Mr. Aaron Williams mentioned that the Army is always looking for more people to join the RAB and that forms are available online. Mr. Williams then asked if there was interest in the Army having a tour of the LHAAP in April. Ms. Overdyke responded that she was interested and would publicize it. Ms. Hackler and Ms. Morgan also indicated interest. After some discussion, it was determined that the next RAB Meeting would be on April 19, 2018, from 4:00 to 5:00 pm, and then the tour would follow from 5:00 to 6:30 pm. Ms. Overdyke offered to set up an event page through the Caddo Lake Institute Facebook page and invite the public to the signup page for the tour. Mr. Williams stated that the Army would need to know a head count one month out.

Mr. Williams stated that everyone should have received the October 2017 meeting minutes. July 2017 RAB Meeting minutes were approved by Ms. Judy VanDeventer first, and then Mr. Tom Walker provided a second motion. Mr. Williams pointed out the link for the RAB applications and encouraged participation.



Defense Environmental Restoration

Overview of Sites

Ms. Kim Nemmers introduced Ms. Sally Smith who is Bhate's Corporate Health and Safety Manager and Mr. Bill Foss who is with APTIM, which is a subcontractor to Bhate. Ms. Nemmers explained which sites are under the Bhate contract and would be discussed in this RAB meeting.

Ms. Nemmers explained that the groundwater treatment plant and Site LHAAP-18/24 work together as the operating interim remedial action. There is another contract that will be awarded for three sites (LHAAP-18/24, LHAAP-29, and LHAAP-47) that require a Record of Decision (ROD).

Mr. Rich Mayer asked how many sites were under Bhate's contract to which Ms. Nemmers responded that she thought it was about 10 to 12 sites. Mr. Mayer then asked who will do the work following the final ROD at the three sites to be covered by the new contract. Mr. Williams responded that a new contract will need to be awarded for that additional work. Mr. Williams indicated that the ROD will determine what the new work will be so that it can be costed for award. Mr. George Rice then asked who is doing the work that Bhate is not. Ms. Nemmers replied that the contract was not yet awarded. Mr. Williams followed up by stating that the contract is anticipated to be awarded next week. Mr. Mayer asked if we would know who the contractor for the other sites were by the next meeting to which Mr. Williams said yes. Ms. VanDeventer requested that RAB Members be emailed after the contractor is selected. **Note:** Ms. Rose Zeiler emailed the notice of award with the contractor's name to the RAB Members on January 23, 2018.

Ms. Nemmers then discussed the documents that are being prepared and the field work that has been completed over the prior 3 months to move the sites forward. Ms. Nemmers explained that a ROD is being prepared to move site LHAAP-03 forward by moving the groundwater plume under LHAAP-58, which also requires an explanation of significant difference (ESD) for the prior ROD. The two Military Munitions Response Program (MMRP) sites have a land use control (LUC) remedial design (RD) being completed to allow for the land to be transferred to the United States Fish and Wildlife Service. Site LHAAP-58 has an ESD being prepared for additional remediation in a portion of the plume that has not received it. The Remedial Action Work Plan (RAWP) for Site LHAAP-58 was revised to include 2016 groundwater data and will allow for the remediation to be completed in the coming months. Site LHAAP-16 has a RAWP that is being prepared. Ms. Nemmers explained that Site LHAAP-16 currently uses groundwater extraction, and the remediation will include injections for bioremediation to advance the site and stop the groundwater extraction. Two sites (LHAAP-50 and LHAAP-58) have Year 3 Remedial Action-Operation (RA-O) Reports, which are groundwater reports, that will have the 2016 groundwater data included.

Ms. Nemmers then explained that mostly groundwater sampling has been completed in the past 3 months. In addition, three new wells were installed at LHAAP-04 in December 2017, which were sampled Monday and Tuesday of the prior week. Ms. Nemmers then explained that Mr.



Foss would discuss LHAAP-17 field work in detail. Ms. Nemmers pointed out that post-closure care activities were completed at the landfill which is Site LHAAP-19.

The 3 month look ahead was presented by Ms. Nemmers, who explained that many of the documents will be finalized in the coming month primarily. The only new document is the Quarterly Groundwater Treatment Plant Report, which will cover October to December 2017.

Similarly, the 3 month look ahead for field work has sites that will require sampling. In addition, we are continuing the LHAAP-17 Pre-Design Investigation (PDI) that will include an aquifer test and some additional groundwater sampling. Site LHAAP-58 will have two new monitoring wells installed followed by a baseline groundwater sampling event. Also, the Contingent Remedy for Site LHAAP-58, which is enhanced bioremediation within the western portion of the site, is planned to be implemented.

LHAAP-17

Mr. Foss introduced Site LHAAP-17 as a burning ground used for propellants, explosives, and similar materials. Mr. Foss then explained that there are two media being evaluated by the PDI. One is the soil that contains explosives, metals, and some dioxins. The other is the groundwater that contains perchlorate and chlorinated solvents, which is part of what was being treated at the site. Mr. Foss then explained that two groundwater zones are being evaluated which are the shallow and the intermediate. The shallow zone includes wells that are approximately 20 feet deep but some go as deep as 35 feet. The site also has an intermediate and a deep aquifer zone, but both of these zones have been clean each time that they were sampled. Only the shallow aquifer zone has contamination present.

The ROD in place for Site LHAAP-17 requires the PDI to be completed to obtain more site data ahead of the RD. The remedy selected is soil excavation of areas above the remedial goal and then groundwater extraction to remove the gross levels of perchlorate, which is defined as 20 parts per million (ppm), at which time the extraction will be stopped. The remedy for the groundwater will then become monitored natural attenuation (MNA), which basically means the natural degradation processes will be monitored.

Mr. Foss explained that there are three things currently being completed. Since the last groundwater sampling data was collected in 2009 and 2010, the first part of the PDI was to sample all the wells in November 2017 to determine the current site conditions. Second, a large number of soils samples were collected from the surface down to 7 to 15 feet to determine the extent of soil excavation. Approximately 50 soil borings were completed the week prior. The soil samples are currently at the laboratory being analyzed. A couple of the soils borings could not be completed due to standing water, but those samples will be collected once the area is dry. The third step is an aquifer pumping test completed to evaluate the well that will have the pump installed and to assist in the design of the extraction system. The test is being completed next week with Mr. Foss installing the transducers on the day following the RAB meeting. What that test is designed to do is to pump on one of the wells that is known to be a part of the extraction



system and then monitor the wells around it to see how those wells draw down with a given pumping rate.

Mr. Mayer asked Mr. Foss to explain what a transducer is. Mr. Foss responded that a transducer is a mechanical device that measures pressure that we use to calibrate the water pressure to depth. A transducer can be dropped into a well and be programmed to take regular measurements. Then the pump can be started in the selected well and measurements can be recorded frequently on nearby wells. One transducer will be in the well that is being pumped as well as nearby wells. At Site LHAAP-17, there will be transducers in wells up to 800 feet away from the well that is being pumped.

Mr. Foss explained that one additional well was also installed at LHAAP-17 to better delineate the shallow groundwater zone plume. MNA is clearly a component of the remedy based upon observed decreases in perchlorate detected in the groundwater from the 2009 data to the recent groundwater data. In general, plume contraction is observed at LHAAP-17. One monitoring well, 17WW06, had an increase in perchlorate, which indicates that the plume mass has moved west. So, the new monitoring well was installed west of 17WW06 and is labeled as 17WW19. The new monitoring well was installed in December 2017 and was recently sampled. The results from the new monitoring well will determine if another well is needed based upon the plume moving further west. Mr. Foss stated that declining concentrations are observed from sampling event to sampling event throughout the site, providing good confidence that MNA is an appropriate remedy.

Mr. Foss explained that this information will be compiled into the PDI Report. The next report will be the RD with a RAWP for the extraction system and soil excavation, after the PDI Report. Mr. Mayer stated that it was interesting that there are no explosives in the groundwater, but explosives are detected in the soil. Mr. Foss said he would not speculate on why that is but stated that movement of chemicals varies by media and chemicals can be more attractive to microorganisms than others.

Mr. Rice asked if the northernmost extent is defined. Mr. Foss explained that there was no groundwater collected for analysis in 17WW12 because the well was dry in November 2017, as well as December 2017 and January 2018 when gauged. However, the well is being evaluated regularly so that when groundwater is present a sample can be collected. Mr. Foss also noted that the 2017 perchlorate detection in 18WW10 was likely associated with Site LHAAP-18/24 to the east based upon historical and recent data and additional monitoring well data not shown on the maps provided as part of the LHAAP 18/24 monitoring well network.

Groundwater Treatment Plant

Ms. Nemmers then discussed the groundwater treatment plant operations indicating that the lower volume of groundwater treated is due to drought conditions. Ms. Nemmers stated that there were no major issues, but the freezing cold weather has been a challenge for the treatment



plant operation that is being managed. Ms. Nemmers stated that a handout with the groundwater treatment plant information was available.

Surface Water Sampling

Ms. Nemmers explained that surface water samples were collected at the end of December 2017 and that the validated data was not yet available. Therefore, this data was not presented.

LHAAP-18/24, -29, and -47

Mr. Williams stated that the new contract for sites LHAAP-18/24, -29, and -47 was planned for award next week. This contract will allow LHAAP to get a decision document for these sites. The first deliverable under the new contract is a Proposed Plan for sites LHAAP-18/24 and -29. This document will require a public meeting which will include a notice in the newspaper. The meeting will allow the public to review the proposed remedy and ask questions. At the next RAB meeting, the Army should be able to provide a schedule for these sites.

Next RAB Meeting Schedule and Closing Remarks

The next RAB meeting will be held on **April 19, 2018**, with a **meeting from 4:00 to 5:00 pm** at the Karnack Community Center followed by the **tour from 5:00 to 6:30 pm**. Ms. Overdyke asked if the community is invited or just the RAB members. Mr. Williams stated that the community is invited, but a head count will be required one month ahead of the meeting. Ms. Overdyke stated that she could set the tour up as a Facebook event through the Caddo Lake Institute page so that people would have to register to attend. Ms. Overdyke noted that this would mean registration would need to be done by March 19, 2018.

Adjourn

Mr. Fortune adjourned the meeting.

January 2018 Meeting Attachments and Handouts:

- Meeting Agenda
- Color Copy of Bhate Presentation Slides
- Groundwater Treatment Plant (GWTP) – Processed Groundwater Volumes Handout



LONGHORN ARMY AMMUNITION PLANT
RESTORATION ADVISORY BOARD

Karnack, Texas
(479) 635-0110

AGENDA

DATE: Thursday, January 18, 2018
TIME: 6:00 – 7:00 PM
PLACE: Karnack Community Center, Karnack, Texas

06:00 **Welcome and Introduction**

06:05 **Open Items {RMZ}**

- RAB Administrative Issues
- Minutes (October 2017 RAB Meeting)
- Ongoing Outreach/Website

06:25 **Defense Environmental Restoration Program (DERP) Update {Bhate}**

- Documents and Field Work Completed in 4th Quarter 2017
- Three Month Lookahead
- Update on LHAAP-17 Pre-Design Investigation (PDI)
- Groundwater Treatment Plant (GWTP) Update

06:45 **Environmental Restoration Issues {RMZ}**

- Decision Document for LHAAP Sites -18/24, -29 and -47
- Schedule

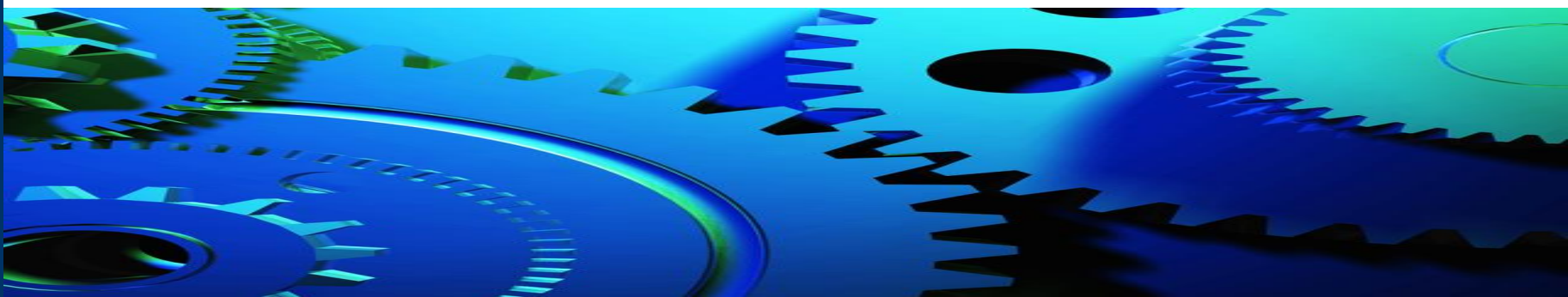
06:50 **Next RAB Meeting Schedule and Closing Remarks {RMZ}**

07:00 **Adjourn {RMZ}**



**Longhorn Army
Ammunition Plant
Quarterly Restoration Advisory
Board Meeting**

**Karnack Community Center
January 18, 2018
6:00 PM CST**



Restoration Advisory Board (RAB) Meeting

Agenda

- 06:00** Welcome and Introduction
- 06:05** Open Items {RMZ}
 - RAB Administrative Issues
 - Minutes (July 2017 RAB Meeting)
 - Ongoing Outreach/Website (2017 Volumes 1-6 loaded)
- 06:25** Defense Environmental Restoration Program (DERP) Update {Bhate}
 - Documents and Field Work Completed in 4th Quarter 2017
 - Three Month Lookahead
 - Update on LHAAP-17 Pre-Design Investigation (PDI)
 - Groundwater Treatment Plant (GWTP) Update
- 06:45** Update on Other Contract
- 06:50** Next RAB Meeting Schedule and Closing Remarks
- 07:00** Adjourn {RMZ}

Restoration Advisory Board Meeting

Abbreviations and Acronyms

µg/L	micrograms per liter
CST	central standard time
COC	constituents of concern
DCE	dichloroethene
DERP	Defense Environmental Restoration Program
DNT	dinitrotoluene
DF	Draft Final
ESD	explanation of significant difference
GWTP	groundwater treatment plant
LHAAP	Longhorn Army Ammunition Plant
LUC	land use controls
MNA	monitored natural attenuation
MW	monitoring well

PCL	protective concentration level
PDI	pre-design investigation
RAB	Restoration Advisory Board
RA-O	Remedial Action - Operation
RAWP	Remedial Action Work Plan
RD	remedial design
ROD	Record of Decision
RTC	response to comment
TCE	trichloroethene
TNT	trinitrotoluene
TRRP	Texas Risk Reduction Program
VC	vinyl chloride

RAB Administrative Issues

RAB Membership

RAB Tour

Restoration Advisory Board Meeting

Minutes from Past RAB Meetings

Discussion of October 2017 RAB Meeting minutes/motion to accept

The Army Wants You to be Informed

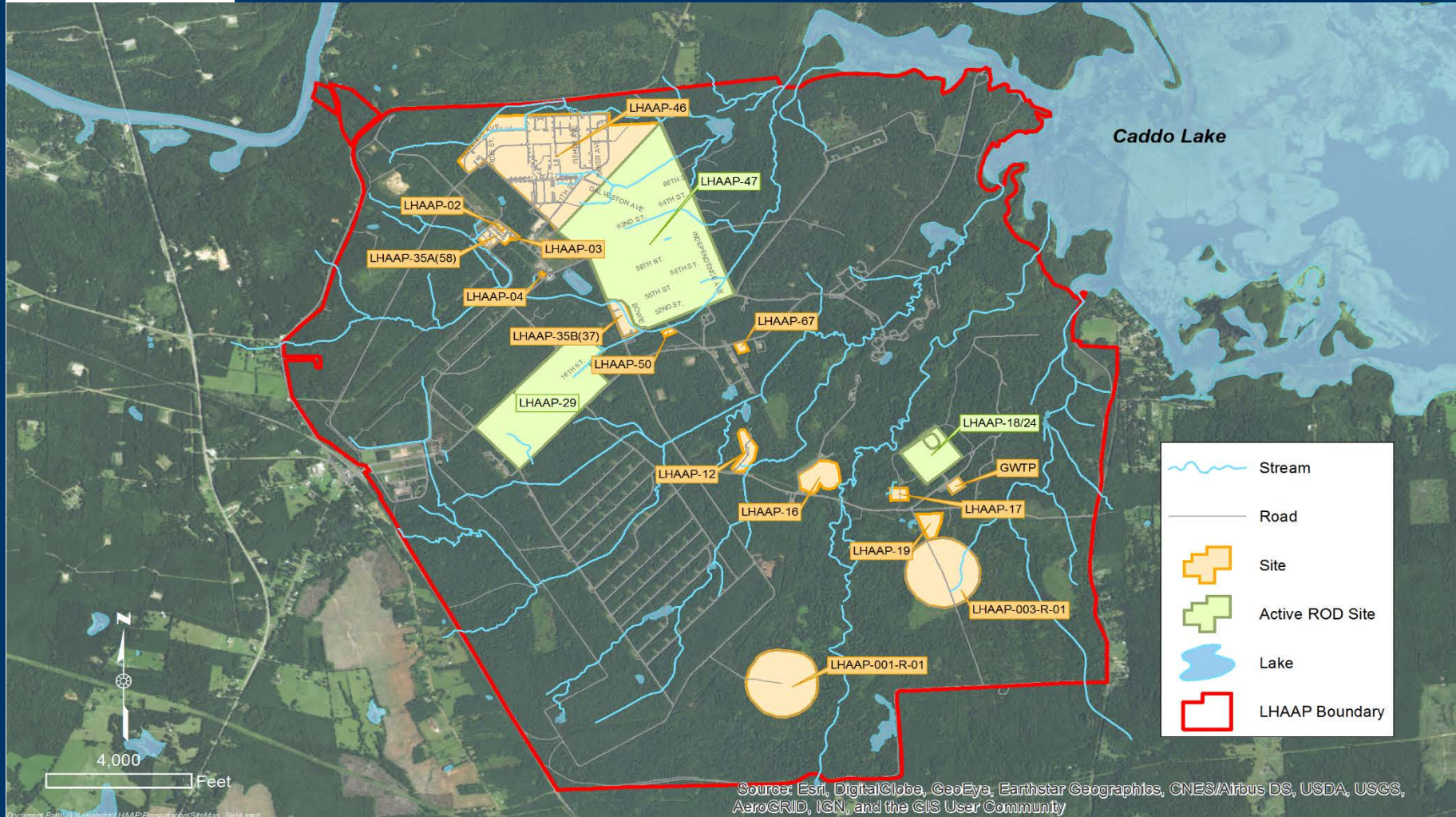
- The Army is committed to protecting human health and the environment; key to that commitment is engaging the community and increasing public participation in environmental restoration at LHAAP
- You are encouraged to:
 - Attend RAB Meetings and/or become a member of the RAB
 - Visit the Longhorn environmental website at www.longhornaap.com
 - Make suggestions for improving communication – the Army welcomes and appreciates community feedback

Outreach

- Website Address: <http://www.longhornaap.com/>
- Website will be updated to indicate the upcoming field events at each site including groundwater sampling, monitoring well installations, soil sampling or remediation activities

Restoration Advisory Board Meeting

Site Map



Restoration Advisory Board Meeting

DOCUMENTS IN PROCESS

Site	Document
Basewide	Installation Wide Work Plan
LHAAP-03	Response to Comment (RTC) – Draft Final (DF) Record of Decision (ROD)
LHAAP-03/58	Explanation of Significant Difference (ESD) for LHAAP-03 groundwater indistinguishable from LHAAP-58
LHAAP-04	Remedial Design (RD)
LHAAP-16	Remedial Action Work Plan (RAWP)
LHAAP-50	Year 3 RA-O Report
LHAAP-58	ESD, Revised Final RAWP for Contingency Remedy, Year 3 RA-O Report
LHAAP001-R-01	Land Use Control (LUC) RD
LHAAP003-R-01	LUC RD

Restoration Advisory Board Meeting

Completed Field Work

Site	Activity
LHAAP-02	Groundwater Sampling – November 2017
LHAAP-04	Installed new wells (Dec 2017) and sampled all wells (Jan 2018)
LHAAP-12	RA-O Sampling – December 2017
LHAAP-17	Pre-Design Investigation (PDI) – Sampled Existing Groundwater Wells (Nov 2017), installed shallow well (Dec 2017) and piezometers; initiated soil sampling (Jan 2018)
LHAAP-19	Cap and LUC Inspection
LHAAP-37	RA-O Sampling – November 2017
LHAAP-50	RA-O Sampling – November 2017
LHAAP-58	RA-O Sampling - November 2017
LHAAP-67	RA-O Sampling – December 2017
LHAAP001-R-01	Confirmation Groundwater Sampling – November 2017
LHAAP-18/24	RA-O Sampling – December 2017

Restoration Advisory Board Meeting

3 Month Lookahead- Documents

Site	Document
LHAAP-03	Response to Comment (RTC) – Draft Final (DF) Record of Decision (ROD)
LHAAP-03/58	Explanation of Significant Difference (ESD)
LHAAP-04	Remedial Design (RD)/Remedial Action Work Plan (RAWP)
LHAAP-16	Remedial Action Work Plan (RAWP)
LHAAP-50	Year 3 RA-O Report
LHAAP-58	Final ESD, Revised RAWP and Year 3 RA-O Report
LHAAP001-R-01	Final Land Use Control (LUC) RD
LHAAP003-R-01	Final LUC RD
GWTP	Draft Quarterly Report

Restoration Advisory Board Meeting

3 Month Lookahead- Field Work

Site	Activity
LHAAP-02	Groundwater Sampling
LHAAP-12	RA-O Sampling
LHAAP-17	Pre-Design Investigation (PDI) –conduct pumping tests; complete soil sampling; complete additional groundwater sampling
LHAAP-37	RA-O Sampling
LHAAP-50	RA-O Sampling
LHAAP-58	Install two new wells, Baseline Sampling, Remedial Action Implementation for Western Plume area
LHAAP-67	RA-O Sampling
Surface Water	Collect Surface Water samples

Restoration Advisory Board Meeting

LHAAP-17: No. 2 Flashing Area/Burning Ground

Groundwater zones: Shallow (10 to 35 Feet Below Ground Surface [ft bgs]), Intermediate (to 55 ft bgs) and Deep (to 150 ft bgs)

Constituents of Concern (COCs)

- Soil: Explosives (2,4-DNT, 2,6-DNT, and 2,4,6-TNT), barium, and dioxins
- Groundwater: Perchlorate, chlorinated solvents (TCE, 1,2-DCE, VC)

Proposed Remedy:

- Soil excavation
- Groundwater extraction to reduce perchlorate concentrations to less than 20,000 micrograms per liter ($\mu\text{g/L}$), an interim cleanup level. Once this level is reached, the remedial action will transition from extraction to monitored natural attenuation (MNA).

Scope of PDI:

- Conduct groundwater gauging and sampling and install up to 3 monitoring wells to define current groundwater plumes
- Conduct soil sampling to define soil contamination to design excavation
- Conduct aquifer pumping tests to collect data to design the extraction system

Restoration Advisory Board Meeting

LHAAP-17: Current Status

- Completed groundwater sampling of existing wells in November 2017
- Installed an additional shallow groundwater monitoring well in December 2017
- Initiated soil sampling in January 2018
- Preparing to sample new shallow well in January 2018
- Preparing for aquifer pumping test in January 2018

Restoration Advisory Board Meeting

LHAAP-17: Shallow Groundwater

18WW10		
Sample Date	9/25/2009	11/15/2017
TCE	ND	ND
1,1-DCE	ND	ND
1,2-DCA	ND	ND
Perchlorate	ND	52

17WW12		
Sample Date	2/26/2009	11/16/2017
TCE	ND	
1,1-DCE	ND	dry
1,2-DCA	ND	
Perchlorate	990	

17WW11		
Sample Date	2/26/2009	11/14/2017
TCE	ND	ND
1,1-DCE	ND	ND
1,2-DCA	ND	ND
Perchlorate	ND	ND

17WW02		
Sample Date	3/5/2009	11/15/2017
TCE	867	6.2
1,1-DCE	6.22	ND
1,2-DCA	34.5	3.3
Perchlorate	160,000	2,500

17WW10		
Sample Date	2/16/2009	11/16/2017
TCE	ND	ND
1,1-DCE	ND	ND
1,2-DCA	ND	ND
Perchlorate	ND	1.6

17WW06		
Sample Date	3/5/2009	11/16/2017
TCE	176	260
1,1-DCE	7.0	7.6
1,2-DCA	5.68	8.4
Perchlorate	74,900	110,000

130		
Sample Date	3/4/2009	11/14/2017
TCE	31.1	2.1
1,1-DCE	ND	ND
1,2-DCA	4.29	ND
Perchlorate	1,700	2.5

17WW01		
Sample Date	9/25/2009	11/14/2017
TCE	6,090	61,000
1,1-DCE	70	240
1,2-DCA	35.8	87
CIS-1,2-DCE	--	3,700
VC	--	4J
Perchlorate	56,000	ND

17WW14		
Sample Date	2/25/2009	11/14/2017
TCE	ND	ND
1,1-DCE	ND	ND
1,2-DCA	ND	ND
Perchlorate	ND	2.5

17WW04		
Sample Date	3/2/2009	11/16/2017
TCE	0.914J	ND
1,1-DCE	ND	ND
1,2-DCA	ND	ND
Perchlorate	ND	ND









18WW14	
Sample Date	11/16/2017
TCE	ND
1,1-DCE	ND
1,2-DCA	ND
Perchlorate	ND

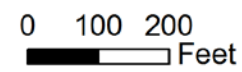
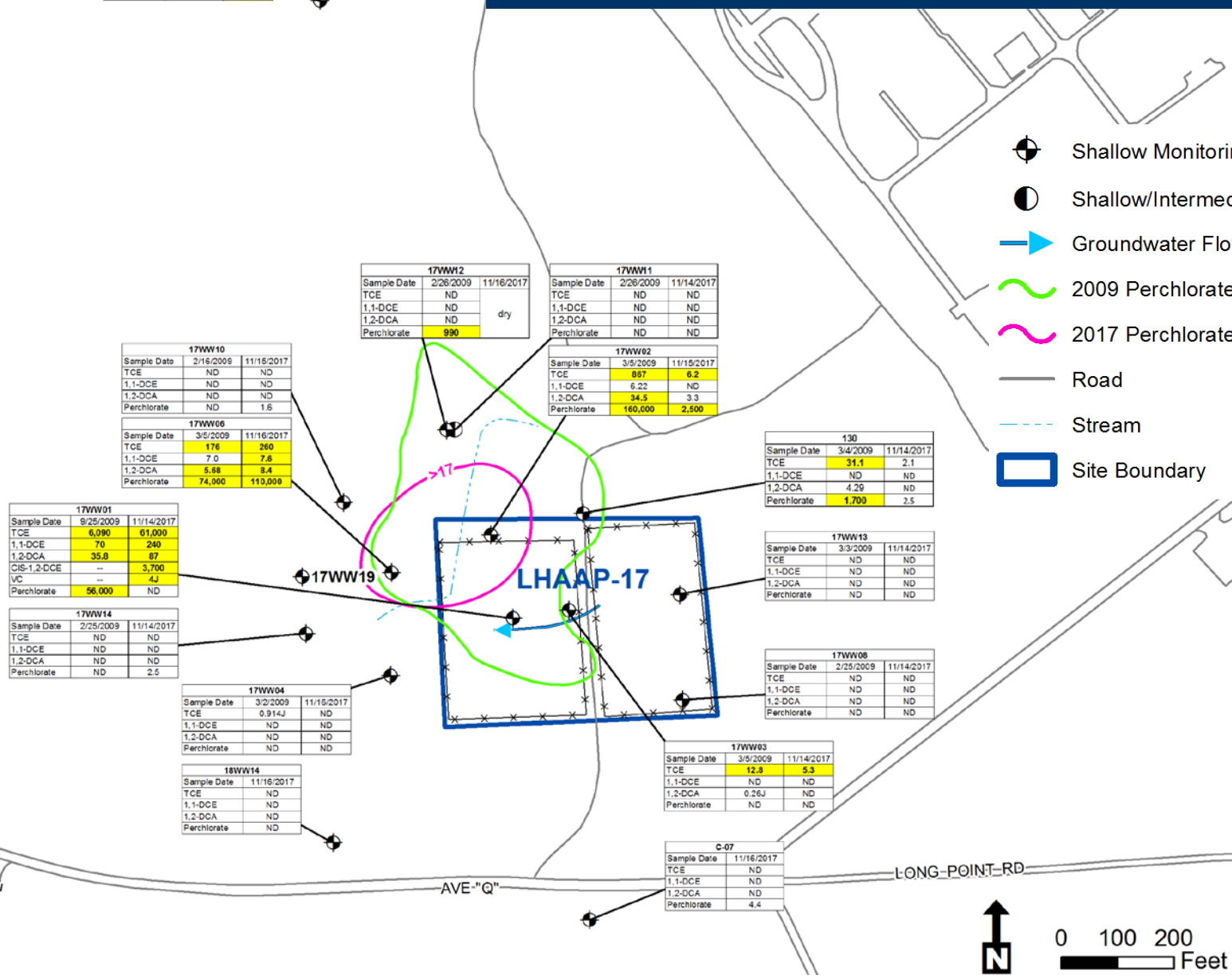
17WW13		
Sample Date	3/3/2009	11/14/2017
TCE	ND	ND
1,1-DCE	ND	ND
1,2-DCA	ND	ND
Perchlorate	ND	ND

17WW08		
Sample Date	2/25/2009	11/14/2017
TCE	ND	ND
1,1-DCE	ND	ND
1,2-DCA	ND	ND
Perchlorate	ND	ND

17WW03		
Sample Date	3/5/2009	11/14/2017
TCE	12.8	5.3
1,1-DCE	ND	ND
1,2-DCA	0.26J	ND
Perchlorate	ND	ND

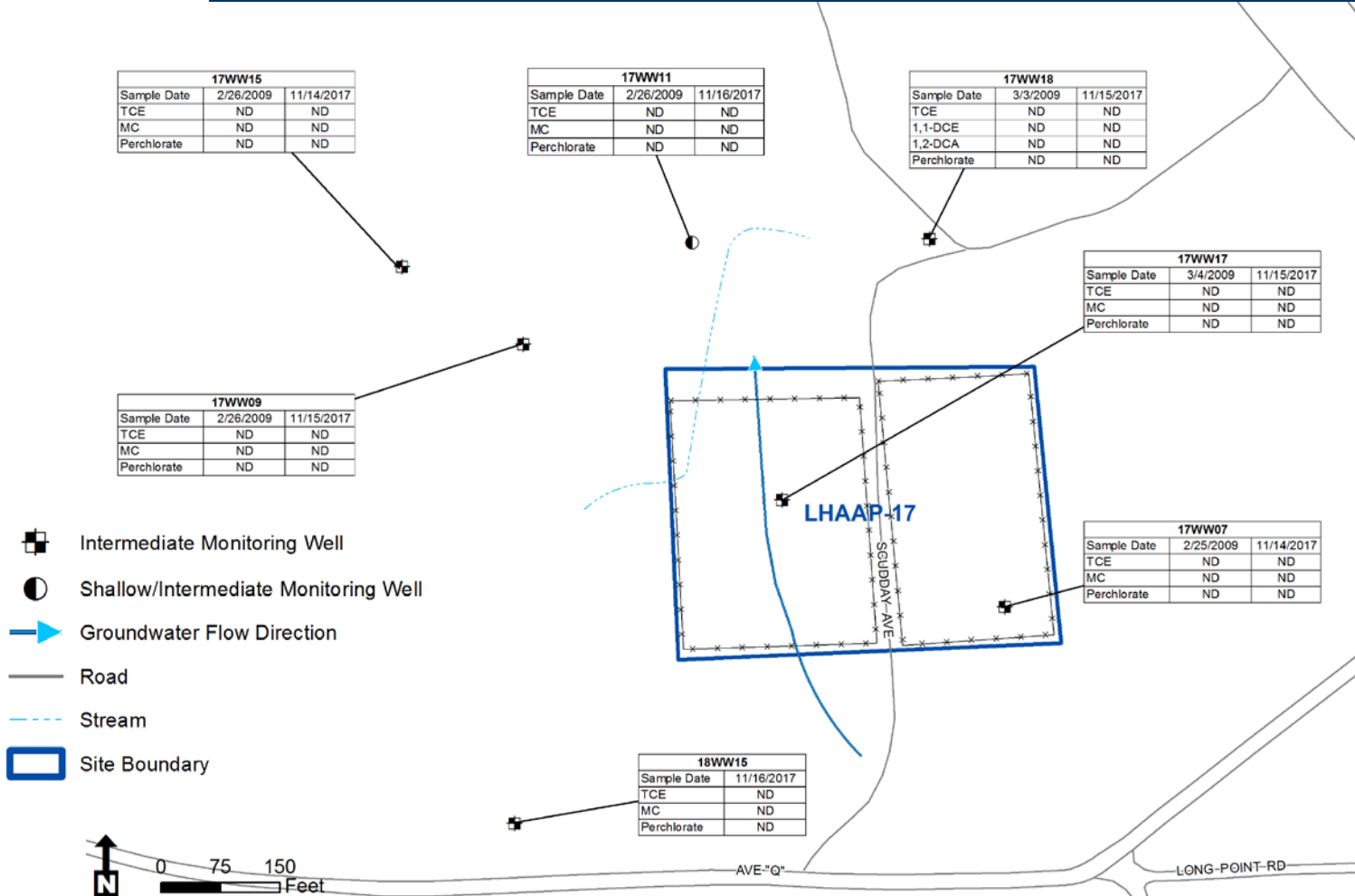
C-07		
Sample Date	11/16/2017	
TCE	ND	
1,1-DCE	ND	
1,2-DCA	ND	
Perchlorate	4.4	

-  Shallow Monitoring Well
-  Shallow/Intermediate Monitoring Well
-  Groundwater Flow Direction
-  2009 Perchlorate Contour (PCL = 17 µg/L)
-  2017 Perchlorate Contour (PCL = 17 µg/L)
-  Road
-  Stream
-  Site Boundary



Restoration Advisory Board Meeting

LHAAP-17: Intermediate Groundwater

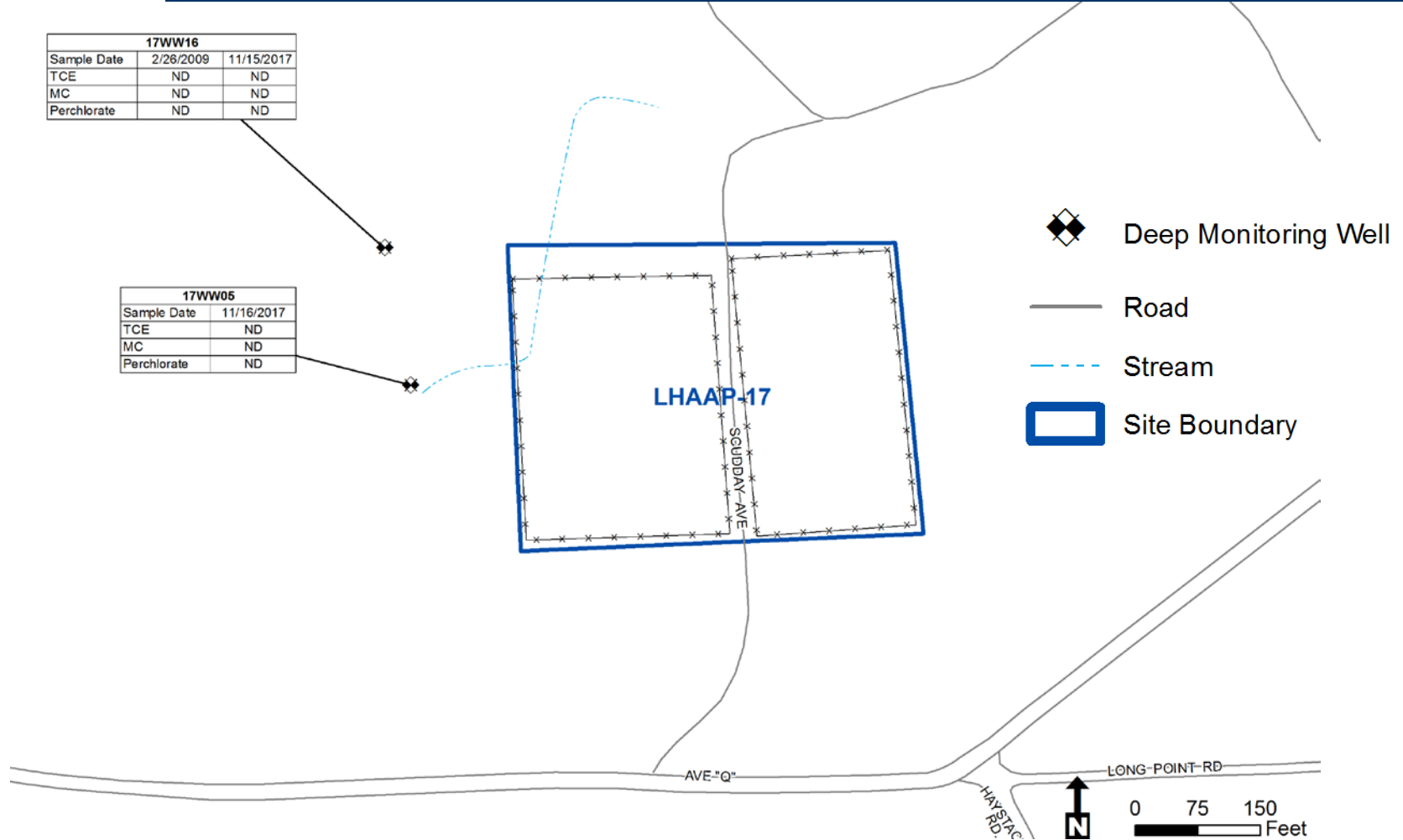


Restoration Advisory Board Meeting

LHAAP-17: Deep Groundwater

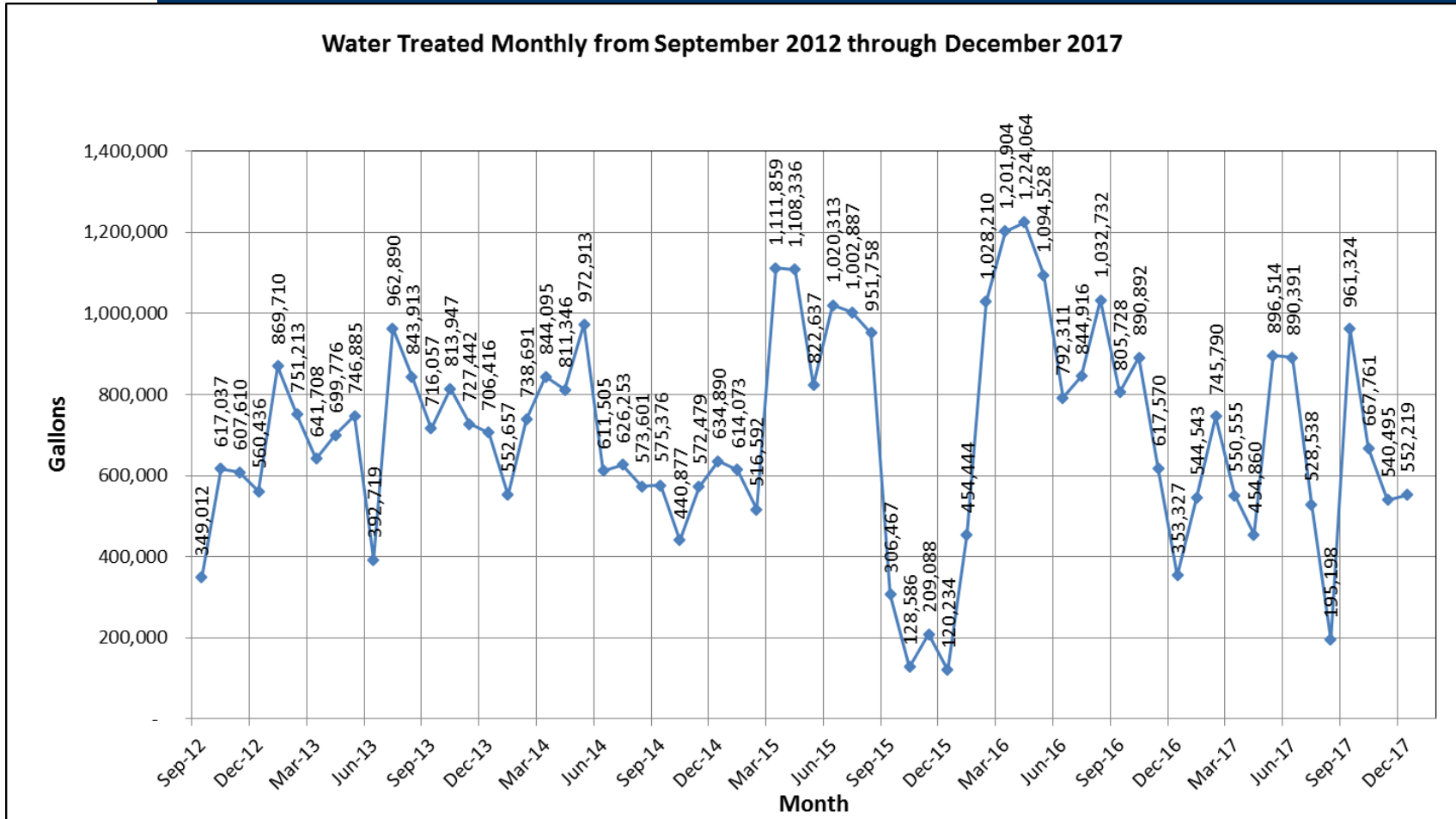
17WW16		
Sample Date	2/26/2009	11/15/2017
TCE	ND	ND
MC	ND	ND
Perchlorate	ND	ND

17WW05	
Sample Date	11/16/2017
TCE	ND
MC	ND
Perchlorate	ND



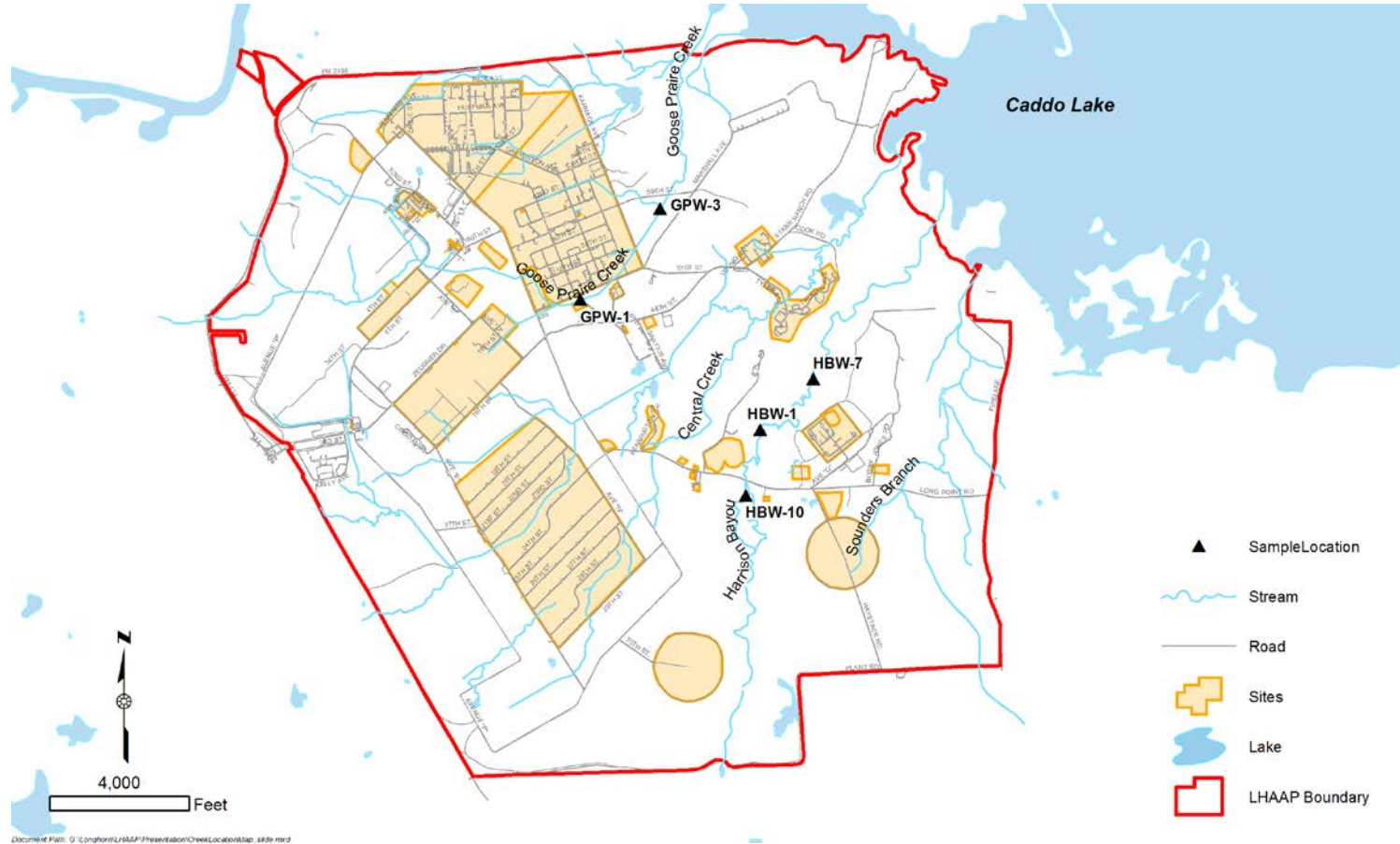
Restoration Advisory Board Meeting

GWTP UPDATE



Restoration Advisory Board Meeting

Surface Water Sample Locations



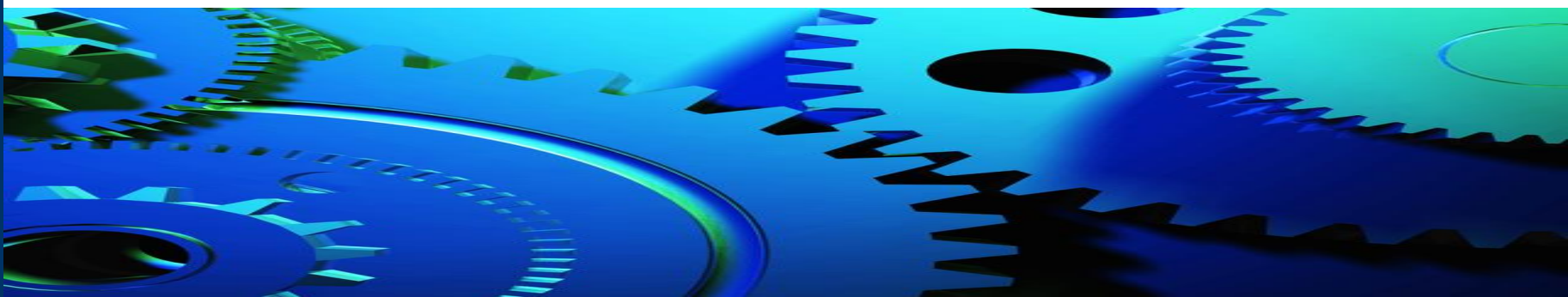
Next RAB Meeting Schedule & Closing Remarks

- Schedule April 2018 RAB Meeting
- Other Issues/Remarks



Longhorn Army Ammunition Plant Quarterly Restoration Advisory Board Meeting

Karnack Community Center
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6:00 PM CST



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Restoration Advisory Board Meeting

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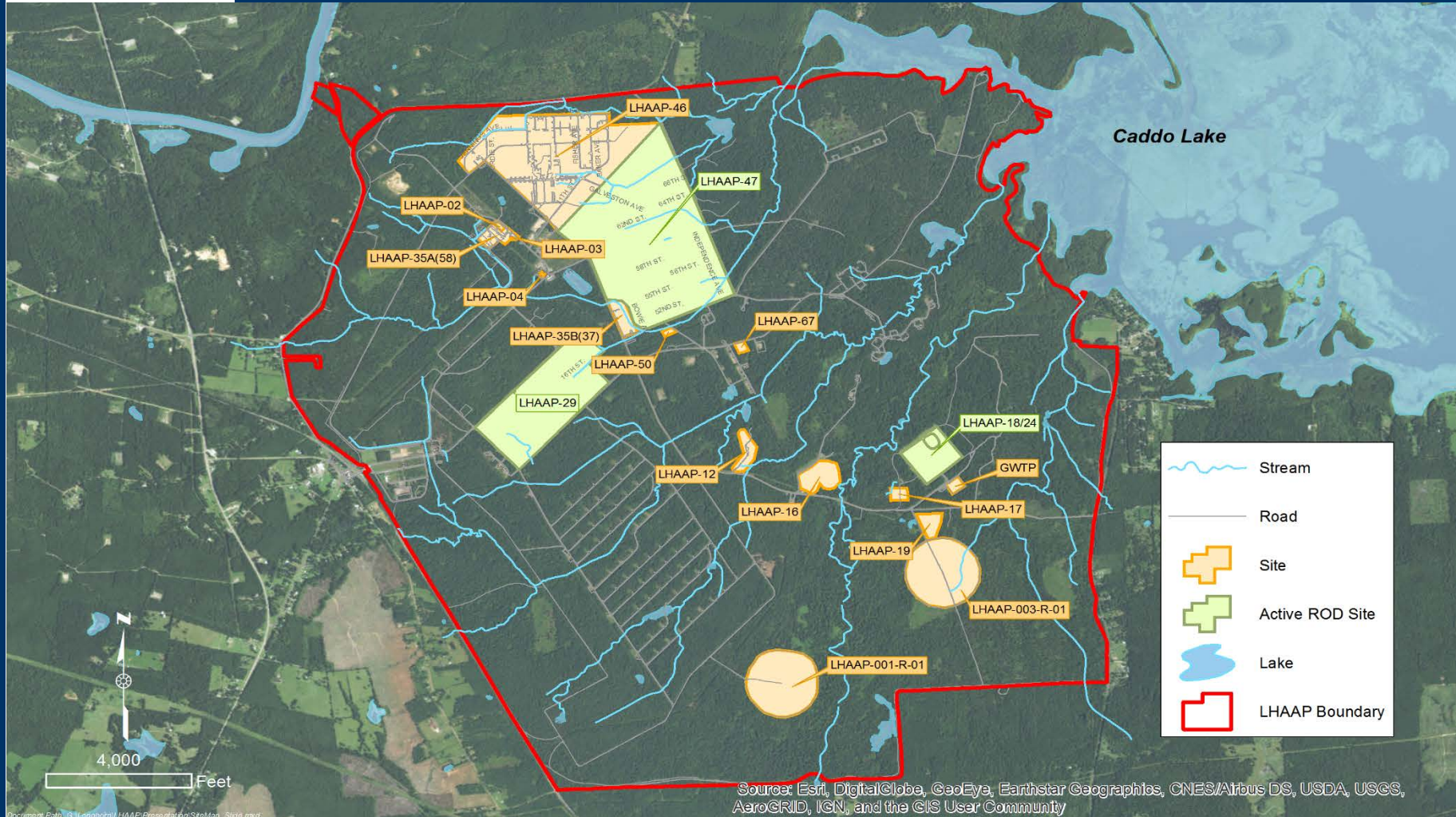
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Restoration Advisory Board Meeting

Site Map



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Restoration Advisory Board Meeting

DOCUMENTS IN PROCESS

Site	Document
Basewide	Installation Wide Work Plan
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LHAAP001-R-01	Land Use Control (LUC) RD
LHAAP003-R-01	LUC RD

Restoration Advisory Board Meeting

Completed Field Work

Site	Activity
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Restoration Advisory Board Meeting

3 Month Lookahead- Documents

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Restoration Advisory Board Meeting

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LHAAP-50	RA-O Sampling
LHAAP-58	Install two new wells, Baseline Sampling, Remedial Action Implementation for Western Plume area
LHAAP-67	RA-O Sampling
Surface Water	Collect Surface Water samples

Restoration Advisory Board Meeting

LHAAP-17: No. 2 Flashing Area/Burning Ground

Groundwater zones: Shallow (10 to 35 Feet Below Ground Surface [ft bgs]), Intermediate (to 55 ft bgs) and Deep (to 150 ft bgs)

Constituents of Concern (COCs)

- Soil: Explosives (2,4-DNT, 2,6-DNT, and 2,4,6-TNT), barium, and dioxins
- Groundwater: Perchlorate, chlorinated solvents (TCE, 1,2-DCE, VC)

Proposed Remedy:

- Soil excavation
- Groundwater extraction to reduce perchlorate concentrations to less than 20,000 micrograms per liter ($\mu\text{g/L}$), an interim cleanup level. Once this level is reached, the remedial action will transition from extraction to monitored natural attenuation (MNA).

Scope of PDI:

- Conduct groundwater gauging and sampling and install up to 3 monitoring wells to define current groundwater plumes
- Conduct soil sampling to define soil contamination to design excavation
- Conduct aquifer pumping tests to collect data to design the extraction system

Restoration Advisory Board Meeting

LHAAP-17: Current Status

- Completed groundwater sampling of existing wells in November 2017
- Installed an additional shallow groundwater monitoring well in December 2017
- Initiated soil sampling in January 2018
- Preparing to sample new shallow well in January 2018
- Preparing for aquifer pumping test in January 2018

Restoration Advisory Board Meeting

LHAAP-17: Shallow Groundwater

18WW10		
Sample Date	9/25/2009	11/15/2017
TCE	ND	ND
1,1-DCE	ND	ND
1,2-DCA	ND	ND
Perchlorate	ND	52

17WW12		
Sample Date	2/26/2009	11/16/2017
TCE	ND	
1,1-DCE	ND	dry
1,2-DCA	ND	
Perchlorate	990	

17WW11		
Sample Date	2/26/2009	11/14/2017
TCE	ND	ND
1,1-DCE	ND	ND
1,2-DCA	ND	ND
Perchlorate	ND	ND

17WW02		
Sample Date	3/5/2009	11/19/2017
TCE	867	6.2
1,1-DCE	6.22	ND
1,2-DCA	34.5	3.3
Perchlorate	160,000	2,500

17WW10		
Sample Date	2/16/2009	11/16/2017
TCE	ND	ND
1,1-DCE	ND	ND
1,2-DCA	ND	ND
Perchlorate	ND	1.6

17WW06		
Sample Date	3/5/2009	11/16/2017
TCE	176	260
1,1-DCE	7.0	7.6
1,2-DCA	5.68	8.4
Perchlorate	74,900	110,000

130		
Sample Date	3/4/2009	11/14/2017
TCE	31.1	2.1
1,1-DCE	ND	ND
1,2-DCA	4.29	ND
Perchlorate	1,700	2.5

17WW01		
Sample Date	9/25/2009	11/14/2017
TCE	6,090	61,000
1,1-DCE	70	240
1,2-DCA	35.8	87
CIS-1,2-DCE	--	3,700
VC	--	4J
Perchlorate	56,000	ND

17WW14		
Sample Date	2/25/2009	11/14/2017
TCE	ND	ND
1,1-DCE	ND	ND
1,2-DCA	ND	ND
Perchlorate	ND	2.5

17WW04		
Sample Date	3/2/2009	11/16/2017
TCE	0.914J	ND
1,1-DCE	ND	ND
1,2-DCA	ND	ND
Perchlorate	ND	ND









18WW14	
Sample Date	11/16/2017
TCE	ND
1,1-DCE	ND
1,2-DCA	ND
Perchlorate	ND

17WW13		
Sample Date	3/3/2009	11/14/2017
TCE	ND	ND
1,1-DCE	ND	ND
1,2-DCA	ND	ND
Perchlorate	ND	ND

17WW08		
Sample Date	2/25/2009	11/14/2017
TCE	ND	ND
1,1-DCE	ND	ND
1,2-DCA	ND	ND
Perchlorate	ND	ND

17WW03		
Sample Date	3/5/2009	11/14/2017
TCE	12.8	5.3
1,1-DCE	ND	ND
1,2-DCA	0.26J	ND
Perchlorate	ND	ND

C-07		
Sample Date	11/16/2017	
TCE	ND	
1,1-DCE	ND	
1,2-DCA	ND	
Perchlorate	4.4	

-  Shallow Monitoring Well
-  Shallow/Intermediate Monitoring Well
-  Groundwater Flow Direction
-  2009 Perchlorate Contour (PCL = 17 µg/L)
-  2017 Perchlorate Contour (PCL = 17 µg/L)
-  Road
-  Stream
-  Site Boundary

AVE "Q"

LONG POINT RD

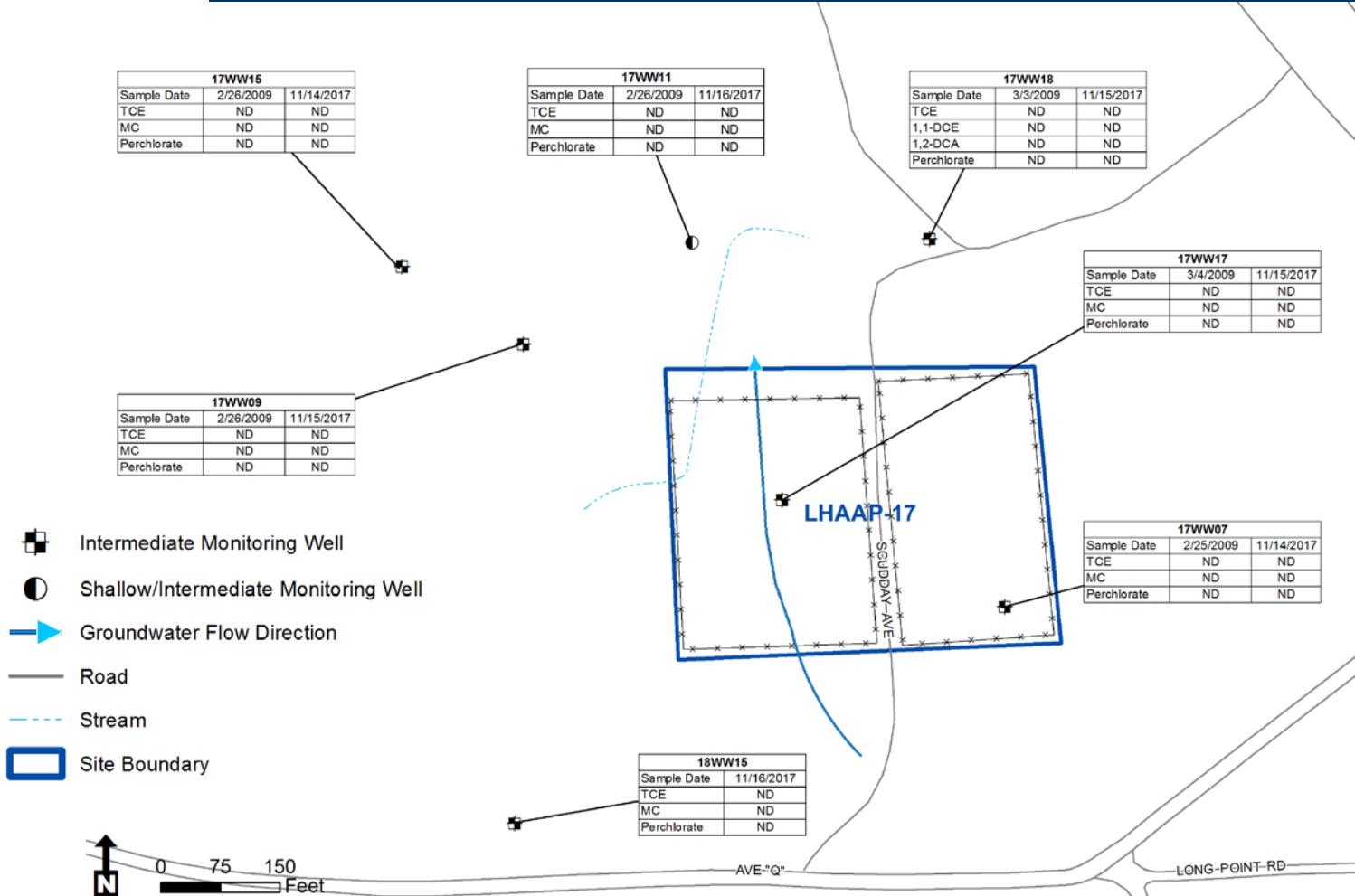


0 100 200 Feet



Restoration Advisory Board Meeting

LHAAP-17: Intermediate Groundwater

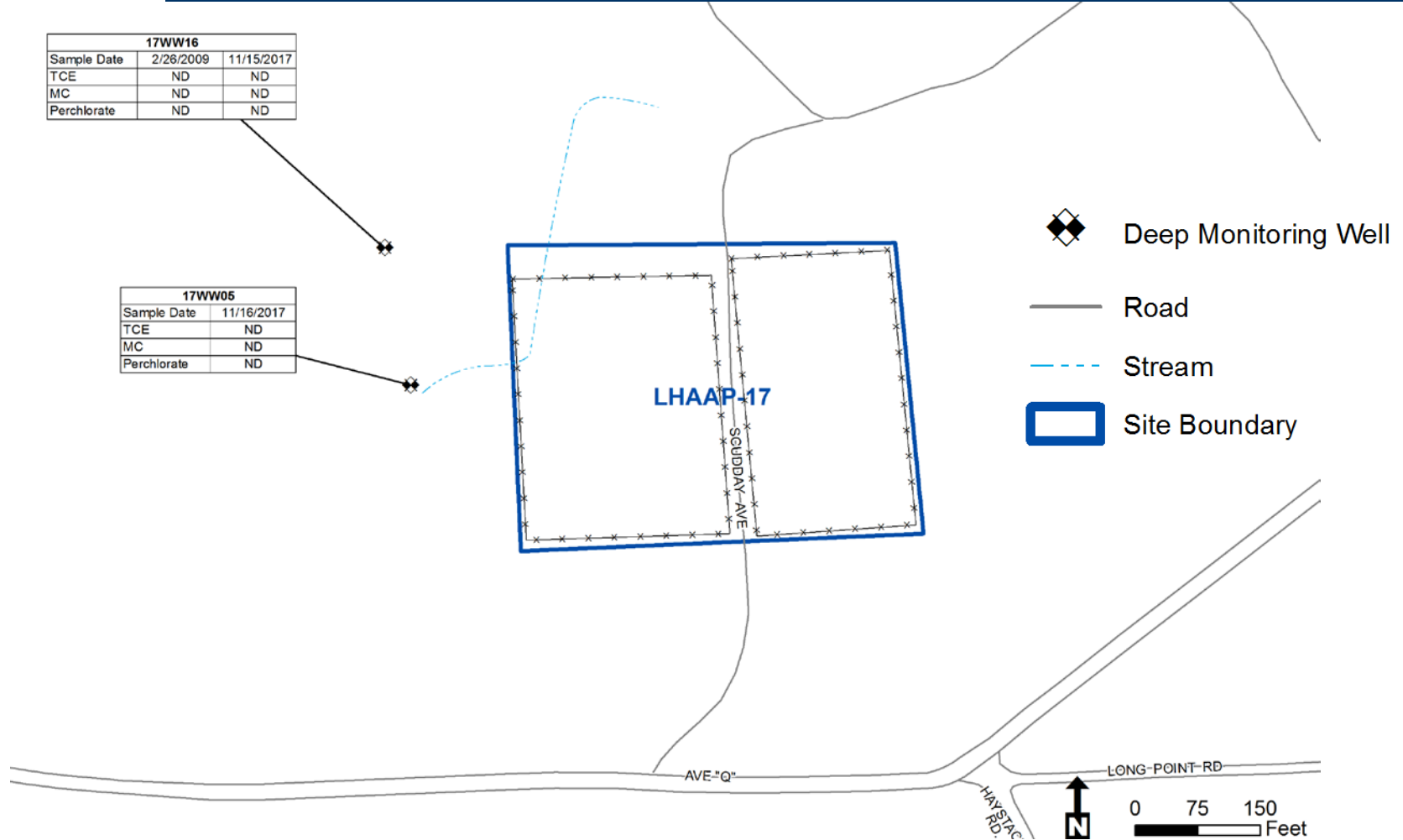


Restoration Advisory Board Meeting

LHAAP-17: Deep Groundwater

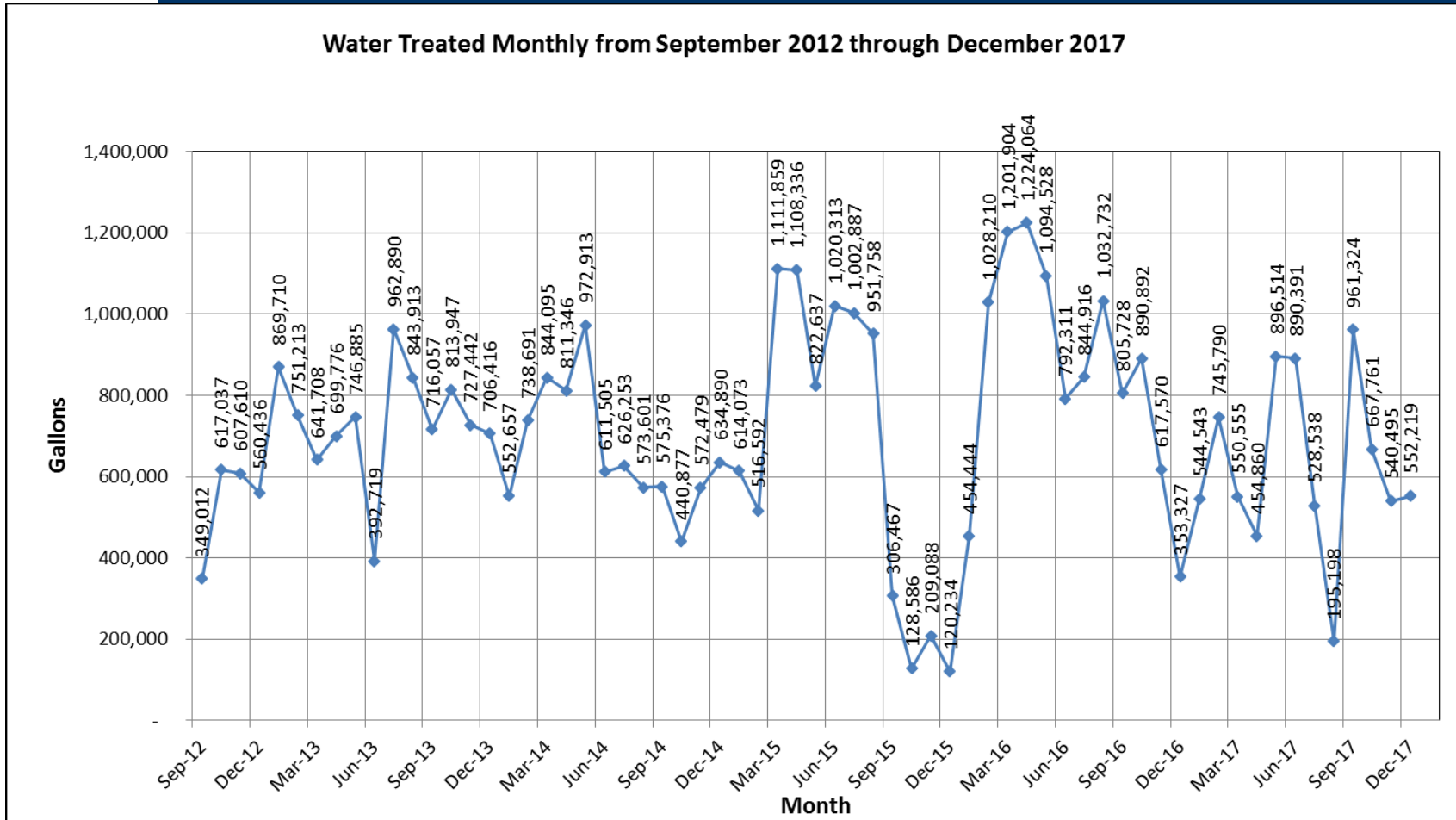
17WW16		
Sample Date	2/26/2009	11/15/2017
TCE	ND	ND
MC	ND	ND
Perchlorate	ND	ND

17WW05	
Sample Date	11/16/2017
TCE	ND
MC	ND
Perchlorate	ND



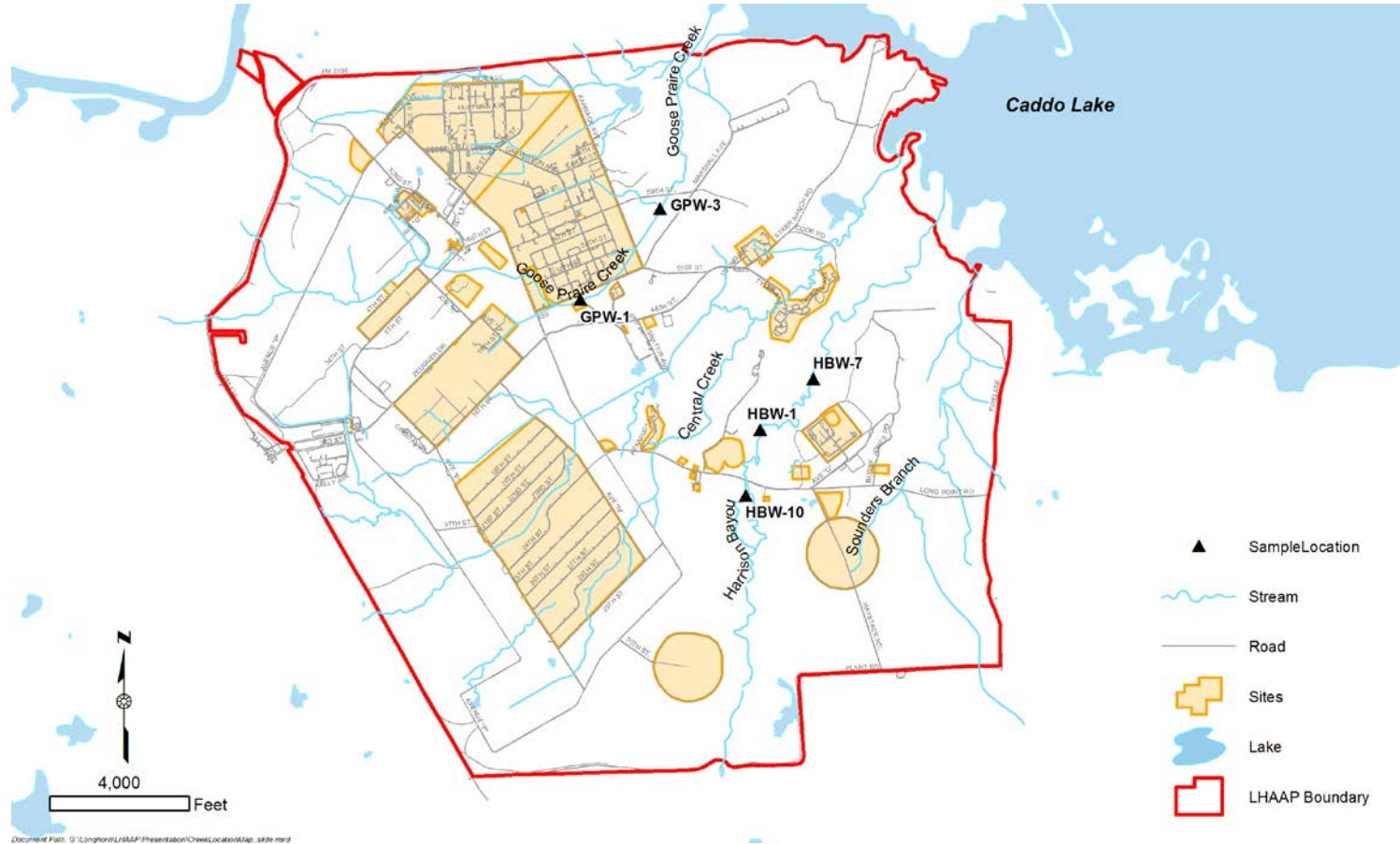
Restoration Advisory Board Meeting

GWTP UPDATE



Restoration Advisory Board Meeting

Surface Water Sample Locations



Next RAB Meeting Schedule & Closing Remarks

- Schedule April 2018 RAB Meeting
- Other Issues/Remarks



LONGHORN ARMY AMMUNITION PLANT
RESTORATION ADVISORY BOARD

Karnack, Texas
(479) 635-0110

AGENDA

DATE: Thursday, January 18, 2018
TIME: 6:00 – 7:00 PM
PLACE: Karnack Community Center, Karnack, Texas

06:00 **Welcome and Introduction**

06:05 **Open Items {RMZ}**

- RAB Administrative Issues
- Minutes (October 2017 RAB Meeting)
- Ongoing Outreach/Website

06:25 **Defense Environmental Restoration Program (DERP) Update {Bhate}**

- Documents and Field Work Completed in 4th Quarter 2017
- Three Month Lookahead
- Update on LHAAP-17 Pre-Design Investigation (PDI)
- Groundwater Treatment Plant (GWTP) Update

06:45 **Environmental Restoration Issues {RMZ}**

- Decision Document for LHAAP Sites -18/24, -29 and -47
- Schedule

06:50 **Next RAB Meeting Schedule and Closing Remarks {RMZ}**

07:00 **Adjourn {RMZ}**

Groundwater Treatment Plant - Processed Groundwater Volumes

The amount of groundwater treated is determined by measuring the number of gallons of processed water.

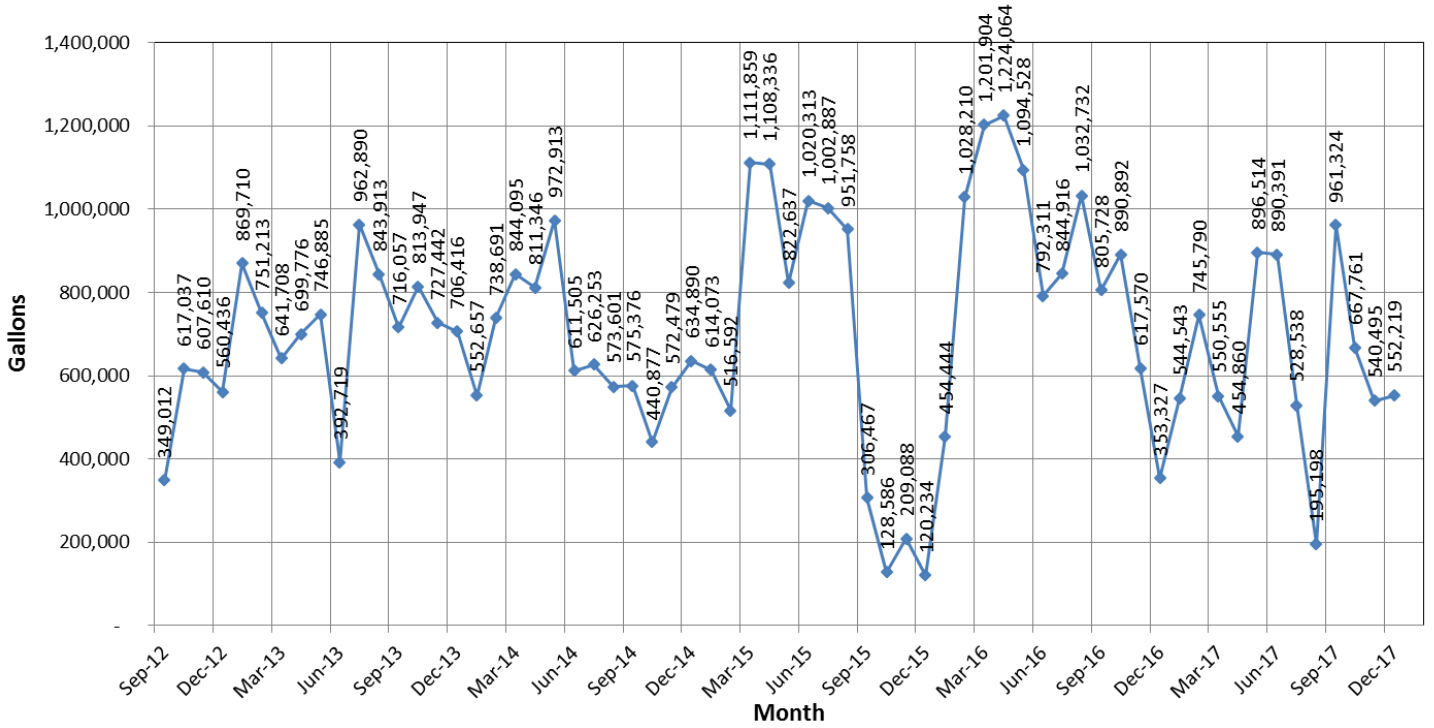
Processed Water Data

(in gallons)

Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08
1,041,491	848,356	804,822	792,148	665,883	818,872	791,306	568,812	776,904	748,377	690,052	617,199
Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09
655,059	619,274	726,118	552,299	598,144	433,800	488,807	526,958	387,644	0	414,853	735,716
Oct-09	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10
808,322	636,306	727,492	391,898	695,343	802,656	894,731	962,121	1,257,977	1,314,924	1,041,495	1,136,547
Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11
956,567	705,805	849,712	811,679	668,281	1,090,348	817,325	900,338	916,552	784,369	652,524	733,456
Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12
748,102	658,250	684,903	865,453	725,000*	730,000*	980,000*	630,000*	0	0	0	349,012
Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13
617,037	607,610	560,436	869,710	751,213	641,708	699,776	746,885	392,719	962,890	843,913	716,057
Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14
813,974	727,442	706,416	552,657	738,691	844,095	811,346	972,913	611,505	626,253	573,601	575,376
Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15
440,877	572,479	634,890	614,073	516,592	1,111,859	1,108,336	822,637	1,020,313	1,002,887	951,758	306,467
Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16
128,586	209,088	120,234	454,444	1,028,210	1,201,904	1,224,064	1,094,528	792,311	844,916	1,032,732	805,728
Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17
890,892	617,570	353,327	544,543	745,790	550,555	454,860	896,514	890,391	528,538	195,198	961,324
Oct-17	Nov-17	Dec-17									
667,761	540,594	552,219									

*Indicates Estimate

Water Treated Monthly from September 2012 through December 2017



Water Discharge Location and Volume (Gallons)

Month	Harrison Bayou	LHAAP-18/24 Sprinklers	INF Pond	INF Pond to Harrison Bayou	Contract Hauled Off-Site
Oct-16	0	642,876	0	0	0
Nov-16	0	576,898	0	0	0
Dec-16	0	236,688	0	0	0
Jan-17	0	0	0	0	0
Feb-17	0	0	0	0	14,355
Mar-17	127,242	0	0	0	14,400
Apr-17	113,038	0	236,821	0	0
May-17	205,665	0	534,155	0	0
Jun-17	467,830	0	294,550	490,574	0
Jul-17	0	0	528,538	0	0
Aug-17	0	0	195,197	0	0
Sep-17	0	0	309,980	651,434	0
Oct-17	0	0	667,761	0	0
Nov-17	0	0	540,495	0	0
Dec-17	0	0	552,219	560,350	0



LONGHORN ARMY AMMUNITION PLANT
RESTORATION ADVISORY BOARD

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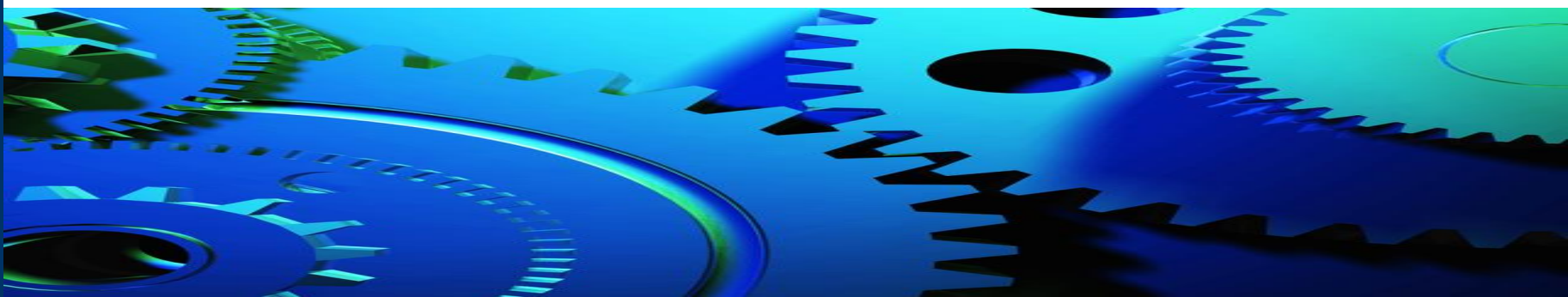
06:50 **Next RAB Meeting Schedule and Closing Remarks {RMZ}**

07:00 **Adjourn {RMZ}**



**Longhorn Army
Ammunition Plant
Quarterly Restoration Advisory
Board Meeting**

**Karnack Community Center
January 18, 2018
6:00 PM CST**



Restoration Advisory Board (RAB) Meeting

Agenda

- 06:00** **Welcome and Introduction**
- 06:05** **Open Items {RMZ}**
- **RAB Administrative Issues**
 - **Minutes (July 2017 RAB Meeting)**
 - **Ongoing Outreach/Website (2017 Volumes 1-6 loaded)**
- 06:25** **Defense Environmental Restoration Program (DERP) Update {Bhate}**
- **Documents and Field Work Completed in 4th Quarter 2017**
 - **Three Month Lookahead**
 - **Update on LHAAP-17 Pre-Design Investigation (PDI)**
 - **Groundwater Treatment Plant (GWTP) Update**
- 06:45** **Update on Other Contract**
- 06:50** **Next RAB Meeting Schedule and Closing Remarks**
- 07:00** **Adjourn {RMZ}**

Restoration Advisory Board Meeting

Abbreviations and Acronyms

µg/L	micrograms per liter
CST	central standard time
COC	constituents of concern
DCE	dichloroethene
DERP	Defense Environmental Restoration Program
DNT	dinitrotoluene
DF	Draft Final
ESD	explanation of significant difference
GWTP	groundwater treatment plant
LHAAP	Longhorn Army Ammunition Plant
LUC	land use controls
MNA	monitored natural attenuation
MW	monitoring well

PCL	protective concentration level
PDI	pre-design investigation
RAB	Restoration Advisory Board
RA-O	Remedial Action - Operation
RAWP	Remedial Action Work Plan
RD	remedial design
ROD	Record of Decision
RTC	response to comment
TCE	trichloroethene
TNT	trinitrotoluene
TRRP	Texas Risk Reduction Program
VC	vinyl chloride

RAB Administrative Issues

RAB Membership

RAB Tour

Restoration Advisory Board Meeting

Minutes from Past RAB Meetings

Discussion of October 2017 RAB Meeting minutes/motion to accept

The Army Wants You to be Informed

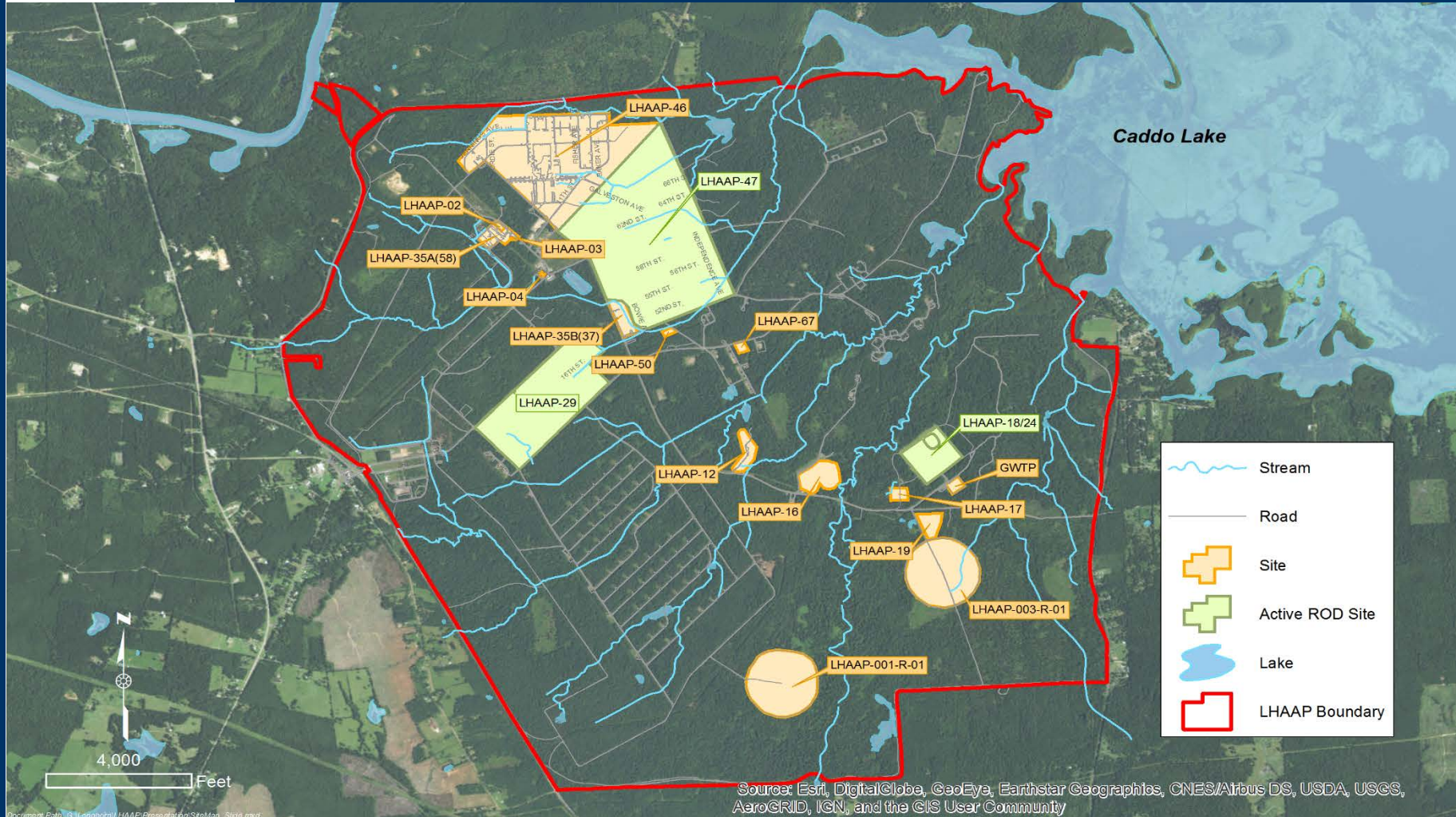
- The Army is committed to protecting human health and the environment; key to that commitment is engaging the community and increasing public participation in environmental restoration at LHAAP
- You are encouraged to:
 - Attend RAB Meetings and/or become a member of the RAB
 - Visit the Longhorn environmental website at www.longhornaap.com
 - Make suggestions for improving communication – the Army welcomes and appreciates community feedback

Outreach

- **Website Address: <http://www.longhornaap.com/>**
- **Website will be updated to indicate the upcoming field events at each site including groundwater sampling, monitoring well installations, soil sampling or remediation activities**

Restoration Advisory Board Meeting

Site Map



Restoration Advisory Board Meeting

DOCUMENTS IN PROCESS

Site	Document
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Restoration Advisory Board Meeting

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Restoration Advisory Board Meeting

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Restoration Advisory Board Meeting

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Restoration Advisory Board Meeting

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Proposed Remedy:

- Soil excavation
- Groundwater extraction to reduce perchlorate concentrations to less than 20,000 micrograms per liter ($\mu\text{g/L}$), an interim cleanup level. Once this level is reached, the remedial action will transition from extraction to monitored natural attenuation (MNA).

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- Conduct groundwater gauging and sampling and install up to 3 monitoring wells to define current groundwater plumes
- Conduct soil sampling to define soil contamination to design excavation
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Restoration Advisory Board Meeting

LHAAP-17: Current Status

- Completed groundwater sampling of existing wells in November 2017
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- Preparing for aquifer pumping test in January 2018

Restoration Advisory Board Meeting

LHAAP-17: Shallow Groundwater

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TCE	ND	ND
1,1-DCE	ND	ND
1,2-DCA	ND	ND
Perchlorate	ND	52

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Sample Date	2/26/2009	11/16/2017
TCE	ND	
1,1-DCE	ND	dry
1,2-DCA	ND	
Perchlorate	990	

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Sample Date	2/26/2009	11/14/2017
TCE	ND	ND
1,1-DCE	ND	ND
1,2-DCA	ND	ND
Perchlorate	ND	ND

17WW02		
Sample Date	3/5/2009	11/15/2017
TCE	867	6.2
1,1-DCE	6.22	ND
1,2-DCA	34.5	3.3
Perchlorate	160,000	2,500

17WW10		
Sample Date	2/16/2009	11/16/2017
TCE	ND	ND
1,1-DCE	ND	ND
1,2-DCA	ND	ND
Perchlorate	ND	1.6

17WW06		
Sample Date	3/5/2009	11/16/2017
TCE	176	260
1,1-DCE	7.0	7.6
1,2-DCA	5.68	8.4
Perchlorate	74,900	110,000

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Sample Date	3/4/2009	11/14/2017
TCE	31.1	2.1
1,1-DCE	ND	ND
1,2-DCA	4.29	ND
Perchlorate	1,700	2.5

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Sample Date	9/25/2009	11/14/2017
TCE	6,090	61,000
1,1-DCE	70	240
1,2-DCA	35.8	87
CIS-1,2-DCE	--	3,700
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Perchlorate	56,000	ND

17WW14		
Sample Date	2/25/2009	11/14/2017
TCE	ND	ND
1,1-DCE	ND	ND
1,2-DCA	ND	ND
Perchlorate	ND	2.5

17WW04		
Sample Date	3/2/2009	11/16/2017
TCE	0.914J	ND
1,1-DCE	ND	ND
1,2-DCA	ND	ND
Perchlorate	ND	ND









18WW14	
Sample Date	11/16/2017
TCE	ND
1,1-DCE	ND
1,2-DCA	ND
Perchlorate	ND

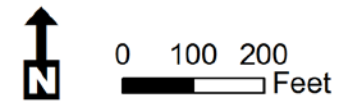
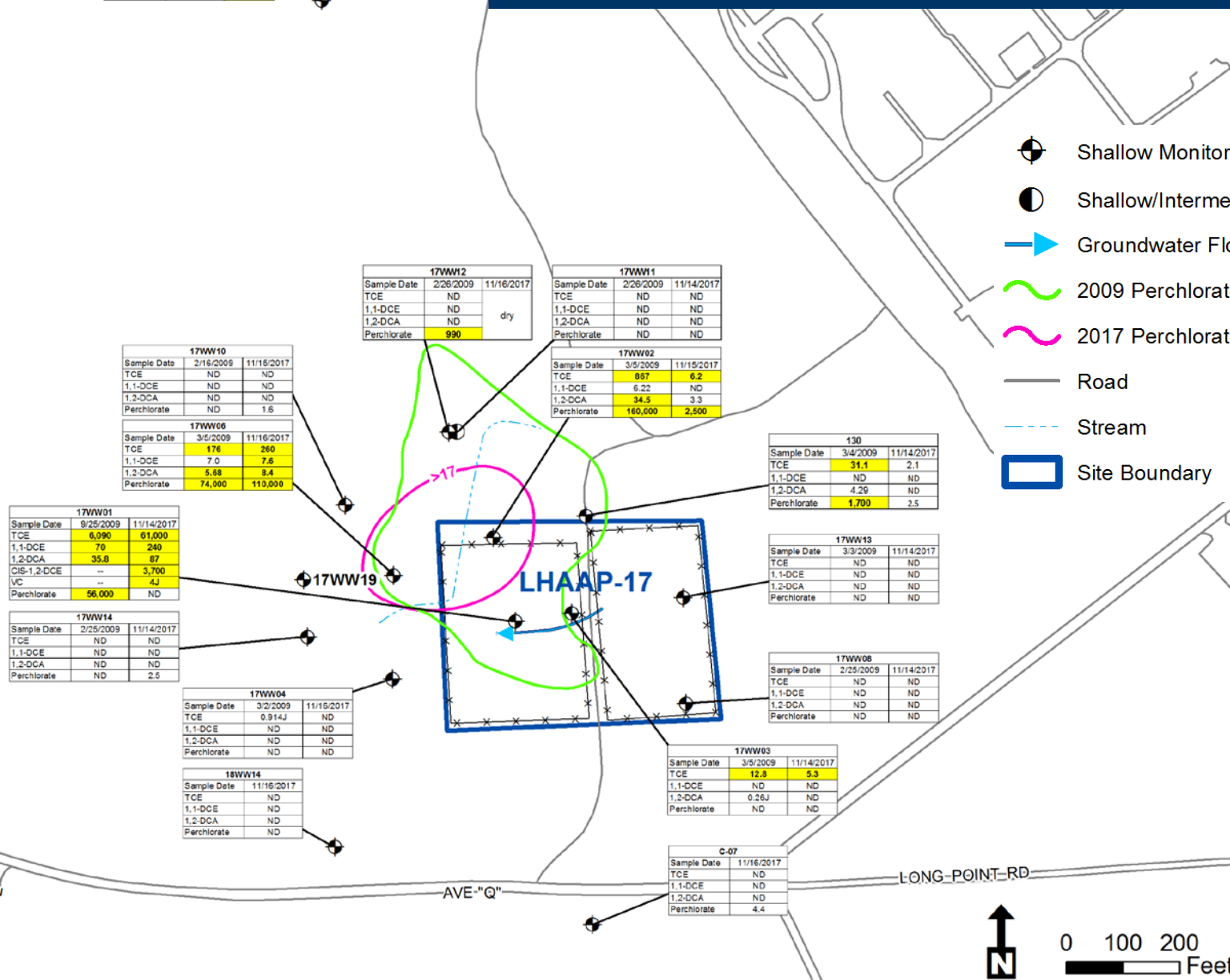
17WW13		
Sample Date	3/3/2009	11/14/2017
TCE	ND	ND
1,1-DCE	ND	ND
1,2-DCA	ND	ND
Perchlorate	ND	ND

17WW08		
Sample Date	2/25/2009	11/14/2017
TCE	ND	ND
1,1-DCE	ND	ND
1,2-DCA	ND	ND
Perchlorate	ND	ND

17WW03		
Sample Date	3/5/2009	11/14/2017
TCE	12.8	5.3
1,1-DCE	ND	ND
1,2-DCA	0.26J	ND
Perchlorate	ND	ND

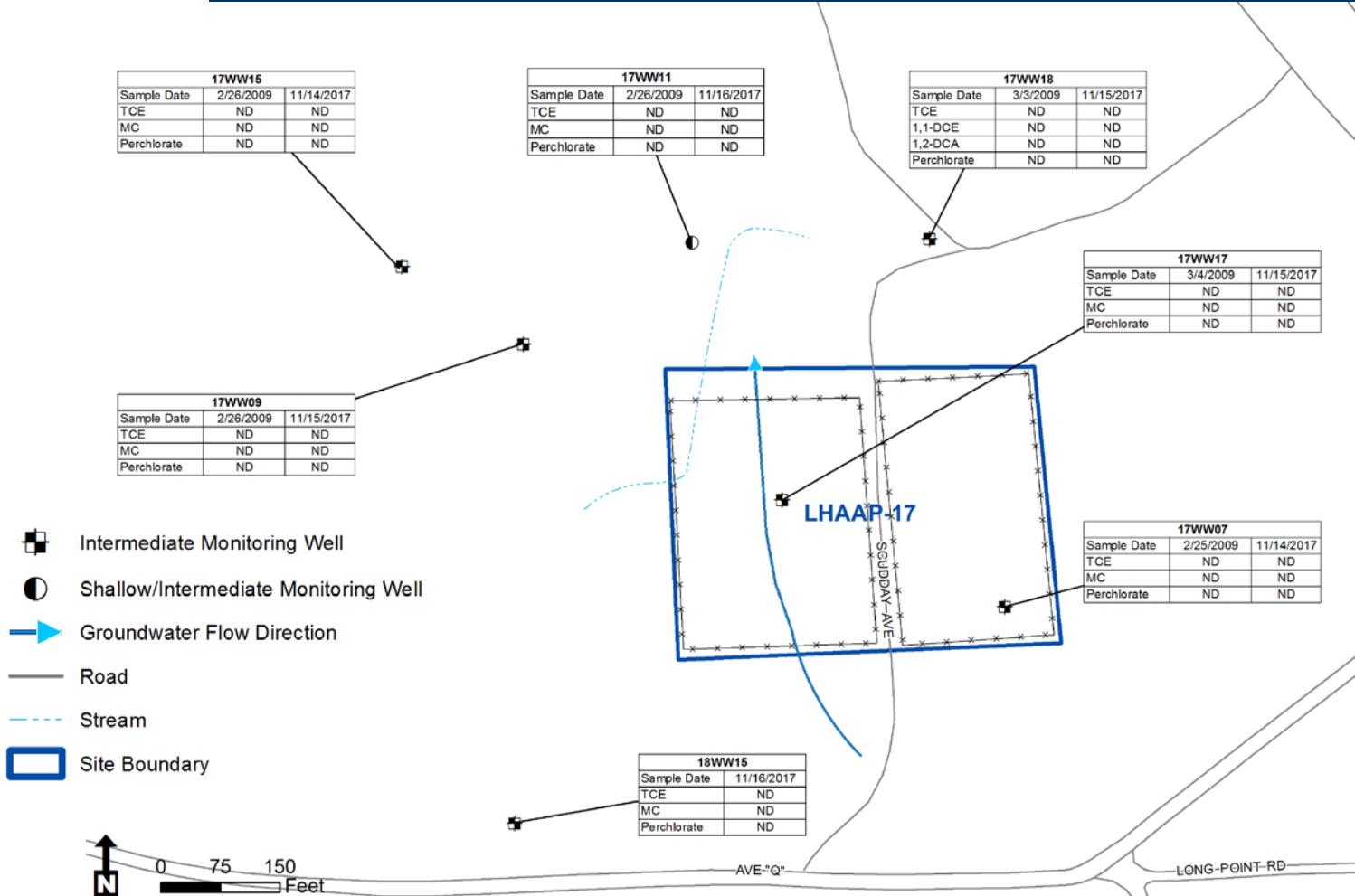
C-07		
Sample Date	11/16/2017	
TCE	ND	
1,1-DCE	ND	
1,2-DCA	ND	
Perchlorate	4.4	

-  Shallow Monitoring Well
-  Shallow/Intermediate Monitoring Well
-  Groundwater Flow Direction
-  2009 Perchlorate Contour (PCL = 17 µg/L)
-  2017 Perchlorate Contour (PCL = 17 µg/L)
-  Road
-  Stream
-  Site Boundary



Restoration Advisory Board Meeting

LHAAP-17: Intermediate Groundwater

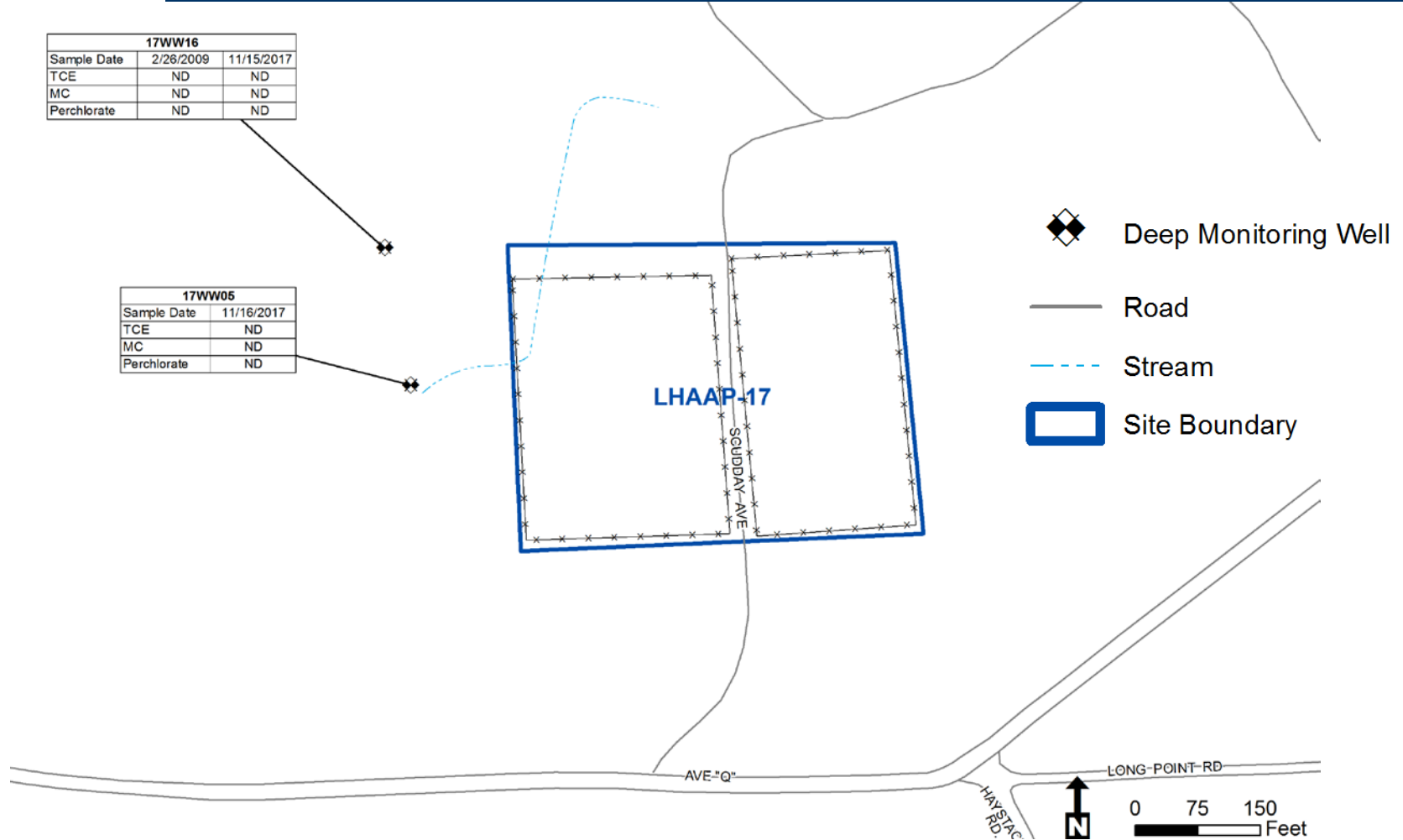


Restoration Advisory Board Meeting

LHAAP-17: Deep Groundwater

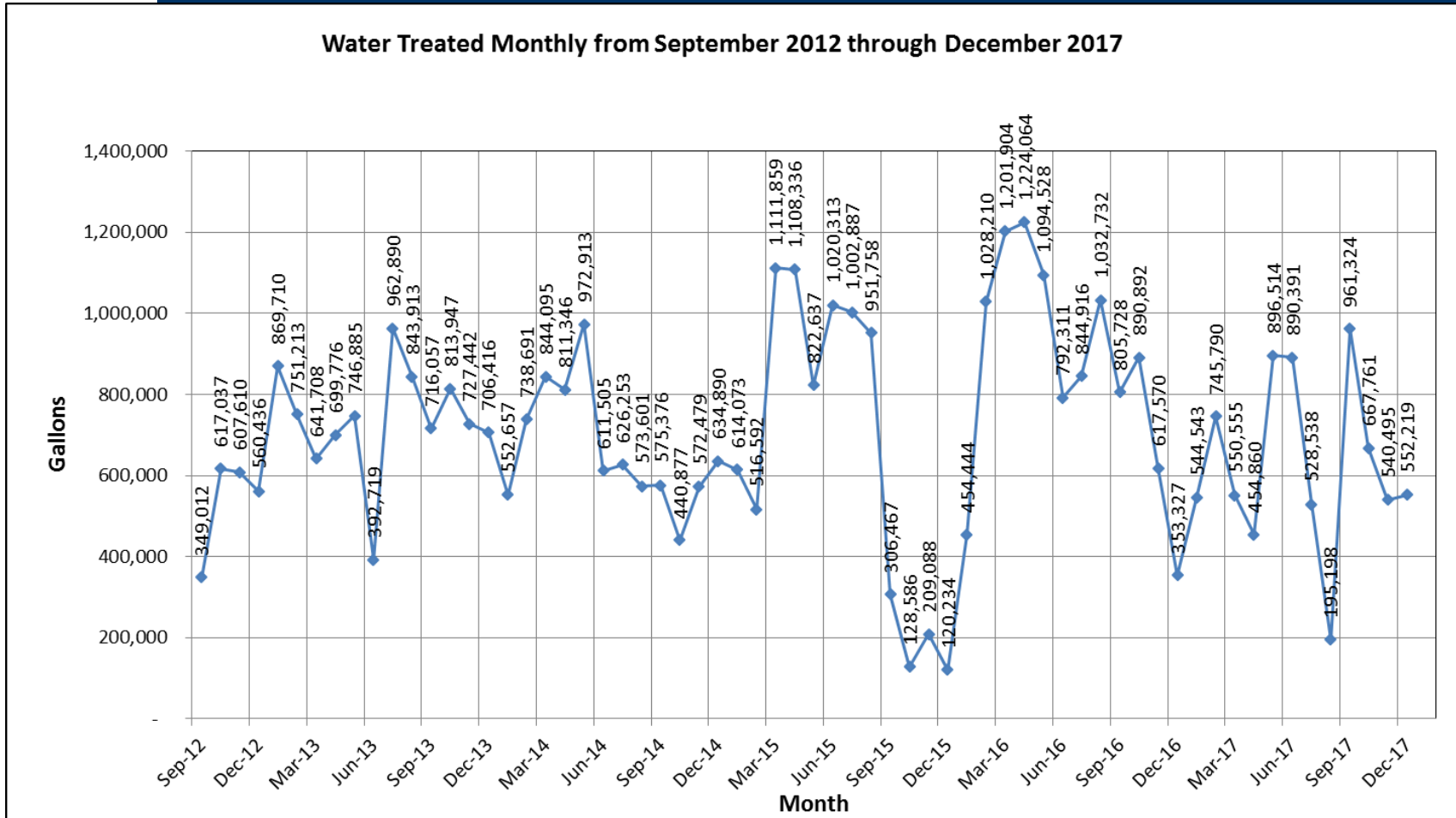
17WW16		
Sample Date	2/26/2009	11/15/2017
TCE	ND	ND
MC	ND	ND
Perchlorate	ND	ND

17WW05	
Sample Date	11/16/2017
TCE	ND
MC	ND
Perchlorate	ND



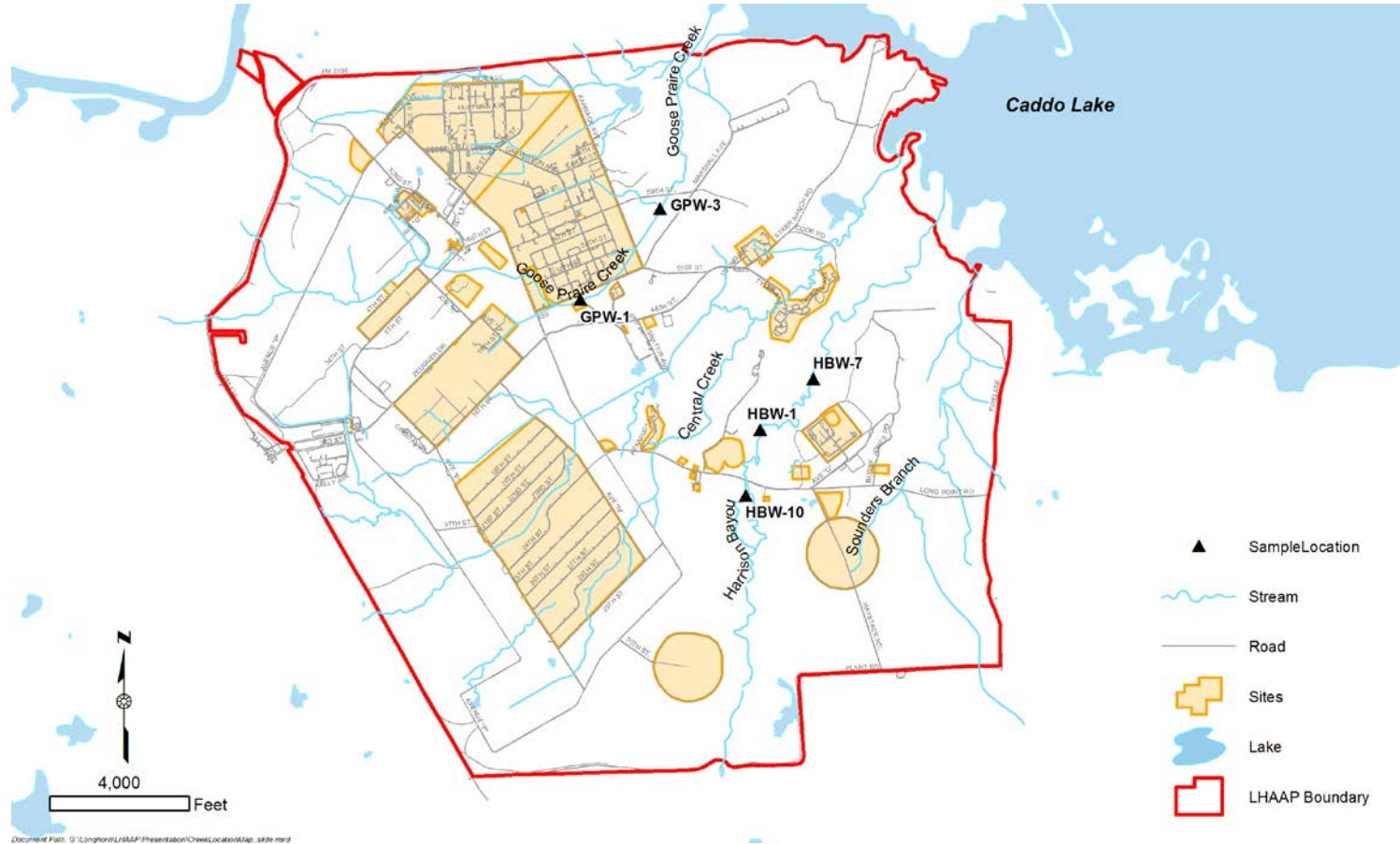
Restoration Advisory Board Meeting

GWTP UPDATE



Restoration Advisory Board Meeting

Surface Water Sample Locations



Next RAB Meeting Schedule & Closing Remarks

- Schedule April 2018 RAB Meeting
- Other Issues/Remarks

Groundwater Treatment Plant - Processed Groundwater Volumes

The amount of groundwater treated is determined by measuring the number of gallons of processed water.

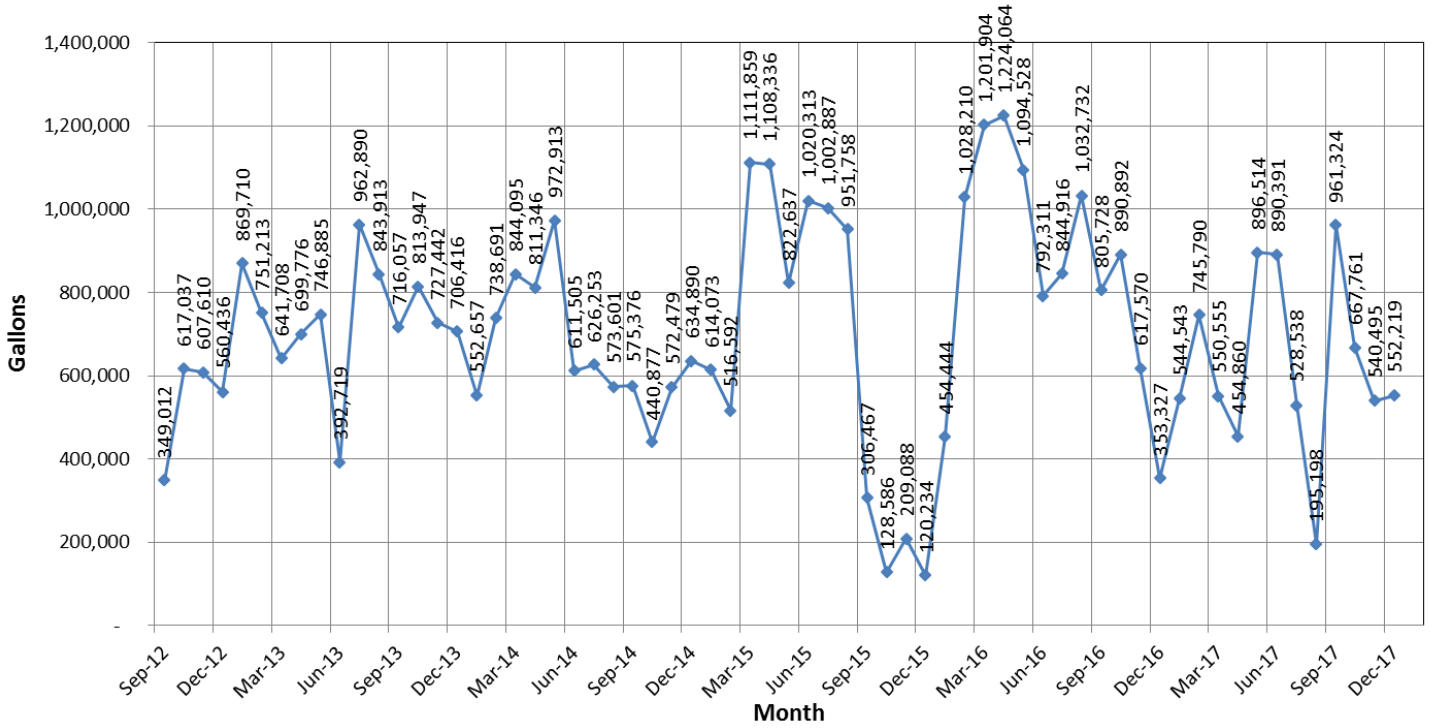
Processed Water Data

(in gallons)

Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08
1,041,491	848,356	804,822	792,148	665,883	818,872	791,306	568,812	776,904	748,377	690,052	617,199
Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09
655,059	619,274	726,118	552,299	598,144	433,800	488,807	526,958	387,644	0	414,853	735,716
Oct-09	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10
808,322	636,306	727,492	391,898	695,343	802,656	894,731	962,121	1,257,977	1,314,924	1,041,495	1,136,547
Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11
956,567	705,805	849,712	811,679	668,281	1,090,348	817,325	900,338	916,552	784,369	652,524	733,456
Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12
748,102	658,250	684,903	865,453	725,000*	730,000*	980,000*	630,000*	0	0	0	349,012
Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13
617,037	607,610	560,436	869,710	751,213	641,708	699,776	746,885	392,719	962,890	843,913	716,057
Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14
813,974	727,442	706,416	552,657	738,691	844,095	811,346	972,913	611,505	626,253	573,601	575,376
Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15
440,877	572,479	634,890	614,073	516,592	1,111,859	1,108,336	822,637	1,020,313	1,002,887	951,758	306,467
Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16
128,586	209,088	120,234	454,444	1,028,210	1,201,904	1,224,064	1,094,528	792,311	844,916	1,032,732	805,728
Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17
890,892	617,570	353,327	544,543	745,790	550,555	454,860	896,514	890,391	528,538	195,198	961,324
Oct-17	Nov-17	Dec-17									
667,761	540,594	552,219									

*Indicates Estimate

Water Treated Monthly from September 2012 through December 2017



Water Discharge Location and Volume (Gallons)

Month	Harrison Bayou	LHAAP-18/24 Sprinklers	INF Pond	INF Pond to Harrison Bayou	Contract Hauled Off-Site
Oct-16	0	642,876	0	0	0
Nov-16	0	576,898	0	0	0
Dec-16	0	236,688	0	0	0
Jan-17	0	0	0	0	0
Feb-17	0	0	0	0	14,355
Mar-17	127,242	0	0	0	14,400
Apr-17	113,038	0	236,821	0	0
May-17	205,665	0	534,155	0	0
Jun-17	467,830	0	294,550	490,574	0
Jul-17	0	0	528,538	0	0
Aug-17	0	0	195,197	0	0
Sep-17	0	0	309,980	651,434	0
Oct-17	0	0	667,761	0	0
Nov-17	0	0	540,495	0	0
Dec-17	0	0	552,219	560,350	0