

# TECHNICAL MEMORANDUM

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**To:** Brian Loffman, Andrew Steinberg  
Nevada Environmental Response Trust

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**From:** Dan Pastor and Dana Grady, Tetra Tech

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**Date:** July 30, 2019

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**Subject:** Treatability/Pilot Study Modification No. 8 – Galleria Drive Bioremediation Treatability Study  
Nevada Environmental Response Trust Site, Henderson, Nevada

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On behalf of the Nevada Environmental Response Trust (NERT), Tetra Tech prepared this technical memorandum to modify the scope of work for implementing Phase 2 of the Galleria Drive Bioremediation Treatability Study. As presented in the Galleria Drive Bioremediation Treatability Study Work Plan (Work Plan) (Tetra Tech, 2017) and the Galleria Drive Bioremediation Treatability Study Work Plan Addendum (Work Plan Addendum) (Tetra Tech, 2019), approved by the Nevada Division of Environmental Protection (NDEP) on October 31, 2017 and May 1, 2019, respectively, an in-situ bioremediation (ISB) treatability study will be performed in the Upper Muddy Creek formation (UMCf) within the Eastside Study Area along Galleria Drive (Figure 1) to support remedy selection as part of the Remedial Investigation and Feasibility Study process.

The Galleria Drive Bioremediation Treatability Study will evaluate the feasibility and effectiveness of ISB to reduce contaminant mass flux at the mid-plume containment and mass removal boundary, which is a remedial action objective. The scope of work identified in the Work Plan and Work Plan Addendum was to be implemented on parcel 160-31-801-002, owned by Basic Environmental Company (BEC) and identified on Figure 1. Resulting from dialogue between the Trust and BEC surrounding future development and potential sale of the above-mentioned parcel, the Trust directed Tetra Tech to evaluate nearby parcels to identify potential new locations to implement the treatability study, with minimal impact to the scope of the Work Plan Addendum. A parcel located approximately 1,500 feet west of the original location specified in the Work Plan has been selected to be assessed for applicability to implement the Phase 2 activities described in Work Plan Addendum. This Treatability/Pilot Study Modification No. 8 identifies the location and data to be collected to evaluate whether the new area is appropriate for the relocation of Phase 2 treatability study activities. In addition to the objectives of the treatability study summarized in the Work Plan Addendum, this new location also has an advantage of implementing a remedial technology in a public right-of-way, which will likely be required during full-scale remedy implementation due to the existing infrastructure and on-going development in the vicinity of Galleria Drive.

Because implementation of the treatability study is considered Phase 2, the initial work described in this modification to confirm the location will be termed Phase 2a. Following completion of Phase 2a field activities, the results will be evaluated to determine if this area is appropriate for relocation. The results from Phase 2a and final recommendations for Phase 2b (implementation of the treatability study) will be summarized in a follow-up modification memorandum.

## 1.0 LOCATION

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The selected new location to be assessed for the Galleria Drive Bioremediation Treatability Study is approximately 1,500 feet southwest of the currently approved location and includes the BEC-owned parcel 160-31-801-003, as well as surrounding public Right-of-Way parcels 160-31-499-004 and 160-31-899-006, as shown on Figure 2. Minor adjustment to the well locations may be required if existing utilities are identified at the proposed drilling locations. Tetra Tech is working with the Trust, the City of Henderson, and other service providers to identify the location of any buried utilities in the right-of-way parcels prior to drilling. Additionally, the Trust has been advised that potential development or sale of the BEC parcel will not affect implementation of this study.

## 2.0 NEW STUDY AREA EVALUATION

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The selected new study area identified in Section 1.0 will be investigated to assess whether the site conditions, including groundwater flow patterns, local hydrogeologic conditions, groundwater geochemistry, and perchlorate/chlorate distribution, are sufficiently similar to the approved location to support implementing the Work Plan Addendum. Data collected during the remedial investigation and the Phase 1 pre-design activities associated with the previous Galleria Drive Bioremediation Treatability Study location and nearby Galleria Drive Zero-Valent Iron Treatability Study were reviewed to minimize the scope required to assess this new study area for relocation. Taking into consideration the available data, the proposed Phase 2a activities selected for this evaluation include the following:

- Monitoring Well Installation – Four monitoring wells will be installed at the new study area, as identified in Figure 2. The monitoring well locations were selected to provide a spatial distribution of data for both groundwater concentrations and hydraulic properties, as well as maximize the likelihood of their reuse as Phase 2b monitoring wells during the treatability study. It is anticipated that two of the four monitoring wells installed will be directly located within the final treatability study footprint and therefore, can be used as upgradient and/or downgradient monitoring wells. Each drilling location will be cleared to a depth of 10 feet below ground surface (bgs) by air knife operations to ensure the area is clear of utilities. Each boring will be advanced to a depth of up to 100 feet bgs or less if semi-consolidated UMCf is encountered at a shallower depth. During this investigation, soil samples will be collected on approximate 10-foot intervals from the top of the water table to the bottom of the boring and analyzed for perchlorate at each of the four new locations. Upon completion of each boring, a monitoring well will be installed. Each monitoring well will be constructed with 2-inch diameter Schedule 40 polyvinyl chloride (PVC) casing and screened with 2-inch diameter slotted PVC well screen. The total well depth, slot size, filter pack, and length of the well screens will be determined in the field based on lithology encountered. All wells will be completed with flush-mounted, traffic-rated well boxes, at an elevation approximately 0.5-inch above grade. All monitoring wells will be installed, developed, and sampled in accordance with the approved Work Plan and approved *Field Sampling Plan, Revision 1* (ENVIRON, 2014).

Continuous soil cores will be logged by a Tetra Tech geologist from ground surface to total depth using the Unified Soil Classification System. Photographs of soil cores will be collected during drilling activities. Once all monitoring wells are installed, each will be surveyed by a Nevada-licensed land surveyor to obtain the elevations of the ground surface and top of well casing measuring points relative to North American Vertical Datum 88. Investigation-derived waste generated will be disposed of off-site as a non-hazardous waste.

- Groundwater Sampling – Following completion of well development, groundwater levels will be gauged in the four newly installed wells and six existing nearby monitoring wells (DM-5, ES-11, ES-36, ES-42, MCF-05, and MCF-20A), for use in potentiometric contouring. Groundwater samples will be collected from the four new wells using low-flow purging and sampling techniques following the guidance of the *Field Sampling Plan, Revision 1* (ENVIRON, 2014). Groundwater samples will be analyzed for perchlorate,

chlorate, nitrate, total organic carbon, sulfate, and total dissolved solids. Field parameters including temperature, pH, turbidity, electrical conductivity, dissolved oxygen, and oxidation reduction potential will be collected during sampling activities. Purge water generated during groundwater sampling activities will be temporarily stored in 55-gallon drums and transferred into the GW-11 Pond for onsite treatment in the groundwater extraction and treatment system.

- Slug Testing – The newly installed wells will be slug tested in general accordance with the ASTM International (ASTM) Standard D4044-96 (ASTM International, 2008) as described in the Work Plan Addendum.

A subsequent Treatability/Pilot Study Modification will summarize the results of the Phase 2a activities and, upon Trust concurrence, present the basis for relocation of the treatability study.

### 3.0 SCHEDULE

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Phase 2a activities will begin upon NDEP approval of this Treatability/Pilot Study Modification, final access approvals, agency approval of all necessary monitoring well permits, and first availability of the drilling subcontractor. Once approvals are in place, it is anticipated that this field work, including well installation, groundwater sampling, and aquifer testing will take approximately three weeks to complete. Every effort will be made to expedite the work described herein and minimize impact to the treatability study project schedule. The current projected schedule includes beginning field activities in August 2019. Following completion of the field work and evaluation of results, a subsequent treatability/pilot study modification memorandum will be submitted in late September 2019 to summarize the data and formally move the study to this location if deemed appropriate.

### 4.0 REFERENCES

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- ENVIRON. (2014). *Field Sampling Plan, Revision 1, Nevada Environmental Response Trust Site, Henderson, Nevada*. July 18, 2014.
- Tetra Tech. (2017). *Galleria Road Bioremediation Treatability Study Work Plan, Nevada Environmental Response Trust, Henderson, Nevada*. October 6.
- Tetra Tech. (2019). *Galleria Drive Bioremediation Treatability Study Work Plan Addendum, Nevada Environmental Response Trust, Henderson, Nevada*. March 29.

## CERTIFICATION

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### Treatability/Pilot Study Modification No. 8 – Galleria Drive Bioremediation Treatability Study

**Nevada Environmental Response Trust Site  
(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 systems(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, not individually, but solely in its representative capacity as the Nevada Environmental Response Trust Trustee

Not Individually, but Solely  
as President of the Trustee

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

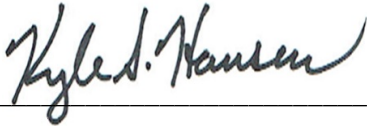
**Date:** 7/30/19

## CERTIFICATION

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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 prepared 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. I hereby certify that all laboratory analytical data was generated by a laboratory certified by the NDEP for each constituent and media presented herein.

**Description of Services Provided:** Prepared the Treatability/Pilot Study Modification No. 8 for the Galleria Drive Bioremediation Treatability Study.



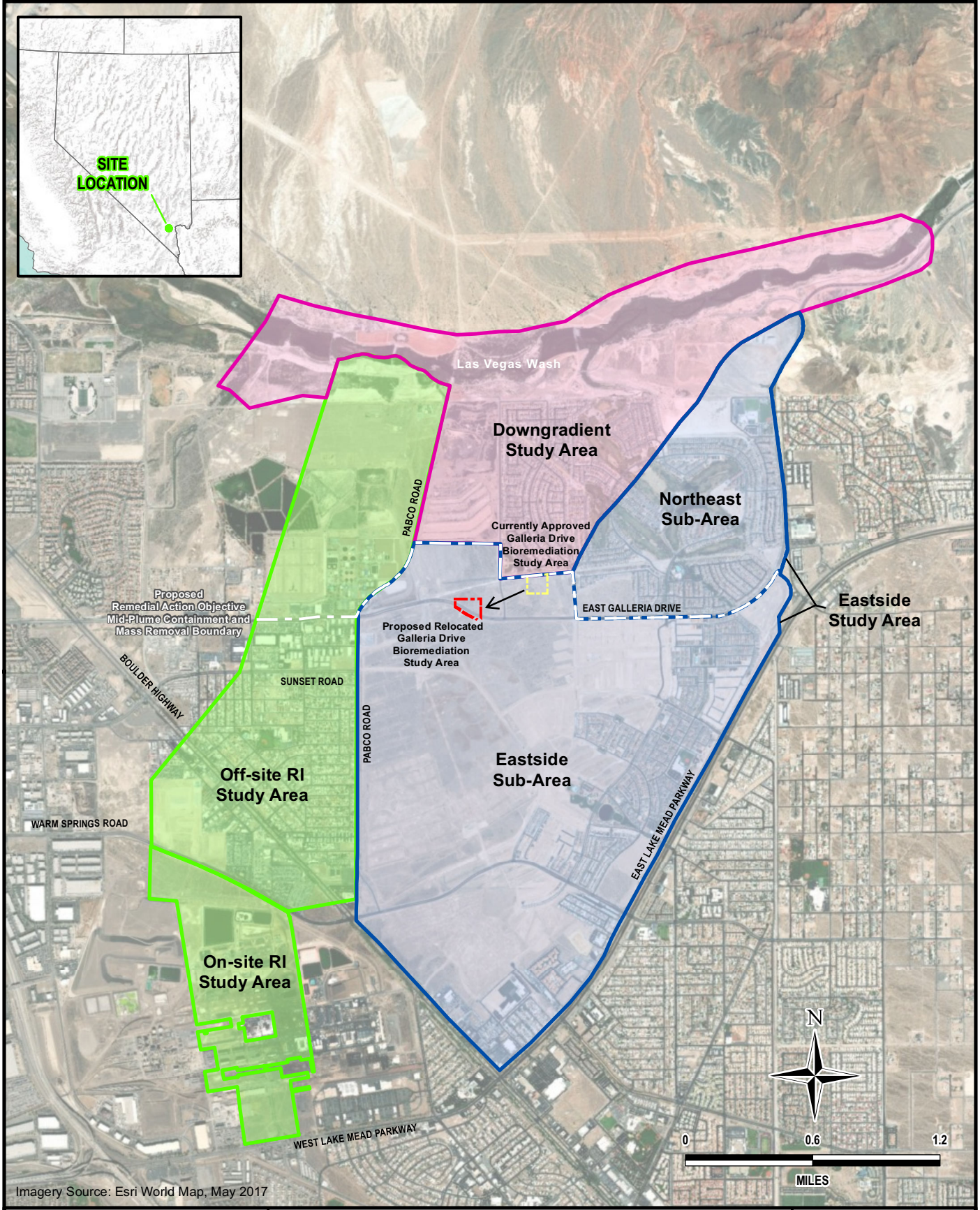
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**Kyle Hansen, CEM**  
Field Operations Manager/Geologist  
Tetra Tech, Inc.

July 30, 2019

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Date

Nevada CEM Certificate Number: 2167  
Nevada CEM Expiration Date: September 18, 2020

# Figures



Imagery Source: Esri World Map, May 2017

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NEVADA ENVIRONMENTAL RESPONSE TRUST

TREATABILITY/PILOT STUDY MODIFICATION NO. 8  
GALLERIA DRIVE BIOREMEDIATION TREATABILITY STUDY

**TREATABILITY STUDY LOCATION**

PROJECT NO.: 117-7502019

DATE: JULY 15, 2019

DESIGNED BY: ES

Figure No.

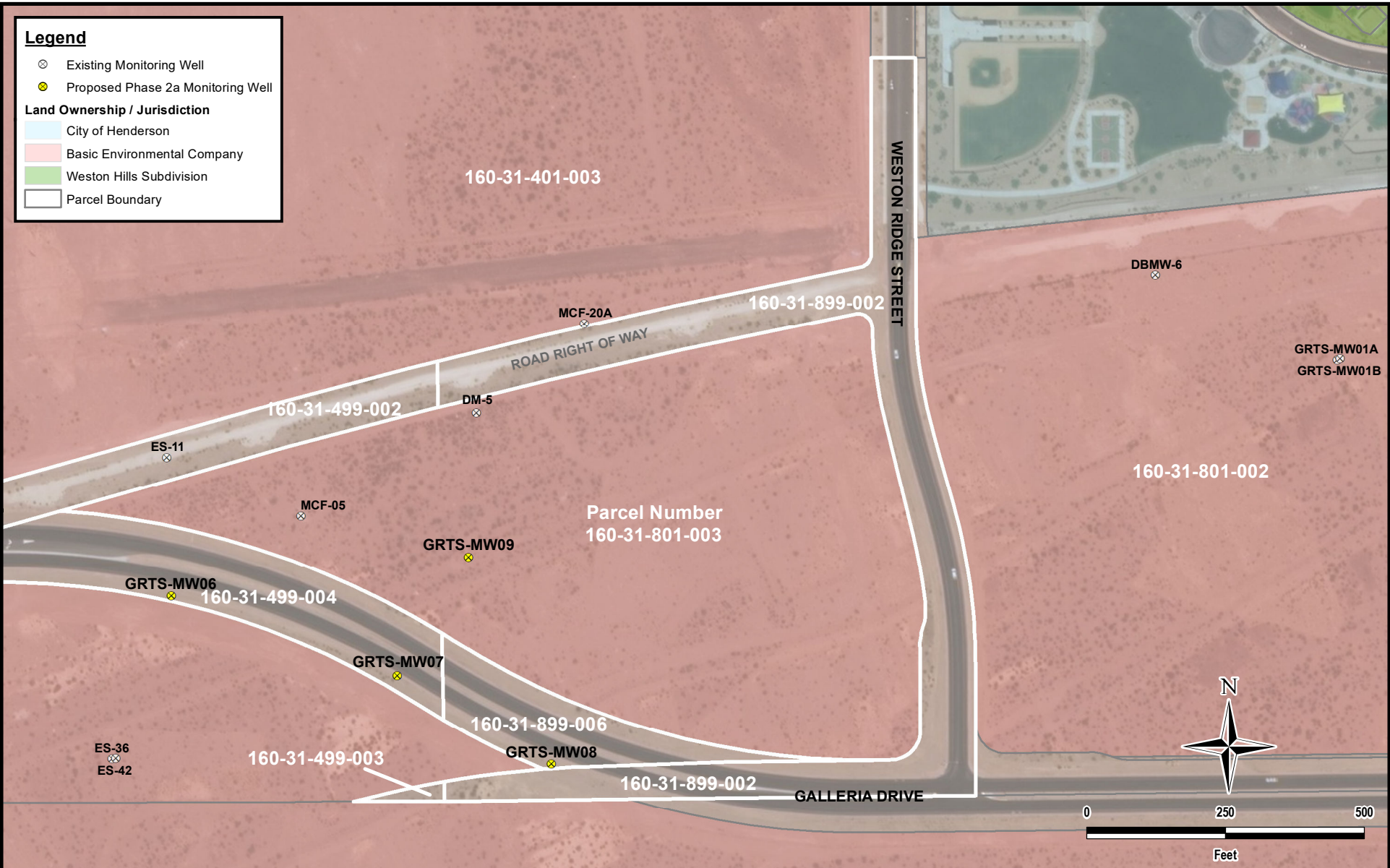
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**Legend**

- ⊗ Existing Monitoring Well
- ⊗ Proposed Phase 2a Monitoring Well


**Land Ownership / Jurisdiction**

- City of Henderson
- Basic Environmental Company
- Weston Hills Subdivision
- Parcel Boundary



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Imagery Source: Esri World Map, May 2017.

 <b>TETRA TECH</b> www.tetratech.com 150 S. 4th Street, Unit A Henderson, Nevada 89015 Phone: (702) 854-2293	NEVADA ENVIRONMENTAL RESPONSE TRUST	Project No.: 117-7502019
	TREATABILITY/PILOT STUDY MODIFICATION NO. 8 GALLERIA DRIVE BIOREMEDIATION TREATABILITY STUDY	Date: JULY 19, 2019 Designed By: ES
<b>PROPOSED PHASE 2A LAYOUT</b>		Figure No. <b>2</b>