Subject: Final Minutes, Quarterly Restoration Advisory Board (RAB) Meeting
Longhorn Army Ammunition Plant (LHAAP)
Location of Meeting: Karnack Community Center
Date of Meeting: June 22, 2022, 6:00 PM Central Standard Time (CST)

Meeting Participants:

Army BRAC:	Rose M. Zeiler
USACE:	Aaron Williams, Chelsea Montoya (on the phone)
USAEC:	Lena Sierocinski, Michael Bowlby
Bhate:	Zachary Beck
APTIM:	Bill Foss
HDR, Inc.	Philip Werner, Amita Patel
USEPA Region 6:	Brian Follin
USGS:	Christopher Braun
TCEQ:	April Palmie (on the phone)
RAB:	Present: John Fortune, Sharon McAvoy, Richard LeTourneau, and Judy VanDeventer Absent: Deon Hall, Charles Dixon, Nigel Shivers, Tom Walker
Public:	USEPA Technical Advisory Group: Laura-Ashleigh Overdyke (Caddo Lake Institute), Nicolette Ledbury (Caddo Lake State Park), Erik Duerkop (Caddo Lake National Wildlife Refuge Manager), Charlene Franks

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A color copy of the slide presentation and handouts (see list at end of meeting minutes) were provided for meeting attendees.

Welcome and Introduction

Ms. Judy VanDeventer welcomed everyone to the RAB Meeting. Ms. Rose Zeiler explained that a website has been established for LHAAP which includes a schedule and administrative record of documents (www.longhornaap.com).

Membership Update

Ms. Zeiler asked if there were any members of the public interested in joining the RAB. Ms. Zeiler provided an overview of the process for joining the RAB. Anyone in the public can become a RAB member. She explained that there is an application to become a RAB member on the website for LHAAP but that an application will be provided to those interested in joining. Ms. VanDeventer stated that a Mr. Ray Polk (not in attendance) would be interested. Ms. Charlene Franks (in attendance) stated that she was interested in becoming a RAB member. Ms. Zeiler encouraged participation of the public attending the RAB regardless of whether they are part of the board.

Ms. Zeiler stated that as approved by the RAB members in January 2022, the meeting frequency has been reduced to three times per year. The new schedule is to meet in February, June, and November of each year, with the next RAB meeting planned for the third Wednesday of

November, on November 16, 2022.

Minutes (January 2022 RAB Meeting)

Ms. Zeiler verified that there were no comments or changes to the January meeting minutes. Motion to approve the January 2022 RAB meeting minutes was provided by Mr. Richard LeTourneau with Mr. John Fortune seconding the motion.

LHAAP-18/24

Ms. Amita Patel with HDR, Inc., presented the preliminary remedial design for Longhorn Site LHAAP-18/24. Ms. Patel outlined the selected remedy which includes enhancement of the existing groundwater extraction and treatment system, enhanced in-situ bioremediation (EISB), thermal treatment to remove dense non-aqueous phase liquid (DNAPL), maintenance of the existing cap over the Unlined Evaporation Pond, unsaturated soil excavation and off-site disposal, land use controls (LUCs), monitored natural attenuation (MNA), and long-term monitoring (LTM).

Ms. Patel explained that the remedy will be implemented in a phased approach. The first phase will include soil excavation, thermal treatment to remove DNAPL, and EISB in the shallow groundwater source area. Ms. Patel explained that the second phase will include EISB within the thermal treatment area, continuation of the EISB in the shallow groundwater source area, and EISB barriers off-site to ensure contamination leaving the site is treated. Ms. Patel explained that the thermal treatment would inhibit the EISB treatment which is why the remedy will be implemented in phases. The third contingent phase will involve soil excavation beneath the Unlined Evaporation Pond if necessary. After the remedy is implemented, MNA and LTM will be conducted to evaluate the remedy.

Ms. Patel presented the most recent perchlorate and TCE groundwater data collected in the shallow and Wilcox aquifer zones. Ms. Zeiler explained that the data was collected as part of the pre-design investigation (PDI). Ms. Zeiler explained that the treatment will be concentrated in the most contaminated part of the shallow zone aquifer. Ms. Patel stated that there is 169,000 square feet of EISB treatment area or nearly three quarters of the area of the site. Ms. Laura-Ashleigh Overdyke, with the Caddo Lake Institute, asked when the soil excavation would begin. Ms. Zeiler explained that the remedy will be implemented under a different contract from the remedial design process. Ms. Patel stated that the 60 percent design is due to the regulators in August 2022 and will not be finalized until October 2022, at which point the remedy implementation will go out for bid to the next contractor. Ms. Zeiler explained that the site is complicated and it is a long process to ensure that the contaminated media is adequately addressed.

Documents in Progress

Mr. Zachary Beck, with Bhate Environmental Associates, Inc. (Bhate), introduced the three contractors performing work at LHAAP. He explained which sites each of the contractors are managing. Mr. Beck explained that LHAAP-18/24, which Bhate manages as an interim remedy, overlaps with HDR, Inc., who is developing the final remedial design as Ms. Patel presented. Mr.

Beck then explained where the LHAAP sites are in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process and pointed out how far along the sites are in that process.

Mr. Beck presented the documents and field work completed in the past 3 months. Mr. Beck explained that Remedial Action-Operation (RA-O) is predominantly groundwater monitoring at LHAAP. Sites with RA-O have remedies in place, such that the groundwater monitoring is completed to evaluate those remedies. An annual report is then produced to document the monitoring. Mr. Beck explained that when a remedy is first put into place, quarterly groundwater sampling is performed for 2 years, followed by semi-annual sampling for another 3 years, and then annual sampling thereafter. Mr. Beck said that a quarterly report is prepared for the Groundwater Treatment Plant (GWTP) and that the groundwater monitoring wells are currently sampled every 6 months at LHAAP-18/24. Mr. Beck explained the document review process and pointed out that each of the reports are posted on the Administrative Record (AR) after Army and regulatory review. Mr. Beck said that the surface water is sampled quarterly and an annual report is produced. He said that the last surface water samples were collected at the beginning of Quarter 2 in April 2022. He stated that the handout for the surface water sampling was provided and included the quarterly data.

LHAAP-12

Mr. Bill Foss with APTIM, explained that LHAAP-12 was a landfill that has been closed since 1998. He stated that the landfill which was in operation from 1978 to 1994 received a variety of waste including cafeteria waste, chemical waste, petroleum contaminated soil, and asbestos. Mr. Foss stated that a cap was placed on the landfill in 1998 as an interim remedy. He stated that a small plume of chlorinated solvents came out of the north end of Landfill 12. Mr. Foss stated that groundwater flows from the west to the east at the site. He said that only one well currently has contamination. At monitoring well 12WW24, trichloroethene (TCE) was detected at 5.5 micrograms per liter (µg/L) just above the clean-up level of 5 µg/L. Mr. Foss presented the chlorinated solvent trends over time for 12WW24 and noted that since 2014, TCE has been consistently trending lower and should continue to decrease to below the clean-up level. Mr. Fortune pointed out that groundwater flow to the east is different than the overall trend in groundwater which is more to the north. Mr. Foss indicated that groundwater flow in the vicinity of Landfill 12 follows the local topography which slopes to the east.

GWTP Update

Mr. Beck then provided an overview of the GWTP, which currently treats groundwater from LHAAP-18/24. He presented a handout with a graph of the amount of treated groundwater discharged each month. He explained that the amount of treated groundwater varies based on rainfall and where the groundwater can be discharged. Mr. Beck explained that weekly monitoring of flow in the Harrison Bayou is performed which determines how treated water is discharged. Currently, there is flow in Harrison Bayou so treated groundwater is discharged directly to the Bayou. He explained that if there is not enough flow in Harrison Bayou the treated groundwater is discharged to a holding pond. Higher volumes of discharged water means that

the Bayou has a high flow and treated groundwater is being discharged from both the GWTP and the holding pond.

Mr. Beck presented the surface water sampling and explained that a handout was provided for the meeting. Surface water is sampled for perchlorate quarterly when the Bayous are flowing. Mr. Beck explained that the locations of the samples collected are presented in the handout.

LHAAP-29 and -47 Status

Mr. Philip Werner, with HDR, then provided an update on LHAAP-29 which does not have a final remedy in place. Mr. Werner discussed the site features including two former wastewater lines. One wastewater line was made of transite and one wastewater line was constructed of wooden staves and held together with iron bands. Ms. VanDeventer asked about the condition of the transite wastewater line. Mr. Werner explained that as part of the PDI in March 2021, eight trenches were dug across the wooden wastewater lines and three trenches across the transite lines. The transite lines were found to be in good condition. The wooden wastewater lines were found to be in poor condition. Mr. Fortune asked what the wastewater lines were used for. Ms. Zeiler explained that the lines were wastewater lines from the production of trinitrotoluene (TNT). Mr. Werner explained that five areas were investigated during the PDI, the former building 812-F, the cooling water outfall ditch, the north TNT cooling water line, the south TNT cooling water line, and the two wastewater lines. Mr. Werner stated that the PDI Report was in progress.

Mr. Werner provided an update on the preliminary 30% remedial design for LHAAP-29. He stated that the selected remedy includes contaminated soil removal, flushing, inspection, and plugging of the transite TNT wastewater line and the vitrified clay cooling water lines. Based on the PDI the wooden TNT wastewater line is in such disrepair that it will be excavated along with surrounding impacted soil for off-site disposal. Groundwater treatment includes in-situ thermal desorption (ISTD) treatment of the intermediate groundwater zone DNAPL plume, followed by MNA in the shallow groundwater zone plumes and for the intermediate groundwater plume following ISTD.

The Final LHAAP-47 Record of Decision (ROD) has been submitted to the United States Environmental Protection Agency (USEPA) for signature and Texas Commission on Environmental Quality (TCEQ) concurrence. He explained that the next step will be LUC notification, Texas Department of Licensing and Regulations (TDLR) notification for well drillers, and placement of the ROD in the AR.

LHAAP-17 Remedial Action

Mr. Beck discussed the ongoing work being performed at LHAAP-17. Mr. Beck summarized the major work elements completed. He explained that excavation and sifting of the soils was completed robotically so that the contaminated soil could safely be removed and sifted. Mr. Beck stated that over 4,048 cubic yards of soil have been excavated and approximately 2,500 cubic yards of this material have been sifted and transported for off-site disposal. All excavations with validated confirmation sidewall samples are complete and backfilled. Mr. Beck said that 96 Munition and Explosives of Concern (MEC) items have been disposed of through on-site

detonations. He said an estimated 41,000 pounds of Non-Munitions Related debris and 18,700 pounds of Munitions Debris have been inspected and transported off-site for recycling/disposal.

Mr. Beck stated that installation of the groundwater extraction system is ongoing and is anticipated to be completed in July 2022. He explained that the groundwater extraction system will be integrated into the GWTP. The extracted groundwater from LHAAP-17 will be pumped to the GWTP for treatment. Mr. LeTourneau asked how deep the extraction pumps will be set. Mr. Beck explained that during the remedial design phase a pump test was conducted to determine the ideal pump depth and pumping rate to maximize extracted volume without pumping the well dry. Based on the pump test, the extraction pumps will be placed at approximately 20 feet below ground surface.

Next RAB Meeting Schedule and Closing Remarks

Ms. Zeiler stated that the next RAB meeting will be held on November 16, 2022. Ms. Zeiler said that an application for RAB membership will be provided to Mr. Ray Polk and Ms. Charlene Franks. Ms. Zeiler thanked the RAB and asked if everyone was ready to adjourn.

Adjourn

Mr. Fortune made a motion to adjourn, which was seconded by Ms. VanDeventer. The meeting adjourned at 6:54 pm CST.

June 2022 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

June 22, 2022
6:00 PM CST

APTIM

bhate

Abbreviations and Acronyms

#	Number
lbs	pounds
µg/L	Micrograms per liter
amsl	Above mean sea level
bgs	Below ground surface
COC	Chemical of concern
Cy	Cubic Yards
DCE	Dichloroethene
DERP	Defense Environmental Restoration Program
DNAPL	Dense Non-aqueous Phase Liquid
DPT	Direct push technology
EISB	Enhanced In-Situ Bioremediation
ft	Feet
GPW	Goose Prairie Creek Water Sample
GWP-Res	Residential Groundwater Use Protection
GWTP	Groundwater Treatment Plant
HBW	Harrison Bayou Water Sample
ISTD	In-Situ Thermal Desorption
J	Estimated laboratory value
LHAAP	Longhorn Army Ammunition Plant
LTM	Long Term Management
LUCs	Land Use Controls
MC	Methylene Chloride
MDAS	Material documented as safe
MEC	Munitions and explosives of concern
mg/L	Milligrams per liter
MNA	Monitored Natural Attenuation
MPPEH	Material Potentially Presenting an Explosive Hazard
MSC	Medium-Specific Concentration
PC	Perchlorate
PCL	Protective Concentration Level
ppb	Parts per billion
RAB	Restoration Advisory Board
PDI	Pre-Design Investigation
RA(O)	Remedial Action Operation
ROD	Record of Decision
sf	Square foot
TCE	Trichloroethene
TCRA	Time Critical Removal Action
TNT	Trinitrotoluene
TOI	Target of Interest
TRRP	Texas Risk Reduction Program
UEP	Unlined Evaporative Pond
UU/UE	Unlimited Use/Unrestricted Exposure
VC	Vinyl Chloride

Restoration Advisory Board Meeting

Agenda

06:00 Welcome and Introduction

06:05 Open Items {RMZ}
- Ongoing Outreach/Website
- Restoration Advisory Board (RAB) Administrative Issues
  - o Membership Update
  - o Change in Meeting Frequency
  - o Minutes (January 2022 RAB Meeting)

06:15 Defense Environmental Restoration Program (DERP) Update {Bhate}
- Documents and Field Work Completed since last RAB
- Three Month Look ahead
- LHAAP-12
- Groundwater Treatment Plant (GWTP) Update

06:30 Other DERP Update
- LHAAP-18/24, -29, and -47 Status {HDR}
- LHAAP-17 Status {MMG-TLI Joint Venture}

06:50 Transfer Update {RMZ}

06:55 Next RAB Meeting Schedule and Closing Remarks {RMZ}

RAB Administrative Issues

- Membership Update
  - Persons interested in being new members
- Change in Meeting Frequency
- Minutes (January 2022 RAB Meeting)

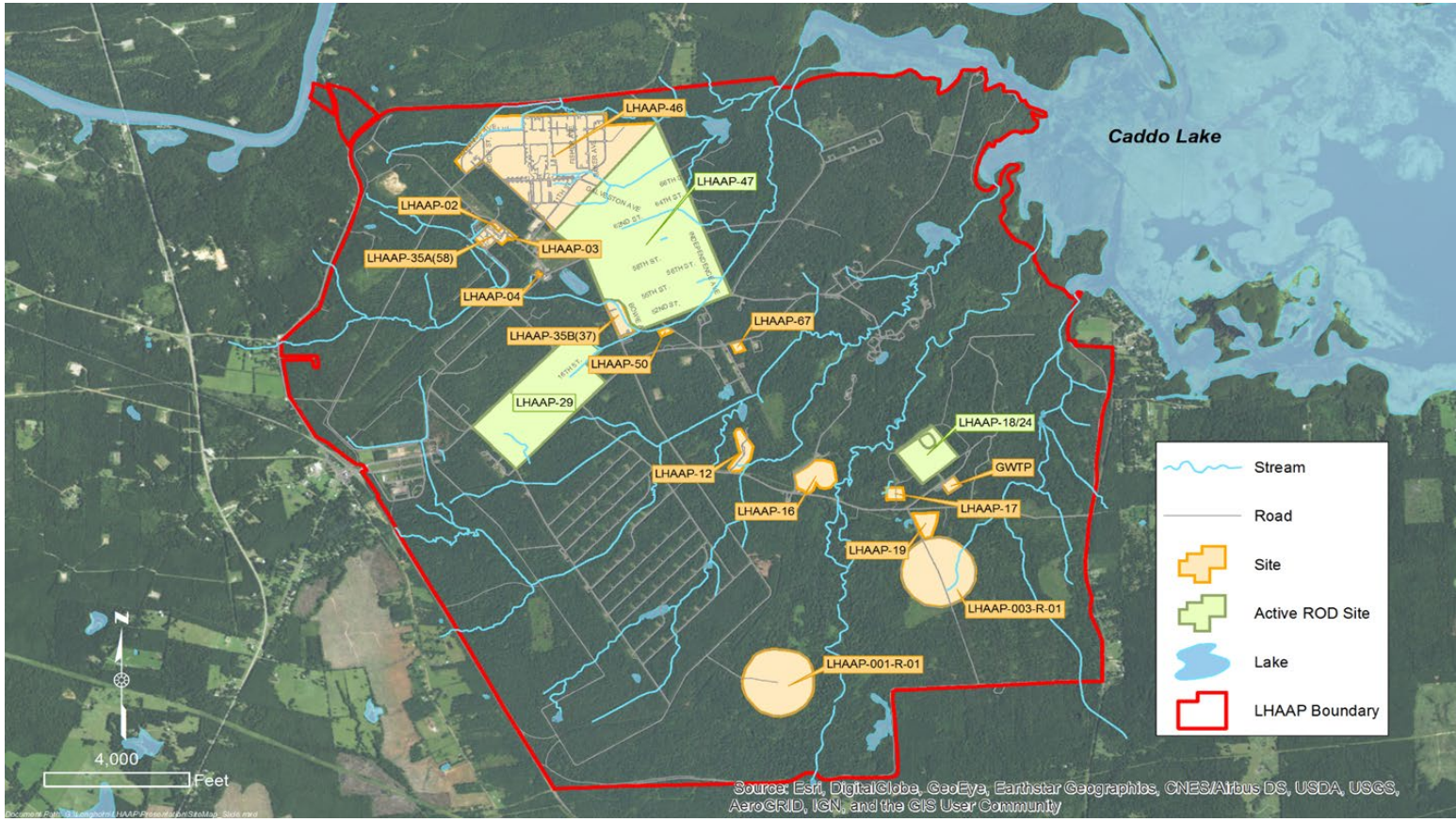
The Army Wants You to be Informed

- 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 the Longhorn Army Ammunition Plant (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
- There are three contractors working at LHAAP: Bhate/APTIM; HDR, Inc.; and MMG-TLI Joint Venture. The work conducted by these contractors will be presented in the following slides in that order.

LHAAP Environmental Contractors

- Bhate/APTIM: LHAAP-02, -03, -04, -12, -16, -37, -46, -50, -58, -67, -001-R-01, -001-R-03, and -18/24 (interim remedy)
- HDR: LHAAP-18/24, -29, and -47
- MMG-TLI Joint Venture: LHAAP-17

Bhate/APTIM


LHAAP-46
LHAAP-47
LHAAP-02
LHAAP-03
LHAAP-35A(58)
LHAAP-04
LHAAP-35B(37)
LHAAP-50
LHAAP-67
LHAAP-29
LHAAP-18/24
GWTP
LHAAP-12
LHAAP-16
LHAAP-17
LHAAP-19
LHAAP-003-R-01
LHAAP-001-R-01
Caddo Lake
Stream
Road
Site
Active ROD Site
Lake
LHAAP Boundary
N
4,000
Feet
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Documents in Process

Site	Document
LHAAP-04	Year 2 Annual Remedial Action Operation (RA[O]) Report – In Process
LHAAP-12	2021 Annual RA(O) Report – under Regulatory review
LHAAP-16	Year 2 Annual RA(O) Report – In Process
LHAAP-67	Year 8 Annual RA(O) Report – under Regulatory review
GWTP	Quarterly Evaluation Report: Fourth Quarter (October – December 2021) – with Regulators Quarterly Evaluation Report: First Quarter (January – March 2022) – In Process

Completed Field Work Since Last RAB Meeting

Site	Activity
LHAAP-04	Year 3 Semi-Annual Sampling Event #1 (February)
LHAAP-12	Year 2 Quarter 4 Performance Monitoring (January)
LHAAP-37	Year 5 Semi-Annual Sampling Event #2 (May)
LHAAP-46	Year 8 Annual RA(O) Sampling (February)
LHAAP-50	Year 2 Quarter 3 Performance Monitoring (January)
Surface Water	First Quarter (March) Second Quarter (April)

3 Month Look Ahead – Documents by Bhate Team

Site	Document
LHAAP-04	Draft RA(O) Report to Regulators
LHAAP-12	Draft Final 2021 RA(O) Report to Regulators
LHAAP-16	Draft RA(O) Report to Regulators
LHAAP-58	Draft Year 8 RA(O) Report to regulators
LHAAP-67	Draft Final Year 8 RA(O) Report to Regulators
GWTP and LHAAP-18/24	Quarterly Evaluation Report First Quarter (January – March 2022) to Regulators

3 Month Look Ahead - Field Work by Bhate Team

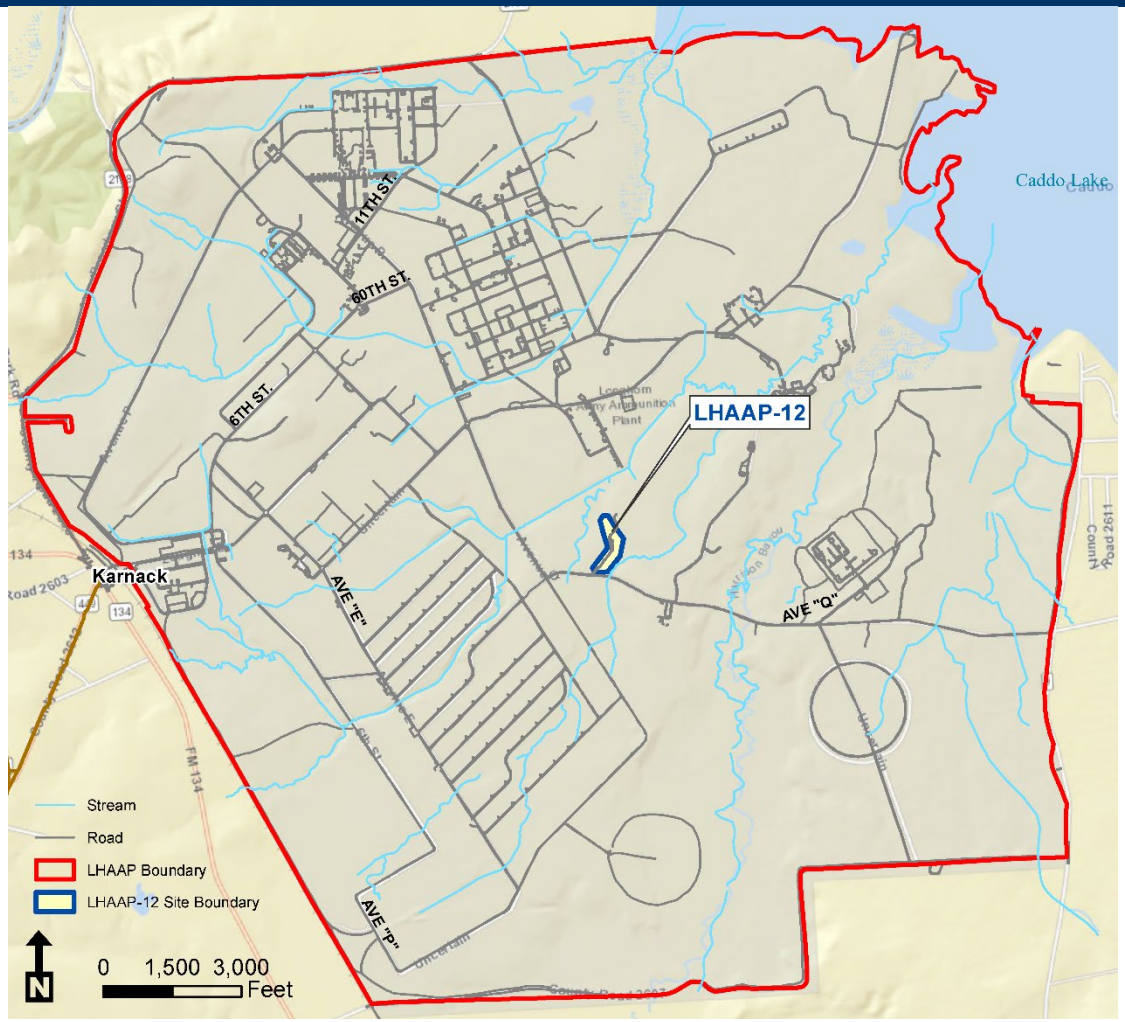
Site	Activity
LHAAP-04	Year 3 Semi-Annual Sampling Event #2 (August)
LHAAP-16	Year 3 Semi-Annual Sampling Event #1 (June)
LHAAP-58	Year 8 Semi-Annual Sampling Event #1 (June)
LHAAP-18/24	Semi-annual Groundwater Sampling (July)
Surface Water	Third Quarter Sampling (July-September depending on rainfall)

LHAAP-12 Remedy Update

- Landfill 12 (LHAAP-12) established in 1963
- Approximately 7 acres in size
- Disposal of cafeteria waste, chemical waste, petroleum contaminated soil, and asbestos from 1978 to 1994
- Cap placed on landfill in 1998 as interim remedy
- Final remedy is monitored natural attenuation and land use controls
- Primary constituents of concern in groundwater are chlorinated solvents

Restoration Advisory Board Meeting

LHAAP-12 Site Location



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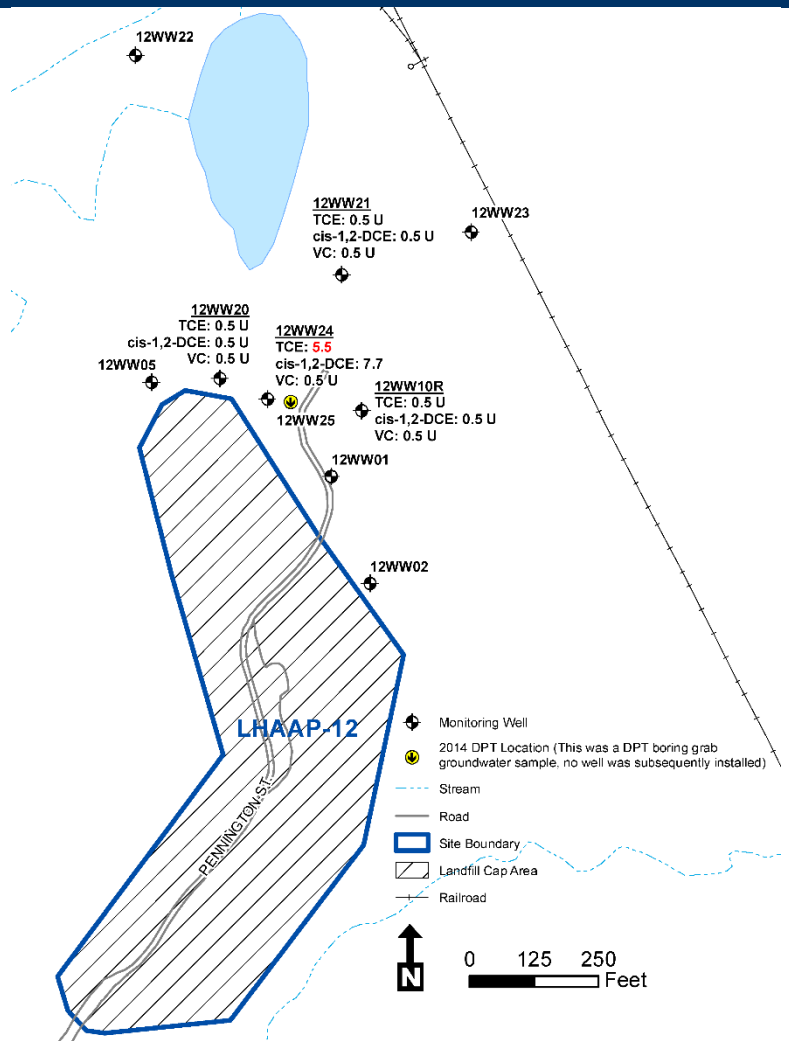
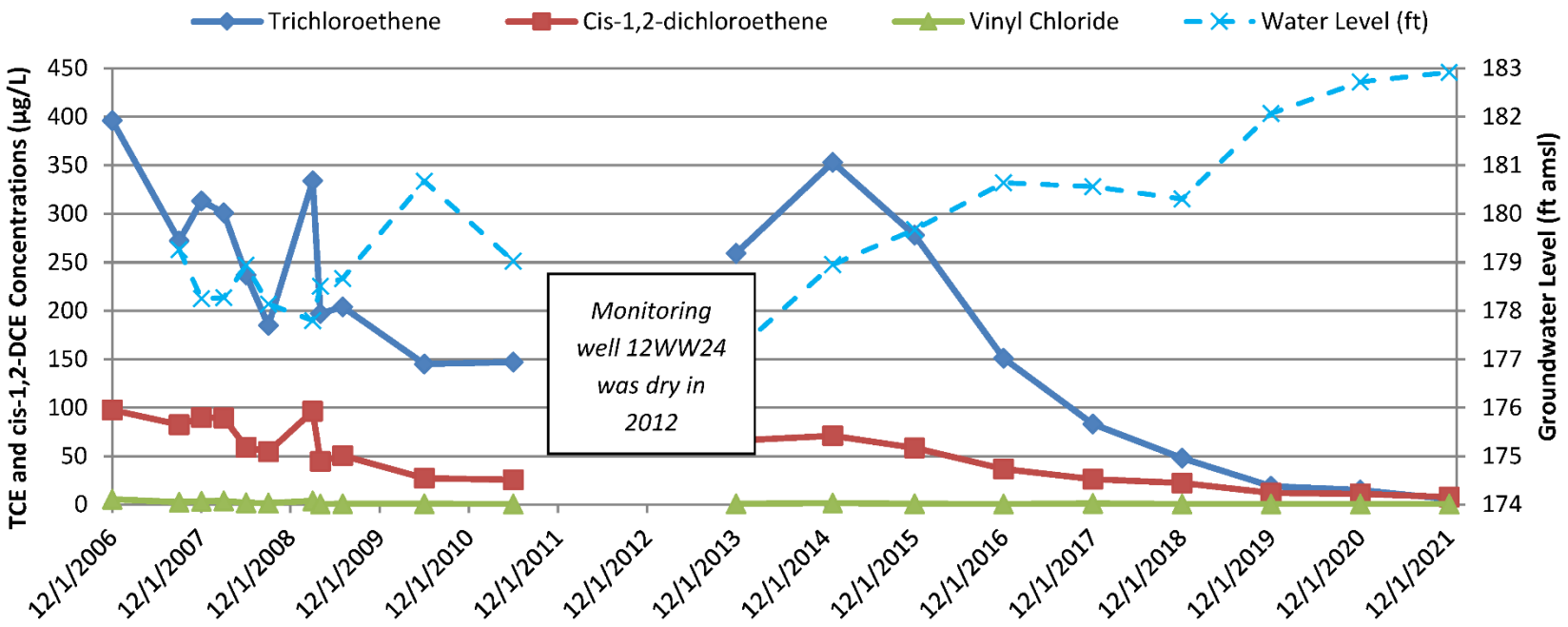
LHAAP-12 December 2021 Groundwater Concentrations



LHAAP-12 Monitoring Well 12WW24 Trend Chart

TCE, cis-1,2-DCE, and VC Concentrations in 12WW24
LHAAP-12



Notes:
Maximum Contaminant Levels: TCE = 5 µg/L; cis-1,2-DCE = 70 µg/L; VC = 2 µg/L
µg/L - micrograms per liter
DCE - dichloroethene
ft amsl - feet above mean sea level
TCE - trichloroethene
VC - vinyl chloride

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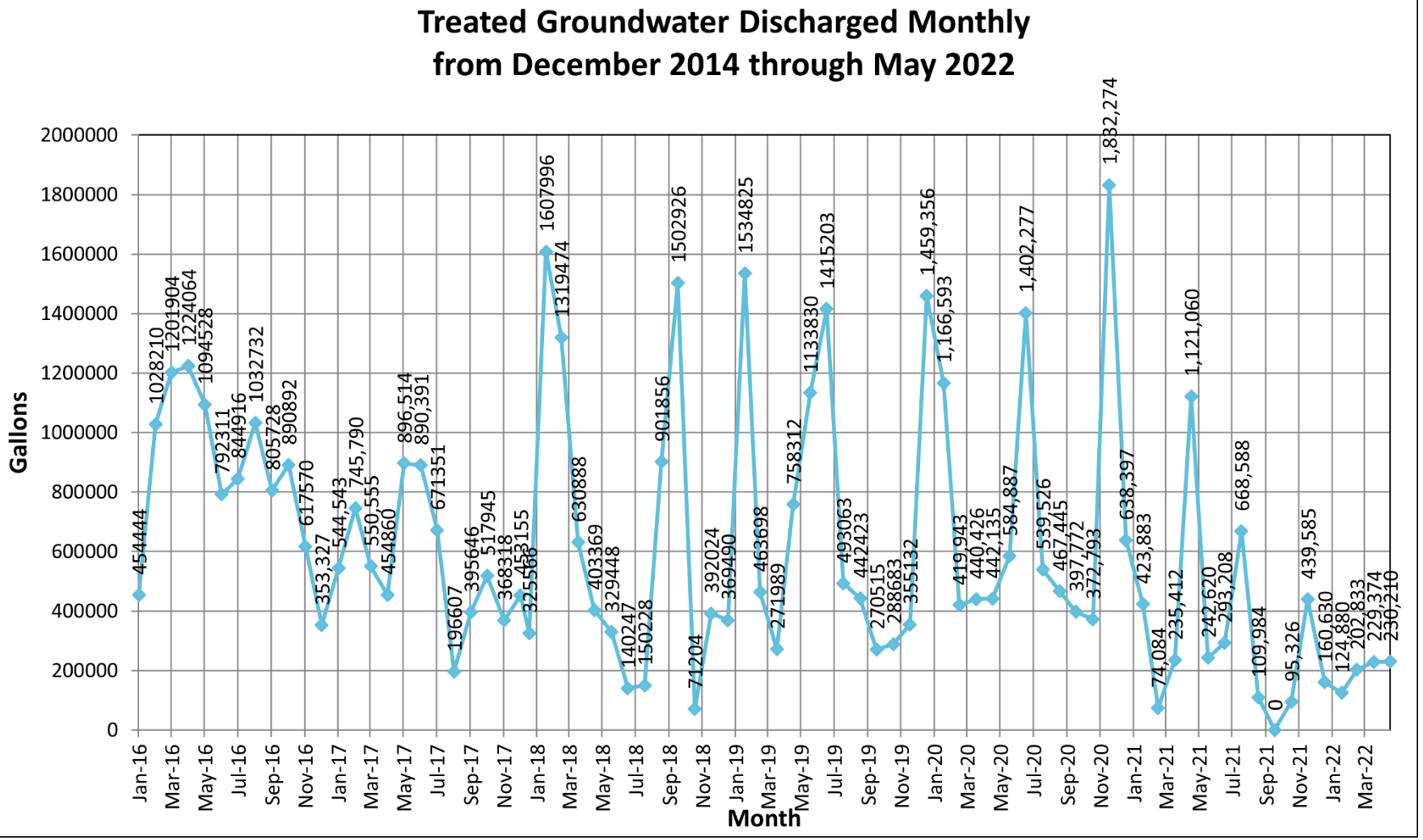
GWTP Update



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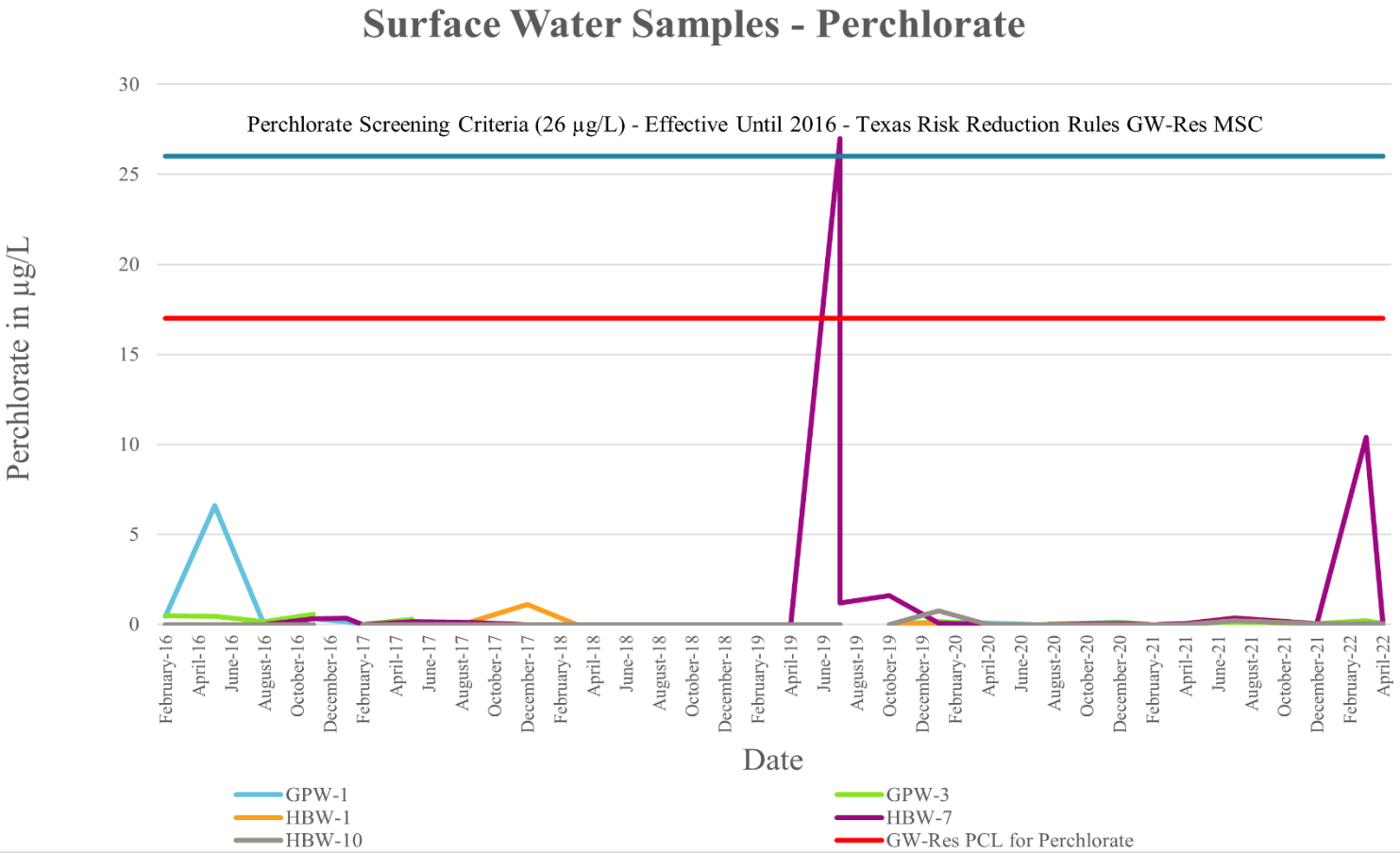
Surface Water Sample Results



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.

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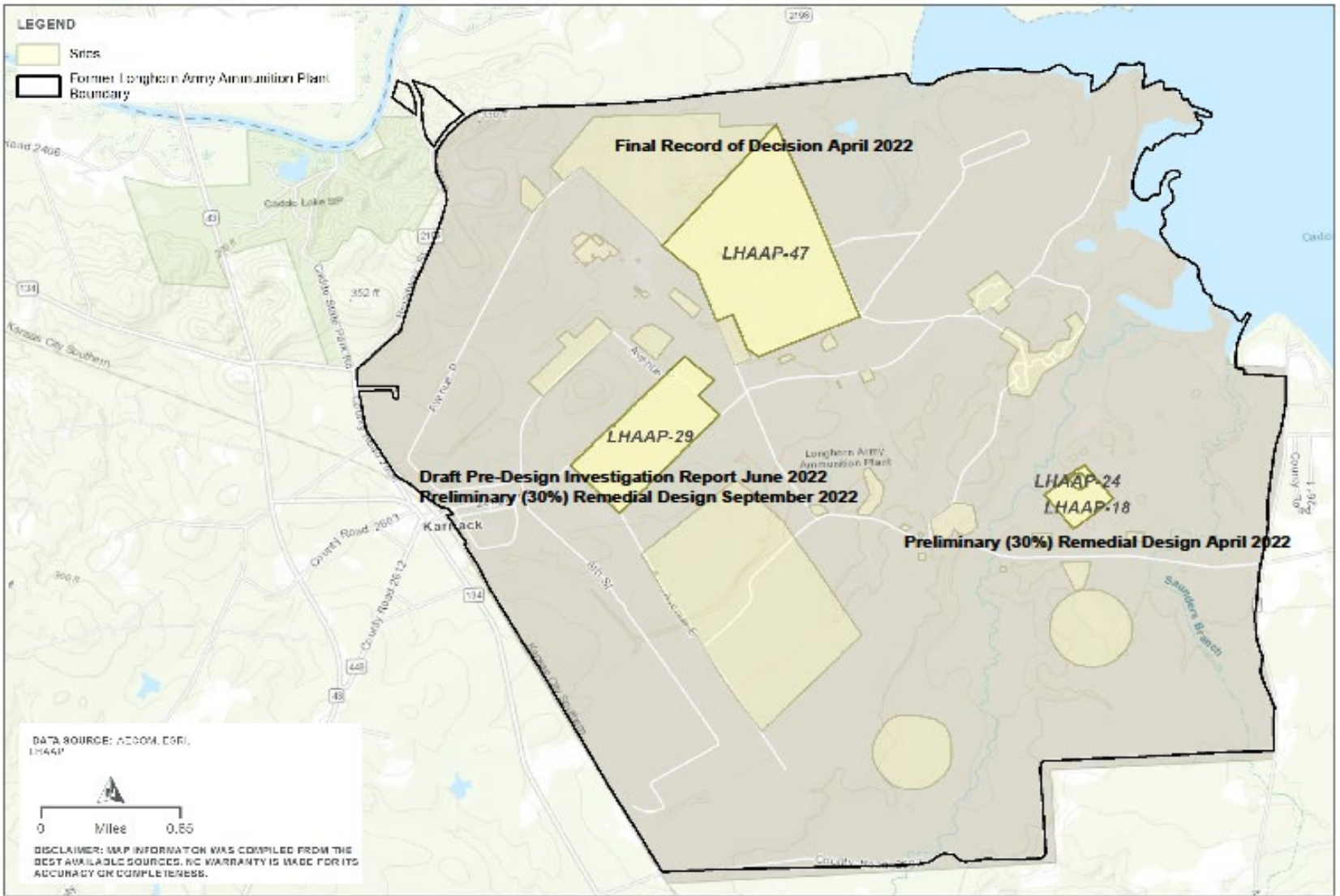
HDR Update



Restoration Advisory Board Meeting

LHAAP-18/24, -29, and -47 Document Status, HDR

Site	Document
LHAAP-18/24	Preliminary (30%) Remedial Design, April 2022
LHAAP-29	Draft Pre-Design Investigation (PDI) Report, June 2022
LHAAP-29	Preliminary (30%) Remedial Design, September 2022
LHAAP-47	April 2022 Final Record of Decision (ROD) Routed for Signatures and Concurrence

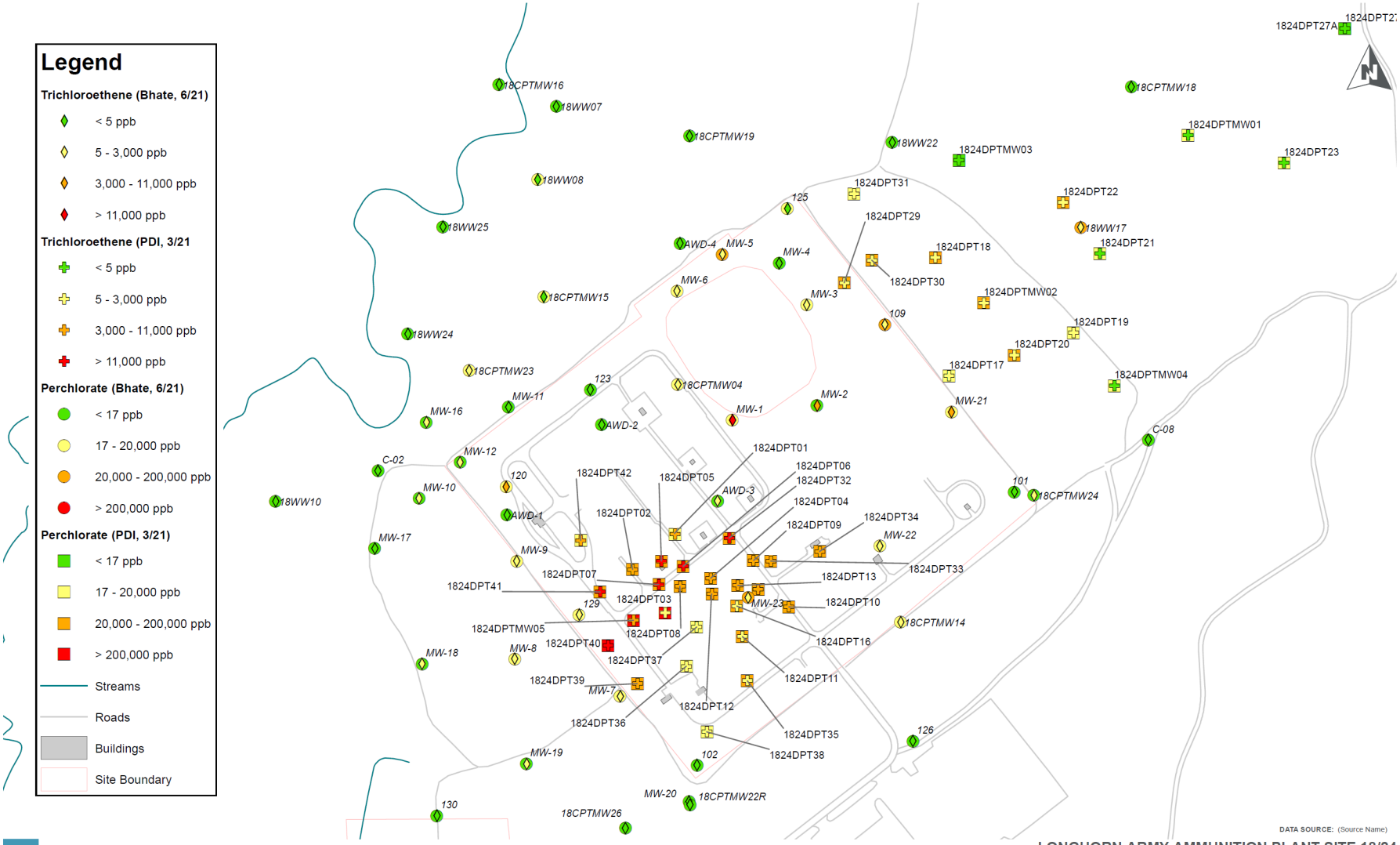
Restoration Advisory Board Meeting

LHAAP-18/24 Preliminary (30%) Remedial Design

- **Selected Remedy**
  - Enhancement of the existing groundwater extraction and treatment system
  - Enhanced In-Situ Bioremediation (EISB) in Shallow Zone and Wilcox Formation groundwater both inside and outside the containment area
  - Thermal treatment to remove Dense Non-aqueous Phase Liquid (DNAPL)
  - Maintenance of the existing cap over the Unlined Evaporative Pond (UEP)
  - Unsaturated soil excavation and off-site disposal
  - Land Use Controls (LUCs), Monitored Natural Attenuation (MNA), and long-term monitoring (LTM)
- **Design Approach**
- **Phase I:**
  - Soil Excavation
  - In-Situ Thermal Desorption (ISTD) to remove DNAPL
  - EISB in groundwater source areas (shallow)
- **Phase II:**
  - EISB within ISTD areas
  - Continuation of EISB in groundwater source areas (shallow)
  - EISB Barriers in the Shallow & Wilcox Formation
- **Phase III:**
  - Excavation of soil beneath the UEP, if required

Restoration Advisory Board Meeting

LHAAP-18/24 Preliminary (30%) Remedial Design
Summary of Shallow Groundwater Perchlorate and TCE Results



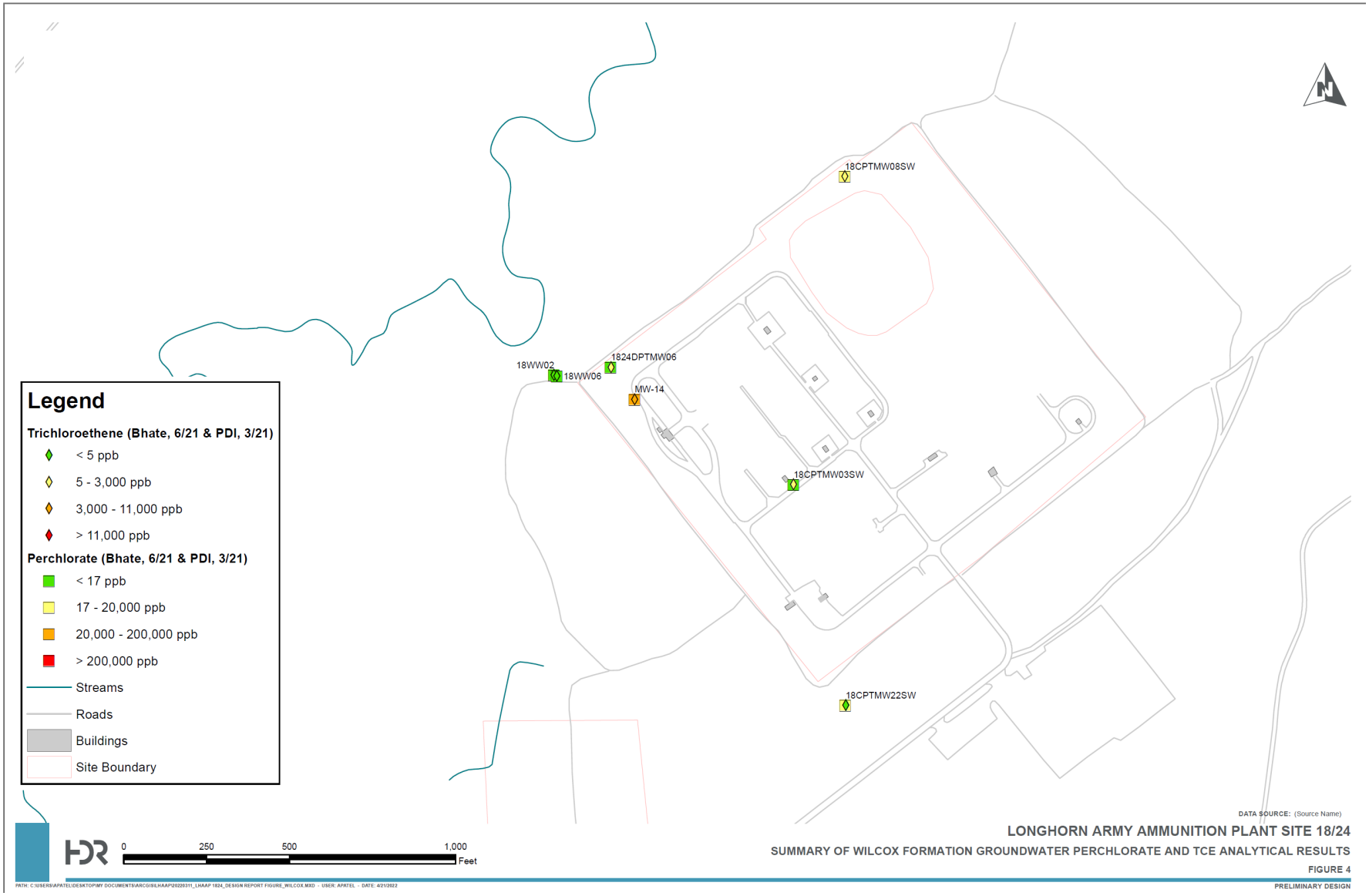
LONGHORN ARMY AMMUNITION PLANT SITE 18/24

SUMMARY OF SHALLOW ZONE GROUNDWATER PERCHLORATE AND TCE ANALYTICAL RESULTS

FIGURE 3

Restoration Advisory Board Meeting

LHAAP-18/24 Preliminary (30%) Remedial Design
Summary of Wilcox Groundwater Perchlorate and TCE Results



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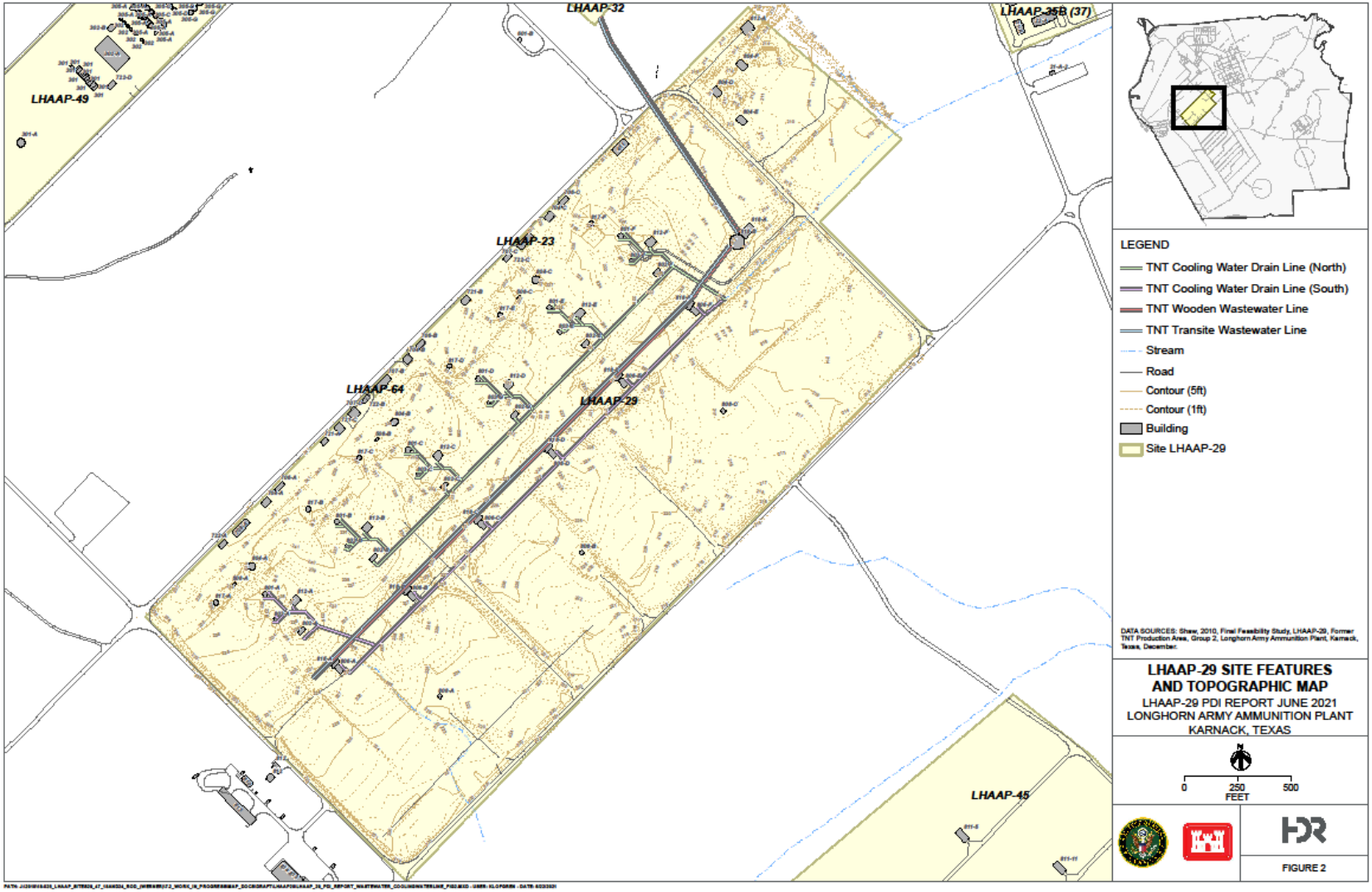
Site Map LHAAP-29



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Status of LHAAP-29 PDI Investigation

- ✓ Second round of PDI field investigation performed March 2022 to fill data gaps identified during initial investigation.
- ✓ Areas of investigation:
  - Former Building 812-F
  - Cooling Water Outfall/Ditch
  - North trinitrotoluene (TNT) Cooling Water Line
  - South TNT Cooling Water Line
  - Transite TNT Wastewater Line
- ✓ Total of 87 boreholes advanced across LHAAP-29, collection of 98 soil samples for explosives testing.
- ✓ Data currently in review.

Restoration Advisory Board Meeting

LHAAP-29 Preliminary (30%) Remedial Design

- ✓ LHAAP-29 Preliminary (30%) Remedial Design
- ✓ Selected Remedy:
  - Contaminated soil removal with off-site disposal.
  - Flushing, inspection, and plugging of the transite TNT wastewater line and the vitrified clay cooling water lines.
  - Excavation and off-site disposal of the wooden TNT wastewater line and impacted soil.
  - In situ thermal desorption (ISTD) treatment of the intermediate groundwater zone dense non aqueous phase liquid (DNAPL) plume
  - MNA in the shallow groundwater zone plumes and for the intermediate groundwater plume following ISTD.
  - Land use controls (LUCs) for soil and groundwater.

Restoration Advisory Board Meeting

LHAAP-47 Record of Decision

- ✓ **Final LHAAP-47 ROD signed by Army and submitted for EPA signature and TCEQ concurrence on the 1st of June.**
- ✓ **Next Actions:**
  - **LUC Notification and Submittal of Transmittal Letters**
  - **Placement in Administrative Record**

Restoration Advisory Board Meeting

LHAAP-47 Record of Decision Responsiveness Summary

- Responsiveness Summary serves three purposes:
  - Provides the U. S. Army, USEPA, and TCEQ with information about community concerns with the preferred alternative;
  - Shows how the public's comments were considered in the decision-making process for selection of the remedy; and
  - Provides a formal mechanism for the U.S. Army to respond to public comments.
- Information provided through public meetings, Administrative Record, and announcements published in the Marshall News Messenger including:
  - Transcripts of the public meetings on January 9, 2013 and July 21, 2021;
  - Presentation slides from the January 9, 2013 and July 21, 2021 public meetings; and
  - Public questions/comments from the public comment period and U.S. Army responses.

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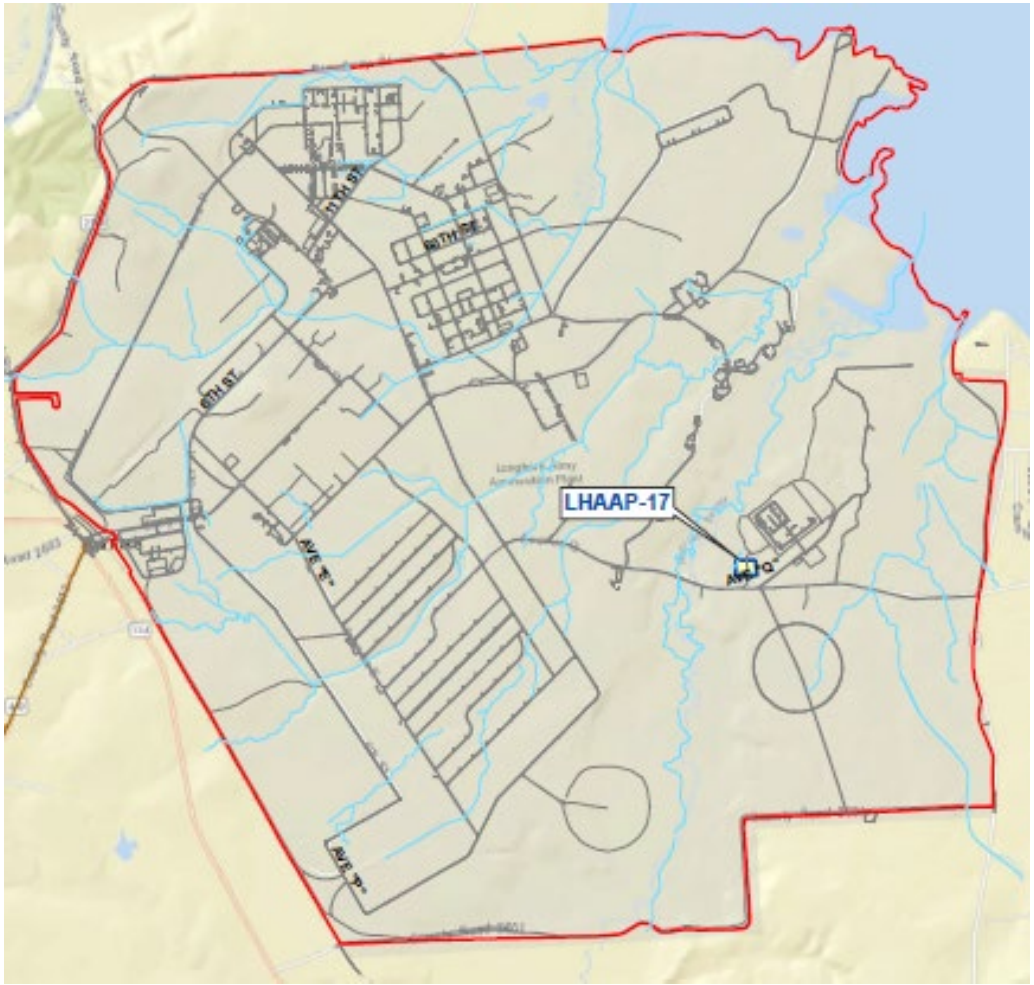
MMG-TLI Joint Venture Update



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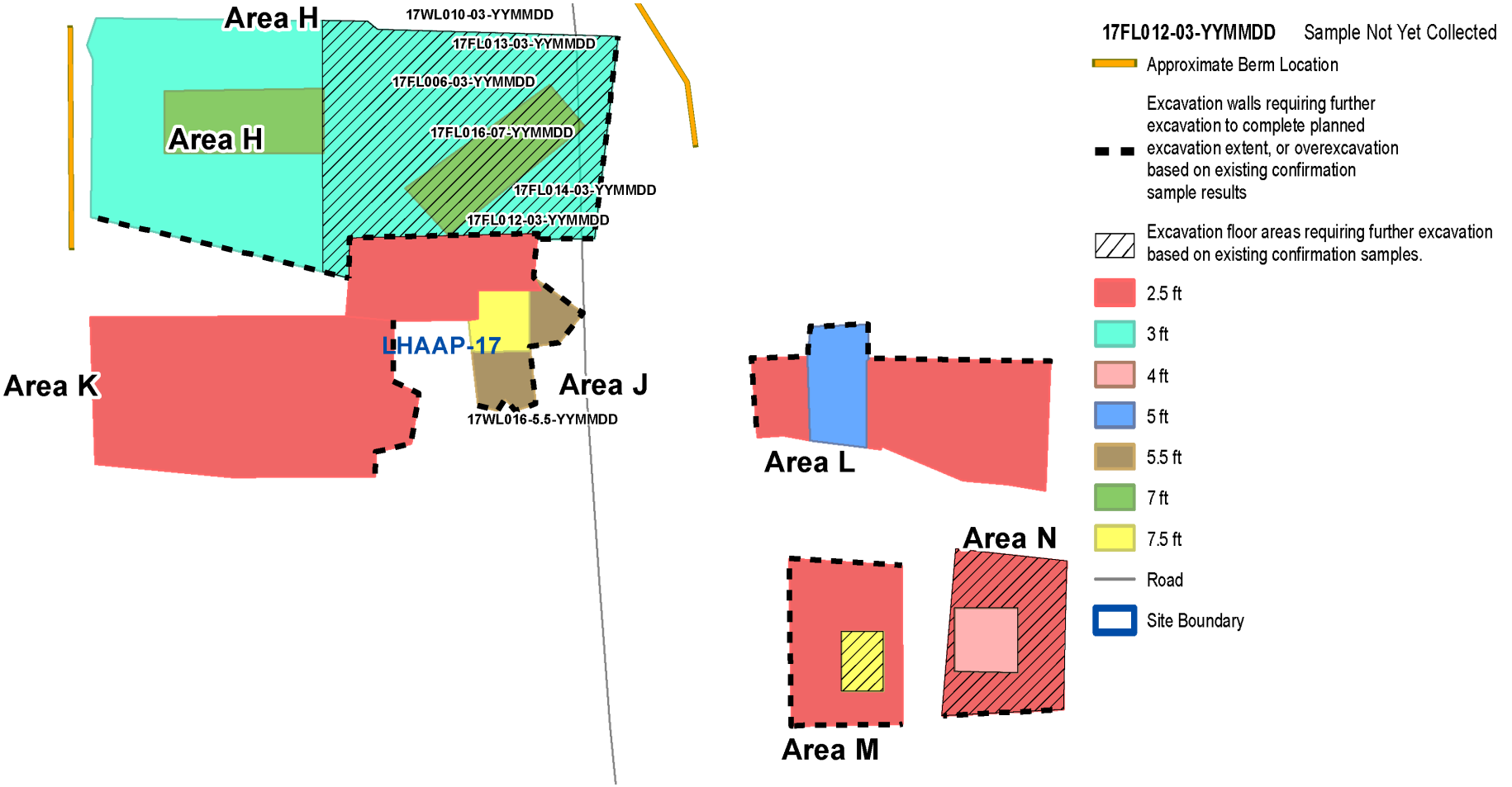
LHAAP-17 Time Critical Removal Action



Restoration Advisory Board Meeting

LHAAP-17 Time Critical Removal Action

- **Major Work Elements:**
  - Civil survey, Vegetation removal & Erosion control repair
  - Robotic sifting of all pre-existing soil piles to remove potential MEC
  - Confirmation sampling and analysis to confirm excavation extents
  - Backfilling in areas previously determined clean
  - Off-site disposal of sifted soils
  - Complete excavations and receive regulatory approval to backfill all areas
  - Complete geophysical survey across the site to identify subsurface anomalies (i.e., targets) that may be MEC
  - Dig/remove identified targets
  - Install the groundwater extraction system components & Site restoration

Restoration Advisory Board Meeting

LHAAP-17 Time Critical Removal Action

- **Status:**
  - All soil piles have been sifted and disposed of off-site
  - Over 4,048 cubic yards of soil have been excavated and approximately 2,500 cubic yards of this material have been sifted and transported for off-site disposal
  - All excavations with validated confirmation samples are complete and backfilled
  - 96 MEC items have been disposed of through on-site detonations
  - An estimated 41,000 pounds of Non-Munitions Related debris and 18,700 pounds of Munitions Debris have been inspected and disposed of off-site for recycling/disposal
  - Groundwater extraction system installation ongoing
  - Fieldwork is anticipated to be completed in June 2022

Next RAB Meeting Schedule & Closing Remarks

- Schedule Next RAB Meeting
  - November 15, 2022
- Other Issues/Remarks
- Thank you for coming

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	<1.0 U	-	4	<4.0 U	<4.0 U	<4.0 U	-	2.65	<4.0 U	<4.0 U	<4.0 U
GPW-3	<1.0 U	<4.0 U	17	8	<4.0 U	<4.0 U	-	2.28	<4.0 U	<4.0 U	<4.0 U
HBW-1	-	<8.0 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	<0.2 U	<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	<0.2 U	<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	-	<0.2 U	<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	<0.5 U	<0.5 U	<0.22 U	16	<4 U	NS	<1.2 U	3.7	1.3 J	<0.6 U
GPW-3	21.9	9.42	1.1	<0.22 U	8.9	<4 U	NS	<0.6 U	2.8	1.8 J	<0.6 U
HBW-1	<0.5 U	<0.5 U	<0.5 U	<0.22 U	<0.55 U	<4 U	NS	<1.5 U	<0.275 U	1.5 U	<0.6 U
HBW-7	<0.5 U	<0.5 U	<0.5 U	<0.22 U	<0.55 U	<4 U	24	<1.2 U	<0.275 U	1.5 U	<0.6 U
HBW-10	<0.5 U	<0.5 U	<0.5 U	<0.22 U	<0.55 U	<4 U	NS	<1.5 U	<0.275 U	1.2 U	<0.6 U

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	<0.1 U	8.7	Dry	Dry	1.76	0.163 J	Dry	NS	1.65	0.735
GPW-3	Dry	0.199 J	0.673	Dry	Dry	1.31	0.261	Dry	NS	1.74	0.754
HBW-1	Dry	<0.1 U	<0.2 U	Dry	Dry	<0.1 U	<0.1 U	Dry	NS	<0.2 U	<0.2 U
HBW-7	Dry	<0.1 U	<0.2 U	Dry	Dry	0.171 J	<0.1 U	Dry	NS	<0.2 U	<0.2 U
HBW-10	Dry	<0.1 U	<0.2 U	Dry	Dry	<0.1 U	<0.1 U	Dry	NS	<0.2 U	<0.2 U

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	0.156 J	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	<0.2 U	<0.2 U	Dry	<0.2 U	Dry	Dry	<0.2 U	<0.2 U	Dry	Dry	<0.2 U
HBW-7	<0.2 U	<0.2 U	Dry	0.201 J	Dry	Dry	<0.2 U	0.124 J	Dry	Dry	<0.2 U
HBW-10	<0.2 U	<0.2 U	Dry	<0.2 U	Dry	Dry	<0.2 U	<0.2 U	Dry	Dry	<0.2 U

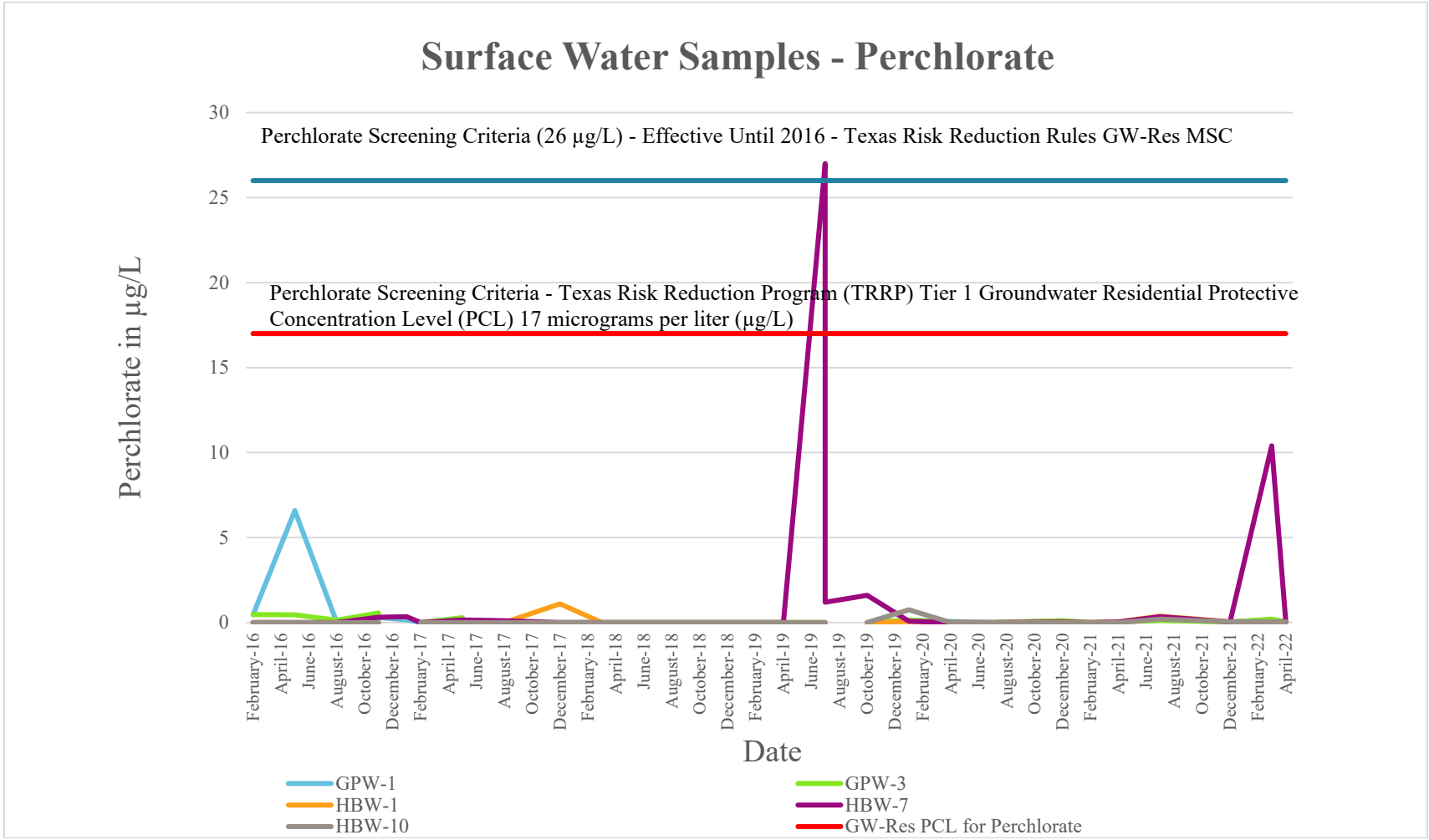
Quarter	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd
Creek Sample ID	Feb 2016	May 2016	Aug 2016	Nov 2016	Feb 2017	May 2017	Aug 2017	Dec 2017	Mar 2018	Jun 2018	Aug 2018
GPW-1	0.447	6.59	<0.2 U	0.301 J	<1 U	0.263	Dry	<2.0 U	<2.0 U	Dry	<2.0 U
GPW-3	0.474	0.457	0.141	0.563	<1 U	0.274	Dry	<2.0 U	<2.0 U	Dry	<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	<2.0 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	<2.0 U	<2.0 U	Dry	<2.0 U
HBW-10	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<1 U	<0.2 U	0.111 J	<2.0 U	<2.0 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	4th	1st
Creek Sample ID	**Oct 2018**	**Jan 2019**	**Apr 2019**	**Jul 2019**	**Oct 2019**	**Jan 2020**	**Apr 2020**	**Jul 2020**	**Dec 2020**	**Feb 2021**
GPW-1	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U	0.163	0.0589 J	<0.05 U	0.110	<0.05 U
GPW-3	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U	0.156	0.0662 J	0.0326 J	0.108	<0.05 U
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	0.0374 J	<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	0.0265 J	<0.05 U
HBW-10	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U	0.0782 J	<0.05 U	<0.05 U	<0.05 U	<0.05 U

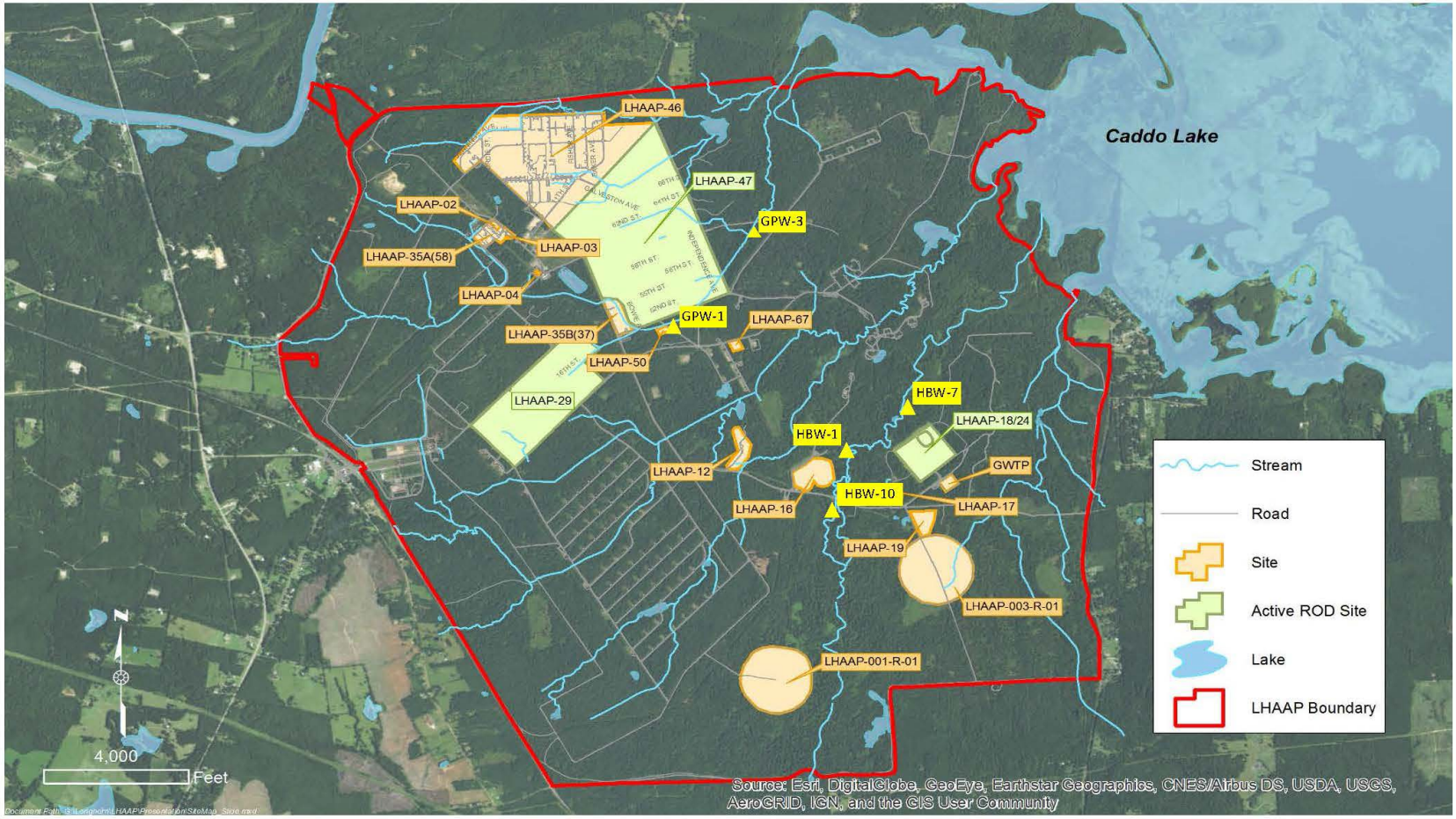
Quarter	2nd	3rd	4th	1st	2nd
Creek Sample ID	**Apr 2021**	**Jul 2021**	**Dec 2021**	**Mar 2022**	**Apr 2022**
GPW-1	0.0268 J	0.154	0.0394 J	0.162	0.042 J
GPW-3	0.0321 J	0.122	0.0344 J	0.198	0.0384 J
HBW-1	0.0410 J	0.369	0.050 U	0.052 J	<0.05 U
HBW-7	0.0373 J	0.348	0.0359 J	10.4	0.0493 J
HBW-10	<0.05 U	0.207	0.0464 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 (30 July 2019) with a detection of 1.2 J µg/L.

Longhorn Army Ammuntion Plant Creek Sampling Locations



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

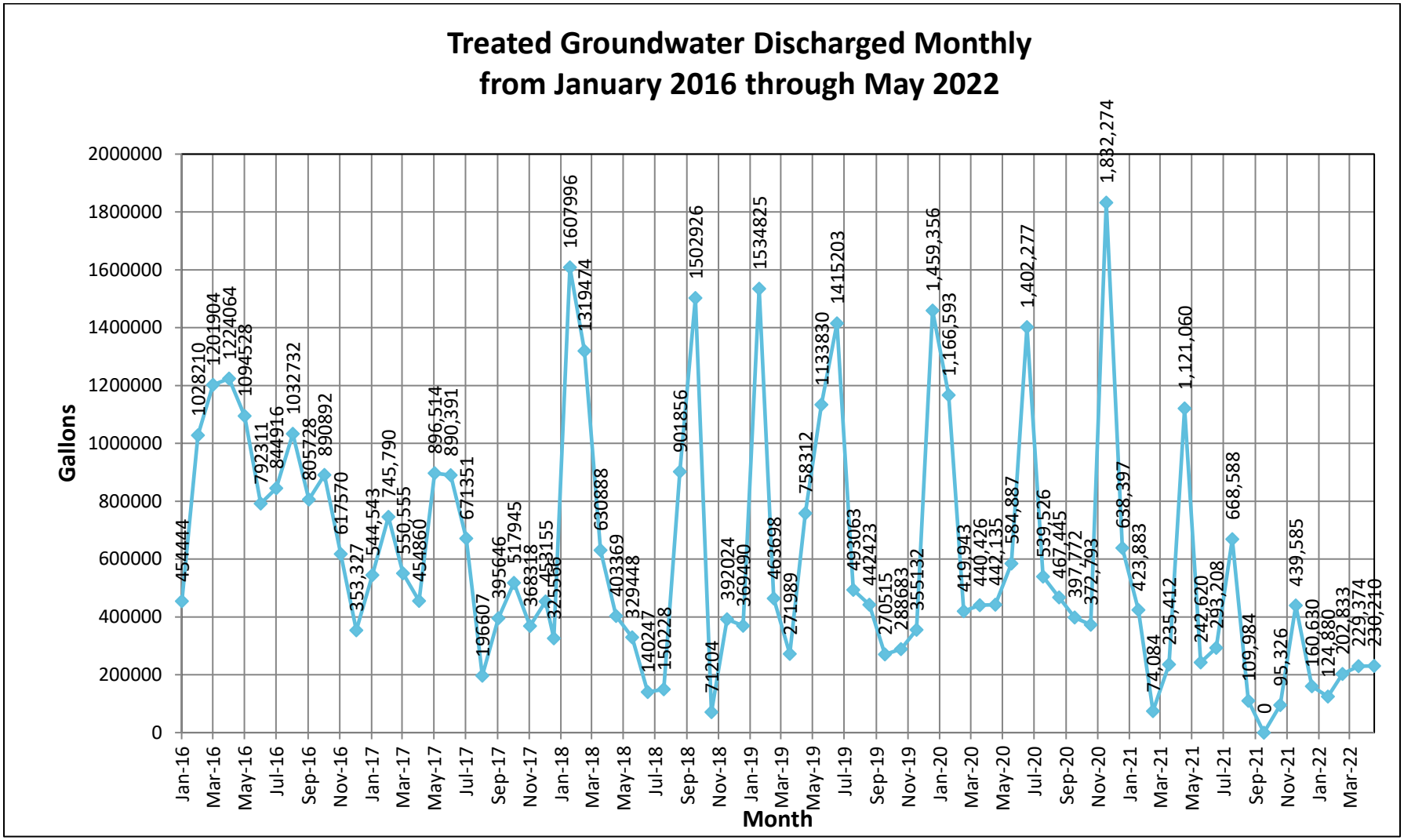
Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul - 19	Aug-19	Sep-19
1,502,926	71,204	392,024	369,490	1,534,825	463,698	271,989	758,312	1,133,830	1,415,203	493,063	442,423

Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20
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

Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21
397,772	372,793	1,832,274	638,397	423,883	74,084	235,412	1,121,060	242,620	293,208	668,588	109,984

Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22
0	95,326	439,585	322,130	124,880	202,833	229,374	230,210

*Indicates Estimate


Treated Groundwater Discharged Monthly
from January 2016 through May 2022
Gallons
Month
2000000
1800000
1600000
1400000
1200000
1000000
800000
600000
400000
200000
0
Jan-16
Mar-16
May-16
Jul-16
Sep-16
Nov-16
Jan-17
Mar-17
May-17
Jul-17
Sep-17
Nov-17
Jan-18
Mar-18
May-18
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Jul-19
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Nov-19
Jan-20
Mar-20
May-20
Jul-20
Sep-20
Nov-20
Jan-21
Mar-21
May-21
Jul-21
Sep-21
Nov-21
Jan-22
Mar-22
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
325568
1607996
1319474
630888
403369
329448
140247
150228
901856
1502926
71204
392024
369490
463698
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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
397,772
372,793
1,832,274
638,397
423,883
74,084
235,412
1,121,060
242,620
293,208
668,588
109,984
0
95,326
439,585
160,630
124,880
202,833
229,374
230,210

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
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

Month	Total Combined to Harrison Bayou	LHAAP-18/24 Sprinklers	GWTP To INF Pond	INF Pond to Harrison Bayou	Contract Hauled Off-Site
Dec-19	318,248	0	36,884	0	0
Jan-20	1,459,396	0	0	1,115,183	0
Feb-20	1,166,593	0	0	741,954	0
Mar-20	419,943	0	0	0	0
Apr-20	440,426	0	0	0	0
May-20	442,135	0	0	0	0
June-20	584,887	0	0	0	0
July-20	1,402,277	0	0	984,393	0
Aug-20	216,197	0	323,359	0	0
Sep-20	0	0	467,445	0	0
Oct-20	0	0	397,772	0	0
Nov-20	0	0	372,793	0	0
Dec-20	1,832,274	0	60,199	1,571,432	0
Jan-21	638,397	0	0	383,318	0
Feb-21	423,883	0	0	259,875	0
Mar-21	74,084	0	0	74,084	0
Apr-21	235,412	0	0	0	0
May-21	1,121,060	0	0	900,000	0
Jun-21	242,620	0	0	0	0
Jul-21	293,208	0	0	243,675	0
Aug-21	668,588	0	0	561,527	0
Sep-21	0	0	109,984	0	0
Oct-21	0	0	0	0	0
Nov-21	0	0	95,326	0	0
Dec-21	271,500	0	168,085	271,500	0
Jan-22	161,500	0	160,630	161,500	0
Feb-22	0	0	124,880	0	0
Mar-22	190,898	0	11,935	0	0
Apr-22	229,374	0	0	0	0
May-22	230,210	0	0	0	0