

**APPENDIX D –  
GROUNDWATER EXTRACTION  
EVALUATION**



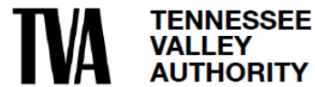
**Appendix D - Groundwater  
Extraction Evaluation Technical  
Memorandum**

TDEC Commissioner's Order:  
Corrective Action / Risk Assessment Plan  
Allen Fossil Plant  
Memphis, Tennessee

October 30, 2025

Prepared for:

Tennessee Valley Authority  
Chattanooga, Tennessee



Prepared by:

Stantec Consulting Services Inc.  
Lexington, Kentucky

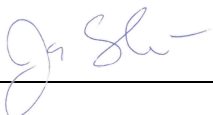
## APPENDIX D - GROUNDWATER EXTRACTION EVALUATION TECHNICAL MEMORANDUM

### Revision Record

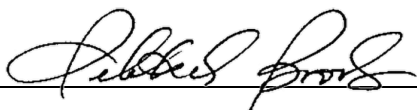
<b>Revision</b>	<b>Description</b>	<b>Date</b>
0	DRAFT submittal to TDEC	August 9, 2024
1	Addresses November 15, 2024 TDEC Review Comments and Issued for TDEC	February 13, 2025
2	Date Revised for Reissuance. No other changes made to this Appendix. Final submittal for TDEC approval.	October 30, 2025

## Sign-off Sheet

This document entitled Appendix D - Groundwater Extraction Evaluation Technical Memorandum was prepared by Stantec Consulting Services Inc. ("Stantec") for the account of Tennessee Valley Authority (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document

Prepared by 

**Justin Soberaski, Hydrogeologist**

Reviewed by 

**Rebekah Brooks, PG, Senior Principal Hydrogeologist**

Approved by 

**Carole Farr, Senior Principal Geologist**

## Table of Contents

<b>ABBREVIATIONS</b> .....	<b>III</b>
<b>1.0 INTRODUCTION AND OBJECTIVES</b> .....	<b>1</b>
<b>2.0 APPROACH AND BACKGROUND</b> .....	<b>2</b>
2.1 APPROACH .....	2
2.2 BACKGROUND.....	2
2.2.1 Site Description.....	2
2.2.2 Hydrogeologic Framework .....	3
<b>3.0 DESIGN DATA</b> .....	<b>5</b>
3.1 GROUNDWATER QUALITY EVALUATION .....	5
3.2 SURFACE WATER STAGE .....	6
3.3 GROUNDWATER LEVEL MONITORING.....	6
3.4 TARGET AREA SUBSURFACE LITHOLOGY.....	6
3.5 AQUIFER PROPERTIES.....	6
3.6 GROUNDWATER FLOW MODEL.....	7
3.7 ACCESS .....	8
<b>4.0 GROUNDWATER EXTRACTION METHODS</b> .....	<b>9</b>
<b>5.0 CONCEPTUAL DESIGN</b> .....	<b>11</b>
5.1 LOCATION AND EXTENT.....	11
5.2 EXTRACTION WELL SPACING.....	12
5.3 DESIGN FLOW RATE.....	12
5.4 EXTRACTION WELL DESIGN .....	12
5.5 PUMP SELECTION, ELECTRICAL, AND CONTROLS .....	13
5.6 GROUNDWATER TREATMENT .....	13
5.7 PERFORMANCE MONITORING SYSTEM.....	13
<b>6.0 REFERENCES</b> .....	<b>14</b>

### LIST OF TABLES

Table 1	Summary of Hydraulic Conductivity Results from Slug Test Data
Table 2	Comparative Evaluation of Advantages and Limitations of Hydraulic Control Technologies



## APPENDIX D - GROUNDWATER EXTRACTION EVALUATION TECHNICAL MEMORANDUM

### LIST OF EXHIBITS

- Exhibit 1 ALF Plant Overview
- Exhibit 2 ALF Plant Features and Adjacent Land Use
- Exhibit 3 Groundwater Monitoring Locations
- Exhibit 4 Cross Section Highlighting Intermediate Well Screen
- Exhibit 5a Groundwater Elevation Contour Map, Intermediate Wells (September 2020)
- Exhibit 5b Groundwater Elevation Contour Map, Intermediate Wells (February 2023)
- Exhibit 6 Groundwater Findings Near ALF Plant WADA CCR Unit
- Exhibit 7 Surface Water Stage Hydrograph and Daily Precipitation Data
- Exhibit 8a Groundwater / Surface Water Elevation Comparison – ALF-207
- Exhibit 8b Groundwater / Surface Water Elevation Comparison – ALF-207A
- Exhibit 8c Groundwater / Surface Water Elevation Comparison – ALF-207B
- Exhibit 8d Groundwater / Surface Water Elevation Comparison – ALF-208
- Exhibit 8e Groundwater / Surface Water Elevation Comparison – ALF-208A
- Exhibit 8f Groundwater / Surface Water Elevation Comparison – ALF-208B
- Exhibit 9 Conceptual Groundwater Extraction System Layout



## APPENDIX D - GROUNDWATER EXTRACTION EVALUATION TECHNICAL MEMORANDUM

Abbreviations  
October 30, 2025

### ABBREVIATIONS

ALF Plant	Allen Fossil Plant
amsl	Above mean sea level
bgs	Below ground surface
CARA	Corrective Action/Risk Assessment
CBR	Closure by Removal
CCR	Coal Combustion Residual
CCR Rule	Title 40, Code of Federal Regulations, Part 257, Subpart D
cm/sec	Centimeter per second
EADA	East Ash Disposal Area
EAR	Environmental Assessment Report
gpm	Gallons per minute
GWPS	Groundwater protection standards
IRA	Interim Response Action
Stantec	Stantec Consulting Services Inc.
TDEC	Tennessee Department of Environment and Conservation
TDEC Order	Commissioner's Order No. OGC15-0177
TM	Technical Memorandum
TVA	Tennessee Valley Authority
WADA	West Ash Disposal Area



## APPENDIX D - GROUNDWATER EXTRACTION EVALUATION TECHNICAL MEMORANDUM

Introduction and Objectives  
October 30, 2025

### 1.0 INTRODUCTION AND OBJECTIVES

Stantec Consulting Services Inc. (Stantec), on behalf of the Tennessee Valley Authority (TVA), has prepared this Groundwater Extraction Technical Memorandum (TM) to present a conceptual design for groundwater extraction at the Allen Fossil Plant (ALF Plant) located in Memphis, Tennessee. An overview of the ALF Plant including the relevant plant and adjacent features is presented on Exhibit 1.

This TM is included as an appendix in this Corrective Action/Risk Assessment (CARA) Plan to support evaluation of potential corrective measures for groundwater near the former West Ash Disposal Area (WADA) coal combustion residuals (CCR) unit at the ALF Plant following the completion of CCR material removal and other closure activities. The information provided in this TM is in support of fulfilling the requirements for the Tennessee Department of Environment and Conservation (TDEC) issued Commissioner's Order No. OGC15-0177 (TDEC Order) to TVA (TDEC 2015). The TDEC Order sets forth a "process for the investigation, assessment, and remediation of unacceptable risks" at the TVA's coal ash disposal sites in Tennessee. This CARA Plan has been prepared pursuant to the TDEC Order to provide the basis for and specify the potential actions TVA may take at the former WADA to address groundwater quality conditions.

CCR material located within the interior portion and surrounding dike at the former WADA was excavated and removed between November 2021 and November 2023. These closure activities effectively removed nearly 500,000 cubic yards of CCR material.

Since completion of the CCR material removal and closure activities, and as of May 2024, two rounds of groundwater sampling have been completed. Therefore, the available data primarily reflect groundwater quality prior to the removal of the CCR material. Given the limited post-CCR material removal groundwater dataset available to support the evaluation of MNA, TVA has identified groundwater extraction and treatment as a potential corrective action for the former WADA at this time. However, TVA will continue to perform routine groundwater monitoring at the former WADA and plans to collect additional geochemical data over the next two to three years. If future data and evaluations confirm that MNA will be effective, then TVA will coordinate with and obtain approval from TDEC to implement MNA as the corrective action. Otherwise, implementation of the identified corrective action of groundwater extraction and treatment will continue in accordance with the schedule provided in this CARA Plan.

The objective of groundwater extraction is to hydraulically control groundwater in the Alluvial aquifer in areas near the former WADA exhibiting concentrations of CCR constituents at statistically significant concentrations above a groundwater protection standard (GWPS). The GWPS established for the CARA Plan have been based on regulatory requirements and are presented in Table 1-1 of the CARA Plan. Groundwater extraction may be considered as a corrective measure along the north boundary of the WADA.

This TM presents the rationale and conceptual design of a groundwater extraction system for the former WADA. A description of the methodology for hydraulic control of groundwater in the Alluvial aquifer at the former WADA is the focus of this TM.



## APPENDIX D - GROUNDWATER EXTRACTION EVALUATION TECHNICAL MEMORANDUM

Approach and Background  
October 30, 2025

### 2.0 APPROACH AND BACKGROUND

#### 2.1 APPROACH

This TM presents:

- A summary of the relevant site setting details and hydrogeologic framework used to inform the design of the CCR unit-specific groundwater extraction system (Section 2.2).
- A summary of the design data used to support the evaluation of a groundwater extraction method considered for CCR unit-specific hydraulic groundwater control (Section 3.0).
- A review and relative comparison of the groundwater extraction methods available to provide hydraulic groundwater control (Section 4.0).
- The CCR unit-specific groundwater extraction method and conceptual design for the CCR unit in which groundwater extraction may be considered as a corrective action (Section 5.0).

The discussed extraction method “or equivalent” is a consideration, and no endorsement of a specific technology method is expressed or implied by Stantec.

#### 2.2 BACKGROUND

##### 2.2.1 Site Description

The ALF Plant is located on the south shore of McKellar Lake, east of the Mississippi River, and adjacent to a United States Army Corps of Engineers (USACE) flood-control levee (Exhibit 1).

The ALF Plant has two CCR units: the East Ash Disposal Area (EADA) and the WADA. The ALF Plant including the two CCR units and other plant and adjacent features are presented on Exhibit 2. Information pertaining to the CCR unit history and land use can be found in Chapter 2.1 of the *Environmental Assessment Report* (EAR) (TVA 2024).

The WADA and EADA were historically used for the management of CCR material. In accordance with a Record of Decision issued by TDEC Division of Remediation, closure-by-removal (CBR) was selected for each of these units. Although the WADA was not part of the TDEC Division of Remediation program for the EADA, to meet TVA’s long-standing commitment to environmental stewardship and to facilitate future site re-use of the area, TVA opted to remove the CCR material from the WADA concurrently while addressing the EADA. CCR material removal and other CBR activities were completed for the WADA in the fall of 2023. For the EADA, CBR activities are expected to be completed by 2029. In addition to CBR activities, an interim response action (IRA) was implemented to hydraulically control and remove arsenic in the Alluvial aquifer in areas north and south of the EADA during CBR. The IRA consists of a groundwater extraction and treatment system that was installed in 2021 and began operating in the fall of 2023. Groundwater is extracted from wells at the EADA, treated using an on-site treatment system, and discharged under permit to the local sanitary sewer (i.e., to the local publicly-owned treatment works, or



## APPENDIX D - GROUNDWATER EXTRACTION EVALUATION TECHNICAL MEMORANDUM

Approach and Background  
October 30, 2025

POTW). More information about the groundwater extraction and treatment system located at the EADA can be found in the *Remedial Action Plan* (TVA 2021).

### 2.2.1.1 WADA

The former WADA is approximately 39.5-acres and located west of the former power plant. The USACE levee forms the south dike of the former WADA (Exhibit 1). The former WADA does not appear to have been subdivided during its construction or periods of operation for the purpose of CCR management.

The WADA ceased receiving CCR material in 1992 and is therefore exempt from the United States Environmental Protection Agency CCR Rule (Title 40, Code of Federal Regulations, Part 257, Subpart D), although it continued to be a National Pollutant Discharge Elimination System regulated unit. In late 2021, TVA began removing CCR material from the WADA and finished CCR material removal in November 2023. The excavation was backfilled with native soils from nearby permitted borrow sites. The majority of the former WADA was then covered with turf grass.

### 2.2.2 Hydrogeologic Framework

The hydrogeologic framework has been developed from the history of investigation and monitoring at the ALF Plant, including recent environmental investigations performed to address TDEC Order requirements. An abbreviated summary of the hydrogeologic framework to support the groundwater extraction system evaluation is provided below. A more robust summary of the hydrogeologic framework is provided in the EAR (TVA 2024).

#### 2.2.2.1 GEOLOGY AND HYDROGEOLOGY

Various subsurface investigations have been conducted at the ALF Plant to characterize the geology, monitor groundwater elevations and quality, estimate aquifer properties, and develop potential corrective measures for groundwater impacts. Based upon these investigations, the following general description of the hydrogeology was developed.

Site-specific geologic mapping indicates that the WADA is directly underlain by fill material and alluvial deposits of the Mississippi River Valley Alluvial aquifer (Alluvial aquifer). These alluvial deposits are composed of silty sand with intervals of silts and clay in the upper portion of the unit and sand with gravel in the lower portion. The alluvial deposits are underlain by the fine-grained Cook Mountain Formation (hydrogeologically referred to as the upper Claiborne confining unit). The Cook Mountain Formation is underlain by the Memphis Sand, which is characterized by predominantly very fine- to very coarse-grained sand with lenses of fine-grained material (Stantec 2024) and is referred to hydrogeologically as the Memphis aquifer.

The saturated alluvial deposits of the Alluvial aquifer, directly underlying the WADA and above the upper Claiborne confining unit, are considered to be the uppermost aquifer that is under unconfined conditions and approximately 110 feet thick. The upper Claiborne confining unit is a low-hydraulic conductivity clayey unit that is at least 100 feet thick beneath the Alluvial aquifer and is underlain by the Memphis aquifer. Based on drilling programs conducted in the area, the top of the Memphis aquifer is



## APPENDIX D - GROUNDWATER EXTRACTION EVALUATION TECHNICAL MEMORANDUM

Approach and Background  
October 30, 2025

approximately 190 to 255 feet below ground surface (bgs). Discussion of the uppermost aquifer in the vicinity of the WADA is provided in Chapter 6.3 of the EAR (TVA 2024).

During the TDEC Order Environmental Investigation, groundwater and surface water elevations were measured prior to groundwater sampling events to estimate horizontal and vertical gradients and groundwater flow patterns in nested wells screened at shallow, intermediate, and deep depth intervals of the Alluvial aquifer. The groundwater monitoring locations at the ALF Plant are shown on Exhibit 3. Exhibit 4 provides a cross-section showing the positions of the three screened intervals in Alluvial aquifer monitoring wells along the north side of the WADA: monitoring wells ALF-207, ALF-208, and ALF-209 are screened in the shallow portion; monitoring wells ALF-207B, ALF-208B, and ALF-209B are screened in the intermediate portion; and monitoring wells ALF-207A, ALF-208A, and ALF-209A are screened in the deep portion. Exhibit 5a and Exhibit 5b provide representative groundwater elevation contour maps for the intermediate portion of the Alluvial aquifer during September 2020 and February 2023, respectively. (Intermediate well screens are highlighted in yellow on Exhibit 4.) Groundwater elevations and contours for the shallow and deep monitoring wells are provided in the EAR (TVA 2024) and are generally consistent with elevations and flow direction of the intermediate portion of the Alluvial aquifer.

Because wells ALF-209 and ALF-209A are susceptible to seasonal flooding from McKellar Lake and are frequently underwater, TVA and TDEC agreed to install a group of three new wells located farther inland from McKellar Lake once the CCR removal activities had been completed at the WADA. The new wells (ALF-209R, ALF-209B, and ALF-209AR) were installed in early 2024 and are located near the northern boundary of the former WADA along the alignment of the former north dike (Exhibit 3). TVA anticipates closing the pre-existing wells (ALF-209 and ALF209A) in early 2025 after the new wells have been sampled for one year.

The groundwater levels in the Alluvial aquifer at the WADA vary depending on the stage of adjacent McKellar Lake, which are influenced by fluctuations in the Mississippi River. Exhibit 5a shows that groundwater flow direction was generally northward toward McKellar Lake during relatively low lake levels. Exhibit 5b shows that groundwater flow direction reversed during relatively low lake levels and was southward from the lake toward the WADA.

Groundwater flow direction changes occur in response to short term increases in surface water stage as a result of precipitation or runoff events. The zone in which the reversal is expected to occur is related to hydraulic gradient, groundwater flow direction, aquifer properties (hydraulic diffusivity), and aquifer conditions. The zone in which the reversals occur varies and extends, at times, beneath the entire WADA and potentially beyond, as observed in the monitoring well network (TVA 2024).

### 2.2.2.2 SURFACE WATER AND HYDROGEOLOGIC BOUNDARIES

The most prominent regional surface water drainage feature in proximity to the ALF Plant is McKellar Lake. The McKellar Lake level and flow direction is influenced by fluctuations in the Mississippi River. Horizontal groundwater flow direction based on data collected from the Alluvial aquifer wells vary based on surface water level fluctuations in McKellar Lake.



## APPENDIX D - GROUNDWATER EXTRACTION EVALUATION TECHNICAL MEMORANDUM

Design Data  
October 30, 2025

### 3.0 DESIGN DATA

The following sections present a summary of site investigation data used to select and develop the conceptual design of the groundwater hydraulic control system.

#### 3.1 GROUNDWATER QUALITY EVALUATION

This section provides a discussion of the analytical results for groundwater samples collected from monitoring wells at the former WADA. The groundwater quality evaluation is based on a statistical evaluation of constituents listed Table 1-1 of the CARA Plan. Additional detailed discussion of the results of the statistical evaluation is provided in Appendix I of the EAR (TVA 2024).

Most CCR constituent concentrations in onsite groundwater were below GWPS. Groundwater results with statistically significant levels above the GWPS near the former WADA are summarized below:

- Statistically significant levels of molybdenum above the GWPS were observed in shallow (ALF-208), intermediate (ALF-207B and ALF-208B), and deep (ALF-207A) monitoring wells in the Alluvial aquifer along the northern side of the former WADA. The GWPS for molybdenum is 100 ug/L.
- A statistically significant level of arsenic above the GWPS was observed in one intermediate well (ALF-219A) south of the former WADA. The GWPS for arsenic is 10 ug/L. Arsenic concentrations in this well generally ranged from 34 to 86 µg/L. The arsenic concentrations in the shallow and deep wells south of the former WADA were less than the GWPS. Since September 2019, arsenic concentrations in well ALF-219B appeared generally stable.
- Though historical arsenic concentrations were below the GWPS at shallow well ALF-208 north of the former WADA, the arsenic results for well ALF-208 were identified at a statistically significant level above the GWPS in the EAR. This statistically significant level was caused by just two sample results from 2023 where the results may have been influenced by concurrent closure activities.

As of May 2024, the arsenic concentration at well ALF-220B had been consistently above the GWPS, but there were not enough sample results to identify arsenic above the GWPS at a statistically significant level. The statistical evaluation of arsenic data at ALF-220B will be completed after a sufficient number of sampling results are available. If that future evaluation indicates arsenic is present at a statistically significant level above the GWPS, then ALF-220B would be included for corrective action to address arsenic in a future revision of this CARA Plan.

Exhibit 6 shows a summary of groundwater findings near the former WADA including wells that have statistically significant concentrations above the GWPS.



## APPENDIX D - GROUNDWATER EXTRACTION EVALUATION TECHNICAL MEMORANDUM

Design Data  
October 30, 2025

### 3.2 SURFACE WATER STAGE

A gauge on McKellar Lake provides high-temporal-resolution surface water stage elevation data adjacent to the ALF Plant. Exhibit 5a and Exhibit 5b show the gauge location at approximately 2,500 feet east of the former WADA on McKellar Lake at low and high lake levels, respectively. Surface water elevation measurements (McKellar Lake) are continuously recorded as part of TVA's plant operations. Exhibit 7 depicts the recorded surface water elevation measurements between January 2019 and January 2024 and daily precipitation data. The stage recorded at the McKellar Lake gauge ranges between approximately 180 and 220 feet above mean sea level (amsl). The seasonal fluctuations in the Mississippi River levels are apparent in the McKellar Lake surface water data, with the lowest stages generally occurring in the late fall and the highest stages generally occurring in the late spring. Shorter-term responses to precipitation events are also evident in the fluctuating stage data.

### 3.3 GROUNDWATER LEVEL MONITORING

Groundwater level measurements collected between September 2019 and August 2023 at monitoring wells ALF-207, ALF-207A, ALF-207B, ALF-208, ALF-208A, and ALF-208B are shown on Exhibit 8a, Exhibit 8b, Exhibit 8c, Exhibit 8d, Exhibit 8e, and Exhibit 8f, respectively. These wells are located along the north side of the former WADA in the shallow, intermediate, and deep portions of the Alluvial aquifer. Groundwater elevations in the Alluvial aquifer at the former WADA are influenced by the stages of the adjacent McKellar Lake and range between approximately 180 to 220 feet amsl. Exhibits 8a through Exhibit 8f show fluctuation patterns and groundwater elevations similar to the stage elevation of McKellar Lake.

### 3.4 TARGET AREA SUBSURFACE LITHOLOGY

Representative cross-sections through the former WADA (A-A' and B-B') are provided in the EAR (TVA, 2024). These cross sections show the underlying lithologic units, which include one north-south structural stratigraphic cross-section A-A' and one east-west structural stratigraphic cross section B-B'.

In the area targeted for groundwater extraction (north former WADA boundary near monitoring wells ALF-207, ALF-207A, ALF-207B, ALF-208, ALF-208A, and ALF-208B), the subsurface geology generally consists of alluvium deposits (i.e., the Alluvial aquifer) underlain by the upper Claiborne confining unit. The thickness of the alluvium deposits is estimated to be greater than 130 feet along the north former WADA boundary near the area targeted for groundwater extraction. The alluvial deposits are composed of silty sand with intervals of silts and clay in the upper portion of the unit and sand with gravel in the lower portion.

### 3.5 AQUIFER PROPERTIES

Slug testing was performed in the shallow, intermediate, and deep Alluvial aquifer monitoring wells near the former WADA. The estimated hydraulic conductivity results for shallow Alluvial aquifer monitoring wells ALF-218, ALF-219, ALF-220, ALF-221, and ALF-222, intermediate Alluvial aquifer monitoring wells ALF-207B, ALF-208B, ALF-210B, ALF-218B, ALF-219B, ALF-220B, ALF-221B, and ALF-222B, and



## APPENDIX D - GROUNDWATER EXTRACTION EVALUATION TECHNICAL MEMORANDUM

Design Data  
October 30, 2025

deep Alluvial aquifer monitoring wells ALF-218A, ALF-219A, ALF-220A, ALF-221A, and ALF-222A are shown in Table 1.

The estimated hydraulic conductivity results in the wells listed above ranged from  $1.23 \times 10^{-4}$  centimeters per second (cm/sec) to  $1.85 \times 10^{-1}$  cm/sec, with a geometric mean of  $1.90 \times 10^{-2}$  cm/sec. The estimated hydraulic conductivity results near the former WADA are provided in Appendix E.2 of the ALF Plant EAR and Table 1.

### 3.6 GROUNDWATER FLOW MODEL

Stantec constructed and calibrated a groundwater flow model (the “Model”) representing the hydrogeologic framework and providing a quantitative tool capable of evaluating groundwater flow conditions related to corrective action approaches for Alluvial aquifer groundwater at the ALF Plant. Details of the calibrated groundwater flow model are documented in the *Groundwater Flow and Solute Transport Modeling Report* (TVA 2020).

Simulations were performed to evaluate the conceptual operation of a groundwater extraction hydraulic control system positioned hydraulically downgradient (north) of the former WADA boundary. The groundwater extraction system would be designed to target areas requiring corrective action.

The following methods and assumptions were used to simulate a groundwater extraction hydraulic control system at the former WADA:

- The MODFLOW drain package was used to simulate groundwater extraction from the simulated well locations. This allowed for setting a targeted groundwater elevation and allowing the Model to calculate the simulated steady-state groundwater extraction rate.
- The simulated extraction wells were placed on the downgradient (north) boundary of the former WADA with extraction within the intermediate portion of the Alluvial aquifer, based on the targeted groundwater elevation.
- A combination of well spacing and groundwater drawdown elevations was utilized to develop a conceptual well layout that would provide hydraulic control while avoiding over-pumping and excessive drawdown. For the presented results, hydraulic control was simulated for the former WADA using seven extraction wells with approximately 240- to 270-foot spacing. It is anticipated that the detailed design will build upon the conceptual Model simulation and that detailed plans and specifications will be prepared. In some cases, additional delineation (installation of additional monitoring wells and subsequent monitoring) or additional pumping tests may be performed during the design phase to refine the design of the proposed extraction systems.
- Forward particle tracing was used to provide a conceptual-level demonstration of hydraulic control efficacy using groundwater extraction. Particles were placed in a line upgradient of the groundwater extraction wells and moved forward in time using the simulated steady-state groundwater flow field. The particle traces were examined to determine if the proposed well



## APPENDIX D - GROUNDWATER EXTRACTION EVALUATION TECHNICAL MEMORANDUM

Design Data  
October 30, 2025

layout and target pumping elevations would capture the particles and demonstrate hydraulic control for the targeted areas.

Exhibit 9 shows the targeted zone for groundwater extraction used to develop the conceptual well layout and the particle traces for this scenario. The particle traces show capture by the simulated extraction wells for the targeted area. The modeled steady-state groundwater extraction rate is approximately 10 gpm for the simulated well layout.

### 3.7 ACCESS

The location available for installation of a groundwater extraction system is not limited by topography between McKeller Lake and the former WADA. As a result, it is anticipated that accessibility for system installation will be similar to accessing monitoring wells ALF-207B and ALF-208B.



## APPENDIX D - GROUNDWATER EXTRACTION EVALUATION TECHNICAL MEMORANDUM

Groundwater Extraction Methods  
October 30, 2025

### 4.0 GROUNDWATER EXTRACTION METHODS

There are several methods available to support hydraulic control of groundwater. Groundwater extraction hydraulic control systems operate by removing groundwater through pumping, thereby creating a lower groundwater head that induces groundwater from the surrounding aquifer to flow towards the pumping location.

The three groundwater extraction methods considered for hydraulic control at the ALF Plant are: vertical extraction wells, horizontal extraction wells, and extraction trenches. These three groundwater extraction methods are described below:

- **Vertical Extraction Wells.** Vertically-oriented extraction well systems are the most common groundwater extraction method. Construction includes positioning the well screen within the uppermost aquifer along the downgradient portion of the CCR unit, which is targeted for hydraulic control. Vertical extraction wells would be installed at a well spacing interval that is appropriate for the site conditions to meet performance objectives. Vertical wells serving as a hydraulic control system are typically oriented in a line perpendicular to groundwater flow to optimize efficiency.
- **Horizontal Extraction Wells.** This method consists of using specialized horizontal directional drilling equipment capable of installing horizontally-oriented well screen. A single horizontal extraction well would be installed by advancing the well boring by entering the ground surface at an angle until the boring nears the base of the uppermost aquifer. The horizontal well boring would then run horizontally along the top a specified alignment targeted for hydraulic control. The boring would either be terminated at the end of the planned horizontal run (a “single-entry” horizontal well boring) or redirected upward at an angle to exit the ground surface at the top of the CCR unit (“double-entry” horizontal well boring). The horizontal extraction well would then be constructed in the boring, with the screened portion of the well positioned along the horizontal leg of the boring in the targeted hydraulic control zone.
- **Extraction Trench.** This method consists of excavating a trench and backfilling with gravel, perforated pipe, and geotextile fabric, as needed. A single trench would be installed by excavating to the top of confining unit at the base of the uppermost aquifer. Due to the relatively deep excavation, specialized equipment may be required. At the bottom of the trench, a geotextile fabric would be installed to reduce potential movement of fine sediment into the trench. A gravel bed containing a perforated pipe is placed on the geotextile; this pipe allows groundwater to flow along its length. Groundwater extraction sumps with installed pumps are placed in the low points of the confining unit surface so that water may be collected and pumped. The gravel bed would be extended vertically to extend to the top of the typical saturated zone within the uppermost aquifer. The trench would then be backfilled with a suitable low permeability fill to typical grade to reduce infiltration into the trench.

The identified advantages and potential limitations of each method are summarized in Table 2.



## **APPENDIX D - GROUNDWATER EXTRACTION EVALUATION TECHNICAL MEMORANDUM**

Groundwater Extraction Methods  
October 30, 2025

The preferred groundwater extraction method for the former WADA is the installation of vertical extraction wells based on the CCR unit-specific features: physical access, depth to groundwater, geometry of the uppermost aquifer, aquifer properties, and size of the targeted zone for groundwater control. Additional detail related to the conceptual design is presented in Section 5.



## APPENDIX D - GROUNDWATER EXTRACTION EVALUATION TECHNICAL MEMORANDUM

Conceptual Design  
October 30, 2025

### 5.0 CONCEPTUAL DESIGN

This chapter describes the conceptual design of a hydraulic control system which could be implemented, as appropriate, for the former WADA. The system described in this TM would be used to hydraulically control flow of groundwater in areas with statistically significant concentrations of CCR constituents above a GWPS.

It is anticipated that a final design would build upon the conceptual design, and that detailed plans and specifications would be prepared. These documents would be used to continue confirmation of constructability of the corrective action and to support permit applications and construction contract documents. In some cases, additional delineation (installation of additional monitoring wells), groundwater quality monitoring, or pumping tests may be performed during the design phase to refine the design of the conceptual extraction system.

#### 5.1 LOCATION AND EXTENT

For the purposes of this TM, the targeted hydraulic control zone is defined by the presence of CCR constituents with statistically significant concentrations above a GWPS. Therefore, based on the information provided in the CARA Plan Chapter 6, the targeted zone is defined by the results from monitoring wells ALF-207B (intermediate), ALF-207A (deep), ALF-208 (shallow), ALF-208B (intermediate), ALF-219B (intermediate), and ALF-220B (intermediate). Exhibit 9 shows the location of the conceptual groundwater extraction layout near the former WADA.

The lateral extents of the hydraulic control zone at the former WADA are delineated by monitoring wells ALF-209, ALF-209B, and ALF-209A within the shallow, intermediate, and deep Alluvial aquifer, respectively and the northeast corner of the CCR unit boundary and are included in the conceptual groundwater extraction layout between the former WADA and McKellar Lake. Based on no statistically significant concentrations above a GWPS at monitoring wells ALF-209 (shallow), ALF-209B (intermediate), and ALF-209A (deep) the targeted extraction zone endpoint to the west is approximately halfway between monitoring wells ALF-209B (intermediate) and ALF-208B (intermediate). To the east, the targeted extraction zone endpoint is approximately halfway to the eastern unit boundary.

The approximate location of the conceptual groundwater extraction system shown on Exhibit 9 follows the north perimeter of the former WADA and is estimated to be approximately 1,750 feet in total length. If the design and implementation of groundwater extraction as a corrective action advances, it is anticipated that the targeted hydraulic control zone would be refined.

Access for installation of the potential groundwater extraction system is available via existing plant roads or will be made available by the construction of new plant roads (if necessary). These roads will allow vehicles, drilling equipment, and personnel a means to travel to and from the work areas during the installation and operation of the extraction wells and conveyance lines.



## APPENDIX D - GROUNDWATER EXTRACTION EVALUATION TECHNICAL MEMORANDUM

Conceptual Design  
October 30, 2025

### 5.2 EXTRACTION WELL SPACING

Groundwater flow model simulations were performed to evaluate the conceptual operation of a groundwater extraction hydraulic control system positioned hydraulically downgradient of the target zone portion of the former WADA. Simulation of a combination of extraction configurations and pumping rates were utilized in combination with particle tracking to develop a conceptual extraction layout that would provide hydraulic control while avoiding over-pumping and excessive drawdown. Based on the modeling results, hydraulic control was simulated using approximately a 240- to 270-foot variable spacing between the former WADA and McKellar Lake.

Forward particle tracking was used to demonstrate groundwater capture efficacy. Particles were placed in a line upgradient of the groundwater extraction wells and moved forward in time using the simulated steady-state groundwater flow field. The particle traces were examined to determine if the conceptual well layout and target pumping would capture the particles and demonstrate hydraulic control for the targeted areas.

Exhibit 9 shows the conceptual groundwater extraction layout used in the modeled scenario. The simulated groundwater elevation contours within the targeted extraction interval are presented and the particle traces show capture by the conceptual groundwater extraction hydraulic control system for the targeted area.

### 5.3 DESIGN FLOW RATE

Groundwater flow model simulations were also used to support development of a conceptual design flow rate. The modeled steady-state total groundwater extraction rate is simulated to be approximately 10 gallons per minute (gpm) for the simulated conceptual extraction layout. Changes in the total flow rate might occur over time, depending on groundwater elevations, McKellar Lake stage, and groundwater extraction and treatment system operational objectives.

### 5.4 EXTRACTION WELL DESIGN

Each vertical extraction well would be designed to meet the needs of the pump equipment size, depth setting, and planned operation schedule for the well. The extraction wells would be expected to have the following design elements:

- A four-inch diameter, flush threaded, stainless-steel screen and riser to a depth of approximately 55 to 75 feet bgs (i.e., the intermediate depth)
- An approximately 10-foot screen to accommodate the variability in seasonal fluctuations of groundwater and maximize production
- A well sump, if feasible, to facilitate a deeper pump placement, maximize the available drawdown within the targeted uppermost aquifer, and improve pump operation efficiency



## APPENDIX D - GROUNDWATER EXTRACTION EVALUATION TECHNICAL MEMORANDUM

Conceptual Design

October 30, 2025

- A filter sand that extends to an appropriate depth below the screen or sump and above the screen. Appropriate filter pack should be selected based upon screen slot size and grain size analysis of the naturally occurring sediments.

Additional extraction well design specifications will be provided in subsequent documents.

### 5.5 PUMP SELECTION, ELECTRICAL, AND CONTROLS

Submersible pumps would likely be used for groundwater extraction. Electric submersible pumps are the most commonly used pumps in vertical well systems. Given the uncertainty of the feasible pumping rate and incorporating a factor of safety, future pump changeout may be required.

Each vertical groundwater extraction well would contain an extraction pump to convey groundwater to a header pipe connected to an extraction manifold. Additional pump, electrical, and control selection information, as well as information on the use of pressure transducers will be provided in subsequent documents as part of the final design after approval of the CARA Plan.

### 5.6 GROUNDWATER TREATMENT

If groundwater extraction and treatment is selected as the corrective action, TVA would use the onsite groundwater treatment plant currently operating as part of the IRA. The onsite groundwater treatment system is located near the EADA and is used to treat groundwater extracted from the EADA. The design elements of this system include extraction wells, a conveyance system, and a treatment plant. Further information regarding these design elements is provided in the *Remedial Action Plan* (TVA 2021). At this time, the treatment system has sufficient capacity to accept groundwater extracted from near the former WADA.

### 5.7 PERFORMANCE MONITORING SYSTEM

In general, system performance will be evaluated based upon a combination of the ability to achieve design flow rates, groundwater chemistry, and groundwater level monitoring. If the design and implementation of groundwater extraction as a corrective action advances, it is anticipated that a performance monitoring plan would be developed, and the groundwater extraction system would be periodically evaluated. The evaluation may be used throughout the lifecycle of system operation to optimize the performance of the monitoring system and to adapt/address to changing site conditions, if needed. The goals of the evaluation are to improve the effectiveness and efficiency of the corrective action, conduct maintenance, reduce operational costs, reduce the environmental footprint, and make the corrective action more resilient to environmental changes.



## APPENDIX D - GROUNDWATER EXTRACTION EVALUATION TECHNICAL MEMORANDUM

References  
October 30, 2025

### 6.0 REFERENCES

Tennessee Department of Environmental and Conservation (TDEC). (2015). Commissioner's Order No. OGC15- 177. August 6, 2015.

Tennessee Valley Authority (TVA). (2020). *Groundwater Flow and Solute Transport Modeling Report*. Allen Fossil Plant. July 2020.

TVA. (2021) *Remedial Action Plan*, Allen Fossil Plant, Revision 3. October 2021.

TVA. (2024). *Environmental Assessment Report*, Allen Fossil Plant, Revision 2. March 22, 2024.



# **TABLES**

**Table 1 - Summary of Hydraulic Conductivity Results from Slug Test Data, Allen Fossil Plant**

Monitoring Well ID	Average Hydraulic Conductivity (K)	
	ft/day	cm/s
ALF-207B	70.01	2.47E-02
ALF-208B	32.34	1.14E-02
ALF-210B	362.1	1.28E-01
ALF-218	104.4	3.69E-02
ALF-218A	522.8	1.85E-01
ALF-218B	72.21	2.55E-02
ALF-219	12.25	4.32E-03
ALF-219A	342.2	1.21E-01
ALF-219B	30.12	1.06E-02
ALF-220	1.8	6.50E-04
ALF-220B	57.3	2.02E-02
ALF-220A	376.8	1.33E-01
ALF-221	0.3	1.23E-04
ALF-221B	117.2	4.13E-02
ALF-221A	68.3	2.41E-02
ALF-222	25.1	8.84E-03
ALF-222B	29.6	1.04E-02
ALF-222A	428.4	1.51E-01
<b>Geometric Mean</b>	53.32	1.90E-02

Notes:

cm/s = centimeters per second

ft/day = ft per day

**Table 2**

**Comparative Evaluation of Advantages and Limitations of Hydraulic Control Technologies**

	<b>Vertical Wells</b>	<b>Extraction Trench</b>	<b>Horizontal Well</b>
<b>Potential Advantages of the Technology</b>	<ul style="list-style-type: none"> <li>▪ Conventional technology/readily implementable</li> <li>▪ Few depth limitations</li> <li>▪ Decreased soil management, odor mitigation requirements, and construction worker protection controls</li> <li>▪ Lower soil and limited water management during construction</li> <li>▪ Readily adaptable to expand system laterally and vertically or eliminate individual wells as needed</li> <li>▪ Greater spatial and temporal control of groundwater recovery</li> <li>▪ Higher specific capacity can be obtained with deeper wells</li> <li>▪ Wide array of conveyance material options, pump types and well construction methods</li> <li>▪ Operational over large fluctuations of water table</li> </ul>	<ul style="list-style-type: none"> <li>▪ Conventional technology/readily implementable</li> <li>▪ Longer operational life span</li> <li>▪ In heterogeneous, anisotropic environments, larger trench surface area increases likelihood of intercepting transmissive zones</li> <li>▪ Uniform flow field more readily established over time</li> <li>▪ Lower long-term O&amp;M, and energy costs – fewer pumps, slower fouling due lower entrance velocities</li> </ul>	<ul style="list-style-type: none"> <li>▪ Conventional technology/readily implementable</li> <li>▪ Reasonable alternative when access is limited by utilities and or other infrastructure</li> <li>▪ Lower long-term O&amp;M, energy costs, and fewer pumps</li> <li>▪ Few depth limitations</li> <li>▪ Decreased soil management, odor mitigation requirements, and construction worker protection controls</li> </ul>
<b>Potential Limitations of the Technology</b>	<ul style="list-style-type: none"> <li>▪ Higher long-term operation and maintenance (O&amp;M) costs based on system complexity</li> <li>▪ Increased system down time during extraction system repairs/well rehabilitation</li> <li>▪ In low permeability environments, radius of influence is limited and will require high well density to provide hydraulic control</li> <li>▪ Low permeability environment likely to increase screen fouling due to pump draw down/cycling</li> <li>▪ Operationally difficult to maintain a consistent flow field in heterogeneous environments</li> <li>▪ High total dissolved solids (TDS) waters may increase fouling</li> </ul>	<ul style="list-style-type: none"> <li>▪ Installation depth limited to ~15 feet via conventional methods or ~50 feet via advanced methods (long reach excavator or one pass trenching)</li> <li>▪ Typically, higher initial capital costs</li> <li>▪ Low strength of soils may impede construction</li> <li>▪ Cannot be readily modified to extend deeper into the water bearing material</li> <li>▪ Higher operational water volumes requiring management at maximum drawdown</li> <li>▪ Require substantial workplace access to install</li> <li>▪ Increased soil and water management during construction</li> <li>▪ Less adaptable to expand system or eliminate individual sections</li> </ul>	<ul style="list-style-type: none"> <li>▪ In low permeability environments, radius of influence is limited and will require high well density to provide hydraulic control</li> <li>▪ Require long run from starting point for deeper installation</li> <li>▪ Operationally difficult to maintain a consistent flow field in heterogeneous environments</li> <li>▪ High TDS waters may increase fouling</li> <li>▪ Less adaptable to expand system and/or eliminate individual sections</li> </ul>

**Abbreviations:**

O&M      Operation & Maintenance

TDS      Total Dissolved Solids

# **EXHIBITS**







**Cross Section Highlighting Intermediate Well Screen**

Client/Project  
Tennessee Valley Authority  
Allen Fossil (ALF) Plant

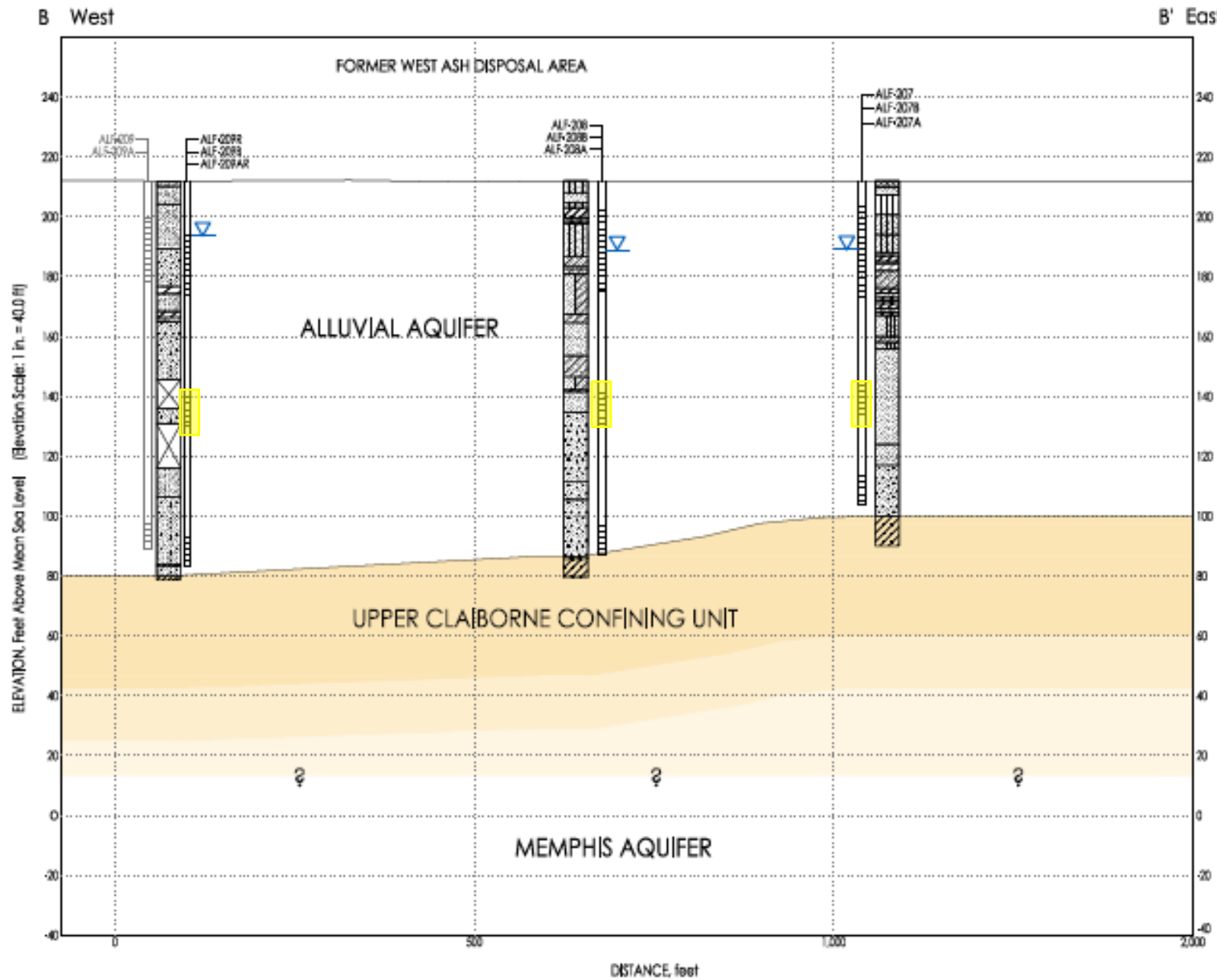
175568282

Project Location  
Memphis, Tennessee

Prepared by DMB on 2024-07-02  
Technical Review by JS on 2024-07-02

Legend

- Monitoring Well (Shallow)
- Monitoring Well (Intermediate)
- Monitoring Well (Deep)
- Cross Section Location
- CCR Unit Area (Approximate)



**NOTES:**

1. The cross-section depicts the contact between Alluvial aquifer and the Upper Claiborne confining unit (UCCU) along the north side of the former West Ash Disposal Area (WADA). At borings along the south side of the WADA, the UCCU was observed to be at least 100 feet thick.
2. Wells ALF-209 and ALF-209A have been replaced by ALF-209R and ALF-209AR respectively, and are anticipated to be closed in 2025 following four quarters of concurring groundwater sampling of ALF-209R and ALF-209AR.
3. The extraction method and associated modeling are conceptual but serve to demonstrate that hydraulic control using groundwater extraction within the intermediate portion of the Alluvial aquifer is feasible to control the flux of groundwater through the upper, intermediate, and deep portions of the Alluvial aquifer (uppermost aquifer) at the lateral boundaries of the WADA CCR unit in the targeted area

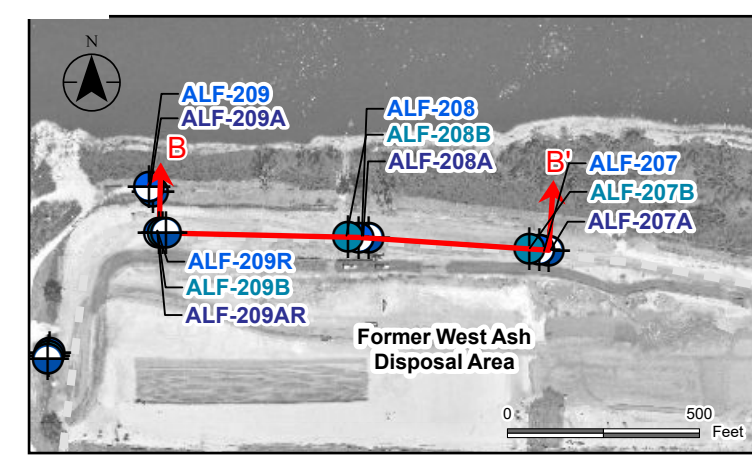
**Legend**


Elevation of well screened intervals (screens of well sets are depicted in a single column, but are actually closely spaced and separate well installations)

Stratigraphic contact correlated between definitive data points

Groundwater elevation on 02/2024 in shallow Alluvial aquifer monitoring wells \*

\* The scale of the drawing precludes adding the groundwater elevations for the intermediate (B-series) or deep (A-series) wells, values that were often only tenths of feet different from the shallow wells. The differences would not be discernable at the scale of the cross-sections.



**Notes**

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Kiewit (10/26/2023 and 12/6/2023) and TVA (2023)



I:\US0209-PPF5501\shared\_projects\TVA-EIP175568282\_ALF\_Phase2\gis\mxd\CARAIGW\_ExtractionU1\_GWExtractionTME\exhibits\Ex4 - Cross Section Highlighting Intermediate Well Screen\_2024-07-02\_By: jkneff

\\US0209-PPF\S01\shared\_projects\TVA-EIP\175566282\_ALF\_Phase2\gis\mxd\CARAGW\_Extracton\J1\_GW\ExtractionTME\Exhibits.aprx Exca - Groundwater Elevation Contour Map, Intermediate Wells (September 2020) Revised: 2024-07-02 By: jkneff

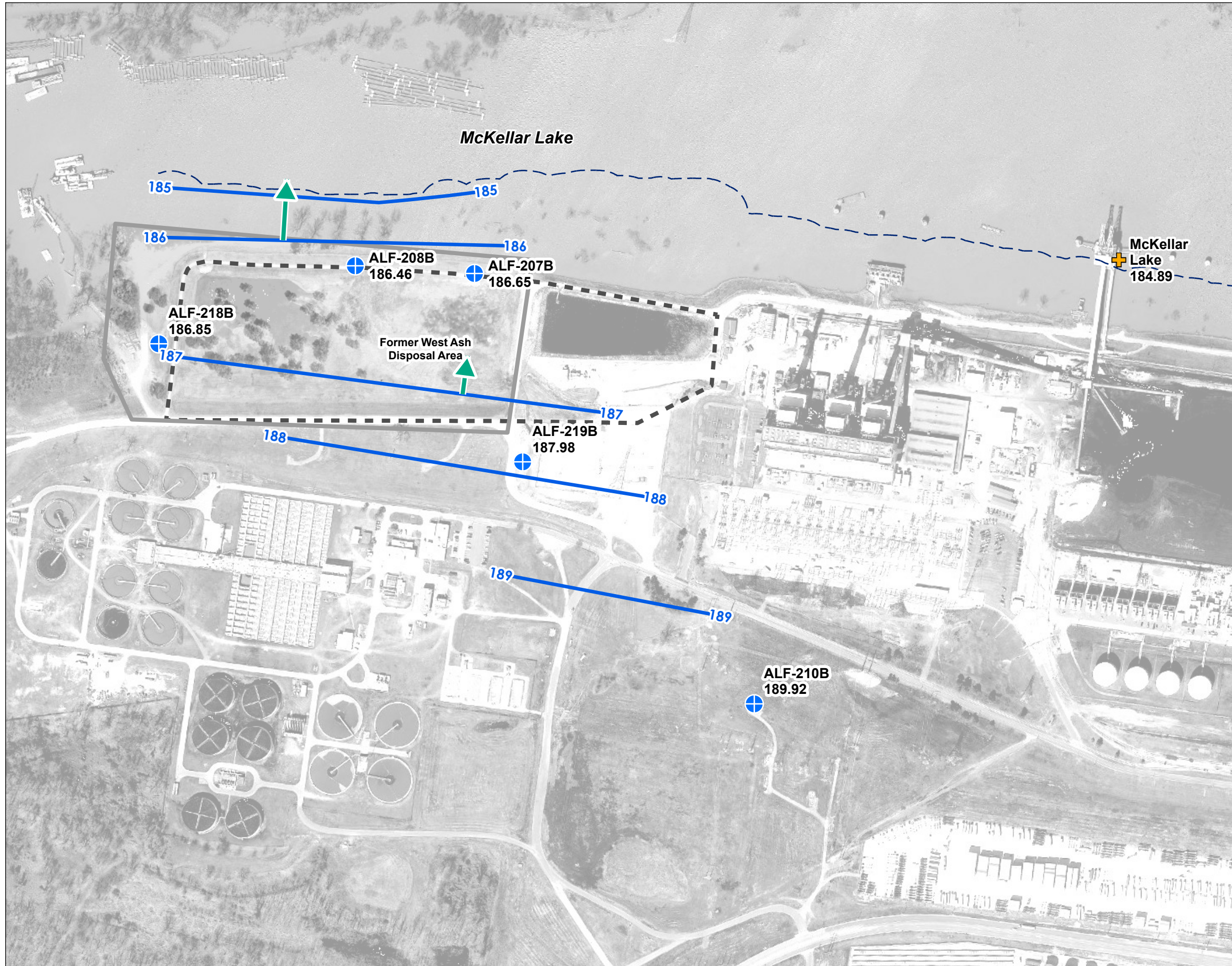
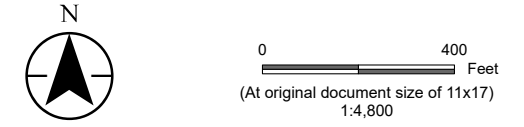


Exhibit No.  
**5a**

Title  
**Groundwater Elevation Contour Map, Intermediate Wells (September 2020)**

Client/Project  
Tennessee Valley Authority  
Allen Fossil (ALF) Plant 175566282

Project Location  
Memphis, Tennessee Prepared by DMB on 2024-07-02  
Technical Review by JS on 2024-07-02



- Legend
- Groundwater Investigation Monitoring Well groundwater elevation in feet above mean sea level (ft amsl)
  - McKellar Lake Gauging Station surface water elevation in ft amsl
  - Generalized Groundwater Flow Direction
  - Groundwater Contour (1 ft interval; elevations are in ft amsl)
  - Estimated McKellar Lake Shoreline (184.89 ft amsl)
  - 2019 Imagery Boundary
  - CCR Unit Area (Approximate)

**Wells are screened in the Alluvial Aquifer unless otherwise noted.**

- Notes
1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
  2. Imagery Provided by TVA dated 3/15/2018 and 6/4/2019
  3. Groundwater contours were created manually.
  4. Although the groundwater elevation values were collected on August 31, 2020, the measurements are affiliated with the September 2020 quarterly groundwater sampling event.



\\US0269-PPF\SS01\shared\_projects\TVA-EP175668282\_ALF\_Phase2\gis\mxd\CARA\GW\_Extract\TME\khibils1\_GW\_Extract\TME\khibils1.aprx Excb - Groundwater Elevation Contour Map, Intermediate Wells (February 2023) Revised: 2024-07-02 By: jkneff

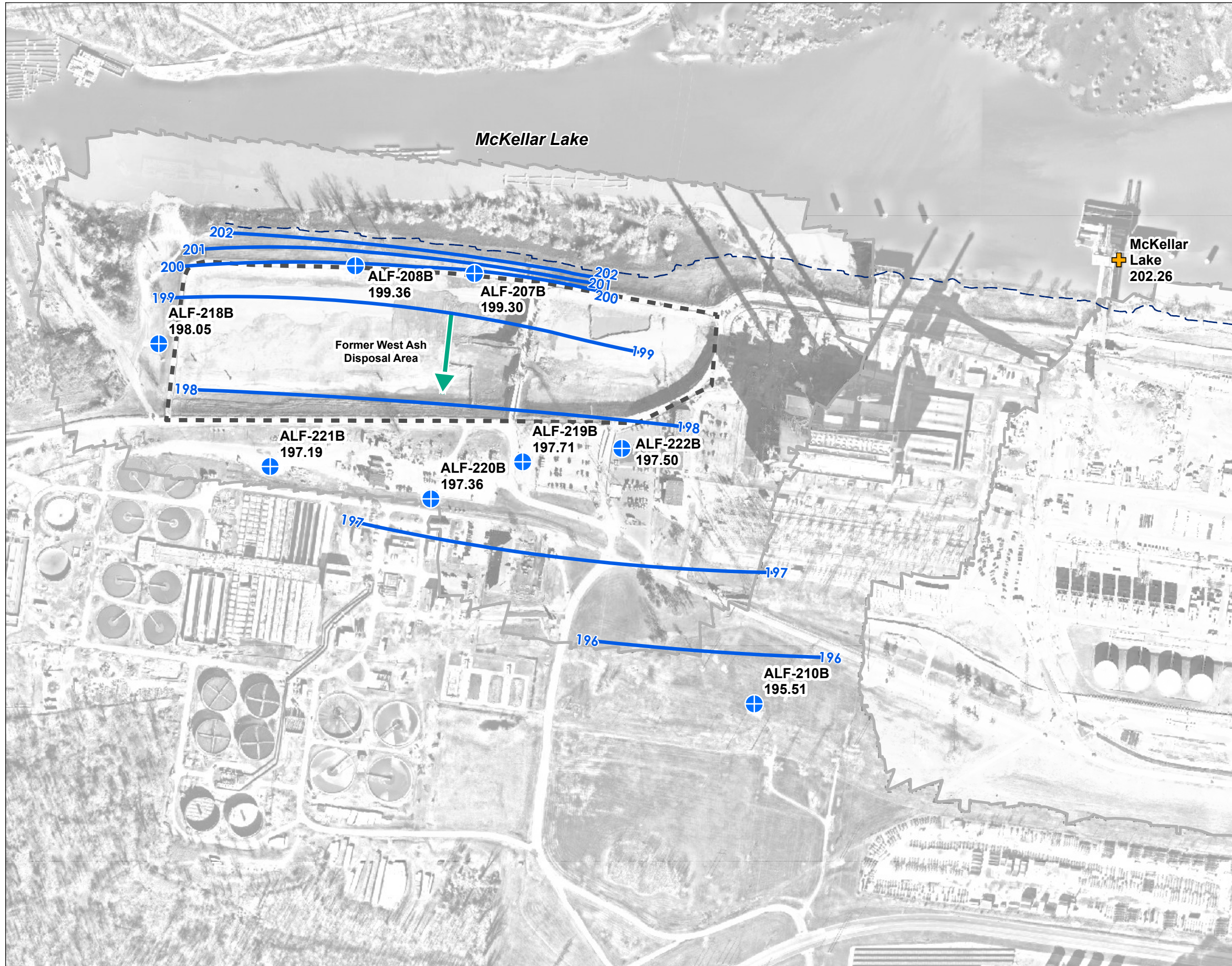
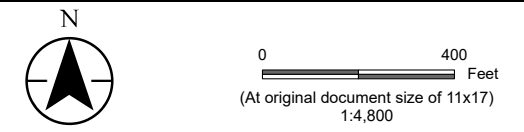


Exhibit No.  
**5b**

Title  
**Groundwater Elevation Contour Map, Intermediate Wells (February 2023)**

Client/Project  
Tennessee Valley Authority  
Allen Fossil (ALF) Plant 175568282

Project Location  
Memphis, Tennessee Prepared by DMB on 2024-07-02  
Technical Review by JS on 2024-07-02



- Legend
- Groundwater Investigation Monitoring Well groundwater elevation in feet above mean sea level (ft amsl)
  - Groundwater Investigation Monitoring Well Not Used for Contouring groundwater elevation in feet above mean sea level (ft amsl)
  - McKellar Lake Gauging Station surface water elevation in ft amsl
  - Generalized Groundwater Flow Direction
  - Groundwater Contour (1 ft interval; elevations are in ft amsl)
  - Estimated McKellar Lake Shoreline (202.26 ft amsl)
  - 2022 Imagery Boundary

**Wells are screened in the Alluvial Aquifer unless otherwise noted.**

- Notes
1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
  2. Imagery provided by Kiewit (dated Dec 2022) and NearMap (dated Jan 2022)
  3. Groundwater contours were created manually.
  4. Groundwater elevation at ALF-218B was based on the reading closest to noon Central Daylight Time recorded by the transducer in that well on April 13, 2020.







\\US0269-PPF5501\shared\_projects\TVA-EIP\1755668282\_ALF\_Phase2\gis\mxd\CARA\GW\_Extract\TME\hibits\J1\_GW\Extract\TME\hibits\J1\_GW\Extract\TME\hibits.aprx Ex04 - GroundwaterSurface Water Elevation - ALF-207 Revised: 2024-07-02 By: jkneff

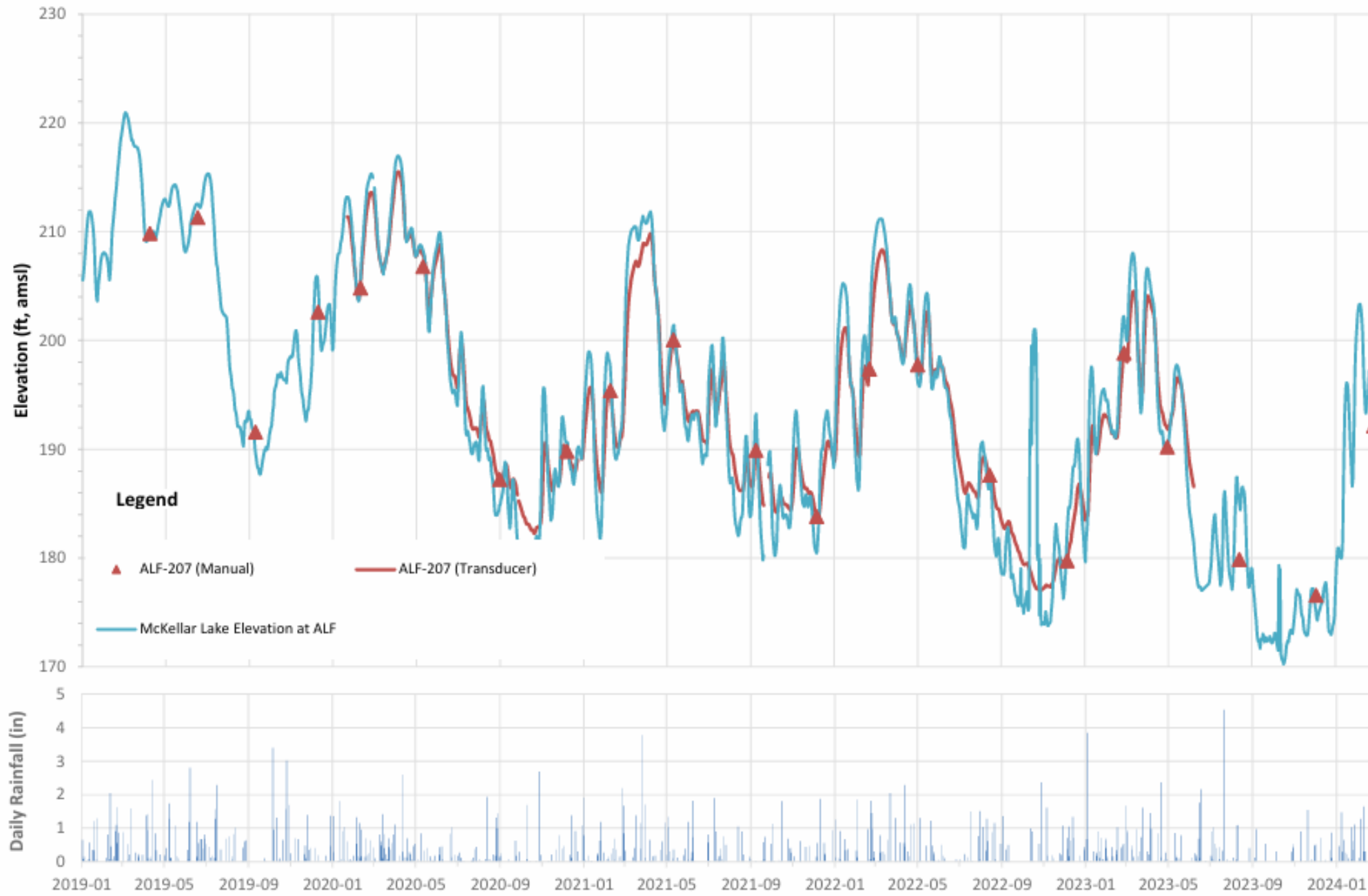


Exhibit No.

**8a**

Title

**Groundwater / Surface Water Elevation Comparison - ALF-207**

Client/Project

Tennessee Valley Authority  
Allen Fossil (ALF) Plant

1755668282

Project Location  
Memphis, Tennessee

Prepared by DMB on 2024-07-02  
Technical Review by JS on 2024-07-02

**Notes**

- 1. ft - feet
- 2. in - inches
- 3. amsl - above mean sea level
- 4. Gaps in the Groundwater Elevation (iSite) transducer data indicate that iSite data was not available for that time period.





\\US0269-PPFSS01\shared\_projects\TVA-EIP\175668282\_ALF\_Phase2\gis\mxd\CARA\GW\_Extract\TME\hibits\J1\_GW\Extract\TME\hibits\J1\_GW\Extract\TME\hibits.aprx Ex06 - GroundwaterSurface Water Elevation - ALF-207B Revised: 2024-07-02 By: jkneff

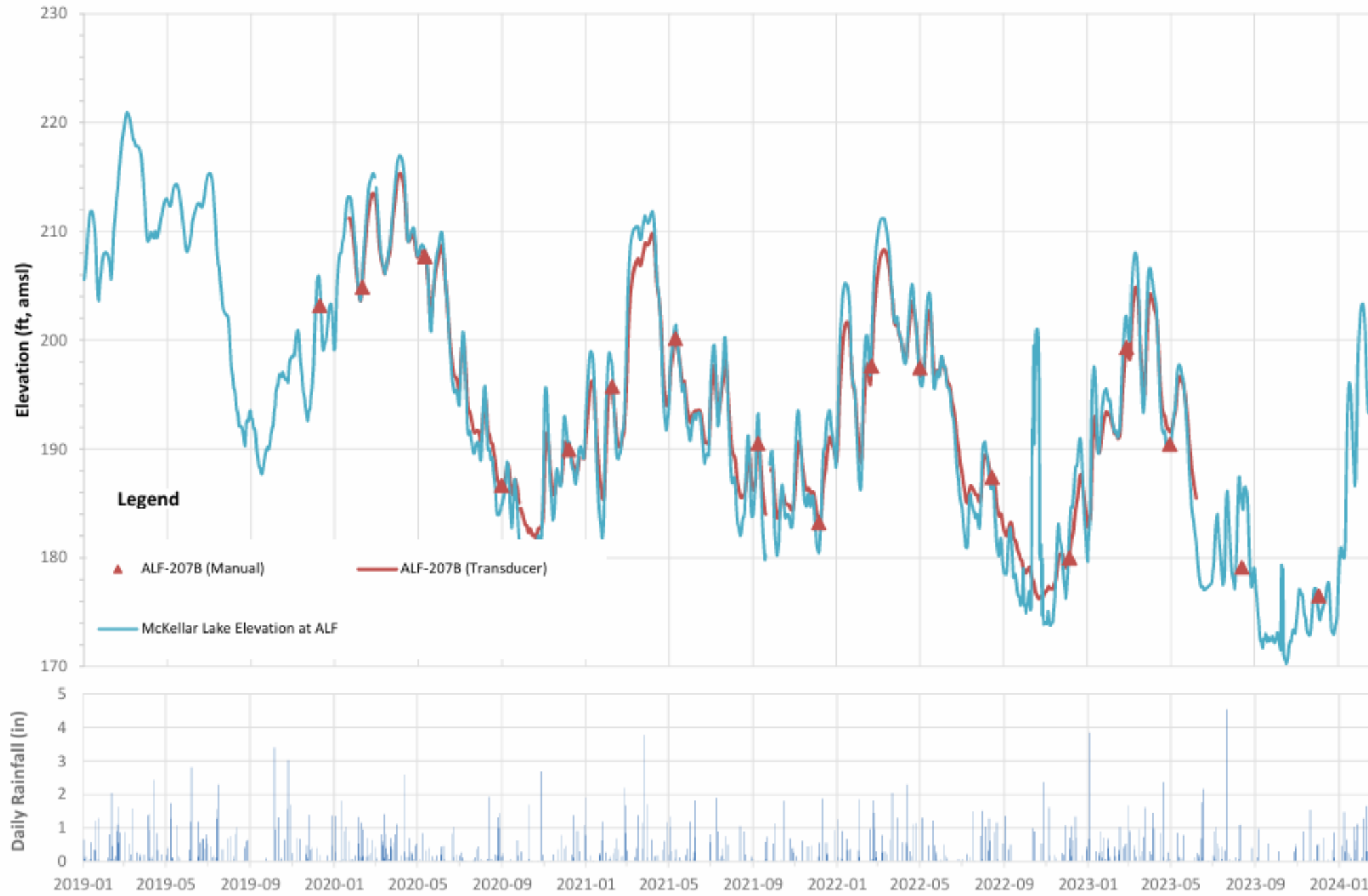


Exhibit No.

8c

Title

**Groundwater / Surface Water Elevation Comparison - ALF-207B**

Client/Project

Tennessee Valley Authority  
Allen Fossil (ALF) Plant

175568282

Project Location

Memphis, Tennessee

Prepared by DMB on 2024-07-02

Technical Review by JS on 2024-07-02

**Notes**

1. ft - feet
2. in - inches
3. amsl - above mean sea level
4. Gaps in the Groundwater Elevation (iSite) transducer data indicate that iSite data was not available for that time period.



\\US0269-PPFSS01\shared\_projects\TVA-EIP\1755668282\_ALF\_Phase2\gis\mxd\CAR\GW\_Extract\TME\hibits\J1\_GW\_Extract\TME\hibits\J1\_GW\_Extract\TME\hibits.aprx Ex0d - GroundwaterSurface Water Elevation - ALF-208 Revised: 2024-07-02 By: jkneff

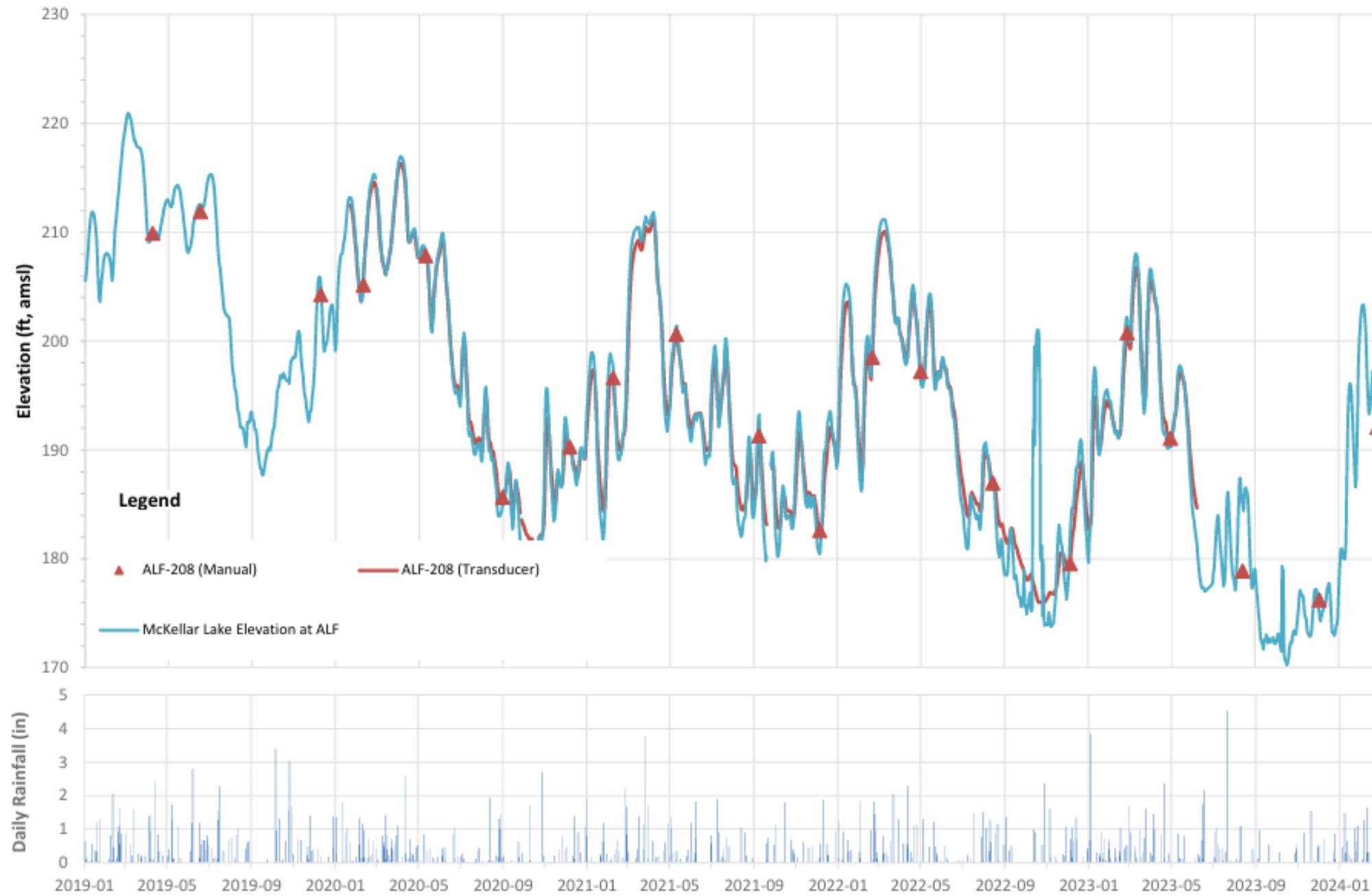


Exhibit No.  
**8d**

---

Title  
**Groundwater / Surface Water Elevation Comparison - ALF-208**

---

Client/Project  
 Tennessee Valley Authority  
 Allen Fossil (ALF) Plant 1755668282

---

Project Location  
 Memphis, Tennessee Prepared by DMB on 2024-07-02  
 Technical Review by JS on 2024-07-02

- Notes**
1. ft - feet
  2. in - inches
  3. amsl - above mean sea level
  4. Gaps in the Groundwater Elevation (iSite) transducer data indicate that iSite data was not available for that time period.



\\US0269-PPF5501\shared\_projects\TVA-EIP\175566282\_ALF\_Phase2\gis\mxd\CAR\GW\_Extract\TVA\TVA\_GW\_Extract\TVA\_2024-07-02\_By\_jkneff

Exhibit No.

**8e**

Title

**Groundwater / Surface Water Elevation Comparison - ALF-208A**

Client/Project

Tennessee Valley Authority  
Allen Fossil (ALF) Plant

175566282

Project Location

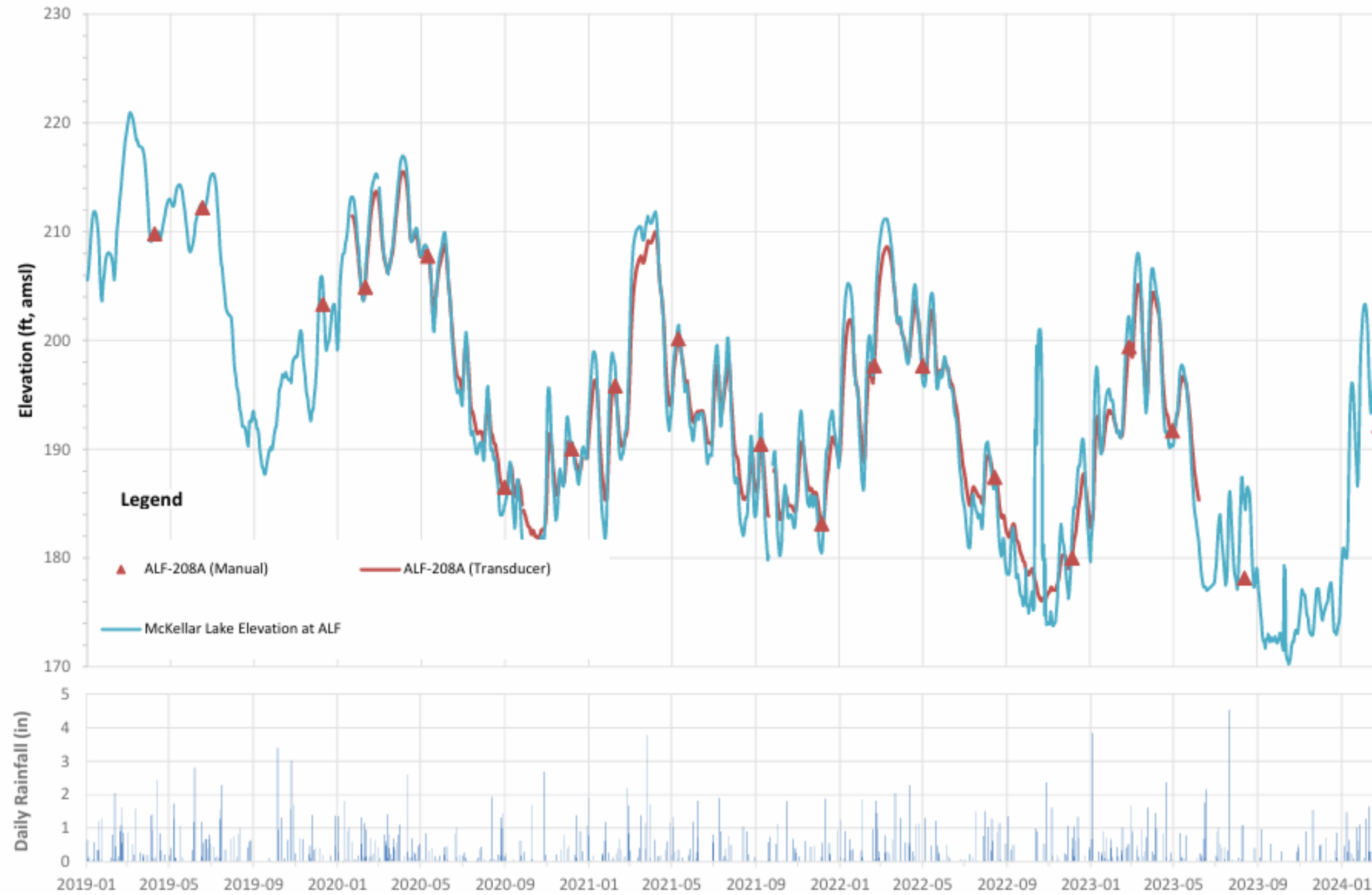
Memphis, Tennessee

Prepared by DMB on 2024-07-02

Technical Review by JS on 2024-07-02

**Notes**

- 1. ft - feet
- 2. in - inches
- 3. amsl - above mean sea level
- 4. Gaps in the Groundwater Elevation (iSite) transducer data indicate that iSite data was not available for that time period.



\\US0269-PPF501\shared\_projects\TVA-EIP\1755668282\_ALF\_Phase2\gis\mxd\CARA\GW\_Extract\TME\hibits\J1\_GWExtract\TME\hibits\J1\_GWExtract\TME\hibits.aprx Excl - GroundwaterSurface Water Elevation - ALF-208B Revised: 2024-07-02 By: jkneff

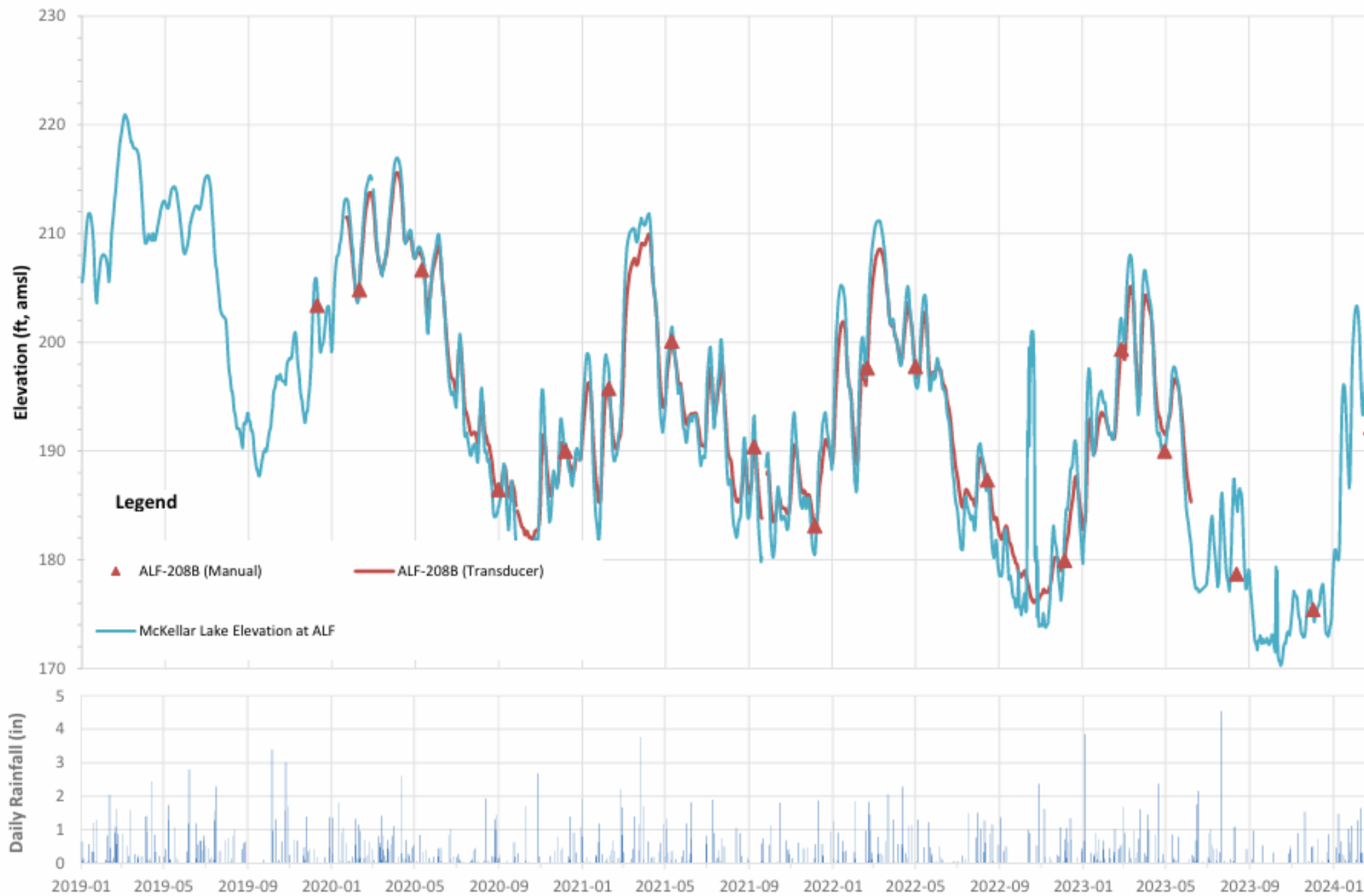


Exhibit No.

**8f**

Title

**Groundwater / Surface Water Elevation Comparison - ALF-208B**

Client/Project

Tennessee Valley Authority  
Allen Fossil (ALF) Plant

1755668282

Project Location

Memphis, Tennessee

Prepared by DMB on 2024-07-02

Technical Review by JS on 2024-07-02

**Notes**

- 1. ft - feet
- 2. in - inches
- 3. amsl - above mean sea level
- 4. Gaps in the Groundwater Elevation (iSite) transducer data indicate that iSite data was not available for that time period.



