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LAS VEGAS WASH ZVI-ENHANCED BIOREMEDIATION TREATABILITY STUDY PHASE 2 COST ESTIMATE AND BASIS

NEVADA ENVIRONMENTAL RESPONSE TRUST SITE HENDERSON, NEVADA

CONTENTS

TABLES

ACRONYMS AND ABBREVIATIONS

BEC	Basic Environmental Company
bgs	below ground surface
cm/s	centimeters per second
COH	City of Henderson
CSU	Colorado State University
CY	cubic yards
DES	Department of Environment and Sustainability
EB	equipment blank
FB	field blank
FBR	fluidized bed reactor
FD	field duplicate
GWETS	Groundwater Extraction and Treatment System
HSA	hollow stem auger
IDW	investigation-derived waste
MS/MSDs	matrix spike/matrix spike duplicates
NAC	Nevada Administrative Code
NDEP	Nevada Division of Environmental Protection
NERT	Nevada Environmental Response Trust, or Trust
NIOSH	National Institute for Occupational Safety and Health
ODCs	other direct costs
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
RACER	Remedial Action Cost Engineering Requirements
Ramboll	Ramboll US Consulting, Inc.
RI	Remedial Investigation
TB	trip blank
Transect 1A	Las Vegas Wash Transect 1A
UAV	unmanned aerial vehicle
UIC	Underground Injection Control
UMCf	Upper Muddy Creek formation
USACE	United States Army Corps of Engineers

USEPA	United States Environmental Protection
Work Plan Addendum	Las Vegas Wash ZVI-Enhanced Bioremediation Treatability Study Work Plan Addendum
ZVI	Zero-Valent Iron

1. BACKGROUND

At the request of the Nevada Environmental Response Trust (NERT or the Trust), Ramboll US Consulting, Inc. (Ramboll), has prepared this cost estimate and basis to implement Phase 2 of the Las Vegas Wash Zero-Valent Iron (ZVI)-Enhanced Bioremediation Treatability Study. This treatability study is being conducted in an area downgradient of the Nevada Environmental Response Trust Site (NERT Site) and upgradient of the Las Vegas Wash within Operable Unit 3 (OU-3) of the NERT Remedial Investigation (RI) Study Area in Clark County, Nevada. Specifically, the field test would be implemented within the Transect 1A Study Area (Transect 1A) on parcel 160-31-501-005, located on City of Henderson (COH) property.

The implementation of the treatability study is divided into two phases:

- Phase 1 consisted of specific, pre-design investigation activities to gather additional, site-specific information required to finalize the field test design. Phase 1 activities and results are presented in the Las Vegas Wash ZVI-Enhanced Bioremediation Treatability Study Work Plan Addendum (Work Plan Addendum; Ramboll, 2021).

- Phase 2 activities will consist of implementing a field test of ZVI-enhanced bioremediation as described in the Work Plan Addendum.

The cost estimate and basis to implement Phase 2 of the Las Vegas Wash ZVI-Enhanced Bioremediation Treatability Study, as detailed in the Work Plan Addendum, are presented herein. These estimated costs are based on currently available information resulting from Phase 1 pre-design field investigations and testing activities and key assumptions presented in the basis of estimate discussions in Section 4. Subcontractor costs are based on budgetary estimates provided by qualified subcontractors[1] with direct experience in executing similar projects.

[1] The costs presented herein are based on contractor quotes received to date and assume labor and laboratory costs are constant for the duration of the field test. Bids will be requested from contractors during contractor procurement. Material changes to the cost estimate will be approved by the Trust prior to field implementation.

2. PHASE 2 SCOPE OF WORK

As presented in the Work Plan Addendum, the Phase 2 field test of ZVI-enhanced bioremediation will involve implementation and performance monitoring of two ZVI emplacement methods within Transect 1A. Five discretely monitored tests (Tests 1a, 1b, 2a, 2b, and 2c) will be conducted to evaluate different configurations and dosages of ZVI in accordance with the objectives of the field test as described in the Work Plan Addendum.

The following test areas will be constructed for evaluation:

- Test 1a – Continuous ZVI wall (lower ZVI dosage) with a 10 percent granular ZVI (by weight) and 90 percent sand/pea gravel mixture in the alluvium constructed using one-pass trenching.
- Test 1b – Continuous ZVI wall (higher ZVI dosage) with a 30 percent granular ZVI (by weight) and 70 percent sand/pea gravel mixture in the alluvium constructed using one-pass trenching.
- Test 2a – Discontinuous ZVI Wall of two arrays of ZVI-filled borings with a 50 percent granular ZVI (by weight) and 50 percent sand mixture in the alluvium constructed using hollow stem auger (HSA) drilling.
- Test 2b – Discontinuous ZVI Wall of two arrays of ZVI-filled borings with a 50 percent granular ZVI (by weight) and 50 percent sand mixture in the alluvium and Upper Muddy Creek formation (UMCf) constructed using HSA drilling.
- Test 2c – Discontinuous ZVI Wall of three arrays of ZVI-filled borings with a 50 percent granular ZVI (by weight) and 50 percent sand mixture in the alluvium and UMCf constructed using HSA drilling.

The cost estimate and basis of estimate presented in this document have been organized into two main tasks, as described below. Applicable sections from the Work Plan Addendum have been provided in parentheses for reference.

- Task 1: ZVI Field Test Implementation
    - Update of access agreements and completion and submission of required permitting applications (Task 1.1 in Section 4.1.1 below and Section 9.0 of the Work Plan Addendum).
    - Advance pre-construction pilot borings and install baseline monitoring wells; complete a pre-construction topographical survey (Task 1.2 in Section 4.1.2 below and Section 7.6.5 of the Work Plan Addendum)
    - Conduct baseline groundwater and limited biological sampling, and aquifer testing (Tasks 1.3 and 1.4 in Sections 4.1.3 and 4.1.4 below and Section 8 of the Work Plan Addendum)
    - Implementation of site preparation activities, including subsurface utility clearing, clearing and grubbing, installation of soil erosion and sediment control measures, set up of temporary construction facilities, and site grading (Task 1.5 in Sections 4.1.5.1 through 4.1.5.6 below and Section 7.6.6 of the Work Plan Addendum).

  - Improvements to existing roads and construction of temporary access roads and staffing areas (Task 1.5 in Section 4.1.5.7 below and Section 7.6.6 of the Work Plan Addendum).
  - Bench down excavation and backfilling for continuous ZVI walls installed within a single trench (Task 1.5 in Section 4.1.5.8 below and Section 7.6.1 of the Work Plan Addendum).
  - Construction layout and as-built surveying (Task 1.5 in Section 4.1.5.9 below).
  - Installation of the continuous ZVI walls – Test 1a/1b within a single trench (Task 1.6a in Section 4.1.6.1 below and Section 7.6.1 of the Work Plan Addendum)
  - Installation of discontinuous ZVI-filled boring arrays – Test 2a/2b/2c (Task 1.6b in Section 4.1.6.2 below and Section 7.6.2 of the Work Plan Addendum)
  - Installation of post-construction performance monitoring wells, and inoculum and nutrient injection points (Task 1.7 in Section 4.1.7 below and Sections 7.6.3 and 7.6.4 of the Work Plan Addendum)
  - Implementation of the Performance Monitoring Program, including aquifer testing, groundwater sampling, and hydraulic monitoring (Tasks 1.8 and 1.9 in Sections 4.1.8 and 4.1.9 below and Section 8 of the Work Plan Addendum)
- Task 2: Reporting
  - Preparation and submission of Underground Injection Control (UIC) Semi-Annual Reports as required by the UIC Permit (Section 4.2 below and Section 9.2.4 of the Work Plan Addendum)
  - Preparation and submission of an Annual Extraction Report as required by the Water Appropriations Permit (Section 4.2 below and Section 9.2.5 of the Work Plan Addendum)
  - Preparation and submission of Monthly Progress Reports (Section 4.2 below and Section 10 of the Work Plan Addendum)
  - Preparation and submission of the Las Vegas Wash ZVI-Enhanced Bioremediation Treatability Study Final Report (Section 4.2 below and Section 10 of the Work Plan Addendum)

3. COST ESTIMATE

The estimated budget to complete the Las Vegas Wash ZVI-Enhanced Bioremediation Treatability Study Phase 2 activities is summarized in the attached Table 1. This cost estimate is based on the scope of work presented in the Work Plan Addendum. These estimated costs are based on currently available information resulting from the Phase 1 pre-design field investigations as well as testing activities and key assumptions presented in the basis of estimate discussions in Section 4. Subcontractor costs are based on budgetary estimates provided by qualified subcontractors with direct experience in executing similar projects.

4. BASIS OF ESTIMATE

The scope of work described in the Work Plan Addendum includes pre-construction tasks specifically designed to determine the final alignment and subsurface design of the ZVI reactive zones for the Test 1a/1b and Test 2a/2b/2c areas. Therefore, Ramboll has included assumptions, detailed in the subsections below, to develop the basis of estimate for components to the Phase 2 field test design (e.g., final quantities of ZVI and sand, final depth of ZVI wall and boring array installations).

Ramboll's cost estimates were developed using standard cost estimating methods and in general conformance with the United States Environmental Protection (USEPA) and United States Army Corps of Engineers (USACE) guidelines (USEPA and USACE, 2000) in addition to local unit pricing, where appropriate. To arrive at a reasonable cost estimate, various assumptions based on available data and outlined below were made regarding means and methods for implementation. Although some of these assumptions and corresponding means and methods could change during any future design and contractor bidding processes, the estimates establish a reasonable basis for cost projections based on currently available information. Construction quantities were defined from available data and information as well as assumptions regarding the configuration of the test areas. For certain activities where quantities (e.g., excavation or borehole depths and volumes, grading volumes) could not be fully defined based on available data, these quantities were assumed based on available hydrogeological data, topographical data, and professional experience with similar projects. Unit costs and production rates[2] used in the remedial cost estimates were defined based on a combination of: (a) quotes obtained from contractors in May 2021 for drilling, trenching, injection, and site preparation and improvement; (b) quotes obtained from suppliers of materials (e.g., ZVI, sand, pea gravel); (c) published remedial unit costs in the United States (e.g., RS Means, Remedial Action Cost Engineering Requirements [RACER®] System) that were adjusted using location cost indexes for Las Vegas, Nevada; (d) prior cost estimates developed by others for implementation of investigations and field tests at the NERT site, including the Las Vegas Wash Bioremediation Pilot Study (Tetra Tech, 2019); (e) Ramboll's professional experience at the NERT site with applicable field procedures; and (f) Ramboll's professional experience with similar projects. The unit pricing used in the cost estimates is inclusive of labor, equipment, materials, and contractor overhead and profit, unless otherwise indicated.

While some of the proposed activities will include construction means and methods not previously implemented within the NERT RI Study Area, Ramboll anticipates that many of the procedures implemented during the Las Vegas Wash ZVI-Enhanced Bioremediation Treatability Study will be similar to those used in other treatability studies performed in the NERT RI Study Area, with lessons learned from those studies incorporated to provide cost efficiencies where applicable. These include the advancement of boreholes and installation of monitoring wells, site preparation activities, and shallow excavations. While conservative assumptions have been made where information is not currently well known, prior to implementation of the Work Plan Addendum, certain key design elements will be need to be finalized: (1) the final configuration (e.g., target depth, dimension) and orientation of ZVI

[2] Where quoted unit costs and pricing were used to develop the cost estimate, it is assumed that these will remain unchanged for the duration of the field test.

reactive zones, based on the findings of the pre-construction activities, baseline sampling results and ongoing groundwater modeling; and (2) potential modifications to the ZVI dosages for each installation and extent of the ZVI reactive zone for the ZVI borings. Any potential modifications, along with the basis for such modifications, will be presented in a Treatability Study Modification which will be submitted to NDEP for approval.

Finally, Ramboll's scope includes program management related activities for the duration of the project, which include communications and updates to the Trust as requested and standard program management activities related to staffing, safety, procurement, document control, document quality reviews, cash flow forecasting, scheduling, insurance, subcontractor management, submittal reviews, and overall project coordination with NDEP and the Trust.

The basis of estimate and key assumptions are outlined in the following subsections for each of the tasks described in Section 2.

4.1 Task 1 – ZVI Field Test Implementation

The following subsections present the basis of costs and associated key assumptions for implementation of the ZVI field test, as detailed in the Work Plan Addendum and presented in Table 1. General Assumptions associated with Task 1 are as follows:

- Estimated Ramboll labor includes:
    - project management and planning, task preparation and coordination, and procurement;
    - field oversight and documentation;
    - operations, monitoring, and maintenance;
    - hydraulic/aquifer testing and soil, sludge, and groundwater sampling activities;
    - data compilation, evaluation and modeling;
    - data management and validation;
    - report, figures, tables and supporting documents preparation; and
    - preparation for and attendance in meetings.
- Subcontractor costs include non-union, non-prevailing wage labor; equipment, materials, and supplies (unless otherwise noted); and travel and expenses.
- Travel and expenses for Henderson-based Ramboll staff will be utilized to the maximum extent possible; however, local staff may not be available depending on the timing of the field activities and commitments on other NERT tasks. It is assumed that one Henderson staff will participate in all field tasks. As a result, the budget includes travel costs for non-Henderson staff when required to provide a conservative budget estimate. Travel allocations include airfare, lodging, per diem, rental vehicles, and fuel. The staffing assumptions are defined in each task.
- No conflict resolution will be required with other activities conducted in the proposed work areas.

- Work will be performed Monday to Friday from 06:00 to 18:00, with no noise control or monitoring requirements, in accordance with the COH Noise Control Code of Ordinances for building operations (City of Henderson, 2020; Chapter 8.84). Nonetheless, noise levels will be maintained below the National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure limit of 85 decibels at the limits of the work areas.

4.1.1 Access, Permitting, Design and Procurement (Task 1.1)

Task 1.1 (Access and Permitting) includes labor and associated fees to procure an access agreement and multiple permits required prior to performing pre-construction and field test implementation associated with the treatability study, including COH license location authorization for access and affidavits to NDWR for well installation. In addition, costs have been included as part of this task for (a) revising the design of the field test, as needed, following completion of the pre-construction activities (Tasks 1.2 through 1.4) in support of permitting and contractor procurement activities; and (b) preparation of bid documents and procurement of subcontractors. Detailed discussions of access negotiations and permitting for the Phase 2 activities are presented in Section 9 of the Work Plan Addendum.

4.1.1.1 Access

The field work will be performed under an access agreement that is being negotiated between the Trust and the COH for the Transect 1A Study Area parcel (APN: 160-31-501-005). As of the date of this document, the COH has initially accepted the field test efforts presented in the Work Plan Addendum and the Trust continues its efforts with the COH to procure access. Key assumptions regarding access include the following:

- The Trust will secure all necessary access for Ramboll and its subcontractors to complete all Phase 2 activities described in the Work Plan Addendum. Ramboll will support the Trust by preparing figures and other necessary documentation to the COH.
- Subject to the currently assumed conditions of the access agreement, as indicated by the Trust, only the ZVI wall, ZVI boring arrays and certain groundwater monitoring wells will remain in place following completion of the Phase 2 field test. Site restoration activities will be limited to dismantling the staging areas and temporary roads, removing all excess materials, and grading the site to promote drainage away from the test area. No revegetation is included in the site restoration activities.
- Project delays or requirements that result in changes to the planned implementation activities have not been included in the estimated costs and will affect the overall projected schedule and costs.

Any material changes to the proposed Phase 2 field test which result from the finalization of an access agreement with the COH will be presented in a Treatability Study Modification which will be submitted to NDEP for approval.

4.1.1.2 Permitting

Costs for preparation and submission of the following anticipated permits have been included in support of the treatability study. Applicable permit fees are excluded from the

cost estimate, as permit fees will be paid directly by the Trust. Key assumptions are as follows:

- County Permitting – In accordance with the requirements of the Clark County Department of Environment and Sustainability (DES), a dust control permit will be required due to activities resulting in soil disturbance greater than 0.25 acres. The permit will be procured prior to initiating any earthmoving activities. It is anticipated that the dust control permit will require daily monitoring for particulates, implementation of best management practices, and that dust suppression measures (e.g., wetting of surfaces) be readily implementable to mitigate excessive dust generated by the construction activities. No air permitting other than dust control is anticipated.
- Nevada Construction Stormwater General Permit – A Nevada Construction Stormwater General Permit is required due to cumulative, construction-related disturbances that are expected to exceed one acre. Procurement of this permit includes:
    - Filing a Notice of Intent with the NDEP to request authorization under the general permit;
    - Preparation of a stormwater pollution prevention plan as required by the general permit;
    - Implementation of soil erosion and sediment control measures around work areas; and
    - Filing a Notice of Termination after final site stabilization, as required by the general permit.
- Well Installation Permits – Field test activities include the installation of monitoring wells and injection wells by a licensed driller[3]. Procurement of the required well installation permits includes:
    - Filing for a Nevada Administrative Code (NAC) 534.441 Monitoring Well Drilling Waiver and a NAC 534.320 Notice of Intent Card prior to installation of monitoring wells and injection wells (as applicable).
- UIC Permits – The Bureau of Water Pollution Control (UIC Program) at NDEP administers permits for the injection of materials into the saturated subsurface. It is anticipated that new UIC permit applications will be required for the following activities:
    - Emplacement of ZVI: It is anticipated that separate permits will be required for each of the ZVI emplacement methods (including the recirculation of groundwater for the trenching method) described in Sections 7.4 and 7.6 of the Work Plan Addendum.

[3] Well abandonment following completion of the treatability study will be subject to the terms of the access agreement between the Trust and the COH, which will be finalized concurrent with NDEP review and approval of this Work Plan Addendum. Well abandonment activities have not been included in the estimated costs.

  - Single-borehole dilution tests: NDEP U240 Chemical Use Request Forms will be completed and submitted as needed prior to performing additional, single-borehole dilution tests.
  - Inoculum: As discussed in Section 7.6.3 of the Work Plan Addendum, biological inoculum (fluidized bed reactor [FBR] solids) or a processed/enriched supernatant from the sludge will be injected following construction of the ZVI walls to accelerate the onset of perchlorate reduction.
  - Amendments: As indicated in Section 7.6.3 of the Work Plan Addendum, nutrient amendments will be injected following construction of the ZVI walls to stimulate development of a robust, perchlorate-reducing biological community.

- Water Appropriation Permit – Pursuant to Nevada Revised Statutes 533.335 and 533.437, a Permit to Appropriate the Public Waters of the State of Nevada for Environmental Purposes (Water Appropriation Permit) will be required to support the extraction of groundwater from (a) the temporary large diameter well casing as part of the ZVI emplacement method described in Section 7.6.1 of the Work Plan Addendum and (b) select monitoring wells for use as chase water during the one-time injection of inoculum and nutrients described in Section 7.6.3 and Appendix I of the Work Plan Addendum.

4.1.2 Pre-Construction Activities (Task 1.2)

Task 1.2 (Pre-Construction Activities) includes Ramboll labor and travel expenses, subcontractor costs, materials and supplies (unless otherwise noted) associated with the pre-construction topographical survey, pilot boring advancement, monitoring well, and laboratory testing activities. The data collected from these pre-construction activities will be used to finalize the design alignment and terminal depths of both the 200-foot long Test 1a/1b and the approximately 60-foot long Test 2a/2b/2c, and they will also be used to define the proposed temporary site construction improvements (refer to Section 4.1.5). Key assumptions are provided for each activity in the following subsections.

4.1.2.1 Pre-Construction Topographical Survey

A topographical survey of existing conditions will be completed using an unmanned aerial vehicle (UAV). The survey will be complemented by the collection of high-resolution aerial imagery. The UAV data files will be provided to a Nevada-licensed land surveyor for processing and creating a one-foot contour topographic survey of the site based on ground controls it will establish (refer to Section 4.1.5.9). The cost estimate includes completion of the UAV survey, post-processing of the data collected, stitching of a high-resolution image of the work areas, and preparation of a topographical map with one-foot contours by a Nevada-licensed land surveyor.

4.1.2.2 Pre-Construction Pilot Borings

As described in Section 7.6.5 of the Work Plan Addendum, pre-construction soil borings will be advanced in two phases to (a) define potential variations in the hydrogeologic profile in the area and select the final position of the Test 1a/1b and Test 2a/2b/2c ZVI walls and additional pre-construction pilot borings; and (b) to inform the alignment and target depths

of Test 1a/1b and Test 2a/2b/2c areas. In addition, as part of the pre-construction activities:

- Four samples from these bench-scale testing columns, which have been preserved at the University of Nevada at Las Vegas, will be analyzed by X-ray diffraction by Eurofins EAG Materials Science, LLC, of Carol Stream, Illinois, or Surface Science Western of Ontario, Canada, to determine the composition of observed mineral precipitation in the ZVI and sand mixture (refer to Section 7.6.5 of the Work Plan Addendum);

- Site-specific passivation rates will be measured by PRIMA Environmental, Inc., in a focused laboratory test using site groundwater and ZVI (refer to Section 7.6.5 of the Work Plan Addendum); and

- Biological inoculum will be developed by SiREM from a sample of the on-site FBR solids (refer to Section 7.6.3 of the Work Plan Addendum).

The cost estimate includes the advancement of the following borings:

- Initial pre-construction borings (refer to Figure 7-11 in the Work Plan Addendum)
    - six soil borings to a depth of 75 feet below ground surface (bgs)
    - 11 soil borings to a depth of 40 ft bgs
- Test 1a/1b area pre-construction borings (refer to Figure 7-6 in the Work Plan Addendum)
    - four soil borings to a depth of 35 ft bgs
    - two soil borings to a depth of 48 ft bgs
- Test 2a/2b/2c area pre-construction borings (refer to Figure 7-9 in the Work Plan Addendum)
    - six soil borings to a depth of 35 ft bgs
    - two soil borings to a depth of 55 ft bgs
    - two soil borings to a depth of 75 ft bgs

Key assumptions include the following:

- 6.25- or 8.5-inch diameter borings will be advanced by a licensed driller using rotary sonic drilling methods. The smaller borehole will be used for the two-inch diameter monitoring wells and the larger borehole for the four-inch diameter monitoring wells (refer to Section 4.1.2.3).
- Drilling costs include air knifing operations or hand augering for subsurface utility clearance of the drilling locations and daily watering of the area to comply with the dust control permit.
- Soil cores will be logged for soil lithology by Ramboll personnel, with saturated soil samples collected from the alluvium and UMCf along each boring in Transect 1A for

geotechnical and biological characterization as described in Sections 7.6.5 and 8.9.2 of the Work Plan Addendum and associated chemical analysis of the soil samples. The following sampling and analytical costs are included in this task:

  - 16 undisturbed soil samples (two from the alluvium and two from the UMCf from each location) will be collected from four of the initial pre-construction borings and submitted to Geotechnical and Environmental Services, Inc. (Las Vegas, Nevada), for geotechnical testing. The Shelby tube samples will be subjected to specific gravity, moisture content, hydraulic conductivity, Atterberg limits, particle size distribution, and density testing.

- Nine soil samples (five from the alluvium and four from the UMCf) will be collected during the pre-construction borings for chemical analyses. These samples will be submitted to Eurofins TestAmerica Laboratories (Phoenix, Arizona) or Pace Analytical (Las Vegas, Nevada) for analysis of perchlorate, chlorate, nitrate, total chromium, and total organic carbon. In addition, the following quality assurance/quality control (QA/QC) samples[4] will be collected and analyzed: one field duplicate (FD) sample and one equipment blank (EB) sample (no field blank [FB], trip blank [TB], or matrix spike/matrix spike duplicates (MS/MSDs) will be collected). Data validation costs for the pilot boring soil sampling event are based on validation of 11 soil samples (nine samples plus two QA/QC samples). Data validation will be performed as described in Section 8.2.1 of the Work Plan Addendum.
- Four bulk samples (two 5-gallon containers each) of the uppermost five feet will be collected from the initial pre-construction borings for geotechnical testing (i.e., standard proctor testing and hydraulic conductivity testing) at Geotechnical and Environmental Services, Inc. (Las Vegas, Nevada).
- The subcontracted drilling estimate was defined from quotes received from Cascade Drilling and BC[2] Environmental both dated May 20, 2021, respectively.
- Estimated geotechnical laboratory costs were obtained from a quote provided by Geotechnical and Environmental Services, Inc. (Las Vegas, Nevada), dated May 18, 2021.
- While samples for the development of the biological inoculum by SiREM will be collected as part of the preconstruction activities, the development of the inoculum was previously authorized by the Trust. However, costs are included herein for completeness.
- The work areas will be secured using typical construction barriers such as metal plates, orange construction fencing, and caution tape for the duration of the drilling activities. In addition, a subcontracted security service will monitor the field area and equipment during non-working hours for the duration of pre-construction boring activities. No allowances have been included to address damage or vandalism of wells or equipment used to perform the work.

[4] Per Quality Assurance Project Plan (QAPP) Revision 6, dated February 24, 2021, the following QA/QC sampling will be conducted on the treatability study samples: (a) Field Duplicates (FD) at a frequency of one FD for every 10 primary samples; (b) Field Blanks (FB) at a frequency of one FB for every 20 primary groundwater samples (does not apply to soil samples); (c) Equipment Blanks (EB) at a frequency of one EB for every 20 primary samples; and (d) Trip Blanks (TB): Not necessary unless sampling for VOCs.

- Investigation-Derived Waste (IDW) generated during drilling activities will be disposed off-site in accordance with applicable federal, state, and local regulations.
    - Liquid waste (i.e., extracted groundwater from monitoring well development and decontamination water) is assumed to be non-hazardous based on existing data and will be temporarily stored in above-ground holding tanks or drums and, as with other liquid IDW generated as part of NERT related field activities, transferred to the GW-11 pond for subsequent treatment. Therefore, the drilling pricing includes costs for liquid waste storage and transfer to the GW-11 pond. No analytical testing for liquid wastes is included in the estimates.
    - Soil cuttings will be containerized in lined, 20-yard roll-off containers or 55-gallon drums that will be located and stored within the staging areas. Costs include waste characterization, transportation, and disposal at a licensed facility, located 37 miles away, of approximately 30 cubic yards (CY) of soil cuttings generated during drilling. It is assumed that excavated soils are non-hazardous and do not require dewatering and/or stabilization prior to transport for disposal. The cost estimate assumes that no hazardous materials will be generated or otherwise encountered that will require transport and disposal of as hazardous wastes. Ramboll will assist the Trust in preparation of manifests and coordinate the Trust's review and signature of manifests.

- Pilot borings and sampling activities are estimated to take 12 days using two drill rigs to complete and will be coordinated and overseen by 3 staff.

4.1.2.3 Pre-Construction Monitoring Well Installation

As described in Section 7.6.5 of the Work Plan Addendum, monitoring wells will be constructed at the 33 pilot boring locations (see Figures 7-6 and 7-9 of the Work Plan Addendum) to be used, in conjunction with data obtained from the pilot borings, to establish baseline conditions at the Test 1a/1b and Test 2a/2b/2c areas.

Key assumptions include the following:

- Monitoring wells will be installed by a licensed driller. The subcontracted well installation estimate, which includes well installation, well development, and daily watering of the area to comply with the dust control permit, was obtained from quotes from Cascade Drilling and BC^2 Environmental – both dated May 20, 2021.
- The work areas will be secured using typical construction barriers such as metal plates, orange construction fencing, and caution tape for the duration of the well installation activities. In addition, a subcontracted security service will monitor the field area and equipment during non-working hours for the duration of pre-construction well installation activities. No allowances have been included to address damage or vandalism of wells or equipment used to perform the work.
- The 17 pre-construction wells to be used for borehole dilution testing (refer to Section 4.1.4) will consist of four-inch diameter, schedule 40 polyvinyl chloride (PVC) casing with four-inch diameter slotted PVC well screen and will be completed with a

flush mount and concrete apron slightly above the surrounding grade. The remaining 16 pre-construction wells will be two-inch diameter wells.

- Well construction will be recorded by Ramboll personnel and monitoring well locations and elevations will be surveyed by a Nevada-licensed land surveyor (as detailed in Section 4.1.5.9).
- The driller will perform well development at least 48 hours after well construction using a surge block and bailer or a pump.
- Liquid wastes will be handled as described in the preceding subsection.
- Pre-construction monitoring well installation and well development will be conducted concurrently with the pilot borings and are estimated to take 3 days beyond the drilling of boreholes to complete using two drill rigs (one staff per drill rig).

4.1.3 Baseline Groundwater Sampling (Task 1.3)

Task 1.3 (Baseline Groundwater Sampling) includes Ramboll labor, travel and expenses, subcontractor costs (includes sampling and analytical costs), materials, supplies, and equipment (unless otherwise noted) associated with the baseline groundwater sampling event. Sampling will be performed in the pre-construction monitoring wells prior to emplacement of ZVI as described in Section 8.3 of the Work Plan Addendum. The cost estimate includes groundwater sample collection by a subcontractor under oversight by Ramboll personnel, laboratory analysis, and data management for samples collected from all existing monitoring wells within each field test area (the LVWPS-MW102 and LVWPS-MW107 monitoring well clusters of two and three wells, respectively, and ZTS-MW-113), as well as 33 pre-construction monitoring wells.

Key assumptions include the following:

- Estimated costs for the sampling subcontractor are based on pricing from OGI Environmental, LLC, dated May 13, 2021.
- Initial pre-construction groundwater samples will be analyzed for perchlorate, chlorate, total dissolved solids, nitrate, sulfate, and dissolved metals (arsenic, calcium, chromium, iron, and manganese).
- Baseline groundwater samples will be analyzed for perchlorate, chlorate, total organic carbon, dissolved organic carbon, total inorganic carbon, dissolved hydrogen, total dissolved solids, total nitrogen, total phosphorus, nitrate, sulfate, sulfide, dissolved metals, alkalinity, and a full cation/anion list.
- Field measurements, such as water level and water quality parameters (oxidation-reduction potential, dissolved oxygen, pH, electrical conductivity, temperature, and turbidity), will be performed at each well using a handheld water level probe and YSI (or comparable) water quality meter. In addition, ferrous iron and sulfide will be analyzed in the field using Hach field kits.
- The initial pre-construction sampling event will include a total of 17 groundwater samples, and the following QA/QC samples: two FD, one FB, and one EB (no TB or MS/MSDs samples will be collected).

- The baseline sampling event will include a total of 39 groundwater samples, and the following QA/QC samples: four FD, two FB, and two EB (no TB or MS/MSDs samples will be collected).
- All groundwater samples will be submitted to Eurofins TestAmerica Laboratories (Phoenix, Arizona) or Pace Analytical (Las Vegas, Nevada) and analyzed on a standard turnaround time. Estimated costs for the analytical subcontractor are based on pricing from Eurofins TestAmerica Laboratories and Pace Analytical dated May 17 and 14, 2021, respectively.
- Four Bio-trap® samples will be collected from the four pre-construction monitoring wells for biological analysis. Bio-trap® samples will be retrieved after 30 to 50 days and submitted to Microbial Insights, Inc. (Microbial Insights), for analysis of Phospholipid Fatty Acids (PLFA), CENSUS-DNA Perchlorate Reductase (pcrA), CENSUS-DNA Perchlorate Reducing Sedimeticola (pcrAS), and Next Generation Sequencing Community Profile. The cost estimate is based on a quote received from Microbial Insights on May 13, 2021.
- Data validation costs for the pre-construction monitoring well groundwater sampling events (initial pre-construction and baseline) are based on validation of 68 groundwater samples (17 samples plus four QA/QC samples for the initial pre-construction sampling event, and 39 samples plus eight QA/QC samples for the baseline sampling event). Data validation will be performed as described in Section 8.2.1 of the Work Plan Addendum.
- Liquid wastes will be handled as detailed in Section 4.1.2.2. Therefore, there are no analytical testing or disposal costs associated with the purge water, other than costs for liquid waste storage and transfer to the GW-11 pond, which are included in the sampling subcontractor's pricing.
- Activities discussed herein are estimated to take eight days to complete.
- Subcontracted costs include field equipment rentals for two groundwater sampling set-ups that consists of a bladder pump, YSI ProDSS, and a water level meter. Other direct costs (ODCs) include the purchase of dedicated tubing for all monitoring wells, bladders, silicon tubing, shipment of samples, and miscellaneous field consumables (such as disposable gloves and ice for samples). The tubing for all pre-construction monitoring wells will be left in the well for use in subsequent sampling events.

4.1.4 Baseline Aquifer Testing (Task 1.4)

Task 1.4 (Baseline Aquifer Testing) includes Ramboll labor, travel and expenses, materials, equipment, and supplies (unless otherwise noted) required to conduct baseline aquifer testing prior to ZVI emplacement. The cost estimate for this task includes the following activities (described in Section 8.5 of the Work Plan Addendum), in order to establish the existing hydrogeologic parameters and further delineate localized preferential flow pathways:

- Slug tests at the 17 initial pre-construction monitoring wells
- Baseline slug tests at the 16 additional pre-construction monitoring wells

- Single-borehole dilution tests at the 17, four-inch diameter pre-construction monitoring wells

Key assumptions include the following:

- Includes Ramboll labor to perform the slug tests and borehole dilution testing, process data collected during the slug testing and borehole dilution testing and prepare summary tables, AQTESOLV interpretation plots, and borehole dilution test plots.
- Labor costs have also been included to update the geochemical and groundwater models, which along with the baseline groundwater sampling results (Task 1.3) will be used to finalize the configuration and orientation of ZVI reactive zones, the ZVI dosages for each installation, and the extent of the ZVI reactive zone for the ZVI borings.
- Using four staff, initial pre-construction and baseline aquifer testing activities are estimated to take three and seven days in the field, respectively.
- ODCs include the rental of a water level meter, miscellaneous field supplies, and the purchase of four transducers. These transducers will be also used as part of the hydraulic monitoring program described in Section 4.1.9.

4.1.5 Site Preparation (Task 1.5)

Task 1.5 (Site Preparation) includes Ramboll labor, travel and expenses, subcontractor costs, materials, and supplies (unless otherwise noted) associated with the following site preparation activities. Construction oversight will be performed by two construction oversight staff and will span a total of 16 days, with several activities occurring concurrently.

Unless otherwise noted, estimated site preparation costs were obtained from a quote provided by Earth Resource Group (Las Vegas, Nevada), dated May 25, 2021. Key assumptions are included for each activity as discussed below.

4.1.5.1 Utility Locating

In addition to the one-call utility locate, a subsurface utility clearance survey will be performed in all work areas where intrusive work will be conducted (refer to Figure 7-1 in the Work Plan Addendum). Costs include two subsurface clearance events and associated costs for production of a subsurface utility report.

Key assumptions include the following:

- Standard Ground Penetrating Radar and electromagnetic conductivity surveys will be performed to encompass an area that extends five feet beyond the proposed work areas shown in Figure 7-1 in the Work Plan Addendum.
- Assumes three days on-site.
- Estimated utility locator costs were obtained from a quote provided by GPR Data, Inc. (Eugene, Oregon), dated May 14, 2021.

4.1.5.2 Clearing and Grubbing

Clearing and grubbing of small shrubs within the work areas will be required. Key assumptions include the following:

- COH will allow clearing and grubbing without special requirements or procedures.
- Includes transportation and off-site disposal of all cleared vegetation.
- Assumes 20 percent of the work areas will require clearing and approximately two days to complete.
- No cost allocation has been included for chipping or stump grinding/removal as these are not believed to be required.

4.1.5.3 Soil Erosion and Sediment Control

Soil erosion and sediment control measures will be implemented in accordance with the Nevada Construction Stormwater General Permit. The cost estimate includes labor, material, and equipment for three days in the field to obtain, install, and maintain construction silt fencing on the downgradient side(s) of the work areas, installation and maintenance of a stabilized construction entrance, and implementation of dust control measures (i.e., wetting of work areas).

4.1.5.4 Temporary Construction Facilities

A temporary trailer will be set up at the site at one of the staging areas to be used as a field office for onsite personnel and storage for miscellaneous, non-hazardous, health and safety, and operation and maintenance supplies for the duration of the project, as provided in Section 5. The cost estimate includes the mobilization, anchoring, and rental of one work trailer with generator, wi-fi service, and delivery and rental of two portable toilets with monthly servicing. Demobilization costs for the trailer and portable toilets are also included. The cost estimate assumes that these facilities will remain on-site for five months.

4.1.5.5 Site Grading

As part of the site preparation activities, the area within Test 1a/1b and Test 2a/2b/2c will be graded to promote positive drainage away from the work areas and prevent ponding of stormwater. Earthen berms will be constructed to divert stormwater, where grading alone cannot achieve the drainage requirements. The cost estimate includes labor and equipment to grade the work areas and construct earth berms (where needed) to manage stormwater flow. It is assumed that this activity will require one week in the field, that on-site materials will be used for this activity, and no materials will need to be imported.

4.1.5.6 Access Roads and Staging Areas

As described in Section 7.6.6 and shown in Figures 7-1 and 7-12 of the Work Plan Addendum, the existing access roads are unimproved dirt roads that, in select locations, are too soft and/or rutted to allow vehicles and equipment to safely access the work areas during field test implementation. Road improvements are necessary to slightly raise the road elevation; provide a more durable and stable driving surface; create a stable working platform during drilling, trenching, construction, and monitoring activities; and reduce the potential for erosion and release of fugitive dust during test implementation and monitoring

activities. In addition, work areas require construction of new access roads and staging areas. These temporary improvements will be largely implemented as part of the site preparation activities and following completion of the pre-construction activities.

The cost estimate for this activity includes the following[5]:

- Improvements to 1,900 linear feet of existing access roads, assuming a 20-foot final road width. This includes labor, equipment, and materials to grade, place, and compact one 0.5-foot lift of Type II aggregate.
- Construction of 1,000 linear feet of 20-foot wide new temporary access roads to reach proposed work and staging areas. This includes labor, equipment, and material to prepare the subgrade and grade, place, and compact one, one-foot lift of Type II aggregate over a separation geotextile.
- Maintenance, on an as needed basis, of all improved and newly constructed access roads, which includes labor, equipment, and materials to maintain the roads within the access areas. Assumes two maintenance events, each including topping off access roads with two inches of Type II aggregate.
- Construction of two staging areas to be placed within close proximity of Test 1a/1b and Test 2a/2b/2c areas (refer to Figure 7-1 in the Work Plan Addendum). This estimate assumes construction of a 1.2-acre staging area for the trenching and site preparation contractors as well as a 0.4-acre staging area for the drilling contractor. This includes labor, equipment, and materials to prepare the subgrade and grade, place, and compact a 0.5-foot lift of Type II aggregate over a separation geotextile.
- Minimal regrading immediately adjacent to work areas that Ramboll has deemed necessary to ensure worker safety.

Key assumptions include the following:

- The cost for Type II aggregate (i.e., materials), including transport and delivery to the site, has been included, unless otherwise noted.
- No cost has been included for road stabilization materials (other than a separation geotextile) as these are not believed to be required based on available information.
- Any vegetation clearing required is included in the Clearing and Grubbing activity described in Section 4.1.5.2.
- Assumes that this work will be conducted in one week.

4.1.5.7 Test 1a/1b Bench Down Area Excavation

As detailed in Section 7.6.1 of the Work Plan Addendum to allow construction of the continuous ZVI walls (installed within the same trench) to the target depths, the work area will need to be benched down prior to trenching (see Figure 7-7 in the Work Plan

[5] The proposed access road and staging area improvements are subject to the access agreement discussions between the Trust and the COH and the Trust and Landwell. Any material changes to the proposed Phase 2 field test which result from the finalization of access agreements with the COH or Landwell will be presented in a Treatability Study Modification which will be submitted to NDEP for approval.

Addendum) and, following ZVI wall construction, backfilled and compacted (see Figure 7-8 in the Work Plan Addendum and Section 4.1.6.1 below).

The cost estimate for this activity includes the following:

- To achieve the target depth of the continuous ZVI walls (installed within the same single trench) using the 35-foot, one-pass trencher, the working surface will need to be excavated approximately five ft bgs along Test 1a/1b (approximately 265 feet long and with a 40-foot bottom width with 1.5:1 to 2:1 slopes (horizontal to vertical) to construct a working platform, which will then be used to trench and simultaneously backfill the excavation with the granular ZVI/sand mix.
- The excavated materials (approximately 2,400 CY) will be stockpiled in the staging area for future use to restore the trench surface.
- A working platform will be constructed in the benched down area by placing a layer of quarried stone over a geosynthetic fabric. An additional working platform will be constructed adjacent to the bench down area to support the one-pass backfilling activities. The total surface area of the working platforms is 16,500 square feet.
- Assumes that the bench down area excavation will be conducted in three days.

4.1.5.8 Surveying

A Nevada-licensed land surveyor will establish ground controls and stake out all proposed monitoring well locations, boring locations, and the trench excavation footprint. Surveying will also be performed to document as-built conditions, including the layout and configuration of the test areas, and monitoring well locations and elevations. Costs include six surveying events and associated costs for production of as-built surveys and associated recordkeeping and documentation needed for the monitoring wells.

In addition, UAVs will be used to complete progress topographical surveys and collect high-resolution aerial imagery, as described in Section 4.1.2.1. Specifically, UAV surveys will be performed during trenching to document construction progress, post-construction to document site conditions immediately after construction, and at the conclusion of the field test to document final site conditions.

Key assumptions include the following:

- It is assumed surveying monuments remain in the vicinity of the work areas that can be used to conduct site surveys.
- The initial survey will include all proposed initial pre-construction borings/monitoring wells (refer to Figure 7-11 in the Work Plan Addendum).
- The pre-construction survey will include the proposed pre-construction borings/monitoring well locations, temporary roads, staging areas, and the trench excavation footprint (refer to Figures 7-1, 7-6, and 7-9 in the Work Plan Addendum).
- The as-built pre-construction survey of the infrastructure installed as part of pre-construction activities will include all as-built, pre-construction monitoring well locations and elevations (refer to two prior items).

- Excavation survey for Test 1a/1b will include an as-built bench down of continuous ZVI wall area (refer to Figure 7-6 in the Work Plan Addendum) as well as the as-built temporary roads and staging areas for Tests 1a/1b and 2a/2b/2c (refer to Figures 7-1, 7-6 and 7-9 in the Work Plan Addendum).
- As-built survey for Test 1a/1b will include the as-built layout of the continuous ZVI walls (installed within the same trench), as well as monitoring well locations and elevations (refer to Figure 7-6 in the Work Plan Addendum).
- As-built survey for Test 2a/2b/2c will include the as-built layout of the discontinuous ZVI wall, as well as monitoring well locations and elevations (refer to Figure 7-9 in the Work Plan Addendum).
- Estimated Nevada-licensed surveyor costs were obtained from a quote provided by Atkins, Inc. (Henderson, NV), dated May 20, 2021.
- The cost estimate of the three UAV surveys includes completion of the UAV survey, post-processing of the data collected, stitching of a high-resolution image of the work areas, and preparation of a topographical map with one-foot contours.

4.1.6 Emplacement of ZVI (Task 1.6)

Task 1.6 (Emplacement of ZVI) includes Ramboll labor, travel and expenses, subcontractor costs, materials, and supplies (unless otherwise noted) associated with two ZVI emplacement methods. Construction oversight for emplacement of ZVI wall will be performed by a construction manager and two construction oversight staff. As discussed in Section 7.5 of the Work Plan Addendum, field testing will involve installation of continuous ZVI walls within the same trench (Task 1.6a) and discontinuous ZVI-filled boring arrays (Task 1.6b) in five discretely monitored tests collectively designed to address the objectives described in Section 1. The locations of the proposed field tests are shown on Figure 7-1, and the five tests are presented in Section 2 with details provided in Section 7.5 of the Work Plan Addendum. Key assumptions are included for each emplacement method discussed below.

4.1.6.1 Continuous ZVI Wall (Task 1.6a)

As described in Section 7.5.2 of the Work Plan Addendum, Test 1a/1b consists of installation of two continuous ZVI walls within a single continuous trench, which will be installed upgradient of the LVWPS-MW107 monitoring well cluster. The estimated location of Test 1a/1b is provided in Figure 7-6 of the Work Plan Addendum.

The cost estimate considers the installation of the continuous ZVI walls (installed within the same trench), as follows:

- Two ZVI walls will be installed along a single, 200-foot long alignment using one-pass trenching technology.
    - The one-pass trenching method will be used to cut a trench and simultaneously backfill the trench with the design coarse-grain, ZVI/sand/pea gravel mixture through the contractor's custom delivery box that extends to the bottom of the trench.

    - The trencher pulls this delivery box along while a backfill supply system keeps the hopper full of backfill material during the entire operation.
    - The trencher can extend below the water table in fluid soils with gravel and some cobbles (large and extensive cobbles larger than the trench width can limit effectiveness).

- The two continuous ZVI walls (installed within a single trench) will be located and oriented in a manner designed to intercept groundwater with similar contaminant concentrations and groundwater flow characteristics.
- Both continuous ZVI walls (installed within a single trench) will be constructed similarly, with Test 1a evaluating a lower percentage by weight of ZVI (i.e., 10%) and Test 1b evaluating a higher percentage by weight of ZVI (i.e., 30%).
- Each continuous ZVI wall (installed within a single trench) will be approximately 100 feet long by 40 feet deep (when including the five-foot bench down area) by 2.5 feet wide and keyed approximately 5 feet into the UMCf.
- Granular ZVI, sand, and pea gravel will be mixed in the staging area using a portable weight batching and blending system (volumetric mixer, pugmill mixer or hoppers, and weigh belt/conveyor system).
    - Approximately 53 tons of ZVI (about 26 CY), 240 CY of sand, and 90 CY of pea gravel will be used for the ZVI backfill in Test 1a.
    - Approximately 167 tons of ZVI (about 83 CY), 190 CY of sand, and 90 CY of pea gravel will be used for the ZVI backfill in Test 1b.
- The trencher will be used to install a large diameter temporary well casing (12 to 24 inches in diameter) at the leading edge of the trench. This temporary well will be used to extract groundwater, which will be reintroduced to the trench during ZVI backfill placement to further stabilize the trench walls and facilitate material placement.
- Following continuous ZVI wall construction in a single trench using the one-pass trencher, backfilling the five feet deep bench down area will be conducted with native soils removed during excavation and stockpiled in the staging area blended with approximately 1 percent bentonite by weight. The trench backfill will be compacted to achieve a hydraulic conductivity of less than $1x10^{-5}$ centimeters per second (cm/s).
- Excess excavated soils that cannot be reused onsite (e.g., backfilling of the bench down area) will be disposed off-site.

Key assumptions include the following:

- Installation of the trench and continuous ZVI walls (installed in a single trench) using the one-pass trencher is anticipated to take up to two weeks (excluding mobilization, assembly, setup, and demobilization, which are assumed to take place concurrently with other site activities). Backfilling the bench down area is assumed to be conducted in seven days.

- Estimated trenching subcontractor costs were obtained from a quote provided by Dewind (Howell, Michigan) dated May 17, 2021, and includes labor and equipment costs needed to complete the ZVI trench installation. Costs for mobilization, set up, and operation of the one-pass trenching equipment and ZVI/sand/pea gravel-mixing equipment are included in Dewind's quote, as well as costs for breakdown/demobilization, equipment cleanout, and decontamination. Estimated costs for backfilling the bench down area were obtained from a quote provided by Earth Resource Group (Las Vegas, Nevada), dated May 25, 2021.
- A subcontracted security service will monitor the field area and equipment during non-working hours for the duration of construction activities.
- Costs for coarse-grain ZVI are based on an estimate provided by Connelly-GPM (Chicago, Illinois) dated May 14, 2021, and includes delivery and tax.
- Costs for pea gravel sourced from a local supplier are based on a quote provided by Impact Sand and Gravel of Las Vegas, Nevada (dated May 14, 2021). Costs for sand used in the cost estimate are based on a verbal quote provided by Covia Corp. (Independence, Ohio)[6] on May 27, 2021. The unit cost used in the cost estimate includes material and delivery charges.
- Liquid wastes generated during decontamination of equipment will be handled as detailed in Section 4.1.2.2. Therefore, there are no analytical testing or disposal costs associated with the purge water, other than costs for liquid waste storage and transfer to the GW-11 pond.
- Soil cuttings will be containerized in lined, 20-yard roll-off containers that will be located and stored within the staging areas. Costs include waste characterization, transportation, and disposal of approximately 1,000 CY of soil removed during trenching activities (i.e., soils removed below the bench down area) at Republic Services' Apex Landfill, a licensed facility located 37 miles away. It is assumed excavated soils are non-hazardous and do not require dewatering and/or stabilization prior to transport for disposal. The cost estimate assumes that no hazardous materials will be generated or otherwise encountered that require transport and disposal of hazardous wastes. The cost estimate also assumes that Ramboll will prepare a waste manifest memorandum per Trust requirements. Ramboll will assist the Trust in preparation of manifests and coordinate the Trust's review and signature of manifests.
- Dust monitoring will be performed during all soil disturbance and mixing activities. Dust mitigation, if required, will be performed using engineering methods, such as water spray or mixing within a container/containment area.
- Soil erosion and sediment control measures will be maintained and repaired during construction, as indicated in Section 4.1.5.3. Upon completion of construction activities, these measures will be dismantled and disposed as construction debris/waste.

[6] The sand that is locally available is unsuitable because it is limestone-based instead of silica-based, and the limestone would affect the subsurface geochemistry. As of the date of this document, this source in Ohio represents that most cost-effective option to meet the technical requirements for the material.

- The proposed site restoration and grading plans will be subject to the terms of the access agreement between the Trust and the COH (refer to Section 4.1.1.1).

4.1.6.2 Discontinuous ZVI-Filled Boring Arrays Installation (Task 1.6b)

As described in Section 7.6.2 of the Work Plan Addendum, Test 2a/2b/2c consists of the installation of two arrays of staggered ZVI-filled borings, which will be installed upgradient of the LVWPS-MW102 monitoring well cluster and ZTS-MW-113. The approximate location of Test 2a and 2b are provided in Figure 7-9 of the Work Plan Addendum.

The cost estimate considers the installation of the ZVI boring arrays as follows:

- Three arrays of closely-spaced borings (12-inch diameter) will be advanced using an HSA drill rig and backfilled at selected depth intervals with a 50 percent, granular ZVI and 50 percent, sand-by-weight mixture.
- The three arrays will be located and oriented in a manner designed to intercept groundwater with similar contaminant concentrations and groundwater flow characteristics.
- The Test 2a array is comprised of seventeen, 12-inch diameter ZVI-filled borings, advanced in two staggered rows to a target depth of 35 ft bgs.
- The Test 2b array is comprised of nine, 12-inch diameter ZVI-filled borings, advanced in two rows staggered to a target depth of 75 ft bgs.
- The Test 2c array is comprised of twenty-five, 12-inch diameter ZVI-filled borings, advanced in three staggered rows to a target depth of 35 ft bgs.
- Borings installed in Tests 2a/2b/2c arrays will be spaced three feet apart with rows spaced two feet apart.
- Granular ZVI and sand will be mixed in the staging area using a portable weigh batching and blending system (volumetric mixer, pugmill mixer or hoppers, and weigh belt/conveyor system).
    - Approximately 12 tons of ZVI (about six CY) and eight CY of sand will be used for the ZVI backfill in Test 2a.
    - Approximately nine tons of ZVI (about five CY) and six CY of sand will be used for the ZVI backfill in Test 2b.
    - Approximately 17 tons of ZVI (about nine CY) and 12 CY of sand will be used for the ZVI backfill in Test 2c.
- The ZVI backfill will extend three feet above the groundwater table, and the upper portions of each boring will be backfilled with neat cement/bentonite grout to the ground surface.

Key assumptions include the following:

- Installation of the ZVI borings, including regrading and mounding of the Test 2a/2b/2c area, is anticipated to take 23 days using two drill rigs.
- Estimated subcontractor costs were obtained from quotes provided by Cascade Drilling and BC^2 Environmental, both dated May 20, 2021, and includes labor and

HSA drilling costs needed to complete the ZVI installation. Costs include an option for rotary sonic drilling equipment for boring installation if the use of the HSA is not feasible to achieve the target depths.

- Costs for mobilization, step up, and operation of the drilling equipment are included in the drilling contractor's quote, as well as costs for breakdown/demobilization, equipment cleanout and decontamination, a subcontracted security service to monitor the field area and equipment during non-working hours for the duration of construction activities, and reporting.
- Costs for ZVI/sand mixing equipment were obtained from a quote provided by Earth Resource Group (Las Vegas, Nevada), dated May 25, 2021.
- Drilling costs include air knifing operations or hand augering for subsurface utility clearance of the drilling locations and daily watering of the area to comply with the dust control permit.
- Costs for coarse-grain ZVI are based on an estimate provided by Connelly-GPM (Chicago, Illinois) and includes delivery and tax.
- Costs for sand used in the cost estimate includes material and delivery charges and was based on a verbal quote provided by Covia Corp. (Independence, Ohio)[7] on May 27, 2021).
- Liquid wastes generated during decontamination of equipment will be handled as detailed in Section 4.1.2.2. Therefore, there are no analytical testing or disposal costs associated with the purge water, other than costs for liquid waste storage and transfer to the GW-11 pond, which are included in the driller's pricing.
- Soil cuttings will be containerized in lined, 20-yard roll-off containers or 55-gallon drums that will be located and stored within the staging areas. Costs include waste characterization, transportation, and disposal of an estimated 115 CY of soil cuttings generated during drilling at a licensed facility located 37 miles away. It is assumed excavated soils are non-hazardous and do not require dewatering and/or stabilization prior to transport for disposal. The cost estimate assumes that no hazardous materials will be generated or otherwise encountered that require transport and disposal of hazardous wastes. The cost estimate also assumes that Ramboll will prepare a waste manifest memorandum per Trust requirements. Ramboll will assist the Trust in preparation of manifests and coordinate the Trust's review and signature of manifests.
- Dust monitoring will be performed during all soil disturbance and mixing activities. Dust mitigation, if required, will be performed using engineering methods, such as water spray or mixing within a container/containment area.
- Soil erosion and sediment control measures will be maintained and repaired during construction as indicated in Section 4.1.5.3. Upon completion of construction activities, these measures will be dismantled and disposed as construction debris/waste.

[7] The sand that is locally available is unsuitable because it is limestone-based instead of silica-based, and the limestone would affect the subsurface geochemistry.

- The proposed site restoration and grading plans will be subject to the terms of the access agreement between the Trust and the COH (refer to Section 4.1.1.1).

4.1.7 Post-Construction Monitoring Well and Injection Well Installation (Task 1.7)

Task 1.7 (Post-Construction Monitoring Well and Injection Well Installation) includes Ramboll labor, travel and expenses, subcontractor costs, materials, equipment, and supplies (unless otherwise noted) required to install the post construction monitoring wells and injection wells (subsequent to the ZVI emplacement). As discussed in Section 7.6.4 of the Work Plan Addendum, a total of 55 monitoring wells are proposed to be installed at varying distances upgradient, cross gradient, and downgradient of the ZVI reactive zones within the Test 1a/1b and 2a/2b/2c areas (see Figures 7-6 and 7-9 of the Work Plan Addendum). These monitoring wells are in addition to those installed as part of the pre-construction activities which will be repurposed for use in the post-construction monitoring program (refer to Task 1.2 in Section 4.1.2). In addition, 16 injection wells are proposed to be installed downgradient of the ZVI reactive zones within the Test 1a/1b and 2a/2b/2c areas (see Figures 7-6 and 7-9 of the Work Plan Addendum).

The cost estimate assumes installation of:

- 28 shallow (35 ft bgs) monitoring wells and four deep (48 ft bgs) monitoring wells installed upgradient, downgradient, and within the continuous ZVI wall at Tests 1a and 1b.
- 17 shallow (35 ft bgs) monitoring wells and four deep (48 ft bgs) monitoring wells installed upgradient, downgradient, and within the arrays of ZVI borings at Tests 2a and 2c.
- Four monitoring wells extending to the upper portion of the UMCf (55 ft bgs) and four monitoring wells extending to the lower portion of the UMCf (75 ft bgs) installed upgradient, downgradient, and within the arrays of ZVI borings at Test 2b.
- 14 shallow (35 ft bgs) injection wells installed for Tests 1a, 1b, 2a, and 2c; one injection well extending to the upper portion of the UMCf (56 ft bgs); and one injection well extending to the lower portion of the UMCf (76 ft bgs).

Key assumptions include the following:

- Monitoring wells will be installed by a licensed driller using rotary sonic drilling. The subcontracted well installation estimate includes well installation, well development, and daily watering of the area to comply with the dust control permit. The cost estimate is based on quotes from Cascade Drilling and BC^2 Environmental, both dated May 19, 2021.
- Monitoring well and injection well construction will consist of two-inch diameter schedule 40 PVC casing with two-inch diameter slotted PVC well screen and will be completed with a flush mount and concrete apron slightly above the surrounding grade.
- Drilling costs include air knifing operations or hand augering for subsurface utility clearance of the drilling locations.

- Well construction will be recorded by Ramboll personnel and monitoring well locations and elevations will be surveyed by a Nevada-licensed land surveyor, as detailed in Section 4.1.5.9.
- The driller will perform well development at least 48 hours after well construction using a surge block and bailer or a pump.
- Liquid wastes will be handled as detailed in Section 4.1.2.2. Therefore, there are no analytical testing or disposal costs associated with the purge water, other than costs for liquid waste storage and transfer to the GW-11 pond, which are included in the driller's pricing.
- Soil cuttings will be containerized in lined, 20-yard roll-off containers or 55-gallon drums that will be located and stored within the staging areas. Costs include waste characterization, transportation, and disposal of an estimated 45 CY of soil cuttings generated during drilling at a licensed facility located 37 miles away. It is assumed excavated soils are non-hazardous and do not require dewatering and/or stabilization prior to transport for disposal. The cost estimate assumes that no hazardous materials will be generated or otherwise encountered that require transport and disposal of hazardous wastes. The cost estimate also assumes that Ramboll will prepare a waste manifest memorandum per Trust requirements. Ramboll will assist the Trust in preparation of manifests and coordinate the Trust's review and signature of manifests.
- Monitoring well installation and well development are estimated to take 18 days using three drill rigs to complete and will be coordinated and overseen by four staff.

4.1.8 Post-Construction Aquifer Testing (Task 1.8)

Task 1.8 (Post-Construction Aquifer Testing) includes Ramboll labor, travel and expenses, materials, equipment, and supplies (unless otherwise noted) required to conduct aquifer testing. Specifically, immediately following completion of the 55 post-construction monitoring wells, slug tests will be performed in each of these new wells to establish their baseline conditions. In addition, at the end of the performance monitoring period (see Section 4.1.9), slug testing will be performed in 58 of the 88 monitoring wells (33 pre-construction and 55 post-construction) to examine potential changes in the hydrogeologic parameters at the conclusion of the field test. These wells will be selected considering the well's location relative to the reactive zone in the test areas, the horizontal distribution of wells, the screened intervals, and the results of the baseline slug tests.

Key assumptions include the following:

- Includes Ramboll labor to perform the slug tests, process data collected during the slug testing and borehole dilution testing and prepare summary tables, and AQTESOLV interpretation plots.
- Each post-construction aquifer testing event discussed herein is estimated to take eight field days and would be performed by a team of four staff.
- ODCs include the rental of a water level and miscellaneous field supplies, and the purchase of 34 transducers. These transducers will also be used as part of the hydraulic monitoring program described in Section 4.1.9.

4.1.9 Performance Monitoring (Task 1.9)

Task 1.9 (Performance Monitoring) includes Ramboll labor, travel and expenses, subcontractor costs (including analytical costs), materials, supplies, and equipment (unless otherwise noted) associated with the performance monitoring program, as discussed in the subsections below. Performance monitoring is discussed in Section 8 of the Work Plan Addendum.

The cost estimate includes the following activities at existing monitoring wells within each field test area (the LVWPS-MW102 and LVWPS-MW107 monitoring well clusters of two and three wells, respectively, and ZTS-MW-113) as well as the 33 pre-construction monitoring wells (refer to Section 4.1.2.3) and the 61 additional post-construction monitoring wells (a total of 100 monitoring wells).

Key assumptions include the following:

- Estimated costs for the sampling subcontractor are based on pricing from OGI Environmental, LLC, dated May 13, 2021.
- Groundwater sampling events will be conducted one month following completion of the test areas and quarterly for the next 15 months for five additional sampling events (six monitoring events total). Samples will be analyzed for perchlorate, chlorate, total organic carbon, dissolved organic carbon, total inorganic carbon, dissolved hydrogen, total dissolved solids, total nitrogen, total phosphorus, nitrate, sulfate, sulfide, and dissolved metals, alkalinity, and a full cation/anion list.
- Field measurements such as water level and water quality parameters (oxidation-reduction potential, dissolved oxygen, pH, electrical conductivity, temperature, and turbidity) will be performed at each well using a handheld water level probe and YSI (or comparable) water quality meter. In addition, ferrous iron and sulfide will be analyzed in the field using Hach field kits.
- Each performance monitoring sampling event will include a total of 100 samples, and the following QA/QC samples: 10 FD, five FB, and five EB (no TB or MS/MSDs samples will be collected).
- All groundwater samples collected for chemical analysis will be submitted to Eurofins TestAmerica Laboratories (Phoenix, Arizona) or Pace Analytical (Las Vegas, Nevada) and analyzed on a standard turnaround time.
- During the first, third, and final quarterly monitoring event, 19 Bio-trap® samples will be collected from 19 monitoring wells for biological analysis. Bio-trap® samples will retrieved after 30 to 50 days and submitted to Microbial Insights for analysis of PLFA, CENSUS-DNA pcrA, CENSUS-DNA pcrAS, and Next Generation Sequencing Community Profile. Cost estimate is based on a quote received from Microbial Insights on May 13, 2021.
- Data validation costs for each performance monitoring well groundwater sampling event are based on validation of 114 groundwater samples (94 samples plus 20 QA/QC samples). Data validation will be performed as described in Section 8.2.1 of the Work Plan Addendum.
- Liquid wastes will be handled as detailed in Section 4.1.2.2. Therefore, there are no analytical testing or disposal costs associated with the purge water, other than costs

for liquid waste storage and transfer to the GW-11 pond, which are included in the sampling subcontractor's pricing.

- Activities discussed above are estimated to take 7 days to complete per event and would be performed by three teams overseen by one staff. A total of six events have been included in this cost estimate.
- Subcontracted costs include field equipment rentals for each groundwater sampling set-up that consists of a bladder pump, YSI ProDSS, and water level meter. ODCs include the purchase of dedicated tubing for all monitoring wells, bladders, silicon tubing, shipment of samples, and miscellaneous field consumables (such as disposable gloves and ice for samples). The tubing for all monitoring wells will be left in the well for use in subsequent sampling events.
- Labor costs have also been included to perform ongoing evaluation of the performance monitoring results during the field test. This includes preparation of data tables, graphical depictions of analytical results, performance evaluation, geochemical and flow model updates, and internal discussion of results, which will be used in the refinement of the effectiveness monitoring program if required.
- Groundwater analytical results will be summarized in the monthly progress reports submitted to NDEP throughout the duration of the field test.
- 38 pressure transducers will be installed in select wells (20 in Test Area 1a/1b and 18 in Test Area 2a/2b/2c) to characterize real-time hydraulic conditions. These pressure transducers are the same as those purchased as part of the aquifer testing (see Sections 4.1.4 and 4.1.8). The pressure transducers will be set to automatically transmit data to cloud storage that can also be accessed in real time. Data from the 38 monitoring wells will be uploaded continuously and analyzed on a weekly basis.
- Groundwater levels will be monitored monthly using a water level meter in all 94 performance monitoring wells. These activities will be performed by a single staff and are estimated to take 2.5 days to complete per event. A total of six events have been included in this cost estimate.
- Labor costs have also been included to download, process, and evaluate the hydraulic monitoring data during the field test. This includes preparation of data tables, graphical depictions of water level measurements, and internal discussion of results.

4.2 Task 2 – Reporting

The cost estimate includes labor required to perform the following reporting-related activities, which are discussed in Section 10 of the Work Plan Addendum:

- Monthly progress updates to the Trust and NDEP summarizing progress and results of field test implementation – The cost estimate includes 24 reports.
- UIC Semi-Annual Reports to NDEP – The cost estimate includes 3 reports.
- Water Appropriations Annual Report – The cost estimate includes 1 report.

Following completion of the field test, a final report summarizing treatability study activities (including final results of the pre-design field investigation, bench-scale testing, and field testing) and results of the performance evaluation will be prepared and submitted to NDEP. The cost estimate is limited to preparation of a draft submittal for Trust review and comment.

In addition, and at the direction of the Trust, an allocation of $25,000 has been included to respond to NDEP requests for technical project updates and/or presentations. This allocation can only be utilized at the direction of the Trust.

5. SCHEDULE

The tasks will be performed in accordance with the preliminary Phase 2 schedule, as provided in the Work Plan Addendum, and will be finalized once a start date has been established and access and permitting conditions have been incorporated. The start date is dependent on approval of the Work Plan Addendum and receipt of a work authorization and notice to proceed. Durations of tasks and overall schedule are subject to change based on discussions and negotiations for access and permitting, as well as contractor availability and actual conditions encountered in the field.

These tasks will be performed in sequence with some overlap where possible to expedite the execution of the project. The sequencing of tasks as shown in the monthly implementation schedule is discussed below:

1. Access and permitting activities will begin immediately upon authorization to proceed. It is assumed that permits and access for installation of pre-construction borings and monitoring wells will be approved within 2 to 4 weeks of submittal. Access and permitting for site preparation, ZVI emplacement, and post-construction activities are assumed to require up to four months.

2. Installation of pre-construction borings and monitoring wells is a path-critical activity because the data collected during this task (and subsequent baseline sampling and aquifer testing tasks) is necessary for finalizing the field test designs. This task will be initiated immediately upon receiving access and well installation permits, as discussed in Section 4.1.1.2.

3. Baseline sampling and aquifer testing will be performed 2 to 4 weeks following installation of the pre-construction monitoring wells. It is estimated that baseline sampling will be performed prior to aquifer testing.

4. Site preparation will begin upon receipt of a dust control permit and general stormwater permit, as discussed in Section 4.1.1.2 (assumed to be granted within three months of application).

5. ZVI emplacement will begin upon receipt of UIC permits, as discussed in Section 4.1.1.2 (assumed to be granted within four months of application).

6. Installation of post-construction monitoring wells will be performed contemporaneous with ZVI emplacement.

7. Post-construction aquifer testing will be performed contemporaneous with installation of post-construction monitoring wells. Aquifer testing will be repeated at the end of field testing to examine potential changes in the hydrogeologic parameters following testing.

8. Performance monitoring will begin one week after post-construction aquifer testing and then on a quarterly basis thereafter. A total of six monitoring events will be performed over 16 months. However, as noted in Section8.3 of the Workplan

Addendum, adjustments may need to be made to the duration of the performance monitoring period.

9. Preparation of the final report will begin concurrent with the final planned performance monitoring event. A draft report is expected to be submitted to the Trust within four months.

6. REFERENCES

City of Henderson. 2021. Municipal Code, City of Henderson. Codified through Resolution No. 4616, adopted December 15, 2020 (Supplement No. 45). Online content last updated January 29, 2021.

Ramboll Environ (Ramboll Environ US Corporation). 2017. Galleria Road ZVI-Enhanced Bioremediation Treatability Study Work Plan; Nevada Environmental Response Trust Site; Henderson, Nevada. September 29. Approved by NDEP on October 26, 2017.

Ramboll. 2019a. Treatability/Pilot Study Modification No. 9; Nevada Environmental Response Trust Site; Henderson, Nevada. October 8. Approved by NDEP on October 14, 2019.

Ramboll 2021. Las Vegas Wash ZVI-Enhanced Bioremediation Treatability Study Work Plan Addendum; Nevada Environmental Response Trust Site; Henderson, Nevada. In preparation.

Ramboll. 2021. Quality Assurance Project Plan, Revision 6; Nevada Environmental Response Trust Site; Henderson, Nevada. February. Approved by NDEP on March 11, 2021.

Tetra Tech. 2019. Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum; Nevada Environmental Response Trust Site; Henderson, Nevada. November 11. Approved by NDEP on December 11, 2019.

USEPA and USACE. 2000. A Guide to Developing and Documenting Cost Estimates During the Feasibility Study. EPA 540-R-00-002. July 2000.

TABLES

Table 1: ZVI-Enhanced Bioremediation Treatability Study Phase 2 Cost Estimate
Nevada Environmental Response Trust Site

RAMBOLL LABOR		TOTAL		Task 1.1: Access and Permitting		Task 1.2: Pre-Construction Pilot Borings and Monitoring Wells Installations		Task 1.3: Baseline Groundwater Sampling		Task 1.4: Baseline Aquifer Testing		Task 1.5: Site Preparation		Task 1.6a: Continuous ZVI Wall		Task 1.6b: ZVI-Filled Boring Arrays		Task 1.7: Post-Construction Monitoring Well Installation		Task 1.8: Post-Construction Aquifer Testing		Task 1.9: Performance Monitoring		Task 2: Reporting	
Staff Level	**Hourly Rate**	**Hours**	**Cost**	**Hours**	**Cost**	**Hours**	**Cost**	**Hours**	**Cost**	**Hours**	**Cost**	**Hours**	**Cost**	**Hours**	**Cost**	**Hours**	**Cost**	**Hours**	**Cost**	**Hours**	**Cost**	**Hours**	**Cost**	**Hours**	**Cost**
Principal	$235	292	$ 68,502.50	123	$ 28,952.00	4	$ 1,034.00	7	$ 1,551.00	30	$ 6,979.50		$ -		$ -		$ -		$ -	2	$ 517.00	81	$ 19,129.00	44	$ 10,340.00
Sr. Managing Consultant 2	$213	463	$ 98,640.30	26	$ 5,623.20	30	$ 6,326.10	13	$ 2,811.60	48	$ 10,309.20	18	$ 3,748.80	19	$ 3,983.10	19	$ 3,983.10	20	$ 4,217.40	87	$ 18,509.70	108	$ 22,961.40	76	$ 16,166.70
Sr Manager Consultant/Project/Engineering	$200	1421	$ 284,130.00	187	$ 37,400.00	80	$ 16,060.00	60	$ 11,946.00	151	$ 30,140.00	26	$ 5,280.00	25	$ 4,950.00	53	$ 10,560.00	85	$ 16,940.00	40	$ 7,920.00	579	$ 115,874.00	135	$ 27,060.00
Manager Consultant/Project/Engineering	$185	1454	$ 268,935.43	88	$ 16,280.00	216	$ 39,886.00	65	$ 12,006.50	11	$ 2,035.00		$ -	124	$ 22,893.75	180	$ 33,272.25	209	$ 38,665.00		$ -	361	$ 66,859.93	200	$ 37,037.00
Sr Consultant 2/Engineer 2/Construction Mgr 3	$155	3386	$ 524,764.90	623	$ 96,503.00	156	$ 24,211.00	163	$ 25,234.00	373	$ 57,799.50	70	$ 10,912.00	99	$ 15,345.00	99	$ 15,345.00	79	$ 12,276.00	171	$ 26,427.50	1194	$ 185,128.90	359	$ 55,583.00
Sr Consultant 1/Engineer 1/Construction Mgr 2	$135	3841	$ 518,524.88	132	$ 17,820.00	240	$ 32,373.00	182	$ 24,576.75	242	$ 32,670.00	176	$ 23,760.00	124	$ 16,706.25	124	$ 16,706.25	418	$ 56,430.00	286	$ 38,610.00	1520	$ 205,264.13	397	$ 53,608.50
Consultant 3/Engineer 3 /Construction Mgr 1	$115	2797	$ 321,657.88	198	$ 22,770.00	231	$ 26,565.00	113	$ 13,029.50	165	$ 18,975.00	176	$ 20,240.00	124	$ 14,231.25	124	$ 14,231.25	209	$ 24,035.00	286	$ 32,890.00	727	$ 83,584.88	444	$ 51,106.00
Consultant 2/Engineer 2/Construction Svs 2	$105	1153	$ 121,044.00	44	$ 4,620.00	163	$ 17,094.00	44	$ 4,620.00		$ -		$ -		$ -	112	$ 11,781.00	339	$ 35,574.00		$ -	132	$ 13,860.00	319	$ 33,495.00
Draftsperson	$92	1513	$ 139,225.90	303	$ 27,830.00	139	$ 12,751.20	48	$ 4,402.20	28	$ 2,530.00		$ -	25	$ 2,277.00	112	$ 10,322.40	169	$ 15,584.80	68	$ 6,223.80	283	$ 26,033.70	340	$ 31,270.80
Support	$70	376	$ 26,334.00	70	$ 4,928.00	44	$ 3,080.00		$ -	2	$ 154.00	18	$ 1,232.00	7	$ 462.00	7	$ 462.00		$ -		$ -		$ -	229	$ 16,016.00
Subtotal Ramboll Labor		16695	$ 2,371,759.78	1794	$ 262,726.20	1302	$ 179,380.30	694	$ 100,177.55	1049	$ 161,592.20	484	$ 65,172.80	545	$ 80,848.35	829	$ 116,663.25	1528	$ 203,722.20	939	$ 131,098.00	4987	$ 738,695.93	2543	$ 331,683.00

SUBCONTRACTORS	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost
Utility Clearance	$ 38,720.00	$ -	$ -	$ -	$ -	$ 38,720.00	$ -	$ -	$ -	$ -	$ -	$ -
Clearing and Grubbing	$ 54,890.00	$ -	$ -	$ -	$ -	$ 54,890.00	$ -	$ -	$ -	$ -	$ -	$ -
Soil Erosion and Sediment Control	$ 44,550.00	$ -	$ -	$ -	$ -	$ 44,550.00	$ -	$ -	$ -	$ -	$ -	$ -
Access Roads and Staging Areas	$ 75,680.00	$ -	$ -	$ -	$ -	$ 75,680.00	$ -	$ -	$ -	$ -	$ -	$ -
Site Grading	$ 26,070.00	$ -	$ -	$ -	$ -	$ 26,070.00	$ -	$ -	$ -	$ -	$ -	$ -
Dirt Road Reconfiguration	$ 22,550.00	$ -	$ -	$ -	$ -	$ 22,550.00	$ -	$ -	$ -	$ -	$ -	$ -
Bench Down Area Excavation	$ 57,200.00	$ -	$ -	$ -	$ -	$ 57,200.00	$ -	$ -	$ -	$ -	$ -	$ -
Drilling and Well Installation	$ 928,850.00	$ -	$ 256,170.00	$ -	$ -	$ -	$ -	$ 171,610.00	$ 501,070.00	$ -	$ -	$ -
Materials (ZVI, sand, pea gravel)	$ 391,260.00	$ -	$ -	$ -	$ -	$ -	$ 337,630.00	$ 53,630.00	$ -	$ -	$ -	$ -
Backfill Mixing for ZVI borings	$ 24,860.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 24,860.00	$ -	$ -	$ -	$ -
Trenching	$ 811,965.00	$ -	$ -	$ -	$ -	$ -	$ 811,965.00	$ -	$ -	$ -	$ -	$ -
Inocculum/Nutrient Injections	$ 129,030.00	$ -	$ -	$ -	$ -	$ -	$ 80,630.00	$ 48,400.00	$ -	$ -	$ -	$ -
Off-Site Soil Disposal	$ 211,530.00	$ -	$ 5,500.00	$ -	$ -	$ -	$ 177,650.00	$ 21,340.00	$ 7,040.00	$ -	$ -	$ -
Bench Down Area Backfilling	$ 68,750.00	$ -	$ -	$ -	$ -	$ -	$ 68,750.00	$ -	$ -	$ -	$ -	$ -
Site Regrading	$ 37,400.00	$ -	$ -	$ -	$ -	$ 37,400.00	$ -	$ -	$ -	$ -	$ -	$ -
Surveying	$ 58,660.00	$ -	$ 20,990.00	$ -	$ -	$ 8,630.00	$ 2,390.00	$ -	$ 26,650.00	$ -	$ -	$ -
Security	$ 54,390.00	$ -	$ -	$ -	$ -	$ 15,400.00	$ 10,830.00	$ 10,830.00	$ 17,330.00	$ -	$ -	
Groundwater Sampling	$ 162,250.00	$ -	$ 4,730.00	$ 9,900.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 147,620.00	$ -
Data Validation	$ 115,610.00	$ -	$ -	$ 8,140.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 84,370.00	$ 23,100.00
Laboratories	$ 532,280.00	$ -	$ 126,580.00	$ 31,560.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 374,140.00	$ -
Geotechnical Testing	$ 20,020.00	$ -	$ 20,020.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Analytical	$ 311,850.00	$ -	$ 5,940.00	$ 22,220.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 283,690.00	$ -
Passivation Testing	$ 45,600.00	$ -	$ 45,600.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Inocculum Development	$ 44,740.00	$ -	$ 44,740.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
XRD on columns	$ 10,280.00	$ -	$ 10,280.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Biological	$ 99,790.00	$ -	$ -	$ 9,340.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 90,450.00	$ -
Subtotal Subcontractor	$ 3,846,495.00	$ -	$ 413,970.00	$ 49,600.00	$ -	$ 381,090.00	$ 1,489,845.00	$ 330,670.00	$ 552,090.00	$ -	$ 606,130.00	$ 23,100.00

OTHER DIRECT COSTS												
Field Office/Temporary Facilities	$ 10,500.00	$ -	$ -	$ -	$ -	$ 2,500.00	$ 1,500.00	$ 1,500.00	$ 2,500.00	$ 2,500.00	$ -	$ -
Travel Allocation	$ 99,818.63	$ -	$ 5,200.00	$ 930.00	$ 8,210.00	$ 8,990.00	$ 14,930.00	$ 14,930.00	$ 14,170.00	$ 13,430.00	$ 16,170.00	$ 2,858.63
Field Equipment	$ 176,551.00	$ -	$ 11,440.00	$ 660.00	$ 19,110.00	$ 4,436.00	$ 6,757.50	$ 6,757.50	$ 18,302.00	$ 93,288.00	$ 15,800.00	$ -
Subtotal Other Direct Costs	$ 286,869.63	$ -	$ 16,640.00	$ 1,590.00	$ 27,320.00	$ 15,926.00	$ 23,187.50	$ 23,187.50	$ 34,972.00	$ 109,218.00	$ 31,970.00	$ 2,858.63
PROJECT TOTAL	**$ 6,505,124.40**	**$ 262,726.20**	**$ 609,990.30**	**$ 151,367.55**	**$ 188,912.20**	**$ 462,188.80**	**$ 1,593,880.85**	**$ 470,520.75**	**$ 790,784.20**	**$ 240,316.00**	**$ 1,376,795.93**	**$ 357,641.63**

Note: 1. Tasks 1.6a and 1.6b will happen concurrently. The labor estimate for shared oversight and cost for Field Office/Temporary Facilities has been split between the two tasks.
2. The costs presented herein are based on contractor bidsquotes received to date and assume labor and laboratory costs are constant for the duration of the field test. Bids will be requested from contractors during contractor procurement. Material changes to the cost estimate will be approved by the Trust prior to field implementation