Subject: Final Minutes, Quarterly Restoration Advisory Board (RAB) Meeting
Longhorn Army Ammunition Plant (LHAAP)
Location of Meeting: Conference Call
Date of Meeting: October 21, 2020, 6:00 PM Central Daylight Time (CDT)

Meeting Participants:

Army BRAC:	Rose M. Zeiler
USACE:	Aaron Williams
USAEC:	Andrew Maly, Laura Zographos, Cathy Kropp, and Thomas Toudouze
Bhate:	Kim Nemmers
APTIM:	Bill Foss
HDR, Inc.	Philip Werner
TLI:	Kyra Donnell, Brian Gentry
USEPA Region 6:	Janetta Coats, Lauren Poulos, Bill Rhotenberry, and Kent Becher-USGS Liaison
TCEQ:	April Palmie
USFWS:	Paul Bruckwicki
RAB:	Present: Judy VanDeventer, Deon Hall, John Fortune, Richard LeTourneau, Sharron McAvoy, and Donna Burney Absent: Terry Britt; John Pollard, Jr., Tom Walker, Charles Dixon, and Nigel R. Shivers
Public:	Laura-Ashley Overdyke (Executive Director of the Caddo Lake Institute [CLI]); George Rice (CLI)

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 via electronic mail (e-mail) and regular postal mail for hard copies.

Welcome and Introduction

Ms. Judy VanDeventer, the RAB Co-Chair, called the meeting to order at 6:03 pm. Ms. Zeiler introduced Ms. Donna Burney as the newest RAB member. Ms. Burney said that she works at Louisiana State University Medical Center in Shreveport as a clinical veterinarian, taking care of the research animals. Ms. Zeiler mentioned that Ms. Burney is also a founding member of Northwest Louisiana Chapter of the Louisiana Master Naturalists. Ms. Zeiler stated that Ms. Burney is now an official member of the RAB. Ms. Zeiler said she sent a package to Ms. Burney, which she said that she received.

Ms. Zeiler explained that the RAB meets every three months. Ms. VanDeventer left the call at 6:07 pm.

Mr. Rhotenberry, the USEPA Remedial Project Manager for LHAAP, introduced Ms. Lauren Poulos who will be taking his role for LHAAP, when he retires in December 2020. Ms. Poulos said she has been with USEPA since 2015, transferring over to the Superfund Division a year ago.

Mr. Andrew Maly, of the USAEC, introduced Laura Zographos and Thomas Toudouze. Mr. Maly explained that Ms. Zorgraphos and Mr. Toudouze are new to USAEC and are training to take over LHAAP from Mr. Maly for USAEC.

Mr. Williams explained that the LHAAP-17 excavation work uncovered munitions. Since the existing contract did not include munitions support, USACE had to procure another contract. The new contract was awarded to MMG-TLI Joint Venture. Ms. Kyra Donnell introduced herself as the Project Manager for the new task order award and stated that she is former United States Army. Mr. Brian Gentry (TLI) serves as the military munitions response operations manager. Mr. Gentry said he was former U.S. Army also and completed munitions work at LHAAP range sites in 2008.

Mr. Williams stated that the other new contract for remedial design, including additional investigation, at LHAAP-18/24 and LHAAP-29 was awarded to HDR Inc (HDR). Mr. Williams introduced Mr. Werner as the Project Manager for HDR. Mr. Werner said that HDR has been involved at LHAAP since 2018 working on the decision documents, including field work efforts. Mr. Werner said that he is leading a multidisciplinary team supporting the remedial design for LHAAP-18/24, LHAAP-47 and LHAAP-29.

Cathy Kropp, USAEC, said that there is a one page handout that she has about the RAB that she could share with Ms. Zeiler. Ms. Palmie of TCEQ also introduced herself and said that she has worked at LHAAP for 6 years. Mr. Paul Bruckwicki represents the USFWS and introduced himself. Mr. Becher said that he is with USGS and is a technical liaison for the USEPA Superfund Division. Mr. Becher said he has worked at LHAAP for 15 years.

Ms. Laura Ashley Overdyke stated that Caddo Lake has a grant for technical support, and Mr. George Rice is the 3rd party contamination expert. Mr. George Rice is a hydrologist in San Antonio that has worked with the Caddo Lake Institute since 2010. Mr. Rice said that he reviews documents and provides comments. He then prepares documents for the RAB. He said that he has been looking at metals in groundwater at LHAAP and hopes to make a presentation at the next RAB meeting.

Ms. Janetta Coats said that she provides community outreach for the USEPA and is the Project Officer for the technical assistance grant provided to the community group as it applies to document review.

Ms. Zeiler asked if the RAB members had reviewed the July 2020 RAB meeting minutes. Mr. John Fortune made a motion to approve the July 2020 meeting minutes. Mr. Richard LeTourneau seconded the motion.

RAB Meeting Format and Presentation

Ms. Zeiler explained the Army mission at LHAAP. Ms. Zeiler reminded attendees to let her know if anyone knew of anyone interested in joining the RAB and that the RAB application form is available on the website. Ms. Zeiler said that the Army is committed to protecting human health and the environment, which is why public involvement and awareness is important. Zeiler said that RAB members need to pass along community concerns to the Army. Any member of the

public is welcome to attend the RAB and become a member.

COVID-19 Status Update

Ms. Nemmers stated that a combination of an Executive Order (EO) and Proclamation issued by the Texas governor on July 2, 2020, required wearing face coverings in public spaces, maintaining 6 feet of social distancing, and minimizing group sizes to 10 people or less. Ms. Nemmers said that, due to the EO along with our goal of keeping everyone safe, the October 2020 RAB meeting is being held via conference call. Ms. Nemmers said that the goal is to have the January 2021 RAB Meeting in person, if at all possible.

Defense Environmental Restoration

Overview of Sites

Ms. Nemmers discussed the documents currently in progress. Ms. Nemmers explained that Remedial Action Operation (RA-O) Reports are being prepared for LHAAP-37, LHAAP-46, LHAAP-50 and LHAAP-58. Ms. Nemmers stated that Remedial Action Completion Reports (RACRs) are being prepared for LHAAP-04, LHAAP-16 and LHAAP-50 for the remedies implemented recently. Ms. Nemmers stated that the other document in process is the quarterly report for the groundwater treatment plant (GWTP). Ms. Nemmers explained that the LUC Management Plan was updated but that some of the recordation of LUC boundaries were not completed because of not being physically present to complete it.

Ms. Nemmers discussed field work completed since the RAB meeting in July 2020. Ms. Nemmers said that the LHAAP-03 excavation had been completed and was backfilled. Ms. Nemmers explained that areas with clean sidewall samples from the excavations at LHAAP-17 were backfilled and would be discussed later in the meeting. Ms. Nemmers said that performance sampling for remedies put in place at LHAAP-04, LHAAP-16, and LHAAP-50 was completed. Ms. Nemmers said that a new well installed at LHAAP-46 was sampled and would be discussed later in the meeting. Lastly, Ms. Nemmers explained that surface water samples were collected when the bayou was flowing.

LHAAP-03

Mr. Foss explained that LHAAP-03 is a small site that had metals contamination in soil due to a former waste pad. Mr. Foss said that following the October-November 2019 excavaton, Area C had one wall that required over-excavation. Mr. Foss said that the residual water was pumped out and taken to the GWTP. The wall was over-excavated and sampled and the results were below cleanup levels. Mr. Foss said that the excavation and confirmation sampling were completed in August and the excavations were backfilled. Soil was transported and disposed at the East Texas Regional Landfill in Henderson, TX in September 2020. Ms. Zeiler clarified that no groundwater monitoring will be completed at this site. Mr. Foss explained that LHAAP-03 is located within the boundaries of LHAAP-58 and that groundwater sampling is being completed as part of the LHAAP-58 RA-O sampling.

LHAAP-04

Mr. Bill Foss explained that there was a perchlorate plume at LHAAP-04 and pointed out that the

yellow outline shows where the site had formerly been excavated. Mr. Foss said that emulsified vegetable oil was injected. Mr. Foss pointed out that the perchlorate detections from the August 2020 sampling event are all below the protective concentration levels (PCL) of 17 micrograms per liter (µg/L). Mr. Foss said that the next sampling event will take place in November 2020. Mr. George Rice said that the large reduction was noted and wondered if that was due to the bioremediation. Mr. Foss said that this is due to the bioremediation. Mr. Foss pointed out the declining dissolved oxygen and low oxidation reduction potential presented in the table that demonstrated reducing conditions. Mr. Rice asked if similar sites had these types of reductions. Ms. Foss said that the injections were done for perchlorate at LHAAP-50, but the results are not yet available. Mr. Foss pointed out the plume prior to the injections.

LHAAP-17

Mr. Foss explained that LHAAP-17 was used for burning of trinitrotoluene (TNT), photoflash material, and rejected material. LHAAP-17 included four burning pits. Mr. Foss explained the selected remedy included excavation of soil contaminated with TNT, trinitrotoluene (TNT) and perchlorate, which was started in August 2019. The selected remedy for groundwater was extraction and treatment followed by monitored natural attenuation. Mr. Foss explained that munitions were encountered during the 2019 excavations so work was stopped due to the contract not allowing for munitions response. Mr. Foss explained that the color lines represent the expected area for excavation. The dashed line shows the surveyed areas of the actual excavation that was completed in 2019.

Ms. Kyra Donnell said that a task order was awarded to MMG-TLI Joint Venture to complete the excavation at LHAAP-17 while incorporating safety measures appropriate for the munitions identified onsite. Ms. Donnell said that work plans are currently being prepared. Ms. Donnell then explained the intended process for LHAAP-17. First, a surface clearance will be done with hand held metal detectors to identify any munitions on or near the surface and any debris that could interfere with the Digital Geophysical Mapping (DGM). Once the surface is cleared, man-portable equipment will be used to complete DGM. The DGM information will be evaluated to identify subsurface anomalies that are targets of interest and that might represent munitions and explosives of concern (MEC). Some or all of the targets will be intrusively investigated. Any suspected subsurface munitions will be removed through that process. MEC will be managed onsite through detonation. Storage will be available onsite to allow for consolidated disposal or individual MEC may be blown-in-place (BIPs). Once subsurface targets of interest are addressed, the onsite soil piles from the previous excavations and soils removed during remaining excavations will be evaluated through sifting and to remove anything that might represent MEC. The material that potentially presents an explosives hazard will undergo a Material Potentially Presenting an Explosive Hazard inspection process to certify that it no longer contains explosives. Any additional munitions construction support will be incorporated for the additional excavation, as needed.

Ms. Donnell stated that the groundwater extraction system will be installed following backfilling of the site in accordance with the Remedial Design/Remedial Action Work Plan.

Mr. LeTourneau wanted to know how deep the DGM works. Mr. Gentry said that the depth of the investigation depends on the types of munitions found. Mr. Gentry said that generally munitions can be found to a depth of 4 feet below the ground surface (bgs). Where excavations are completed, munitions can be found at an additional 4 feet from the surface. Ms. Zeiler said that munitions found at LHAAP-17 were generally located at depths of 3 to 5 feet bgs.

Mr. LeTourneau asked if it was possible that the munitions were dumped 20 feet bgs. Mr. Foss said that most of the areas where the munitions were found in the areas that were excavated to 2.5 ft. Mr. Foss said that the depth to water is 6 to 7 feet bgs, which would limit the likelihood that something would be buried deeper.

Mr. George Rice said that the slide for the groundwater extraction system showed three radius of influence circles but only two extraction wells. Mr. Rice ask if there was a third extraction well that would be installed. Ms. Nemmers said that a baseline sampling event would be completed and then another extraction well may be connected. The two extraction wells shown are currently planned for use as the extraction system. Mr. Foss said the addition extraction well would be 17WWW01.

LHAAP-46

Mr. Foss explained that monitoring well LHSMW21 had solvents detected that required additional delineation. Mr. Foss pointed out that the groundwater flow is generally straight east so the new monitoring well shown in pink on the slide was installed. Mr. Foss reported that the analytical results from the groundwater collected from the new well did not have any detections above screening levels. Mr. Foss said that the plume boundary is now defined.

Look Ahead

Ms. Nemmers then discussed the 3-month look ahead for LHAAP field work. Ms. Nemmers said that the LHAAP-03 transportation and disposal of soil had been complete. Ms. Nemmers said that groundwater monitoring was being completed at several sites.

Ms. Nemmers discussed the document look-ahead and explained that several RA-O Reports were being prepared along with the quarterly evaluation report for the GWTP.

Groundwater Treatment Plant

Ms. Nemmers explained the graph with the treated groundwater discharged. She said that the higher volumes usually include discharge to the bayou from both the holding pond and the GWTP when the bayou has enough flow. Ms. Nemmers explained that the discharge volume from the GWTP is typically about 400,000 gallons per month.

Surface Water Sampling

Ms. Nemmers said that the surface water results from 2020 had all been near or at non-detect. Ms. Nemmers said that the information presented about the GWTP and surface water is included in handouts that were mailed out.

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

Mr. Werner said that the draft Pre-Design Investigation (PDI) Work Plan for LHAAP-29 is in review with the Army and will then be submitted to the Regulators. Mr. Werner explained that a PDI Work Plan is also being prepared for LHAAP-18/24.

For LHAAP-47, additional monitoring wells, direct push technology borings, and samples from soil and groundwater are presented in the PSI Addendum Report that is currently under review. Mr. Werner explained that remedies and technologies are being evaluated for LHAAP-47 under the Feasibility Study phase. A Proposed Plan will then be prepared.

Mr. Werner said that the PDI field work for LHAAP-18/24 is planned for March 2021 and for LHAAP-29 in February 2021. Mr. Fortune asked if LHAAP-18/24 is the older burning ground, which Mr. Werner confirmed.

Mr. Williams said that during the next RAB meeting in January 2021 they should be able to present the LHAAP-47 PSI information as well as the plan for the other sites.

Mr. LeTourneau asked if LHAAP-29 is the old TNT plant, and asked what LHAAP-16 was. Ms. Zeiler said that LHAAP-16 was a landfill. Mr. LeTourneau ask if there was an issue with collapsed TNT pipes. Ms. Zeiler said that LHAAP-29 did have pipes and that the status of the pipes is unknown but they will be sampled under this contract. Mr. Werner said that there are four lines at LHAAP-29.

Next RAB Meeting Schedule and Closing Remarks

Ms. Zeiler then discussed the next meeting with the RAB members. It was decided that the next RAB Meeting will be held on **Wednesday, January 20, 2021,** with the **meeting starting at 6:00 pm CDT**. Ms. Zeiler stated that the plan is to meet in person. Ms. Overdyke suggested moving the meeting because January 20, 2021 is inauguration day. Ms. Zeiler said that her new boss plans to come to LHAAP and wants to attend the RAB meeting in January 2021.

Mr. LeTourneau made a motion to adjourn; Mr. Fortune seconded the motion.

Adjourn

The meeting adjourned at 7:05 pm CDT.

October 2020 Meeting Attachments and Handouts:

- Color Copy of Bhate Presentation Slides
- GWTP – Processed Groundwater Volumes Handout
- Surface Water Sampling Handout

Longhorn Army Ammunition Plant Quarterly Restoration Advisory Board Meeting

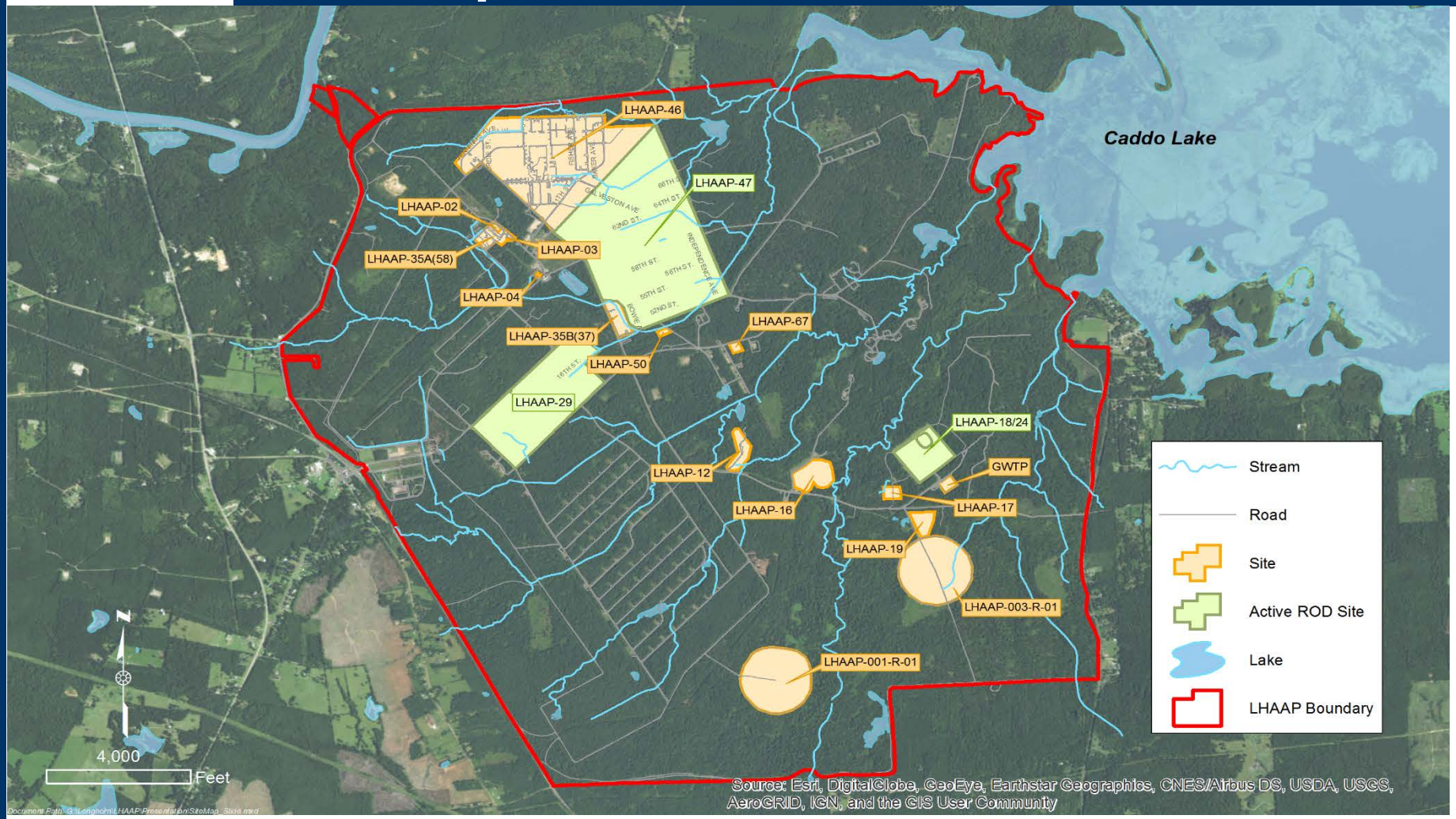
October 21, 2020
6:00 PM CDT

APTIM

bhate

Restoration Advisory Board Meeting

Site Map



Abbreviations and Acronyms

µg/L	Micrograms per liter
Cu. Yd.	Cubic Yard
DCE	Dichloroethene
DERP	Defense Environmental Restoration Program
DNT	Dinitrotoluene
GPW	Goose Prairie Creek Water Sample
GW-Ind	Industrial Groundwater
GWTP	Groundwater Treatment Plant
HBW	Harrison Bayou Water Sample
J	Estimated laboratory value
LHAAP	Longhorn Army Ammunition Plant
LUC	Land Use Control
mg/L	Milligrams per liter
MSC	Medium-Specific Concentration
mV	Millivolts
NV	No Value
PCL	Protective Concentration Level
RAB	Restoration Advisory Board
RA(O)	Remedial Action Operation
TCE	Trichloroethylene
TNT	Dinitrotoluene
TRRP	Texas Risk Reduction Program

Restoration Advisory Board Meeting

Agenda

06:00	Welcome and Introduction
06:05	Open Items {RMZ}
	-RAB Administrative Issues
	o Membership Update
	o Minutes (July 2020 RAB Meeting)
	-Purpose of the Restoration Advisory Board (RAB) Meeting
	-Ongoing Outreach/Website
	-Update on COVID-19
06:15	Defense Environmental Restoration Program (DERP) Update {Bhate}
	-Documents in Process and Field Work Completed since last RAB
	o LHAAP-03 Remedy Implementation
	o LHAAP-04 Performance Sampling
	o LHAAP-17 Progress
	o LHAAP-46 Performance Sampling
	-Three Month Look ahead
	-Groundwater Treatment Plant (GWTP) Update
06:45	Other DERP Update {RMZ}
	-LHAAP-18/24, -29 and -47 Document Status
06:55	Next RAB Meeting Schedule and Closing Remarks {RMZ}
	-Transfer Update {RMZ}

RAB Administrative Issues

- Membership Update
  - Persons Interested in being new members
- Minutes (July 2020 RAB Meeting)

Purpose of the RAB Meeting

- Held every 3 months
- The mission of the Longhorn Army Ammunition Plant (LHAAP) RAB is to promote community awareness and obtain constructive community review and comments on environmental restoration activities at the former LHAAP

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. The website is regularly updated to indicate the upcoming field events at each site including groundwater sampling, monitoring well installations, soil sampling, or remediation activities.
  - Make suggestions for improving communication – the Army welcomes and appreciates community feedback

Update on COVID-19

- Executive Order/Proclamation issued on 2 July 2020 from Governor of Texas
  - Remains in effect until amended, superseded, or rescinded
  - Wear face coverings in public spaces
  - People cannot be in groups larger than 10 and must maintain 6 feet of social distancing from others.
- January 2021 RAB Meeting – To Be Determined

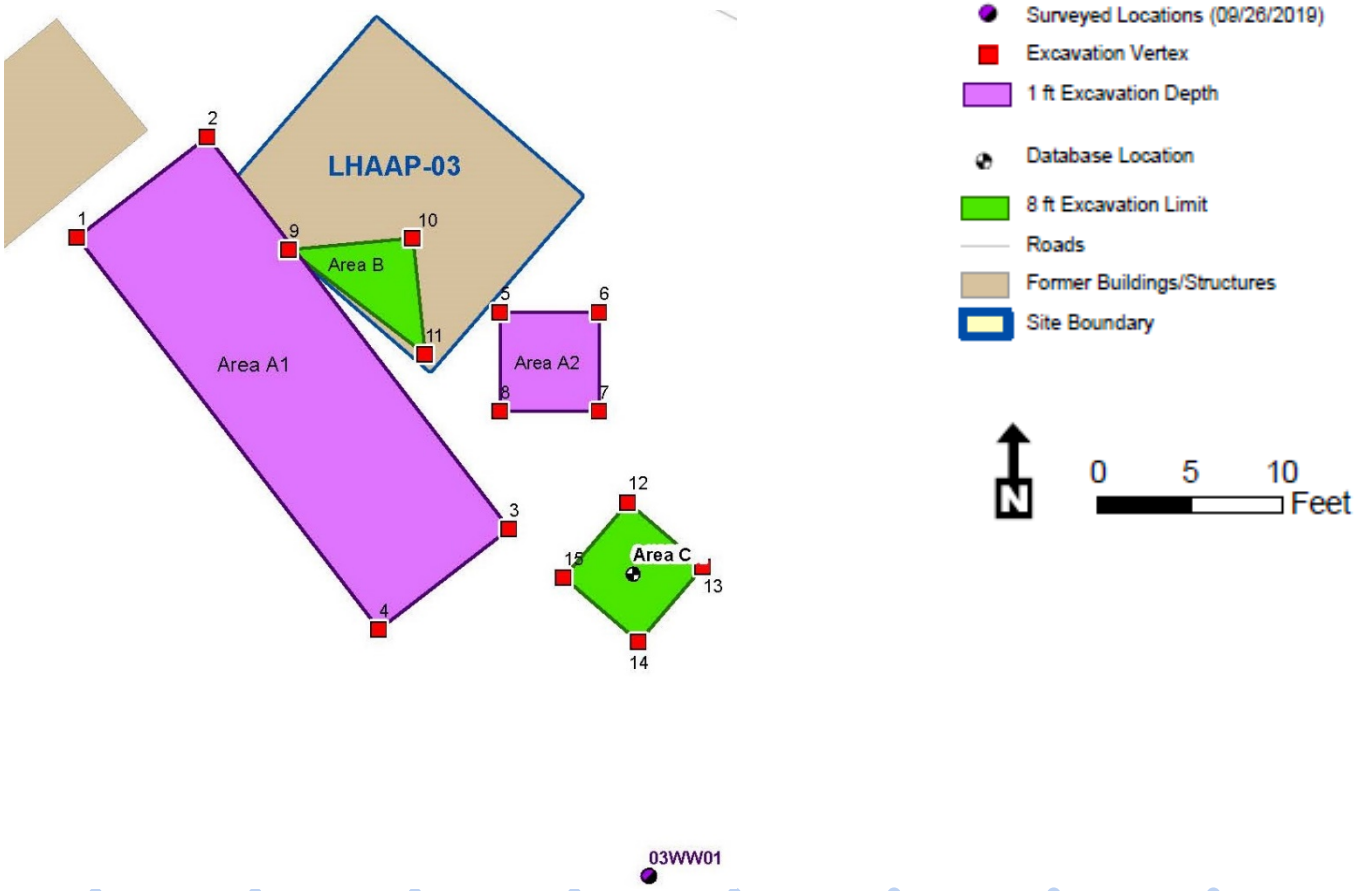
Documents in Process

Site	Document
LHAAP-04	Remedial Action Completion Report
LHAAP-16	Remedial Action Completion Report
LHAAP-37	Annual Remedial Action Operation [RA(O)] Report
LHAAP-46	Annual RA(O) Report
LHAAP-50	Remedial Action Completion Report Annual RA(O) Report
LHAAP-58	Annual RA(O) Report
Land Use Control (LUC) Sites	LUC Management Plan Update
GWTP	Quarterly Evaluation Report: Third Quarter (July-September2020)

Completed Field Work Since Last RAB Meeting

Site	Activity
LHAAP-03	Excavation and backfill
LHAAP-04	Year 1 Quarter 3 Performance Sampling
LHAAP-16	Year 1 Quarter 2 Performance Sampling
LHAAP-17	Backfill of clean excavations A, B, C, D, E, F, and G; and berm construction to prevent rain water from entering excavations
LHAAP-46	New well sampling
LHAAP-50	Year 1 Quarter 1 Contingency Remedy Performance Sampling
LHAAP-18/24	Surface Water Sampling

LHAAP-03 Excavation and Backfill Complete

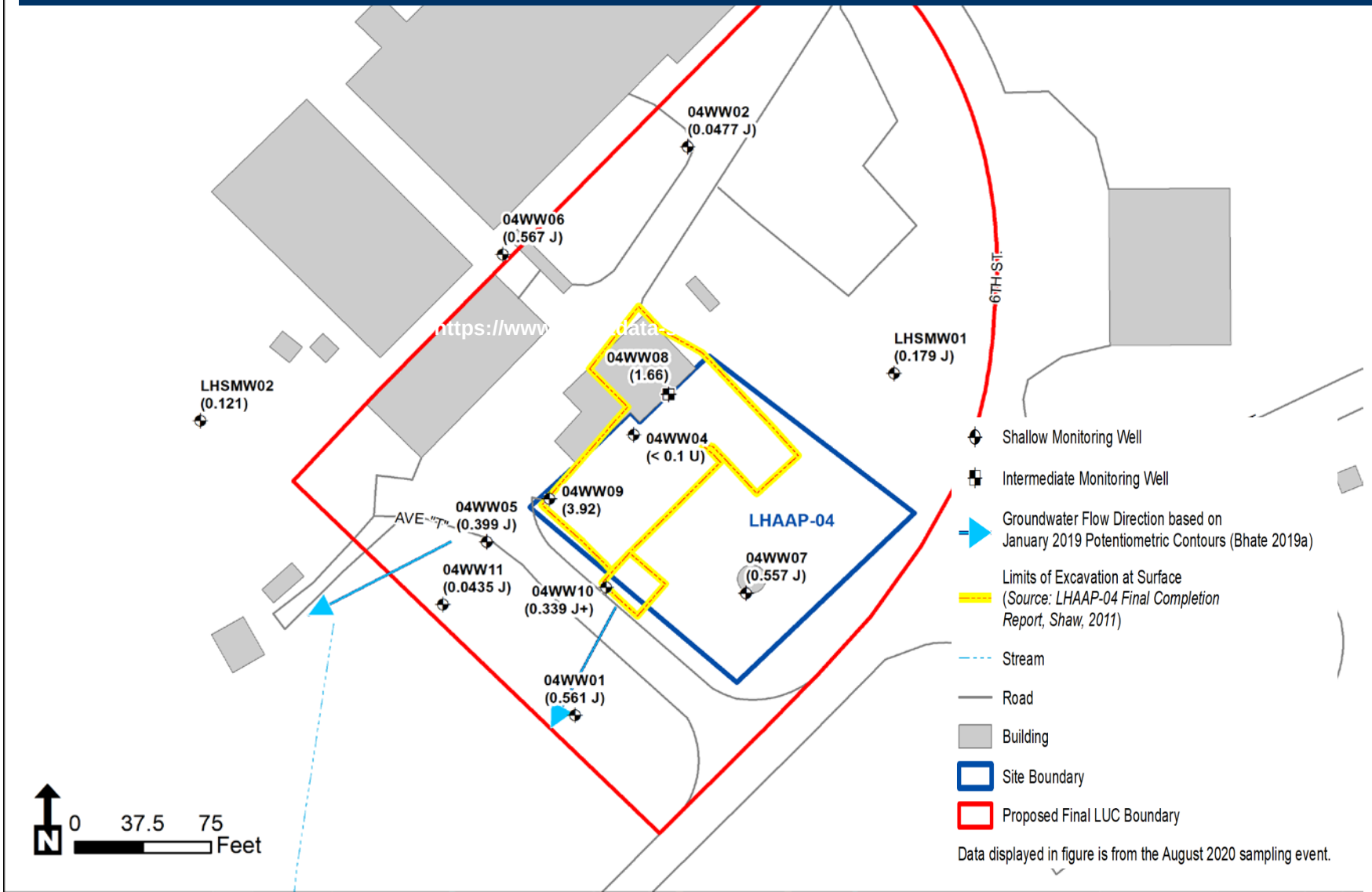


LHAAP-03 Excavation and Backfill Complete

- Majority of excavation was completed in October-November 2019
- Excavation of Area C could not be completed in 2019 due to wet conditions that flooded the excavations
- South wall of Area C had one confirmation sample higher than cleanup goal
- Bhate Team mobilized in August 2020, pumped residual water from Area C for treatment at the GWTP, and over-excavated the south wall
- A confirmation sample was collected and results were below cleanup goals
- Excavations were backfilled with soil from a source near Jefferson that was tested and determined to be acceptable
- Transport and disposal of stockpiled soil was completed on September 30, 2020

Restoration Advisory Board Meeting

LHAAP-04 Perchlorate Groundwater Monitoring Sample Results – August 2020



LHAAP-04 Performance Sampling

Pre-Injection, Year 1 Quarter 1, Quarter 2, and Quarter 3 Sampling Results at Key Monitoring Locations

	Location Code		04WW01				04WW05				04WW07			
	Sample Date		1/22/2019	2/4/2020	5/4/2020	8/10/2020	1/22/2019	2/4/2020	5/5/2020	8/10/2020	1/22/2019	2/4/2020	5/5/2020	8/10/2020
Analyte	Units	PCL	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Perchlorate														
Perchlorate	µg/L	17	< 2	19	< 0.05	0.561 J	78	< 2	< 0.05	0.399 J	110	86	3.51	0.557 J
Field Parameters														
Dissolved Oxygen	mg/L	NV	0.15	0.03	0.04	0.05	1.62	0.09	0.22	0.14	1.83	0.05	2.12	0.04
Oxidation-Reduction Potential	mV	NV	327	-52	-135	-191	163	-88	-90	-66	338	-260	-314	-112

Notes:

Blue highlighting indicates concentrations above the PCL.

< The analyte was not detected above the laboratory reporting limit shown.

J The analyte was positively identified; the associated numerical value is its approximate concentration

J+ The analyte was positively identified; the associated numerical value is its approximate concentration with a high bias in the sample

µg/L - micrograms per liter

mg/L - milligrams per liter

NV - No PCL value has been established for the analyte.

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level.

mV - millivolts

LHAAP-04 Performance Sampling

Pre-Injection, Year 1 Quarter 1, Quarter 2, and Quarter 3 Sampling Results at Key Monitoring Locations

	Location Code		04WW09				04WW10			
	Sample Date		1/22/2019	2/4/2020	5/5/2020	8/11/2020	1/22/2019	2/4/2020	5/5/2020	8/11/2020
Analyte	Units	PCL	Result	Result	Result	Result	Result	Result	Result	Result
Perchlorate										
Perchlorate	µg/L	17	2,100	18	11.1	3.92	10,000	< 2	< 0.05	0.339 J+
Field Parameters										
Dissolved Oxygen	mg/L	NV	5.78	0.08	0.04	0.03	3.59	5.54	2.72	1.03
Oxidation-Reduction Potential	mV	NV	326	-74	-16	-87	333	-79	-286	-47

Notes:

Blue highlighting indicates concentrations above the PCL.

< The analyte was not detected above the laboratory reporting limit shown.

J The analyte was positively identified; the associated numerical value is its approximate concentration

J+ The analyte was positively identified; the associated numerical value is its approximate concentration with a high bias in the sample

µg/L - micrograms per liter

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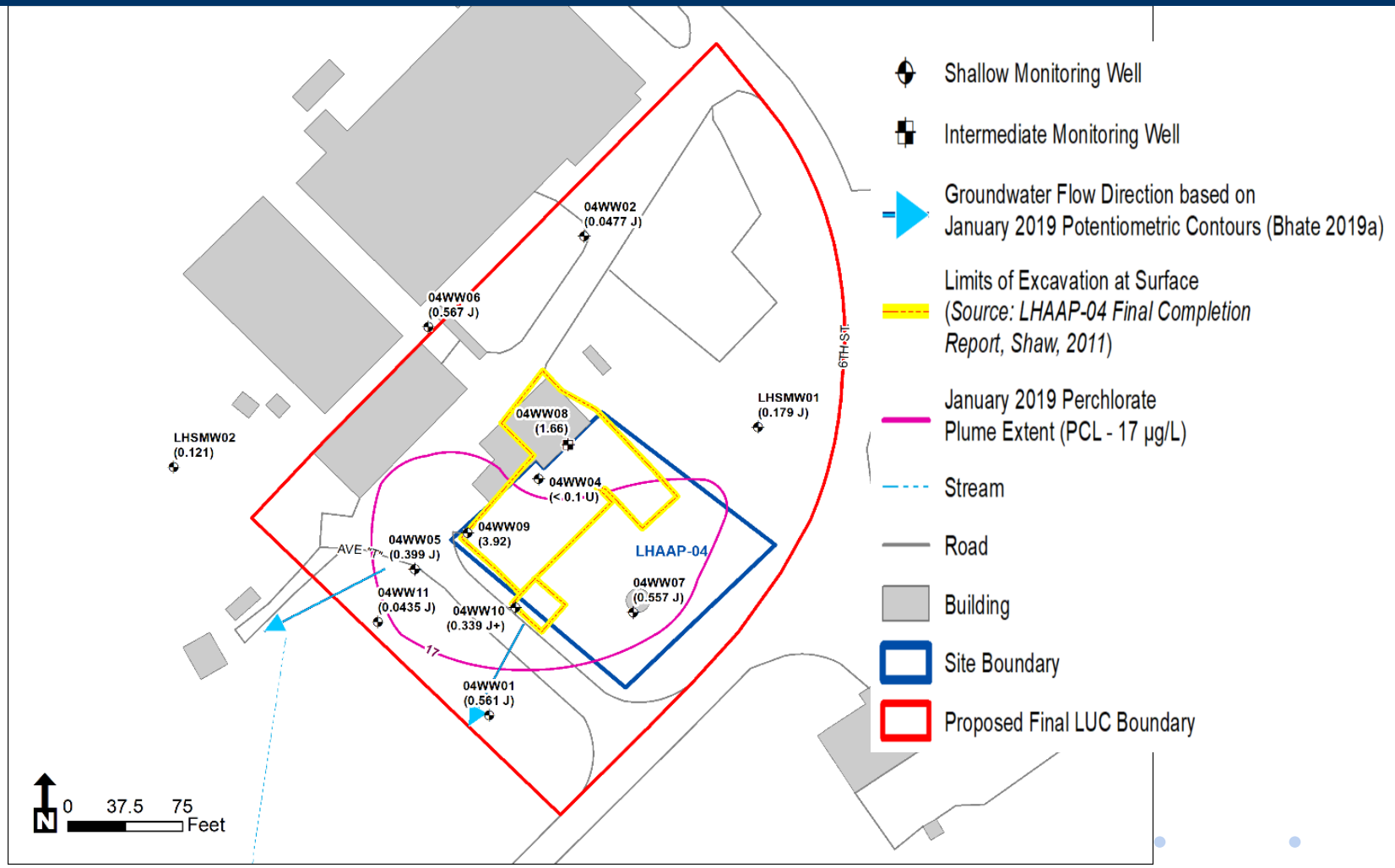
NV - No PCL value has been established for the analyte.

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level.

mV - millivolts

Restoration Advisory Board Meeting

LHAAP-04 Performance Sampling



LHAAP-17 Background

- Used for burning bulk trinitrotoluene (TNT), photoflash powder, and rejected material from Universal Match Corporation's production process from 1959-1980
- Consisted of 4 burning pits 5 feet deep x 10 feet wide
- Selected remedy is excavation of contaminated soil, extraction and treatment of groundwater, monitored natural attenuation and LUCs.
- Excavation to remove TNT, trinitrotoluene (DNT), 2,6-DNT and perchlorate contaminated soils began in August 2019
- On August 30, 2019, with approximately ½ of excavation remaining, an empty, unfuzed 4.2-inch illumination mortar was uncovered in Area M.
- Additional munitions items, some empty and others containing pyrotechnic material were subsequently uncovered/identified in excavation areas and stockpiles of excavated soil

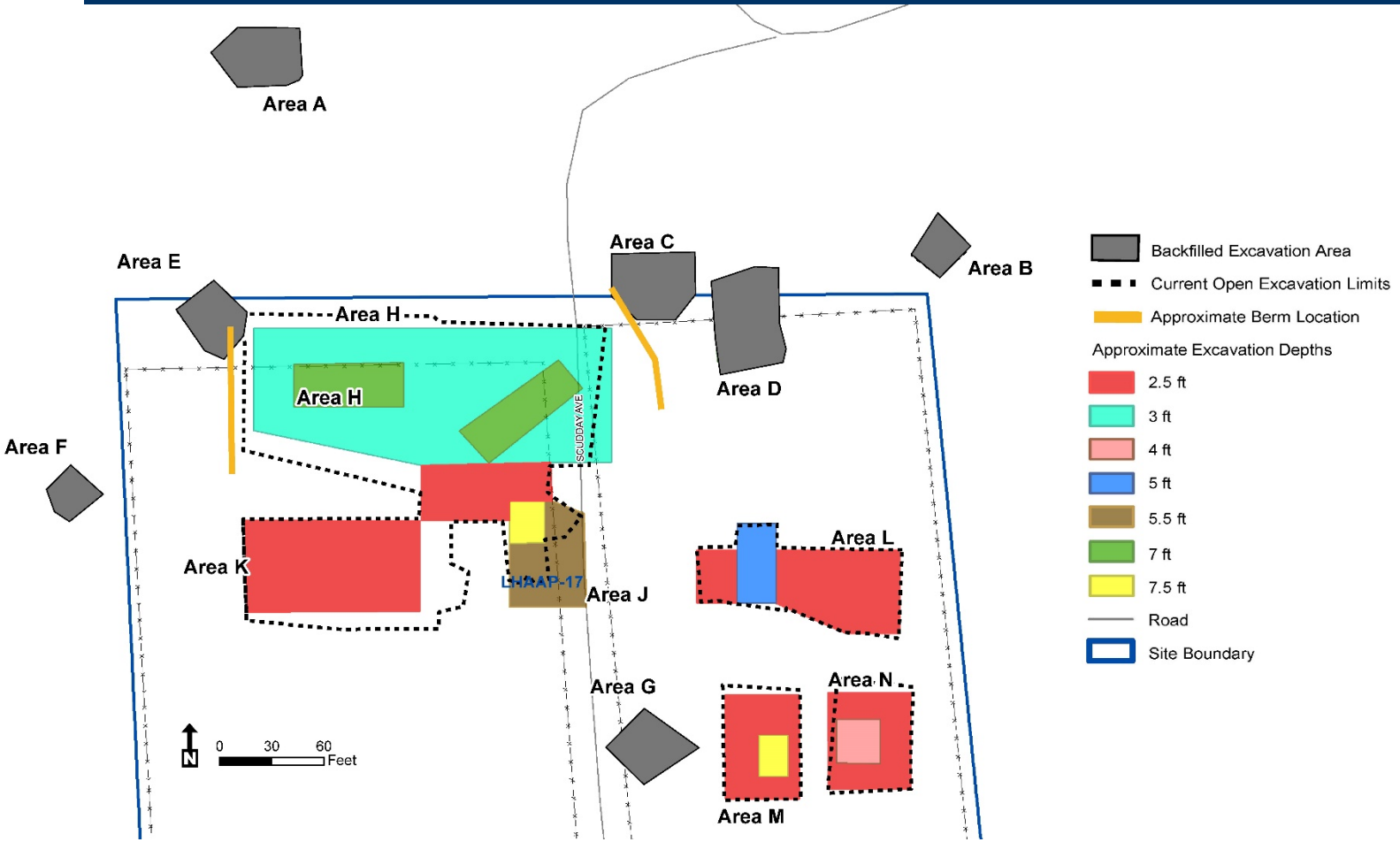
Restoration Advisory Board Meeting

LHAAP-17 Remedial Action

LHAAP-17 Remedial Action

- A work stoppage occurred on September 30, 2019
- Munitions and associated safety hazards were not addressed in the original contract
- A new task order has been awarded to complete the soils excavation while incorporating appropriate safety measures to address the identified munitions hazards, including:
  - Clearing the surface of munitions hazards
  - Geophysical mapping to identify potential subsurface munitions across the site, including areas previously backfilled within the site boundary
  - Removal of suspected subsurface munitions, if any
  - Screening of existing soil piles and newly excavated soils to remove material potentially presenting an explosive hazard
- The new task order also includes installation of the groundwater extraction and transport system identified in the Remedial Design and Remedial Action Work Plan

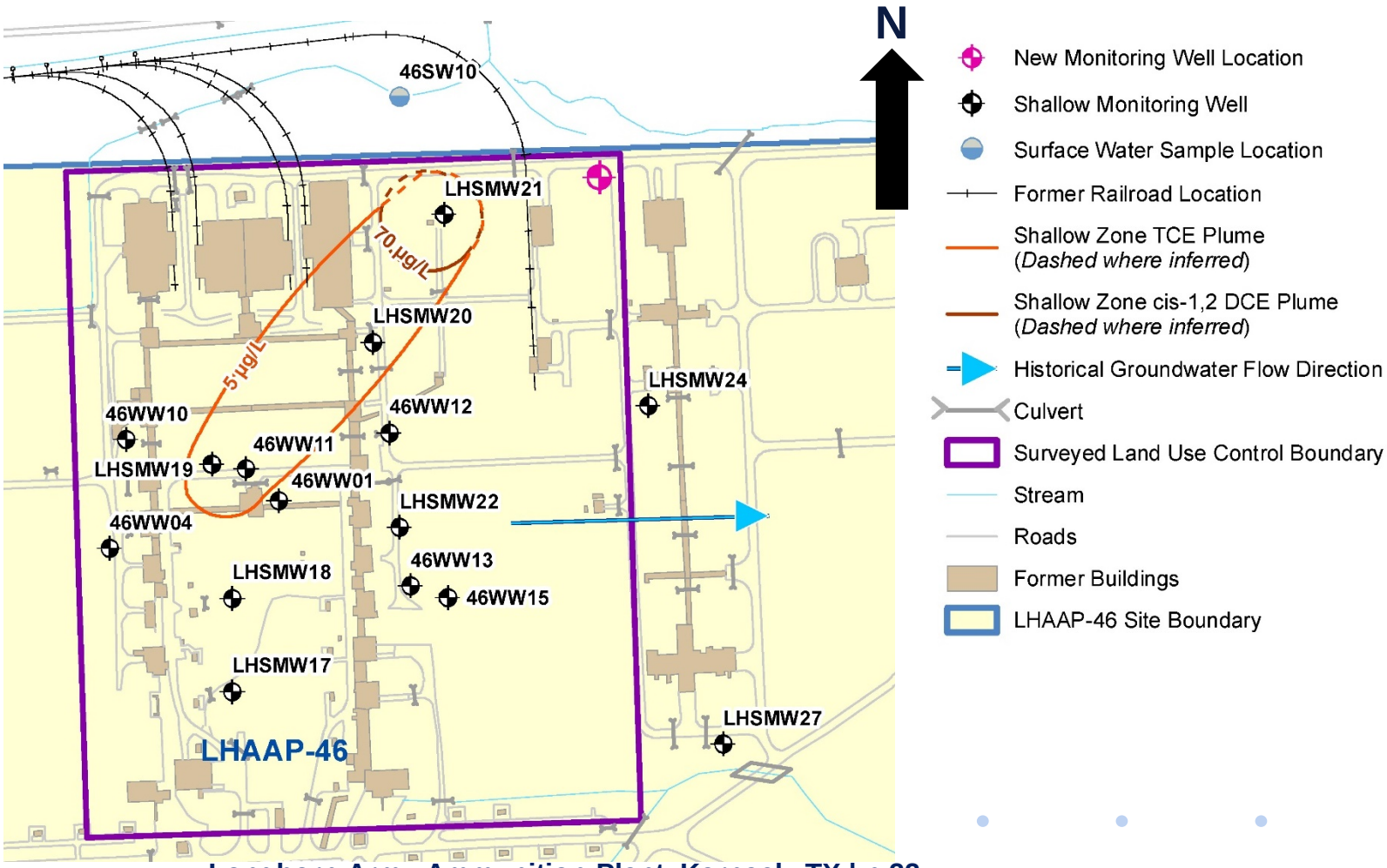
LHAAP-17 Backfilled Excavations



LHAAP-17 Groundwater Extraction

Restoration Advisory Board Meeting

LHAAP-46 New Well Sampling



LHAAP-46 New Well Sampling

- New well 46WW17 was sampled in July 2020
- The results for trichloroethylene (TCE), cis-1,2-dichloroethene (DCE), and vinyl chloride were below detection limit
- The plume extent is thus defined

Restoration Advisory Board Meeting

3 Month Look Ahead - Field Work by Bhate Team

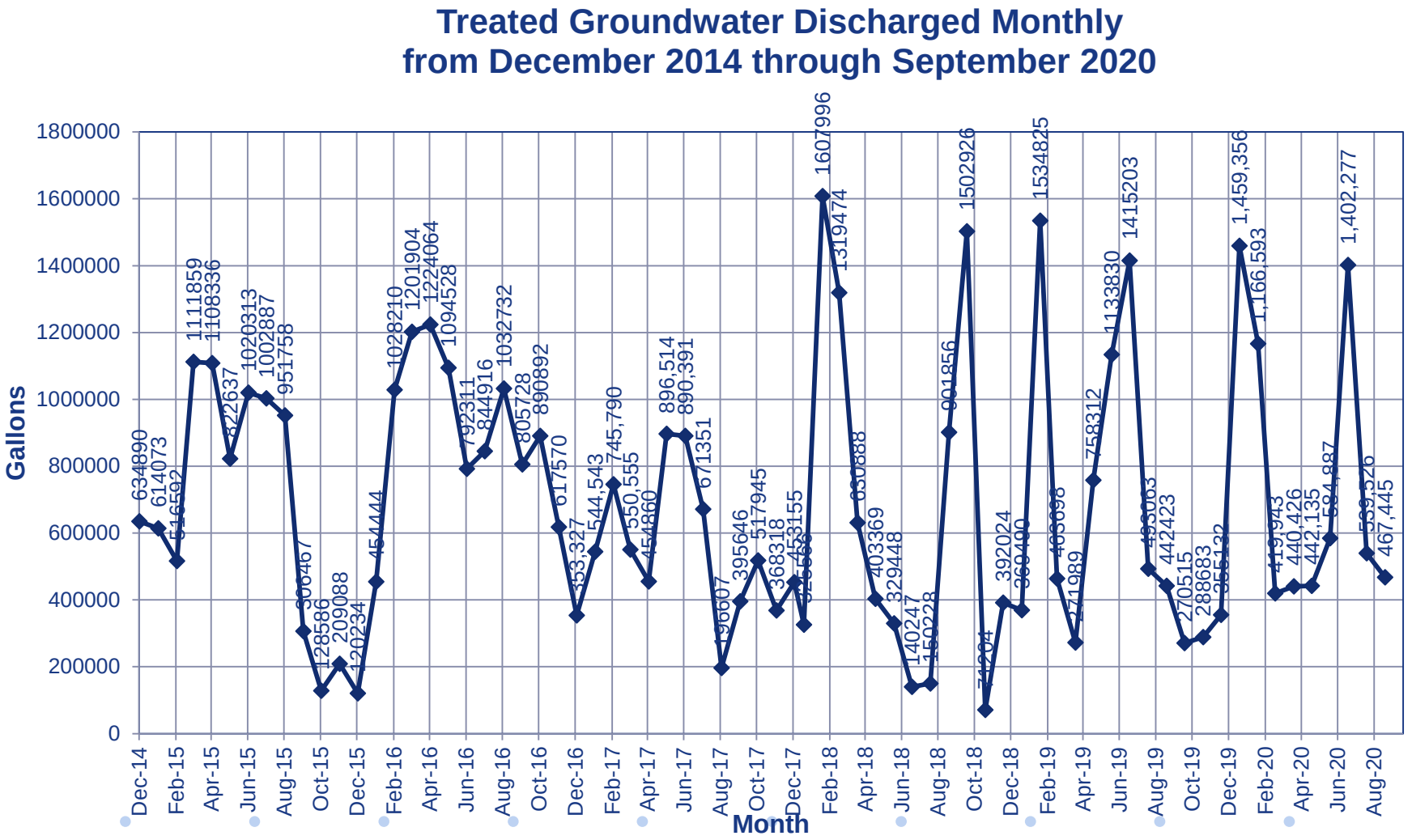
Site	Activity
LHAAP-03	Complete transport and disposal of soil
LHAAP-04	Performance monitoring – November 2020
LHAAP-16	Performance monitoring – October 2020
LHAAP-37	Year 4 1st Semi-annual RA(O) Sampling – November
LHAAP-50	Performance monitoring – October 2020
LHAAP-67	Year 7 Annual Sampling – October 2020

3 Month Look Ahead – Documents by Bhate Team

Site	Document
LHAAP-37	Year 3 RA(O) Report to Regulators
LHAAP-46	Year 6 RA(O) Report to Regulators
LHAAP-50	Year 6 RA(O) Report to Regulators
LHAAP-58	Year 6 RA(O) Report Finalized
GWTP and LHAAP-18/24	Quarterly Evaluation Report: Third Quarter (July –September 2020)

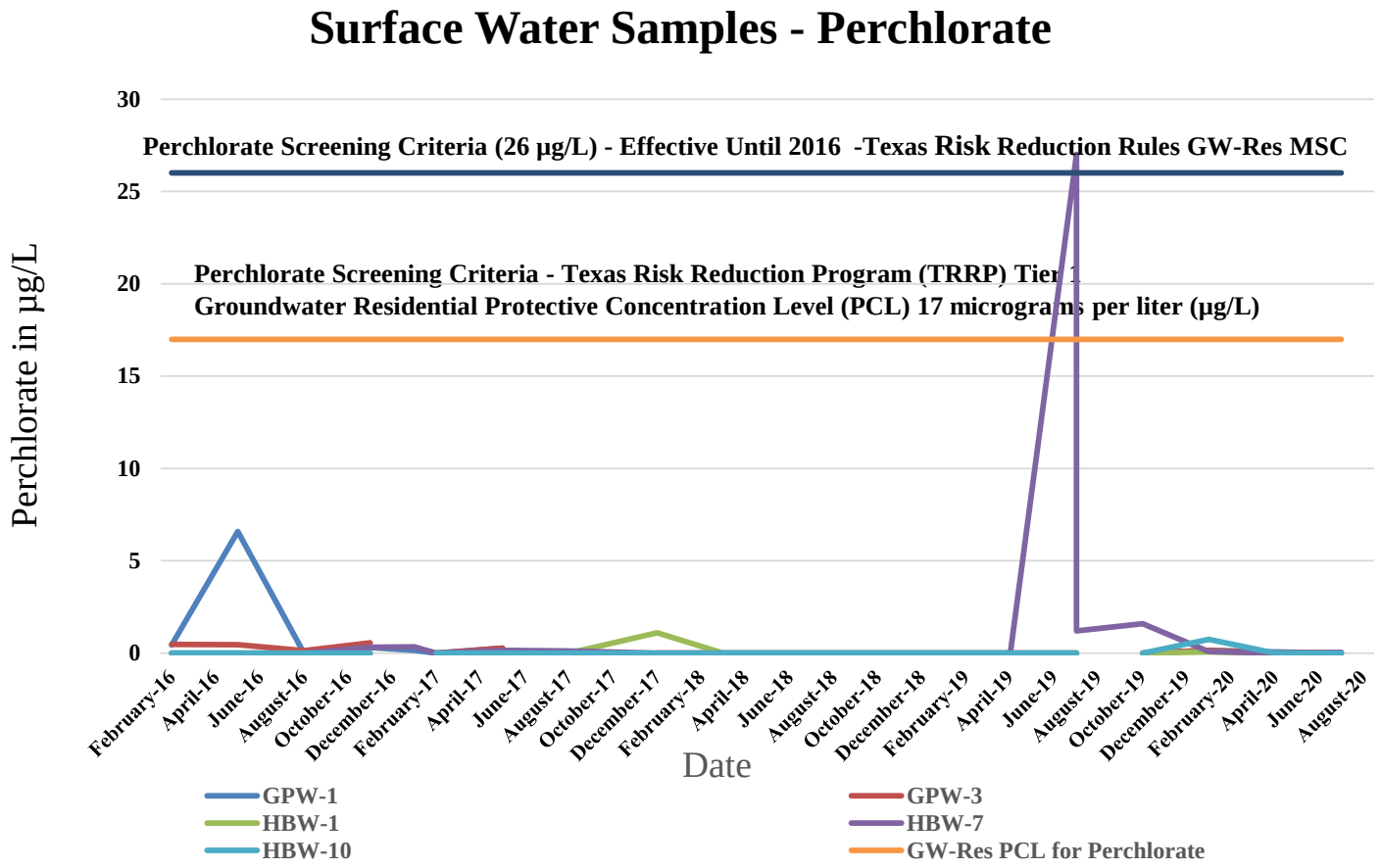
Restoration Advisory Board Meeting

GWTP Update



Restoration Advisory Board Meeting

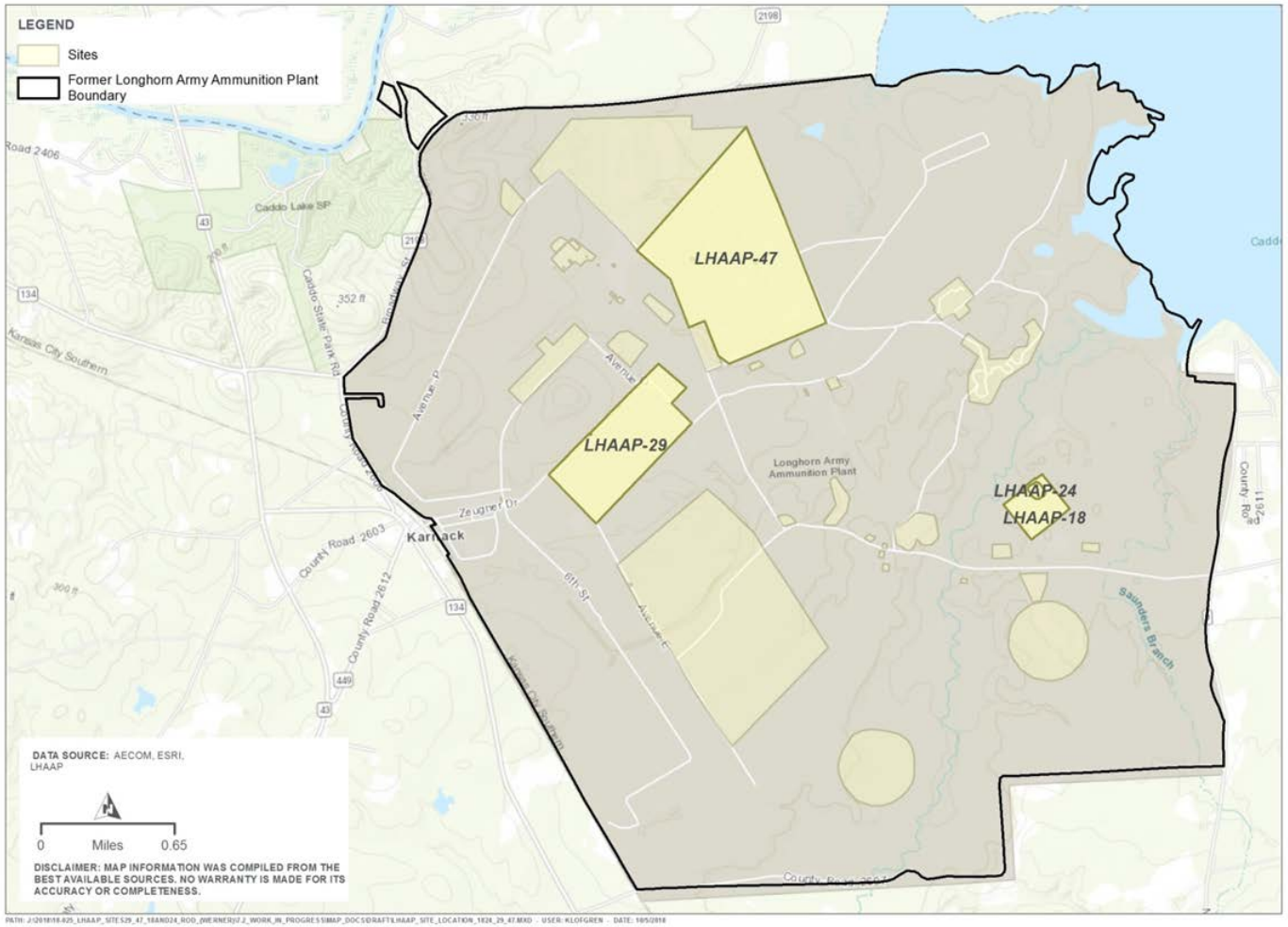
Surface Water Sample Results



Note: Surface water at HBW-7 had a detection of 27 µg/L from a sample collected on 11 July 2019. Surface water at HBW-7 was resampled 19 days later (30 July 2019) with a detection of 1.2 J µg/L.

Restoration Advisory Board Meeting

Other DERP Update



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LHAAP-18/24, -29 and -47 Document Status
6 Month Look Ahead - Documents by HDR Team

Site	Document
LHAAP-18/24	Draft Pre-Design Investigation Work Plan January 2021
LHAAP-29	Draft Pre-Design Investigation Work Plan November 2020
LHAAP-47	Draft Post Screening Investigation Addendum No. 2 Report October 2020
LHAAP-47	Draft Revised Feasibility Study December 2020
LHAAP-47	Draft Revised Proposed Plan March 2021

Future Field Work by HDR Team

Site	Activity
LHAAP-18/24	Pre-Design Investigation Field Work March - April 2021
LHAAP-29	Pre-Design Investigation Field Work February – March 2021

Next RAB Meeting Schedule & Closing Remarks

- Schedule January 2021 RAB Meeting
- Other Issues/Remarks
- Thank you for coming

Groundwater Treatment Plant - Processed Groundwater Volumes

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

Processed Water Discharged 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

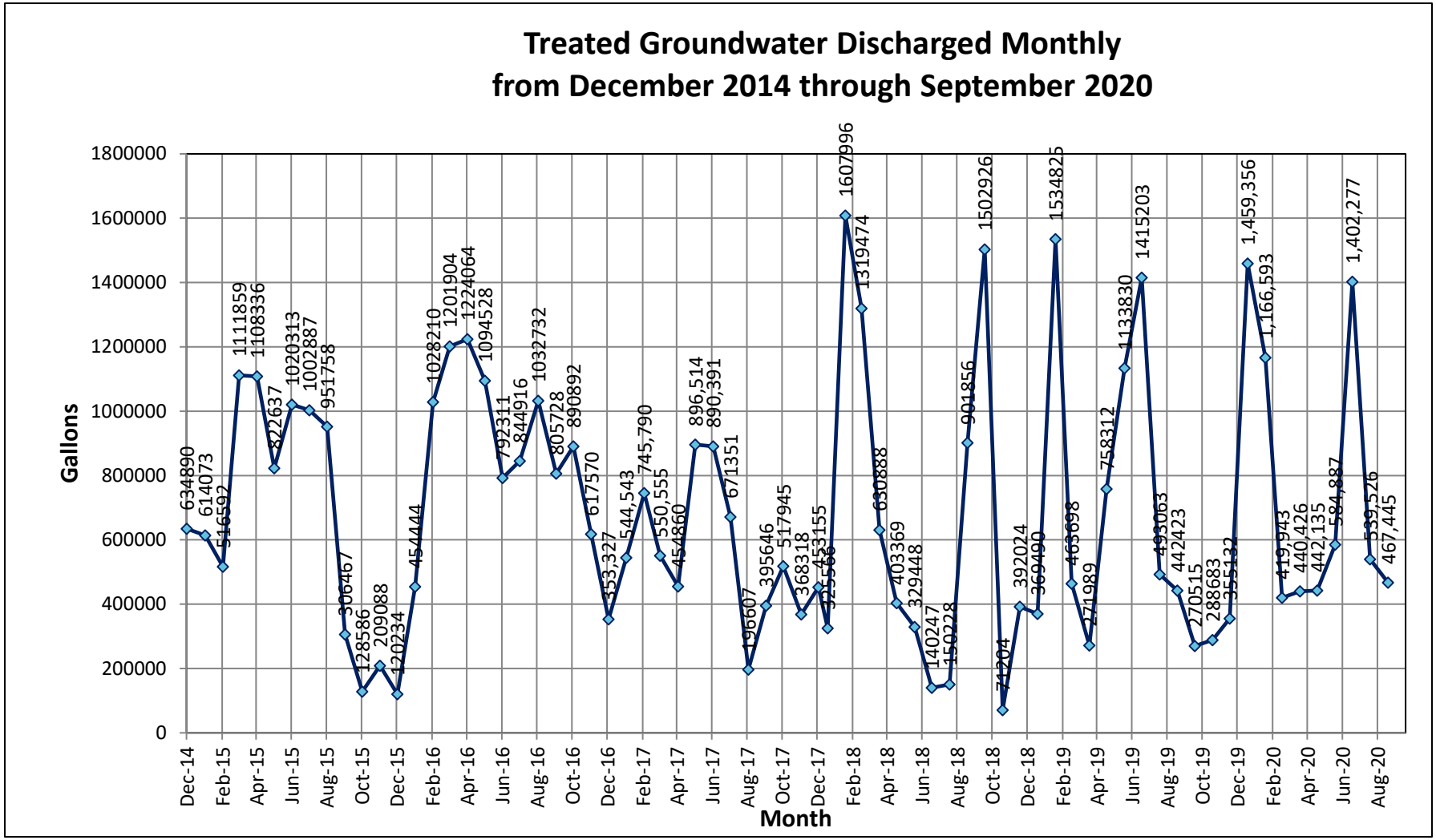
Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17
890,892	617,570	353,327	544,543	745,790	550,555	454,860	896,514	890,391	528,538	195,198	961,324

Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul - 18	Aug-18	Sep-18
517,945	368,318	453,155	325,566	1,607,996	1,319,474	630,888	403,369	329,448	140,247	150,228	901,856

Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul - 19	Aug-19	Sep-19
1,502,926	71,204	392,024	369,490	1,534,825	463,698	271,989	758,312	1,133,830	1,415,203	493,063	442,423

Oct-19	Nov-19	Dec-19	Jan 2020	Feb 2020	Mar 2020	Apr 2020	May 2020	Jun 2020	Jul 2020	Aug 2020	Sep 2020
270,515	288,683	355,132	1,459,356	1,166,593	419,943	440,426	442,135	584,887	1,402,277	539,526	467,445

*Indicates Estimate


Treated Groundwater Discharged Monthly
from December 2014 through September 2020
Gallons
Month
1800000
1600000
1400000
1200000
1000000
800000
600000
400000
200000
0
Dec-14
Feb-15
Apr-15
Jun-15
Aug-15
Oct-15
Dec-15
Feb-16
Apr-16
Jun-16
Aug-16
Oct-16
Dec-16
Feb-17
Apr-17
Jun-17
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Feb-19
Apr-19
Jun-19
Aug-19
Oct-19
Dec-19
Feb-20
Apr-20
Jun-20
Aug-20
634890
614073
516592
1111859
1108336
822637
1020313
1002887
951758
306467
128586
209088
120234
454444
1028210
1201904
1224064
1094528
792311
844916
1032732
805728
890892
617570
353,327
544,543
745,790
550,555
454860
896,514
890,391
671351
196607
395646
517945
368318
453155
325566
1607996
1319474
630888
403369
329448
140247
150228
901856
1502926
71204
392024
369490
1534825
463698
271989
758312
1133830
1415203
493063
442423
270515
288683
355132
1,459,356
1,166,593
419,943
440,426
442,135
584,887
1,402,277
539,526
467,445

Water Discharge Location and Volume (Gallons)

Month	Total Combined to Harrison Bayou	LHAAP-18/24 Sprinklers	GWTP To INF Pond	INF Pond to Harrison Bayou	Contract Hauled Off-Site
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	0	0	534,155	0	0
Jun-17	958,404	0	294,550	490,574	0
Jul-17	0	0	528,538	0	0
Aug-17	0	0	195,197	0	0
Sep-17	651,434	0	309,980	651,434	0
Oct-17	0	0	517,945	0	0
Nov-17	0	0	368,318	0	0
Dec-17	560,350	0	453,155	560,350	0
Jan-18	325,566	0	253,177	325,566	0
Feb-18	1,607,996	0	62,017	1,430,634	0
Mar-18	1,319,474	0	0	870,816	0
Apr-18	630,888	0	0	630,888	0
May-18	403,369	0	0	403,369	0
Jun-18	193,669	0	135,779	0	0
Jul -18	0	0	140,247	0	0
Aug -18	49,409	0	100,819	0	0
Sep-18	585,397	0	316,459	524,484	0
Oct-18	1,409,106	0	93,820	1,016,285	0
Nov-18	71,204	0	0	0	0
Dec-18	392,024	0	0	0	0
Jan-19	369,490	0	0	369,490	0
Feb-19	1,534,825	0	0	1,326,485	0
Mar-19	463,698	0	0	83,250	0
Apr-19	271,989	0	0	0	0
May-19	758,312	0	0	253,817	0
Jun-19	1,133,830	0	0	847,918	0

Month	Total Combined to Harrison Bayou	LHAAP-18/24 Sprinklers	GWTP To INF Pond	INF Pond to Harrison Bayou	Contract Hauled Off-Site
Jul -19	1,415,203	0	0	903,001	0
Aug-19	374,629	0	118,434	0	0
Sep-19	0	0	442,423	0	0
Oct-19	0	0	270,515	0	0
Nov-19	115,503	0	173,180	0	0
Dec-19	318,248	0	36,884	0	0
Jan 2020	1,459,396	0	0	1,115,183	0
Feb 2020	1,166,593	0	0	741,954	0
Mar 2020	419,943	0	0	0	0
Apr 2020	440,426	0	0	0	0
May 2020	442,135	0	0	0	0
June 2020	584,887	0	0	0	0

Harrison Bayou and Goose Prairie Creek – Perchlorate Data

Surface water samples are collected quarterly from each location in Harrison Bayou and Goose Prairie Creek, unless the sampling location is dry.

Surface Water Sample Data (in micrograms per liter)

Quarter	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st
Creek Sample ID	**Jul 1999**	**Sep 1999**	**Feb 2000**	**Apr 2000**	**Aug 2000**	**Dec 2000**	**Feb 2001**	**Apr 2001**	**July 2001**	**Oct 2001**	**Jan 2002**
GPW-1	<1.0U	-	4	<4.0 U	<4.0 U	<4.0 U	-	2.65	<4.0 U	<4.0 U	<4.0 U
GPW-3	<1.0U	<4.0 U	17	8	<4.0 U	<4.0 U	-	2.28	<4.0 U	<4.0 U	<4.0 U
HBW-1	-	<80.0 U	310	23	-	-	<4.0 U	-	<4.0 U	<4.0 U	<4.0 U
HBW-7	-	<8.0 U	370	110	-	-	<4.0 U	-	<4.0 U	<4.0 U	<4.0 U
HBW-10	-	<8.0 U	905	650	<4.0 U	-	<4.0 U	-	<4.0 U	-	-

Quarter	2nd	3rd	4th	1st	2nd	3rd	3rd	4th	2nd	3rd	4th
Creek Sample ID	**June 2002**	**Sept 2002**	**Dec 2002**	**Feb 2003**	**June 2003**	**Aug 2003**	**July 2004**	**Dec 2006**	**May 2007**	**Aug 2007**	**Dec 2007**
GPW-1	<4.0 U	<4.0 U	18.3	18.6	59.9	-	2.25	-	<1.0 U	<1.0 U	10.7
GPW-3	<4.0 U	<4.0 U	5.49	12.6	14.7	-	2.2	-	<1.0 U	<1.0 U	7.48
HBW-1	<4.0 U	<4.0 U	<4.0 U	-	<4.0 U	99.3	<0.2U	<1.0 U	<1.0 U	122	<1.0 U
HBW-7	<4.0 U	<4.0 U	<4.0 U	-	<4.0 U	<4.0 U	<0.2U	<1.0 U	<1.0 U	1.02	<1.0 U
HBW-10	<4.0 U	<4.0 U	<4.0 U	-	<4.0 U	-	<0.2U	<1.0 U	<1.0 U	<1.0 U	<1.0 U

Quarter	1st	2nd	3rd	4th	2nd	3rd	3rd	3rd	4th	1st	2nd
Creek Sample ID	**Mar 2008**	**Jun 2008**	**Sep 2008**	**Dec 2008**	**May 2009**	**Jul 2009**	**Aug 2009**	**Sep 2009**	**Dec 2009**	**Mar 2010**	**Jun 2010**
GPW-1	27	<0.5U	<0.5U	<0.22U	16	<4U	NS	<1.2U	3.7	1.3J	<0.6U
GPW-3	21.9	9.42	1.1	<0.22U	8.9	<4U	NS	<0.6U	2.8	1.8J	<0.6U
HBW-1	<0.5U	<0.5U	<0.5U	<0.22U	<0.55U	<4U	NS	<1.5U	<0.275U	1.5U	<0.6U
HBW-7	<0.5U	<0.5U	<0.5U	<0.22U	<0.55U	<4U	24	<1.2U	<0.275U	1.5U	<0.6U
HBW-10	<0.5U	<0.5U	<0.5U	<0.22U	<0.55U	<4U	NS	<1.5U	<0.275U	1.2U	<0.6U

Quarter	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st
Creek Sample ID	**Sep 2010**	**Dec 2010**	**Mar 2011**	**Jun 2011**	**Sep 2011**	**Dec 2011**	**Mar 2012**	**Jun 2012**	**Not Applicable**	**Jan & Feb 2013**	**Mar 2013**
GPW-1	dry	<0.1U	8.7	dry	dry	1.76	0.163J	dry	NS	1.65	0.735
GPW-3	dry	0.199J	0.673	dry	dry	1.31	0.261	dry	NS	1.74	0.754
HBW-1	dry	<0.1U	<0.2U	dry	dry	<0.1U	0.1U	dry	NS	<0.2U	<0.2U
HBW-7	dry	<0.1U	<0.2U	dry	dry	0.171J	0.1U	dry	NS	<0.2U	<0.2U
HBW-10	dry	<0.1U	<0.2U	dry	dry	<0.1U	0.1U	dry	NS	<0.2U	<0.2U

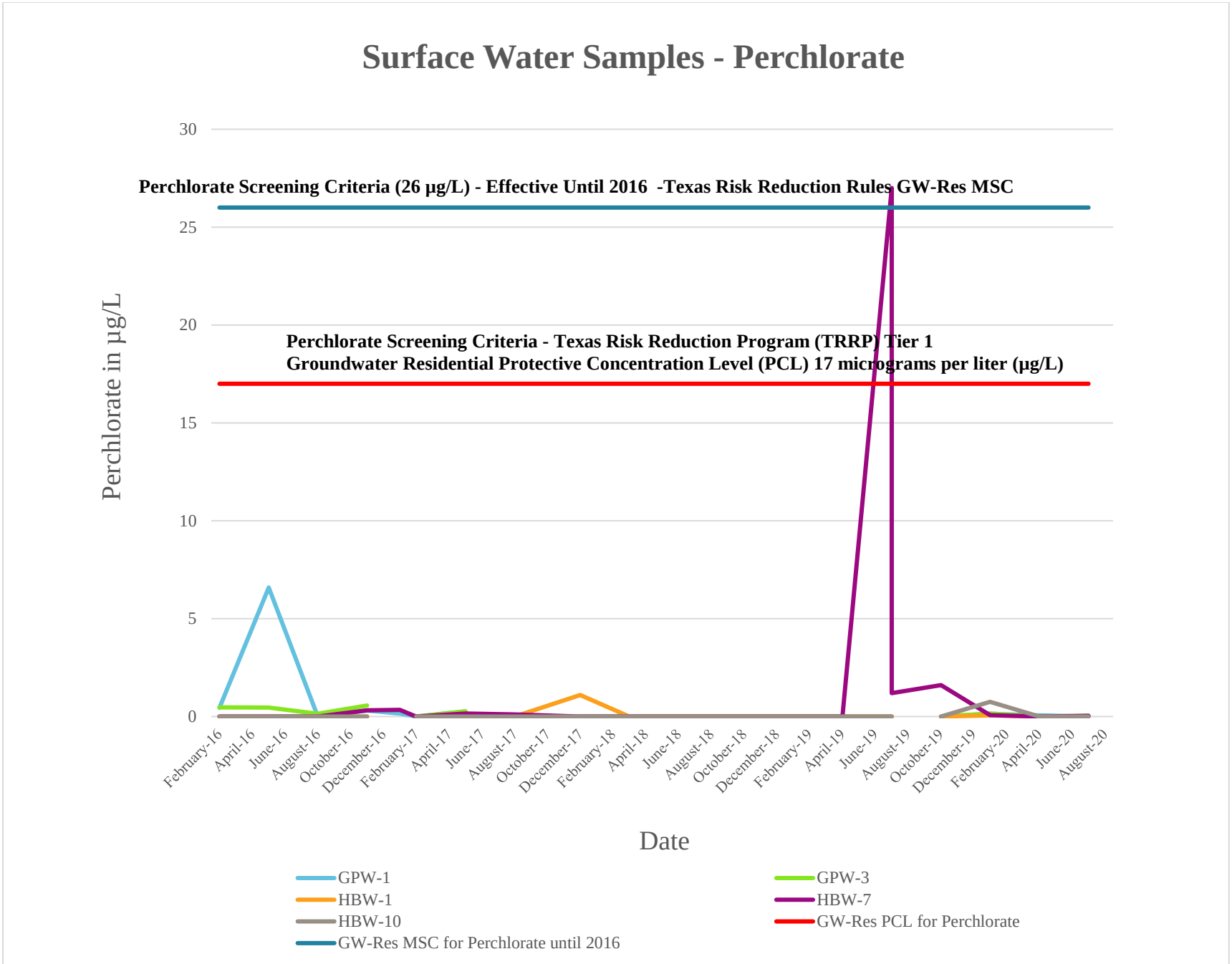
Quarter	2nd	3rd	4th	1st	2nd	3nd	4th	1st	2nd	3rd	4th
Creek Sample ID	**Jun 2013**	**Sept 2013**	**Dec 2013**	**Feb 2014**	**May 2014**	**Aug 2014**	**Nov 2014**	**Feb 2015**	**May 2015**	**Aug 2015**	**Nov 2015**
GPW-1	dry	<0.2 U	dry	0.766	dry	dry	0.244 J	0.311 J	0.156J	dry	0.142 J
GPW-3	dry	<0.2 U	dry	1.15	dry	dry	0.276 J	0.344 J	dry	dry	0.311 J
HBW-1	<0.2U	<0.2 U	dry	<0.2 U	dry	dry	<0.2 U	<0.2 U	dry	dry	<0.2 U
HBW-7	<0.2U	<0.2 U	dry	0.201 J	dry	dry	<0.2 U	0.124 J	dry	dry	<0.2 U
HBW-10	<0.2U	<0.2 U	dry	<0.2 U	dry	dry	<0.2 U	<0.2 U	dry	dry	<0.2 U

Quarter	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd
Creek Sample ID	**Feb 2016**	**May 2016**	**Aug 2016**	**Nov 2016**	**Feb 2017**	**May 2017**	**Aug 2017**	**Dec 2017**	**Mar 2018**	**June 2018**	**August 2018**
GPW-1	0.447	6.59	<0.2 U	0.301 J	<1 U	0.263	dry	<4.0 U	<4.0 U	dry	<2.0 U
GPW-3	0.474	0.457	0.141	0.563	<1 U	0.274	dry	<4.0 U	<4.0 U	dry	<2.0 U
HBW-1	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<1 U	<0.2 U	<0.2 U	1.1 J	<4.0 U	dry	<2.0 U
HBW-7	<0.2 U	<0.2 U	<0.2 U	0.318 J	<1 U	0.155	<0.2 U	<4.0 U	<4.0 U	dry	<2.0 U
HBW-10	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<1 U	<0.2 U	0.111J	<4.0 U	<4.0 U	dry	<2.0 U

NS – not sampled U – non-detect J – Estimated Dry – no surface water

Quarter	4th	1st	2nd	3rd	4th	1st	2nd	3rd
Creek Sample ID	**Oct 2018**	**Jan 2019**	**April 2019**	**July 2019**	**Oct 2019**	**Jan 2020**	**Apr 2020**	**July 2020**
GPW-1	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U	0.146	0.0589 J	<0.05 U
GPW-3	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U	0.156	<0.05 U	0.0326 J
HBW-1	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U	0.0600 J	<0.05 U	<0.05 U
HBW-7	<2.0 U	<2.0 U	<2.0 U	27 (initial)/ 1.2 J (resample)	1.6 J	0.0761 J	<0.05 U	0.0318 J
HBW-10	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U	0.0752 J	<0.05 U	<0.05 U

NS – not sampled U – non-detect J – Estimated Dry – no surface water



Note: Surface water at HBW-7 had a detection of 27 µg/L from a sample collected on 11 July 2019. Surface water at HBW-7 was resampled 19 days later.

Longhorn Army Ammuntion Plant Creek Sampling Locations