

April 30, 2020

**TECHNICAL MEMORANDUM**

**To:** Steve Clough  
Nevada Environmental Response Trust

**From:** Chris Stubbs, Pejman Rasouli, Ramboll  
John Pekala, CEM#2347, Expires 9/20/2020, Ramboll

**Re:** **Phase 3 RI Modification No. 10**  
**High-Frequency Sampling in Las Vegas Wash**  
**Henderson, Nevada**  
**Ramboll Project No. 1690016064-042**

This Technical Memorandum presents Ramboll US Corporation’s (Ramboll’s) recommended Modification No. 10 to the scope of work for Phase 3 of the Remedial Investigation (RI) currently in progress at the Nevada Environmental Response Trust (NERT) Site (the “Site”), located in Henderson, Nevada. The purpose of this modification is to collect high frequency surface water samples from the Las Vegas Wash (the “Wash”) in order to better characterize the temporal variation in mass loading of perchlorate in the Wash resulting from discharge of groundwater into surface water within Operable Unit 3 (OU-3). This was one of the recommended areas of additional investigation from the Downgradient Study Area Investigation (AECOM 2019).<sup>1</sup>

Currently, monthly estimates of perchlorate mass loading in the Wash at nine transect locations are calculated based on monthly surface water sampling results and surface water flows measured at a series of stream gages operated by the United States Geological Survey (USGS). The sample locations, USGS stream gage locations, and preliminary unvalidated analytical results from February 2020 are shown in Figure 1. Samples are analyzed for perchlorate, chlorate, and total dissolved solids (TDS) at between one and six sampling points per transect. The current surface water sampling program is described in the Phase 2 RI Modifications No. 3, No. 10, and No. 14, all of which have been approved by the Nevada Division of Environmental Protection (NDEP).

Because the flow in the Wash varies significantly on a diurnal cycle, the current monthly sampling frequency does not capture the temporal variation in mass loading resulting from the variation in daily flow. As part of this Phase 3 RI Modification No. 10, high-frequency (i.e., hourly) sampling within Las Vegas Wash will be conducted to better characterize how surface water concentrations change in response to daily and seasonal flow variation. The results of this sampling will be used to evaluate the relationship between instantaneous mass loading at the sampling time and the average mass loading over daily and monthly time scales. This evaluation will allow us to develop a more accurate estimate of average mass loading, which is one of the key metrics that will be used in the upcoming feasibility study to evaluate the effectiveness of alternative remedies.

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<sup>1</sup> AECOM. 2019. Supplemental Surface Water Investigation Technical Memorandum; NERT Remedial Investigation – Downgradient Study Area; Nevada Environmental Response Trust Site; Henderson, Nevada. April.

Ramboll proposes conducting two separate sampling events with one event in the summer and one event in the winter. For each event, hourly sampling for 48 hours at six key locations within the Wash using portable automated sampler technology (available, for example, from Teledyne ISCO and YSI) is proposed. The automated samplers will collect samples hourly using a programable peristaltic pump and provide temporary sample storage. Samples will be retrieved from the automated samplers by Ramboll personnel once per day, and then shipped to a laboratory to be analyzed for perchlorate, chlorate, and TDS.

As shown on Figure 2, proposed sampling locations are co-located with USGS stream gage stations so that stream flow rates are known at each location. The same sampling locations will be used in both the summer and winter sampling events. Table 1 provides the proposed sampling locations and number of the samples at each transect. At Duck Creek (LVW 7.2), Pabco Road (LVW 6.05), and Northshore Road (LVW 0.55), only one sampling point at the center of the Wash is proposed because prior sampling has indicated the Wash is well-mixed at these locations. At Historic Lateral (LVW 5.3), Homestead (LVW 4.2) and Rainbow Gardens (LVW 3.5), three sampling points, equally spaced across the Wash (south bank, center, and north bank), are proposed because prior sampling indicates the Wash is less well-mixed at these locations. The specific sample locations will be finalized based on observations made during a field reconnaissance visit, health and safety requirements, and permissions for property access.

Please contact us should you have any questions regarding the recommended scope of Phase 3 RI Modification No. 10.

### **Attachments**

- Table 1 High-Frequency Surface Water Sampling at Stream Gages in Las Vegas Wash
- Figure 1 Preliminary Las Vegas Wash Sampling Results – February 2020
- Figure 2 Proposed High-Frequency Sampling Locations



**Phase 3 RI Modification No. 10  
High-Frequency Sampling in Las Vegas Wash**

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

**Nevada Environmental Response Trust (NERT) 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 NERT. 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 as President of the Trustee**

**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:** 4/30/2020



**Phase 3 RI Modification No. 10  
High-Frequency Sampling in Las Vegas Wash**

**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.

**John M. Pekala, PG  
Principal**

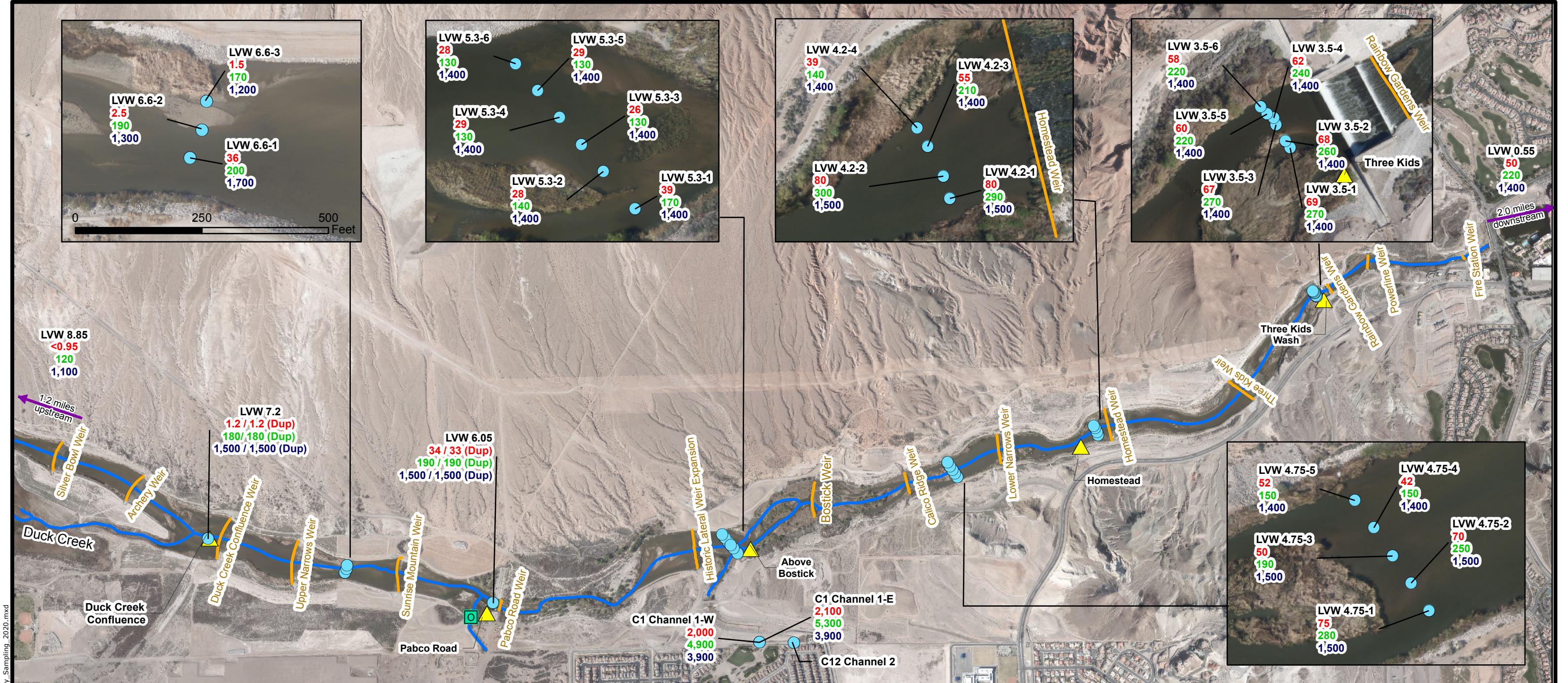
April 30, 2020

**Date**

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

**Table 1. High-Frequency Surface Water Sampling at Stream Gages in Las Vegas Wash**  
Phase 3 RI Modification No. 10  
Nevada Environmental Response Trust Site; Henderson, Nevada

<b>Transect Name</b>	<b>Transect ID</b>	<b>Number of Samples</b>
Duck Creek	LVW 7.2	single sample transect
Pabco Road	LVW 6.05	single sample transect
Historic Lateral	LVW 5.3	3 sample transect
Homestead	LVW 4.2	3 sample transect
Rainbow Gardens	LVW 3.5	3 sample transect
Northshore Road	LVW 0.55	single sample transect



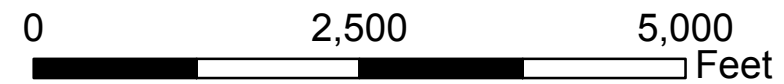
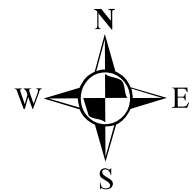
**Explanation**

- NERT Surface Water Sample
- ▲ USGS Continuous Streamflow Location
- NERT/AMPAC/TIMET/COH Outfall Location
- Weirs
- Las Vegas Wash

LVW7.2	Sampling Location
ND<0.95	Perchlorate (µg/L)
77	Chlorate (µg/L)
1,300	TDS (mg/L)

**Perchlorate loading to C-1 Channel:**  
 1.43 lb/day from C1 Channel 1-W  
 0.26 lb/day from C1 Channel 1-E

Notes:  
 Dup= Duplicate  
 ND= Not detected at or above laboratory reporting limit shown  
 Samples were collected on 02-05-2020 and 02-06-2020  
 There was no flow at C12 Channel 2; no sample was collected



**PRELIMINARY LAS VEGAS WASH SAMPLING RESULTS - February 2020**

Nevada Environmental Response Trust

Henderson, Nevada

Figure

**1**

DRAFTED BY: ME      DATE: 3/30/2020

PROJECT: 1690011200

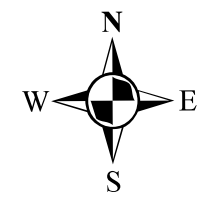
H:\LePetomane\NERT\GIS\Remedial\_Investigation\Phase 3\Phase3\_Mod10\Fig 1- LVW\_February\_Sampling\_2020.mxd

H:\LePetomane\NERT\GIS\Remedial Investigation\Phase 3\Phase3\_Mod10\Fig 2 - Proposed sampling locations.mxd



**Explanation**

- NERT Surface Water Sample
- ▲ USGS Continuous Streamflow Location
- NERT/AMPAC/TIMET/COH Outfall Location
- Weirs
- Las Vegas Wash



**PROPOSED HIGH-FREQUENCY SAMPLING LOCATIONS**

Nevada Environmental Response Trust

Henderson, Nevada

Figure

**2**

DRAFTED BY: ME/JC

DATE: 3/30/2020

PROJECT: 1690011200