

November 13, 2018

TECHNICAL MEMORANDUM

To: Steve Clough
Nevada Environmental Response Trust

From: John Pekala, CEM#2347, Expires 9/20/2020, Ramboll
Jessica Donovan, Ramboll

Re: **RI Phase 3 Modification No. 4 – Transect D Area Drilling
Nevada Environmental Response Trust Site
Henderson, Nevada
Ramboll Project No. 1690006943-036**

This Technical Memorandum presents Ramboll’s recommended Modification No. 4 to the scope of work for Phase 3 of the Remedial Investigation (Phase 3 RI) currently in progress at the Nevada Environmental Response Trust Site (the “Site”) located in Henderson, Nevada. During the Phase 3 RI Ramboll drilled seven soil borings north of the Tuscany Village community in an effort to verify the presence of a paleochannel eroded into the Upper Muddy Creek formation (UMCf). Since the goal of these borings was only to map the location of the paleochannel, no soil or groundwater samples were collected for laboratory analysis. Subsequent investigative work performed by Tetra Tech as part of the Las Vegas Wash Bioremediation Pilot Study identified this paleochannel as potentially a significant migration pathway with perchlorate concentrations in groundwater as high as 10 milligrams per liter (mg/L) in the pilot study area. Based on these findings, Ramboll has developed this modification to determine the concentrations of perchlorate and other NERT-related COPCs in soil and groundwater within this same paleochannel, but upgradient of the pilot study area. This recommended modification proposes additional soil borings and monitoring wells on City of Henderson property located north of the Tuscany Village community (at the location of Phase 3 RI Transect D) to evaluate the presence and potential vertical and lateral extent of perchlorate and other NERT-related COPCs in the alluvium and Upper Muddy Creek formation (UMCf) in the vicinity of a paleochannel identified at this location. Details regarding the proposed RI Phase 3 Modification No. 4 investigation are provided below.

Investigation Locations ESB-19, ESB-20, ESB-21, and ESB-22. Four deep soil borings will be advanced adjacent to the RI Phase 3 Transect D series soil borings (TB-D1 through TB-D7), which were completed in March 2018. The purpose of the Transect D borings was to investigate the presence and extent of a paleochannel that had been identified previously during development of an early version of the groundwater flow model for the NERT Site vicinity (Northgate 2010). Figure 1 presents a plan view showing the Transect D borings and the proposed additional soil boring locations. Subsurface conditions along Transect D are illustrated schematically on Subsurface Cross-Section A-A’ (see Figure 2). As illustrated on Figure 2, a deep paleochannel was identified during completion of the Transect D soil borings. However, consistent with the 2017 RI Phase 3 work plan, soil samples from the

transect borings were not submitted for chemical laboratory analyses. To obtain data to evaluate the presence of NERT-related COPCs within and below the paleochannel, the Modification No. 4 soil borings will be advanced to a planned total depth of 200 feet bgs, and soil samples will be collected at intervals of 10 feet from ground surface to the total depth of each boring. Soil samples will be analyzed for perchlorate, chlorate, total chromium, nitrate/nitrite, and moisture content. A select number of soil samples will also be tested for physical properties, including grain size distribution, Atterberg Limits, dry bulk density, effective porosity, hydraulic conductivity, and total organic carbon.

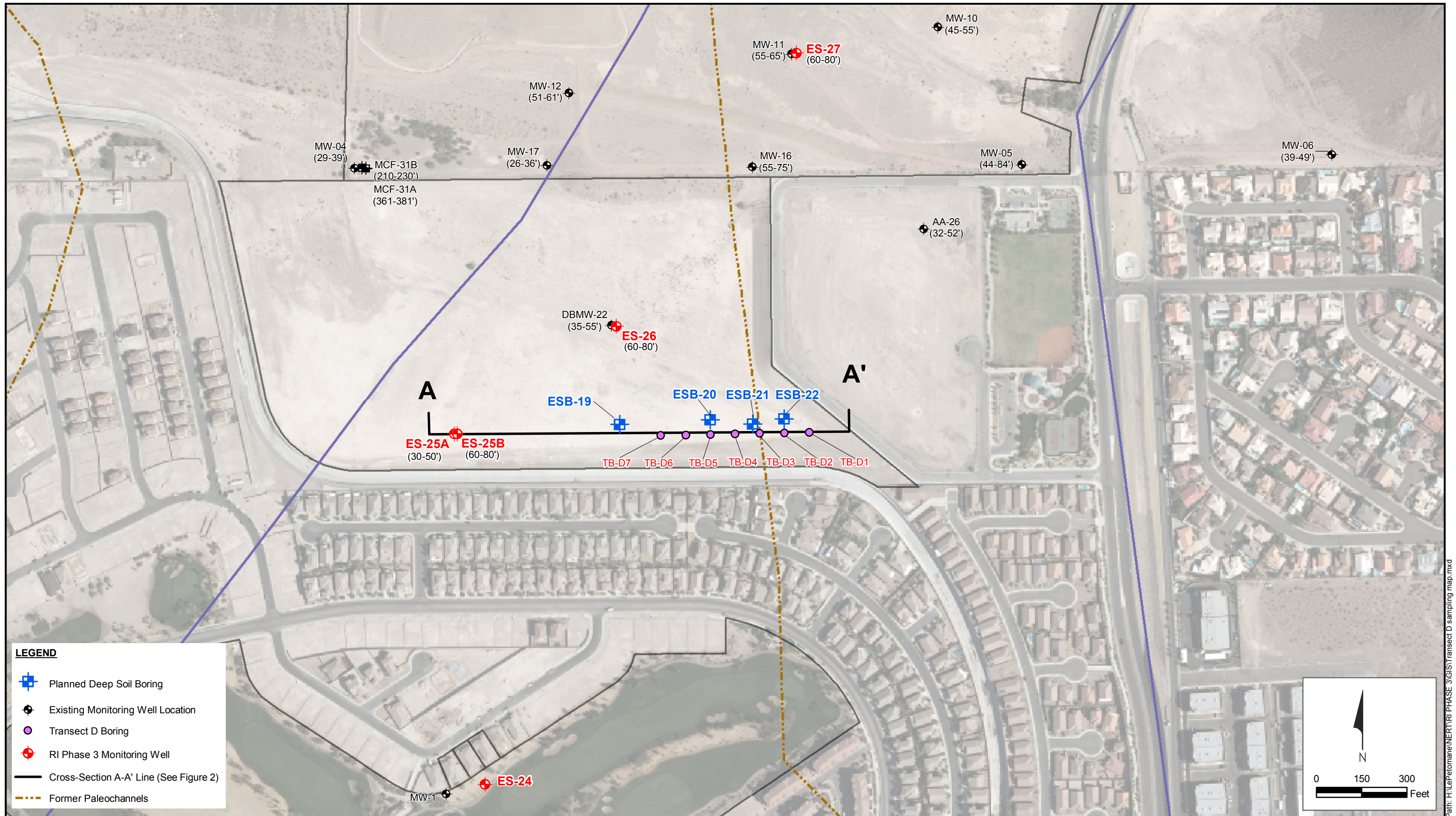
Up to nine groundwater monitoring wells will be installed in the vicinity of Transect D. Currently it is anticipated that this may include three separate well clusters consisting of up to three wells each; one screened in the alluvium, and two screened in the UMCf (each at different depths). The specific number of wells at each investigation location, well names, screened intervals, and construction details for the wells will be finalized based on observations made during the drilling of the deep soil borings and evaluation of the soil sample analytical results. Following installation and development, the new monitoring wells will be sampled and analyzed for perchlorate and chlorate, total and hexavalent chromium, and general chemistry parameters including total dissolved solids (TDS) and major ions (calcium, magnesium, sodium, potassium, sulfate, nitrate, chloride, and bicarbonate/carbonate/hydroxide alkalinity). Field parameters including temperature, pH, dissolved oxygen (DO), oxygen reduction potential (ORP), turbidity, and electrical conductivity (EC) will be measured during sampling.

Please contact us should you have any questions about the recommended additional investigation locations.

Attachments

Figure 1 Proposed Deep Boring Locations (Transect D Area)

Figure 2 Schematic Subsurface Cross-Section A-A' Showing Transect D Area



Proposed Deep Boring Locations (Transect D Area)
 Nevada Environmental Response Trust Site
 Henderson, Nevada

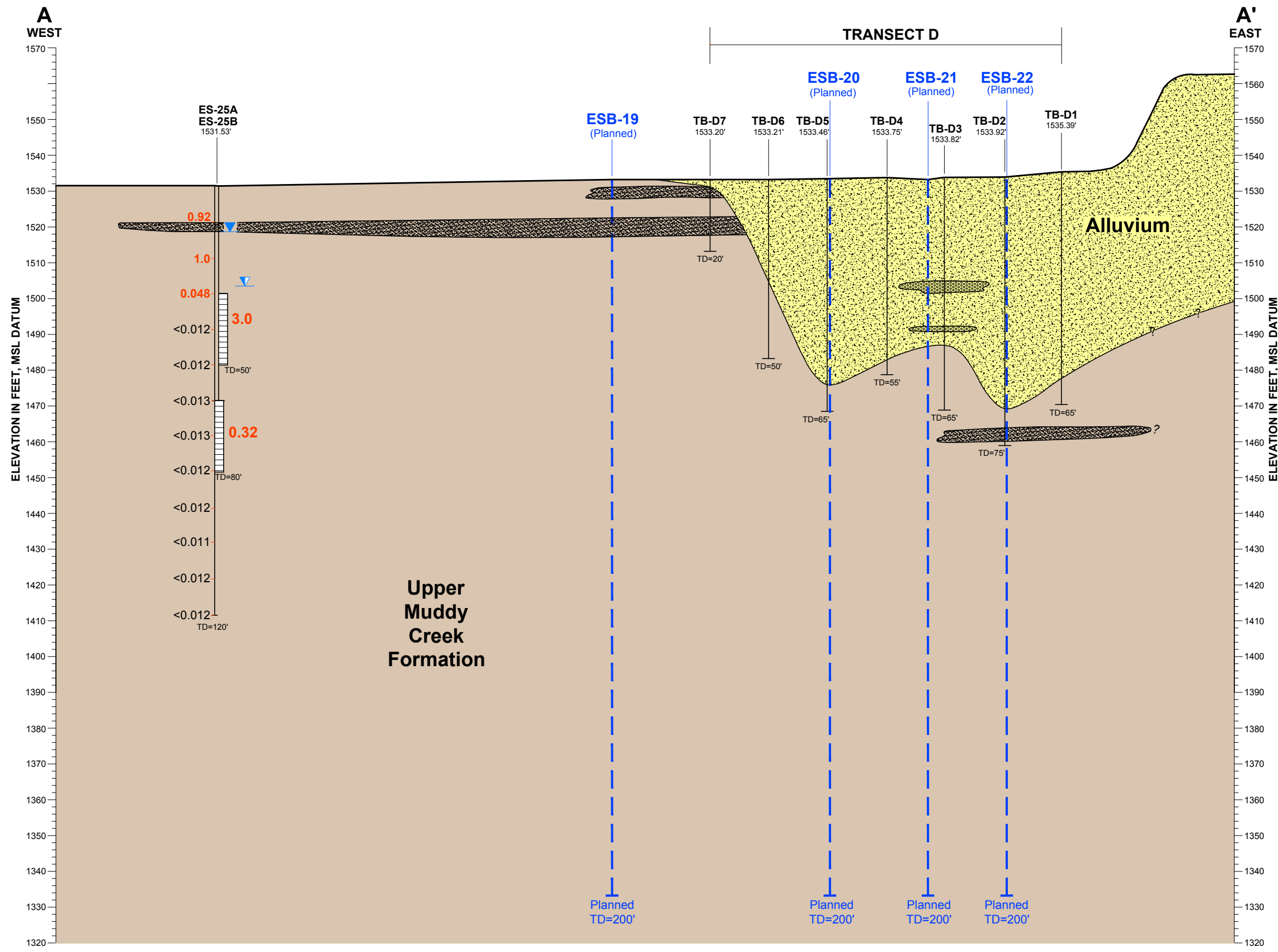
Drafter: RS

Date: 11/13/2018

Contract Number: 21-41400A-F99I

Approved by:

Revised:



Explanation:

ES-25A Well name
3.0 Perchlorate, mg/L (April 2018)

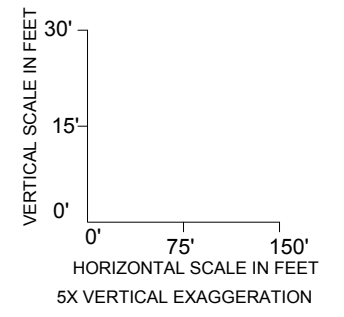
▼ Groundwater Elevation (April 2018)

▼ Deeper Shallow WBZ Well (April 2018)

Notes:

1. Planned investigation locations are shown in blue.
2. TD = total depth.
3. MSL Datum = Mean Sea Level Datum.
4. Subsurface interpretation is preliminary; subject to change.
5. Pilot boring ES-25B soil perchlorate results are in mg/kg.

ALLUVIUM (Qal)	
GRAVEL/ SANDY GRAVEL	SILTY SAND / SAND WITH GRAVEL
UPPER MUDDY CREEK FORMATION (UMCf)	
SANDY SILT	SILT/ CLAYEY SILT



RMSO 10/25/18 Q:\DRAWINGS\1690006943-TRANSECT D A-A' CROSSSECTION >



Schematic Subsurface Cross-Section A-A' Showing Transect D Area

RI Phase 3 Modification No.4
 Nevada Environmental Response Trust Site; Henderson, Nevada

**RI Phase 3 Modification No. 4
Transect D Area Drilling**

**Nevada Environmental Response Trust
(Former Tronox LLC Site)
Henderson, Nevada**

Nevada Environmental Response Trust (Trust) Representative Certification

I certify that this document and all attachments submitted to the Division were prepared at the request of, or under the direction or supervision of the Trust. Based on my own involvement and/or my inquiry of the person or persons who manage the system(s) or those directly responsible for gathering the information or preparing the document, or the immediate supervisor of such person(s), the information submitted and provided herein is, to the best of my knowledge and belief, true, accurate, and complete in all material respects.

Office of the Nevada Environmental Response Trust

Le Petomane XXVII, Inc., not individually, but solely in its representative capacity as the Nevada Environmental Response Trust Trustee

Signature: Jay A Steinberg, not individually, but solely in his representative capacity as President of the Nevada Environmental Response Trust Trustee

not individually, but solely as Pres. Sent

Name: Jay A. Steinberg, not individually, but solely in his representative capacity as President of the Nevada Environmental Response Trust Trustee

Title: Solely as President and not individually

Company: Le Petomane XXVII, Inc., not individually, but solely in its representative capacity as the Nevada Environmental Response Trust Trustee

Date: 11/13/18

**RI Phase 3 Modification No. 4
Transect D Area Drilling**

**Nevada Environmental Response Trust
(Former Tronox LLC Site)
Henderson, Nevada**

Responsible Certified Environmental Manager (CEM) for this project

I hereby certify that I am responsible for the services described in this document and for the preparation of this document. The services described in this document have been provided in a manner consistent with the current standards of the profession and, to the best of my knowledge, comply with all applicable federal, state and local statutes, regulations and ordinances.



November 13, 2018

**John M. Pekala, PG
Principal**

Date

Certified Environmental Manager
Ramboll US Corporation
CEM Certificate Number: 2347
CEM Expiration Date: September 20, 2020