

Las Vegas Wash Bioremediation Pilot Study Phase 2 Cost Estimate and Basis Nevada Environmental Response Trust Site Henderson, Nevada

PREPARED FOR

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LIST OF ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
bgs	below ground surface
BOR	Bureau of Reclamation
COH	City of Henderson
IDW	investigation-derived waste
ISB	in-situ bioremediation
gpm	gallons per minute
MS/MSDs	matrix spike/matrix spike duplicates
NAC	Nevada Administrative Code
NDEP	Nevada Division of Environmental Protection
NERT	Nevada Environmental Response Trust, or Trust
NMR	nuclear magnetic resonance
ODCs	other direct costs
OUL	Ozark Underground Laboratory
PLFA	phospholipid fatty acids
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
RI	remedial investigation
SWF	Seep Well Field
TAL	Test America Laboratories
Tetra Tech	Tetra Tech, Inc.
TOC	total organic carbon
UIC	Underground Injection Control
UMCf	Upper Muddy Creek formation
UMCf-cg	Upper Muddy Creek formation – coarse grained
Work Plan Addendum	Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

1.0 BACKGROUND

At the request of the Nevada Environmental Response Trust (NERT or the Trust), Tetra Tech, Inc. (Tetra Tech) prepared this cost estimate and basis to implement Phase 2 of the Las Vegas Wash Bioremediation Pilot Study in Clark County, Nevada. The Las Vegas Wash Bioremediation Pilot Study is being performed upgradient of the Las Vegas Wash, in a location northeast of the NERT site, to demonstrate and evaluate the effectiveness and implementability of in-situ bioremediation (ISB) in a geologically complex area where perchlorate-contaminated groundwater is thought to be migrating into the Las Vegas Wash.

Pilot study implementation is divided into two phases:

- Phase 1 consisted of specific pre-design investigation activities completed in 2018 and 2019 to gather additional site-specific information required to finalize the pilot study design. Phase 1 activities and results are presented in the Draft Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum (Work Plan Addendum) dated November 11, 2019.
- Phase 2 activities will consist of implementing the bioremediation pilot study in 2019 through 2022 as described in the Work Plan Addendum.

This document presents the estimated cost and basis of estimate to implement Phase 2 of the Las Vegas Wash Bioremediation Pilot Study as described in the Work Plan Addendum. Costs presented in this document are based on currently known information developed in the Phase 1 pre-design work and are intended to provide an estimate of the cost to implement Phase 2. Costs for subcontractors have been developed based on budgetary estimates provided by pre-qualified and approved subcontractors with direct experience completing similar tasks at the site. Funding has been included within the Project Management budget to develop and refine field staffing plans.

2.0 PHASE 2 PILOT STUDY SCOPE

Phase 2 of the Las Vegas Wash Bioremediation Pilot Study will be implemented as described in the Work Plan Addendum. For cost estimating purposes, the Phase 2 activities have been segregated into two primary tasks as shown below.

- **Task 1: Pilot Study Implementation**
 - Complete updates to access agreements and required permitting applications as described in Section 7.0 of the Work Plan Addendum.
 - Implement staging area construction and road improvements as described in Section 5.5 of the Work Plan Addendum.
 - Install pilot borings and monitoring wells, perform groundwater sampling, and conduct aquifer testing of pilot monitoring wells as described in Sections 5.1.1.2.1 and 5.1.3.2.1 of the Work Plan Addendum.
 - Install pilot study wells (injection, extraction, monitoring, and dose response wells) as described in Section 5.0 of the Work Plan Addendum.
 - Perform baseline groundwater sampling, surface water sampling and aquifer testing as described in Section 6.0 of the Work Plan Addendum.
 - Inject carbon substrate and amendments as described in Section 5.4 of the Work Plan Addendum.
 - Implement effectiveness monitoring program as described in Section 6.0 of the Work Plan Addendum.
- **Task 2: Reporting**
 - Prepare and submit Underground Injection Control (UIC) Semi-Annual Reports as part of the requirements of the UIC Permit as described in Section 7.2.4 of the Work Plan Addendum.
 - Prepare and submit annual extraction reports as part of the requirements of the Water Appropriations Permit as described in Section 7.2.5 of the Work Plan Addendum.
 - Prepare and submit monthly progress reports as described in Section 8.0 of the Work Plan Addendum.
 - Prepare and submit the Las Vegas Wash Bioremediation Pilot Study Results Report as described in Section 8.0 of the Work Plan Addendum.

In addition to these tasks, Tetra Tech's scope includes overarching program management related activities for the duration of the project.

3.0 BUDGET

Tetra Tech's estimated budget to complete the Las Vegas Wash Bioremediation Pilot Study Phase 2 activities is summarized in attached Table 1. The estimated budget is based on the scope of work presented in the Work Plan Addendum and includes a total of 76 on-site days for drilling with up to four drilling rigs, 50 on-site days for well development with up to two well development rigs, 62 on-site injection days, and 186 on-site field days associated with baseline and effectiveness monitoring activities. Key assumptions and the basis of estimate are described in detail in Section 4.

4.0 BASIS OF ESTIMATE

Tetra Tech's estimated budget to implement Phase 2 of the Las Vegas Wash Bioremediation Pilot Study is based on the scope of work described in the Work Plan Addendum. Due to the nature of the effort (i.e., pilot study versus final remedy), some areas of the Work Plan Addendum are designed to allow flexibility, such as the final location, orientation and length for the injection well transect that will be finalized following pilot boring installation. For components to the pilot study design that will be determined in the field (i.e., final well depths based on field observations), Tetra Tech made assumptions, described below, to provide a basis of estimate.

The estimated costs are based on Tetra Tech's experience at the NERT Site with applicable field procedures, including well construction, substrate injection, and effectiveness monitoring, during the Phase 1 Las Vegas Wash Bioremediation Pilot Study activities and previous and on-going treatability studies performed for the Trust, including the Bioremediation Treatability Study on City of Henderson (COH) property, the Seep Well Field (SWF) Area Bioremediation Treatability Study, and the In-Situ Chromium Treatability Study. Tetra Tech anticipates that the procedures implemented during the Las Vegas Wash Bioremediation Pilot Study Phase 2 activities will be similar to those used in other treatability studies performed in the NERT Remedial Investigation (RI) Study Area, with lessons learned from those studies incorporated to provide cost efficiencies where applicable. Indicative price quotes obtained in May/June 2019 from drilling, injection, carbon substrate and amendments supply, surveying and laboratory subcontractors were used to develop the cost estimate and were based on currently available information. Conservative estimates have been included where information is not currently well known. Key decisions during the pilot study will be: 1) confirming access to the COH landfill to be used as a staging area during drilling and injections, 2) the final total depth, screened intervals, and layout of well infrastructure, which will be based on installation of pilot borings (Zones 1 and 3) and experience with similar substrate injections in other geologic settings at the site, 3) the ratios of substrate to distribution water, which will be determined in the field based on pre-injection step-rate testing, and 4) the source for distribution water (extracted groundwater and/or hydrant water). This decision making process and results will be documented in monthly progress reports provided to the Nevada Division of Environmental Protection (NDEP).

Finally, Tetra Tech's scope includes overarching 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 – PILOT STUDY IMPLEMENTATION

Access and Permitting

- Access – The Trust was granted access for pre-design activities by COH, Clark County, and the United States Bureau of Reclamation (BOR). Per Section 7.1 of the Work Plan Addendum, updates to existing access agreements will be required to complete the Phase 2 activities. The estimated budget assumes that: (1) all necessary access will be secured by the Trust for Tetra Tech to complete all pilot study activities described in the WP Addendum under terms consistent with the existing access agreements, (2) minimal access support will be required from Tetra Tech, and (3) no new site restoration or reporting requirements will be mandated under the continued access terms. Access delays or requirements that result in changes to the planned project implementation will affect the schedule and budget and have not been accounted for in this estimate. Specifically, Tetra Tech envisions completing the following activities related to access:

- Clark County – Prepare a figure and short letter requesting changes to the scope of work approved under the current access agreement.
- BOR – Correspondence with BOR to confirm that Tetra Tech is approved to use a small road that has been previously approved for use by Ramboll as part of the Downgradient RI Study Area.
- COH – Prepare a short letter and figure to request permission to use the upgradient COH landfill as a staging area during drilling and injection activities and a short application listing the new wells planned for the property.
- County Permitting – As described in Section 7.2.1 of the Work Plan Addendum, a dust control permit will be obtained prior to site work related to road improvements and well installation. As prescribed in the dust control permit, daily monitoring of best management practices will be conducted during site activities covered by the dust control permit.
- Nevada Construction Stormwater General Permit – As described in Section 7.2.2 of the Work Plan Addendum, the estimated budget assumes permission will be granted to use the COH landfill as a staging area and that a NV Construction Stormwater General Permit will not be required. The estimated budget does not include preparing and filing a stormwater permit.
- Well Permits – As described in Work Plan Addendum Section 7.2.3, a Nevada Administrative Code (NAC) 534.441 Monitoring Well Drilling Waiver and a NAC 534.320 Notice of Intent Card will be obtained prior to installation of pilot study wells. An authorized Trust signature will be obtained in a notarized Affidavit of Intent to Abandon a Well. Tetra Tech will coordinate preparation of these documents consistent with previous work efforts at the site.
- UIC Permit – A UIC General Permit for Long-Term Remediation will be required prior to injection of carbon substrate, amendments, and water into the saturated subsurface. As described in Work Plan Addendum Section 7.2.4, permit authorization is expected to be a modification to the existing general permit authorization, GU07RL-51057, which was previously issued for the on-going SWF Area Bioremediation Treatability Study and recently amended to include Phase 1 activities for the Las Vegas Wash Bioremediation Pilot Study. The budget includes preparation of a modification request letter and associated attachments. The basis of estimate does not include preparation of a full application for issuance of an individual UIC permit if a modification to the existing permit cannot be obtained or any travel for meetings to support permit modification and approval.
- Water Appropriation Permit – An application for 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 extraction and/or monitoring wells to be used as distribution water during injections as described in Section 7.2.5 of the Work Plan Addendum. The budget includes preparation of this application.

General Assumptions Related to All Field Activities

- Henderson-based Tetra Tech 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. As a result, the budget includes travel costs for non-Henderson staff when required to provide a conservative budget estimate. In addition, field tasks will be coordinated with the approved monthly and quarterly groundwater and surface water monitoring events as well as the other treatability studies to minimize travel costs to the extent possible. Travel allocations include airfare, lodging, per diem, rental vehicles, and fuel. The following travel assumptions have been made for each task:
 - Site Preparation – includes no travel as two Henderson-based staff will oversee/coordinate initial site preparation and construction activities related to road improvements.
 - Pilot Boring and Monitoring Well Installation – includes travel for one non-Henderson staff to assist two Henderson-based staff for installation and development activities.

- Pilot Monitoring Well Groundwater Sampling and Aquifer Testing – includes travel for one non-Henderson staff to assist one Henderson-based staff for groundwater sampling and aquifer testing activities.
- Pilot Study Well Installation (injection, extraction, monitoring, and dose response wells) – includes travel of four non-Henderson staff to assist two Henderson-based staff for the duration of the installation and development activities.
- Baseline Groundwater Sampling – includes travel of two non-Henderson staff to assist three Henderson-based staff with groundwater sampling activities.
- Baseline Surface Water Sampling – Includes no travel as samples will be collected in coordination with the on-going Task M15.
- Baseline Aquifer Testing – includes travel of one non-Henderson staff to assist two Henderson-based staff with aquifer testing activities.
- Injection Events – includes no travel as one Henderson-based staff will oversee each injection event. Additionally, travel costs are included for one senior engineer to be present during the initial week of the first injection event.
- Effectiveness Monitoring Program
 - Biweekly Sampling – Includes no travel as two Henderson-based staff will perform each biweekly groundwater sampling event.
 - Monthly Sampling – Travel allocation varies depending on the scope of each sampling event (see Table 7 of Work Plan Addendum):
 - Travel for three non-Henderson staff to assist two Henderson-based staff for eight monthly groundwater sampling events;
 - Travel for four non-Henderson staff to assist two Henderson-based staff for five monthly groundwater sampling events;
 - Travel for one non-Henderson staff to assist two Henderson-based staff for one monthly groundwater sampling event;
 - No travel for four monthly groundwater sampling events as two Henderson-based staff will perform these events.
 - Surface Water Sampling – Includes no travel as samples will be collected in coordination with the on-going Task M15.
 - Periodic Slug Testing – includes no travel as two Henderson-based staff will perform each of the three slug testing events.
 - Quarterly Transducer Downloads – Includes no travel as one Henderson-based staff will perform quarterly transducer downloads.
- Work activities will be coordinated to avoid conflicts with other activities in the area such as activities associated with the Downgradient Study Area Remedial Investigation. Should unavoidable conflict occur, the Trust will identify priorities. Tetra Tech assumes no delays are incurred related to work suspension due to other priorities.
- Following completion of the pilot study field activities, revegetation and/or well abandonment may be required. Budget for these site restoration activities has not been included in this basis of estimate. If required, these activities will be addressed at the appropriate time.

Site Preparation

- As described in Work Plan Addendum Section 5.5, the existing access roads will need the periodic addition of gravel in select locations to slightly raise the road elevation, provide a more robust driving surface, and reduce the potential for erosion and release of fugitive dust during drilling, injection, and

monitoring activities. Although road improvements will be performed on an as-needed bases, this basis of estimate includes 5 events of approximately 15 tons of gravel applied to select locations to maintain the access roads within the pilot study area. As previously described, this basis of estimate assumes access will be granted to use the COH landfill as a staging area during drilling and injection activities and, therefore, the budget does not include the construction of a staging area on land under Clark County jurisdiction. However, to make the landfill accessible to large tractor trailers and drill rigs, as well as allow for direct access from the COH landfill to the pilot study areas, an estimate for completion of the following items has been included in the budget:

- Construct a new 40-foot wide chain link double-swing access gate at the landfill's existing perimeter gate along the north side of Dave Wood Circle, including two new fence posts set in concrete to secure a new swing gate;
- Improve existing access road within the landfill to the proposed staging area, which will consist of approximately 1,000 tons of Type II aggregate that will be imported and compacted over an 800 linear foot section to a width of 18 to 20 feet of roadway. Includes one compacted lift of approximately 0.5 feet;
- Construct a new 30-foot-wide chain link double-swing access gate in the landfill's existing perimeter fence to allow vehicles to reach the pilot study area from the landfill.

The subcontracted construction budget was estimated using a quote obtained from Logistical Solutions. If Logistical Solutions is unavailable to perform the work due to schedule constraints or other issues beyond the control of Tetra Tech, construction costs may vary. In this event, the Trust will be consulted and changes to the construction program will be approved by the Trust prior to field implementation.

- Tetra Tech will set up a trailer at the site to be used as a field office for all onsite personnel for the duration of the well installation portion of the project. The budget includes the rental of one office trailer, generator power for the trailer, and wi-fi service for eight months, which accounts for drilling associated with pilot study well infrastructure, completion of baseline activities, and the first injection event.
- As part of the site preparation task, Tetra Tech will ensure proper signage is placed in appropriate locations to define dust permit information and travel ways. Additionally, Tetra Tech will ensure all equipment needed for site activities is procured and/or rented for the commencement of field activities.
- Prior to drilling activities, an initial survey will be conducted by a Nevada-licensed land surveyor to mark all well locations. The survey budget is based on an estimate obtained from Atkins. If Atkins is unavailable to perform the work due to schedule constraints or other issues beyond the control of Tetra Tech, survey costs may vary.

Pilot Boring and Monitoring Well Installation

- Tetra Tech has budgeted to install 11 pilot monitoring wells in accordance with Sections 5.1.1.2.1 and 5.1.3.2.1 of the Work Plan Addendum. All pilot monitoring wells will be completed as single monitoring wells. The estimated budget for installing the pilot monitoring wells is based on the following:
 - Zone 1 – Five single completion monitoring wells at five locations including:
 - Two monitoring wells with an estimated total depth of 160 feet bgs;
 - Three monitoring wells with an estimated total depth of 175 feet bgs.
 - Zone 3 – Six single completion monitoring wells at six locations including:
 - Two monitoring wells with an estimated total depth of 140 feet bgs;
 - Two monitoring wells with an estimated total depth of 160 feet bgs;
 - Two monitoring wells with an estimated total depth of 175 feet bgs.

- No provisions have been included for air knife operations to clear the drilling locations. Due to the remote location with lower potential for buried utilities, the one-call utility locates will be relied on for identification of potential subsurface utilities within the pilot study area.
- Tetra Tech oversight labor for the installation program is based on Tetra Tech and Cascade Drilling's experience at the site. Based on the scope of work for the drilling effort, this basis of estimate includes labor for oversight of two drill rigs for 11 days and one well development rig for six days.
- The subcontracted drilling budget, including well installation, well development, and daily watering of the area to comply with the dust control permit was estimated using Cascade Drilling's rates and extrapolated from a quote obtained from Cascade Drilling for the Phase 2 well installation. If Cascade Drilling is unavailable to perform the work due to schedule constraints or other issues beyond the control of Tetra Tech, drilling costs may vary. In this event, the Trust will be consulted and changes to the drilling program will be approved by the Trust prior to field implementation.
- 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. No allowances have been included to address damage or vandalism of wells or equipment used to perform the work. Estimated subcontractor costs include using a subcontracted security service to monitor the field area and equipment during non-working hours for the duration of drilling activities. If required by the Trust, other measures can be provided at additional cost.
- Other direct costs (ODCs) include field equipment rentals, including one YSI ProDSS unit and two water level meters, rental of a portalet for the duration of the drilling and well development activities, well locks, and miscellaneous field consumables (such as gloves and drinking water).
- Investigation Derived Wastes (IDW) generated during drilling activities will be managed in accordance with applicable federal, state, and local regulations and in the same manner as well installations performed during the pre-design activities described in Section 2.3.4 of the Work Plan Addendum. The budget includes estimated costs for placement of soil cuttings and other wastes into 10-yard rollofs that will be located and stored near the drilling locations during field activities, delivery and rental charges associated with rollofs, and transportation and disposal of up to 30 cubic yards of non-hazardous waste at a licensed facility. Tetra Tech will prepare a waste manifest memo per Trust requirements. All waste manifests will be signed by an authorized representative of the Trust.
- Groundwater and decontamination water generated during drilling and well development is assumed to be non-hazardous based on existing data and will be transported and discharged to the GW-11 pond on a daily basis with no additional testing.
- The estimated budget includes non-field work labor hours, which include digitizing 11 field boring logs and 11 well construction logs into gINT software.

Pilot Monitoring Well Groundwater Sampling

- As described in Work Plan Addendum Sections 5.1.1.2.1 and 5.1.3.2.1, groundwater samples will be collected from all pilot monitoring wells and 11 samples will be analyzed for perchlorate and chlorate.
- In addition to the 11 standard groundwater samples, field quality assurance/quality control (QA/QC) samples will also be collected and include equipment blanks, field blanks, field duplicates, and matrix spike/matrix spike duplicates (MS/MSDs) as noted in Work Plan Addendum Section 6.1.3. This sampling event will include a total of five QA/QC samples, consisting of two field duplicates, two equipment rinsate/field blanks, and one MS/MSD.
- All groundwater samples will be submitted to Test America Laboratories (TAL) and analyzed on a standard turn-around-time. The budgetary estimate is based on the Trust's 2019 analytical test rates from TAL and assumes rates remain unchanged for the duration of the pilot study.

- ODCs include field equipment rentals for one groundwater sampling set-up rented for two days that consists of a bladder pump, YSI ProDSS, and water level meter. Additional ODCs include the purchase of dedicated tubing for all monitoring wells, bladders, silicon tubing, and miscellaneous field consumables (such as gloves, ice for samples, and drinking water).
- Data validation costs for the pilot monitoring well groundwater sampling event are based on validation of 16 groundwater samples (11 samples plus 5 quality control samples). Data validation will be performed as described in Section 6.1.3 of the Work Plan Addendum.

Pilot Monitoring Well Aquifer Testing

- Aquifer testing of the 11 pilot monitoring wells will be performed as described in Sections 5.1.1.2.1 and 5.1.3.2.1 of the Work Plan Addendum. The budget includes performing slug tests and NMR logging in 11 newly installed wells and estimated labor to process the slug test and NMR data and generate AQTESOLV interpretation plots and NMR profiles for each logged monitoring well.
- ODCs include rental of NMR logging equipment, rental of a water level meter, and miscellaneous field consumables.

Well Installation Activities (Injection, Extraction, Monitoring, and Dose Response Wells)

- Tetra Tech has budgeted to install injection wells at 37 locations in accordance with Section 5.2 of the Work Plan Addendum. As described in Section 5.2 of the Work Plan Addendum, injection wells will be installed as nested injection wells at 25 of the 37 locations due to the large saturated thickness that is being targeted for the pilot study, with the remaining 12 injection wells installed as single wells. The estimated budget for installing the injection wells is based on the following:
 - Zone 1 Study Area – Upper Muddy Creek formation (UMCf) only:
 - 8 dual-nested wells consisting of:
 - 4 dual-nested injection wells with the deeper injection well installed to an approximate depth of 175 feet below ground surface (bgs) and the shallower injection well installed to an approximate depth of 140 feet bgs;
 - 4 dual-nested injection wells with the deeper injection well installed to an approximate depth of 160 feet bgs and the shallower injection well installed to an approximate depth of 120 feet bgs.
 - Zone 2 Study Area – Alluvium and UMCf:
 - 21 injection wells (either dual-nested or single) consisting of:
 - 9 dual-nested injection wells in the alluvium, with the deeper injection well installed to an approximate depth of 100 ft bgs and the shallower injection well installed to an approximate depth of 65 ft bgs;
 - 12 single injection wells in the UMCf, with each well installed to an approximate depth of 120 feet bgs.
 - Zone 3 Study Area – Upper Muddy Creek formation – coarse grained (UMCf-cg) only:
 - 8 injection wells (either dual- or triple-nested) consisting of:
 - 6 dual-nested injection wells, with the deeper injection well installed to an approximate depth of 160 feet bgs and the shallower injection well installed to an approximate depth of 120 feet bgs;
 - 2 triple-nested injection wells, with the deepest injection well installed to an approximate depth of 175 feet bgs, the middle injection well installed to an approximate depth of 140 feet bgs, and the shallowest injection well installed to an approximate depth of 100 feet bgs.

- All injection wells will be completed with 2-inch polyvinyl chloride (PVC) casing (Schedule 40 used for shallow wells and Schedule 80 used for deep wells) and screened with appropriately sized 2-inch diameter slotted PVC well screen. The final number of locations with nested injection wells and the depths and screened intervals of the injection wells will be determined based on actual field conditions encountered.
- As described in Work Plan Addendum Section 5.4.2, Tetra Tech will install extraction wells to be used as a water source for distribution water during injections and to collect hydraulic data that may be useful in evaluation of other remedial technologies during the Feasibility Study (i.e., pump and treat). The budget includes the installation of 5 six-inch, Schedule 40 PVC wells with 6-inch stainless steel wire-wrap screens to a depth of approximately 80 feet bgs.
- The effectiveness monitoring well network will consist of either a single monitoring well or a cluster of monitoring wells. Tetra Tech has budgeted to install a total of 88 new monitoring wells at 36 locations to evaluate effectiveness within the various targeted injection intervals within the alluvium and/or unconsolidated UMCf/UMCf-cg, as described in Work Plan Addendum Section 5.3. The final number of monitoring wells at each location, total depths, and screened intervals of the monitoring wells will be determined based on actual field conditions encountered and ability to repurpose pilot and existing monitoring wells depending on final placement of the injection well transect in Zones 1 and 3. The estimated budget for installing the monitoring wells is based on the following:
 - Zone 1 Study Area – 20 monitoring wells consisting of:
 - 6 monitoring wells in the alluvium with an estimated total depth of 100 feet bgs;
 - 14 monitoring wells in the UMCf:
 - 9 monitoring wells with an estimated total depth of 140 feet bgs;
 - 5 monitoring wells with an estimated total depth of 175 feet bgs.
 - Zone 2 Study Area – 44 monitoring wells consisting of:
 - 32 monitoring wells in the alluvium:
 - 4 monitoring wells with an estimated total depth of 60 feet bgs;
 - 14 monitoring wells with an estimated total depth of 80 feet bgs;
 - 14 monitoring wells with an estimated total depth of 100 feet bgs.
 - 12 monitoring wells in the UMCf with an estimated total depth of 120 feet bgs.
 - Zone 3 Study Area – 24 monitoring wells consisting of:
 - 6 monitoring wells in the alluvium with an estimated total depth of 70 feet bgs;
 - 18 monitoring wells in the UMCf-cg:
 - 4 monitoring wells with an estimated total depth of 100 feet bgs;
 - 9 monitoring wells with an estimated total depth of 140 feet bgs;
 - 5 monitoring wells with an estimated total depth of 175 feet bgs.
- In addition to the monitoring wells installed as part of the effectiveness monitoring well network described above, Tetra Tech has budgeted to install 18 dose response monitoring wells (2 clusters of 3 monitoring wells in each of the three zones), which will be used during the dye tracer study as described in Section 5.4.3 of the Work Plan Addendum. The total depths and screened intervals of the dose response monitoring wells will be determined based on actual field conditions encountered. The estimated budget for installing the dose response monitoring wells is based on the following:
 - Zone 1 Study Area – 6 dose response monitoring wells consisting of:
 - 2 dose response monitoring wells in the alluvium with an estimated total depth of 100 feet bgs;

- 4 dose response monitoring wells in the UMCf:
 - 2 dose response monitoring wells with an estimated total depth of 140 feet bgs;
 - 2 dose response monitoring wells with an estimated total depth of 175 feet bgs.
- Zone 2 Study Area – 6 dose response monitoring wells consisting of:
 - 4 dose response monitoring wells in the alluvium:
 - 2 dose response monitoring wells with an estimated total depth of 80 feet bgs;
 - 2 dose response monitoring wells with an estimated total depth of 100 feet bgs.
 - 2 dose response monitoring wells in the UMCf with an estimated total depth of 120 feet bgs.
- Zone 3 Study Area – 6 dose response monitoring wells consisting of:
 - 2 dose response monitoring wells in the alluvium with an estimated total depth of 70 feet bgs;
 - 4 dose response monitoring wells in the UMCf-cg:
 - 2 dose response monitoring wells with an estimated total depth of 140 feet bgs;
 - 2 dose response monitoring wells with an estimated total depth of 175 feet bgs.
- No provisions have been included for air knife operations to clear the drilling locations. Due to the remote location with lower potential for buried utilities, the one-call utility locates will be relied on for identification of potential subsurface utilities the pilot study area.
- Tetra Tech oversight labor for the installation program is based on Tetra Tech and Cascade Drilling's experience at the site. Based on the scope of work for the drilling effort, this basis of estimate includes labor for oversight of four drill rigs for 65 on-site days and two well development rigs for 44 on-site days.
- The subcontracted drilling budget, including well installation, well development, and daily watering of the area to comply with the dust control permit was estimated using Cascade Drilling's rates and extrapolated from a quote obtained from Cascade Drilling for the Phase 2 well installation. If Cascade Drilling is unavailable to perform the work due to schedule constraints or other issues beyond the control of Tetra Tech, drilling costs may vary. In this event, the Trust will be consulted and changes to the drilling program will be approved by the Trust prior to field implementation.
- 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. No allowances have been included to address damage or vandalism of wells or equipment used to perform the work. Estimated subcontractor costs include using a subcontracted security service to monitor the field area and equipment during non-working hours for the duration of drilling activities. If required by the Trust, other measures can be provided at additional cost.
- ODCs include field equipment rentals, including two YSI ProDSS units and six water level meters, rental of a portalet for the duration of the drilling and well development activities, well locks, and miscellaneous field consumables.
- Following completion of drilling activities, all well locations will be resurveyed as described in Work Plan Addendum Sections 5.2 and 5.3 of the Work Plan Addendum. The survey budget is based on an estimate obtained from Atkins. If Atkins is unavailable to perform the work due to schedule constraints or other issues beyond the control of Tetra Tech, survey costs may vary.
- IDW generated during drilling activities will be managed in accordance with applicable federal, state, and local regulations and in the same manner as well installations performed during the pre-design activities described in Section 2.3.4 of the Work Plan Addendum. The budget includes estimated costs for placement of soil cuttings and other wastes into 10-yard rolloffs that will be located and stored near the drilling locations during field activities, delivery and rental charges associated with rolloffs, and

transportation and disposal of up to 210 cubic yards of non-hazardous waste at a licensed facility. Tetra Tech will prepare a waste manifest memo per Trust requirements. All waste manifests will be signed by an authorized representative of the Trust.

- The drilling time and associated costs are based on the use of the COH landfill as a laydown area for drilling supplies/equipment and storage of roll-offs for management of IDW. The close proximity to the drilling location provides a significant cost savings as compared to storing the IDW roll-offs on-site, which requires waste and equipment transportation costs and associated time. If use of the landfill area is denied by COH, additional costs will be incurred.
- Groundwater and decontamination water generated during drilling and well development are assumed to be non-hazardous based on existing data and will be transported and discharged to the GW-11 pond on a daily basis with no additional testing.
- The estimated budget includes non-field work labor hours, which include digitizing 84 field boring logs (one boring at each well location) and 148 well construction logs into gINT software.

Baseline Groundwater Sampling

- Tetra Tech will complete baseline groundwater sampling in accordance with Section 6.1 of the Work Plan Addendum. As described in Section 6.1 and Table 7 of the Work Plan Addendum, baseline groundwater monitoring will include sampling all newly installed wells plus all monitoring wells installed as part of the Phase 1 pre-design, pilot boring well installation for a total of 232 wells. As described in Work Plan Addendum Section 6.1.3, groundwater samples will be analyzed for perchlorate, chlorate, and nitrate. Groundwater samples collected from monitoring wells located within each zone (total of 122 monitoring wells) will also be analyzed for sulfate and total organic carbon (TOC). To further establish the baseline geochemical environment of the subsurface, additional groundwater samples will be collected from 27 monitoring wells (three locations within each of the three remediation zones, each location consisting of three monitoring wells at varying depths) and analyzed for the larger suite of field and laboratory analytes listed in Table 8 of the Work Plan Addendum (with the exception of perchlorate reductase gene and phospholipid fatty acids [PLFA], which are described in a subsequent bullet).
- In addition to standard groundwater samples, field QA/QC samples will also be collected and include equipment blanks, field blanks, field duplicates, and MS/MSDs as noted in Work Plan Addendum Section 6.1.3. The baseline sampling event will include a total of 60 QA/QC samples, consisting of 24 field duplicates, 24 equipment rinsate/field blanks, and 12 MS/MSDs.
- All groundwater samples will be submitted to TAL and analyzed on a standard turn-around-time. The budgetary estimate is based on the Trust's 2019 analytical test rates from TAL and assumes rates remain unchanged for the duration of the pilot study.
- Bio-traps® will be installed within the pilot study area as part of the baseline sampling as described in Section 6.1.3 of the Work Plan Addendum. The estimated budget includes the installation of Bio-traps® in clustered monitoring wells installed at two locations within each remediation zone (resulting in 18 Bio-traps®). Bio-traps® will remain in the wells for a period of approximately 30 days and then be retrieved for microbial analysis of PLFA and the perchlorate reductase gene. All microbial samples will be submitted to Microbial Insights and analyzed on a standard turn-around-time. The budgetary estimate is based on 2019 analytical test rates from Microbial Insights and assumes rates remain unchanged for the duration of the pilot study.
- Samples will also be collected as part of the tracer study described in Sections 5.4.3 and 6.1.3 of the Work Plan Addendum. The basis of estimate includes a baseline round of 140 samples to be collected and analyzed for dye. In addition to standard groundwater samples, field QA/QC samples will also be collected for the dye study and will include 14 field duplicates and 14 equipment rinsate/field blanks. The budgetary estimate is based on analytical test rates from Ozark Underground Laboratory (OUL) and assumes rates remain unchanged for the duration of the pilot study.

- ODCs include field equipment rentals for four groundwater sampling set-ups rented for two weeks that each consist of a bladder pump, YSI ProDSS, and water level meter. Additional ODCs include the purchase of dedicated tubing for all monitoring and extraction wells, disposable tubing for all injection wells, bladders, metals filters, silicon tubing, shipment of samples (samples collected for analysis by Microbial Insights and OUL), rental of a portalet, and miscellaneous field consumables.
- Data validation costs for the baseline groundwater sampling event are based on validation of 292 groundwater samples (232 samples plus 60 quality control samples). Data validation costs for the dye study are based on validation of a total of 168 samples (140 samples plus 28 quality control samples). Data validation will be performed as described in Section 6.1.3 of the Work Plan Addendum.

Baseline Aquifer Testing

- Prior to carbon substrate injections, aquifer testing will be performed on selected monitoring wells to determine pre-injection hydraulic conditions as described in Section 6.3 of the Work Plan Addendum. As the basis of this estimate, the budget includes performing slug tests in 93 newly installed wells (88 monitoring wells and 5 extraction wells) and borehole dilution tests in 36 monitoring wells installed at 12 new locations within the various remediation zones (4 locations within each zone). The estimated budget includes non-field work labor hours to process data collected during the slug testing and borehole dilution testing and prepare summary tables, AQTESOLV interpretation plots, and borehole dilution test plots.
- ODCs include the purchase of 6 transducers (combination of four RuggedTROLL 100 units and two AquaTROLL 200 units), rental of a water level meter, rental of additional transducers for borehole dilution testing, and miscellaneous field consumables.

Injections

- As described in Work Plan Addendum Section 5.4, two carbon substrate injection events at injection wells screened within the UMCf/UMCf-cg in each of the three remediation zones and three carbon substrate injection events at injection wells screened within the alluvium in the Zone 2 study area will be completed to maintain sufficient carbon loading throughout the duration of the pilot study. For the injections into each remediation zone, the budget is based on the following estimated injection rates:
 - Zone 1 Study Area – average injection rate of 10 gallons per minute (gpm) for the carbon substrate solution and follow-up distribution water per injection location.
 - Zone 2 Study Area:
 - Alluvium – average injection rate of 30 gpm for the carbon substrate solution and follow-up distribution water per injection location;
 - UMCf – 5 gpm per UMCf injection location.
 - Zone 3 Study Area – average injection rate of 15 gpm per injection location.
- The injection budget includes batch mixing and injections consistent to the Field Guidance Document (FGD) provided in Appendix J of the Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum and includes oversight of each injection event using Henderson-based field staff. Future modifications to the FGD or additional staff requirements may have a material impact on the injection budget.
- Initial pre-injection step rate testing will be performed to provide a better estimate of actual injection rates that may be encountered.
- Preliminary quantities of carbon substrate and injection volumes have been estimated as described in Sections 5.4.1 and 5.4.2 and Appendix I of the Work Plan Addendum. Costs for the carbon substrate and associated amendments (glycerin, phosphate, sodium sulfite, and tracer dye) required for the pilot study are based on costs (including delivery and tax) provided by the specialized carbon substrate vendor (EOS Remediation) and the chemical supplier (Brenntag) and assumes rates remain unchanged for the duration of the pilot study. As explained in Section 5.4.1 of the Work Plan Addendum, final injection quantities may be adjusted based on data collected during injection well installation and baseline

groundwater sampling. NERT will schedule a conference call with NDEP to discuss the final calculation of carbon substrate required for this project.

- The basis of estimate includes an adjustment for subsequent injection events to only include 85% of the initial amount of the carbon substrate based on previous experience on other treatability studies performed for NERT. Subsequent injection events include the injection of carbon substrate, glycerin, sodium sulfite, and water and do not include the addition of phosphate or tracer dye. Although a budget allotment of 85% of the quantity injected into the first injection event has been included for all subsequent injection events, actual injection quantities in subsequent injection events will be determined based on effectiveness monitoring results, which will be presented in the monthly progress reports submitted to NDEP throughout the duration of the pilot study.
- The budget does not include costs associated with water for injections since the anticipated water source for the injections into both the alluvium and UMCf/UMCf-cg is likely to be extracted groundwater as described in Work Plan Addendum Section 5.4.2. If the request to use extracted groundwater from the alluvium as the water source for injections into the alluvium and UMCf/UMCf-cg is not approved by the Bureau of Water Pollution Control or NDEP requires additional evaluation of hydrant water versus extracted groundwater, additional costs will be incurred for both water usage from COH and trucking the water to the pilot study area.
- The subcontractor injection budget was estimated using Cascade Technical Service's rates and extrapolated from a quote obtained from Cascade Technical Services for the Phase 2 injection work and assumes the rates remain unchanged for the duration of the pilot study. If Cascade Technical Services is unavailable to perform the work due to schedule constraints or other issues beyond the control of Tetra Tech, injection costs may vary. In this event, the Trust will be consulted and changes to the injection program will be approved by the Trust prior to field implementation. Estimated subcontractor costs include mobilization/set-up, daily remediation field services (10 hours per day), breakdown/demobilization, tank rentals and associated cleanout, a subcontracted security service to monitor the field area and equipment during non-working hours for the duration of injection activities, and reporting. During working hours, the work areas will be secured using typical construction barriers such as metal plates, orange construction fencing and/or caution tape. If required by the Trust, other measures can be provided at additional cost.
- As described in Section 5.4.3 of the Work Plan Addendum, dye will also be injected into each remediation zone during the first injection event. Because final selection of tracer and associated quantities will be determined following completion of the baseline sampling event and lessons learned from recent tracer testing performed as part of the RI activities, a budget allotment of \$2,250 each for remediation Zones 1 and 3 and \$3,000 for Zone 2, for a total of \$7,500, has been included in this basis of estimate. During injections, a fluorometer will be used to monitor for the presence of dye in dose response monitoring wells installed near the injection transects, as described in Work Plan Addendum Section 5.4.3. Samples will also be periodically collected and analyzed for dye by OUL to confirm field fluorometer readings (includes daily samples from dose response monitoring wells and samples from each injection batch). Charcoal samplers will also be installed prior to injections and collected at the end of the injection event for analysis of the dyes by OUL. The basis of estimate includes the collection and analysis of charcoal samplers and groundwater samples from 99 wells (as described in Work Plan Addendum Section 6.1.3). Both laboratory analysis and data validation costs have been included for a total of 119 samples (99 samples, plus 10 field duplicates and 10 equipment/rinsate blanks). To confirm fluorometer readings, an additional 186 samples will be collected from the dose response monitoring wells and batch injection solutions and analyzed for dye by OUL (as described in Section 5.4.3). The budgetary estimate is based on analytical test rates from OUL and assumes rates remain unchanged for the duration of the pilot study. Costs include analysis of all charcoal samples for the presence of dye, and assumes 50% of these samples will test positive, and therefore, the associated water sample will be analyzed for fluorescence.

- ODCs associated with injection activities include the purchase of additional sensor(s) and field display equipment required to repurpose the fluorometers previously purchased by AECOM, rental equipment (water level meter and portalet), and purchase of miscellaneous field consumables.
- Injection well rehabilitation was not included in the Work Plan Addendum and no costs have been included to perform any well rehabilitation measures as part of on-going injections.

Effectiveness Monitoring Program

The effectiveness monitoring program consists of groundwater monitoring and aquifer testing. Each of these are described below.

- Groundwater Monitoring – Tetra Tech will perform biweekly and monthly groundwater sampling for an 18-month period to collect data to evaluate the effectiveness of in-situ bioremediation in accordance with Section 6.1 of the Work Plan Addendum. The frequency of groundwater sampling, selected wells, and specific parameters to be sampled during each individual event may be adjusted based on the results from prior pilot study effectiveness monitoring events. To provide a conservative basis of estimate, the budgeted scope of work includes the following:
 - Based on the scope described in Section 6.1 and Tables 7 and 8 of the Work Plan Addendum, the budget for the effectiveness monitoring program includes groundwater sampling on a biweekly (2 events) and monthly (18 events) basis, with the collection and analysis of a total of 2,313 groundwater samples (including QA/QC samples) for the parameters described in Section 6.1.3 of the Work Plan Addendum.
 - Field QA/QC samples will be collected and will include equipment blanks, field blanks, field duplicates, and MS/MSDs as noted in Section 6.1.3 of the Work Plan Addendum. Each biweekly effectiveness monitoring event will include 14 QA/QC samples consisting of 5 field duplicates, 6 equipment rinsate/field blanks, and 3 MS/MSDs. Samples collected during each monthly effectiveness monitoring event will vary, as described in Section 6.1.3 and Table 7 of the Work Plan Addendum. The monthly groundwater sampling program will include a total 465 QA/QC samples consisting of 183 field duplicates, 188 equipment rinsate/field blanks, and 94 MS/MSDs.
 - All groundwater samples will be submitted to TAL and analyzed on a standard turn-around-time, with the exception of ferrous iron and sulfide, which will be analyzed in the field via HACH field kits. The budgetary estimate is based on the Trust's 2019 analytical test rates from TAL and assumes rates remain unchanged for the duration of the pilot study.
 - Bio-traps® will be installed during the study (post-injection) as described in Section 6.1.3 of the Work Plan Addendum. Bio-traps® will be deployed at six clustered monitoring well locations (three wells per cluster, total of 18 wells) during two separate events following injections for a total of 36 Bio-traps®. All microbial samples will be submitted to Microbial Insights and analyzed on a standard turn-around-time. The budgetary estimate is based on 2019 analytical test rates from Microbial Insights and assumes rates remain unchanged for the duration of the pilot study.
 - Dye analysis will be performed on groundwater samples for the first six months following the first injection event as described in Section 6.1.3 of the Work Plan Addendum. This will include analysis of 936 samples, including samples from 48 monitoring wells during each of the two biweekly sampling events and samples from 122 monitoring wells and 18 dose response monitoring wells during each monthly sampling event. The cost of dye analysis is estimated based on 2019 rates provided by OUL and assumes rates remain unchanged for the duration of the pilot study. Costs include analysis of all charcoal samples for the presence of dye, and assumes 50% of these samples will test positive, and therefore, the associated water sample will be analyzed for fluorescence. Field QA/QC samples will also be collected and will include 94 field duplicates and 96 equipment/rinsate blanks.

- ODCs include field equipment rentals for the groundwater sampling set-ups required per monitoring event, which each consist of a bladder pump, YSI ProDSS, water level meter, and silicon tubing. ODCs include field equipment rentals of groundwater sampling set-ups for each field staff, which varies depending on the scope of the sampling event (as previously described in the General Assumptions Related to Field Activities section in Section 4.1). Additional ODCs include the purchase of bladders, metals filters, shipping costs (samples analyzed by Microbial Insights and OUL) and miscellaneous field consumables.
- Data validation costs for the groundwater monitoring program are based on validation of a total of 2,313 samples (1,820 samples plus 493 quality control samples). Data validation costs for samples associated with the dye study are based on validation of a total of 1,012 samples (828 samples plus 184 quality control samples). Data validation will be performed as described in Section 6.1.3 of the Work Plan Addendum.
- Labor costs have also been included to perform ongoing evaluation of the effectiveness monitoring results during the pilot study. This includes preparation of data tables, graphical depictions of analytical results, evaluation of degradation kinetics, and internal discussion of results, which will be used in the decision-making process to determine the timing of subsequent injection events and 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 pilot study.
- Surface Water Monitoring – As described in Section 2.5 of the Work Plan Addendum, monthly surface water sampling is currently being conducted as part of the on-going RI. As described in Section 6.2 of the Work Plan Addendum, Tetra Tech will monitor TOC in surface water at 15 sampling points in three transects downgradient of the pilot study area. Because Tetra Tech is already performing the monthly surface water sampling as part of Task M15, these additional samples will be collected during the on-going monthly program. The additional monthly samples will be collected during one monthly event prior to injections, followed by 18 monthly events during the pilot study timeframe. Baseline and monthly surface water samples collected during the first six months following the first injection event will also include analysis for tracer dye. Surface water samples will be collected for dye analysis from seven locations along the southern bank of the Las Vegas Wash (as described in Section 6.2 of the Work Plan Addendum). The frequency of surface water sampling, selected locations, and specific parameters to be sampled during each individual event may be adjusted based on the results from prior surface water sampling events. To provide a conservative basis of estimate, the budgeted scope of work includes the following:
 - Monthly surface water sampling of 15 locations (three transects) for a 19-month monitoring period (1-month pre-injection and 18-months following injections, for a total of 19 events) as described in Section 6.2. Surface water samples will be analyzed for TOC at three transect locations sampled as part of the on-going surface water sampling program. Additionally, both baseline and monthly events during the first six months following the first injection event will also include the analysis of tracer dye at each of four additional locations downgradient of the pilot study area plus one sample from each of the three transect locations sampled as part of the on-going surface water program.
 - Field labor is included for one additional day added to the current surface water sampling program (Task M15). In the event Task M15 is discontinued during the pilot study, additional costs will be incurred to fulfill the surface water sampling requirements specified in Section 6.2 of the Work Plan Addendum.
 - In addition to standard surface water samples, field QA/QC samples will also be collected and will include equipment blanks, field blanks, field duplicates, and MS/MSDs as noted in Section 6.1.3

- of the Work Plan Addendum. Each surface water sampling event will include 5 QA/QC samples consisting of 2 field duplicates, 2 equipment rinsate/field blanks, and 1 MS/MSD.
- All surface water samples will be submitted to TAL and analyzed on a standard turn-around-time. The budgetary estimate is based on the Trust's 2019 analytical test rates from TAL and assumes rates remain unchanged for the duration of the pilot study.
 - Data validation costs for the surface water sampling events are based on validation of a total of 361 samples (285 samples plus 95 quality control samples). Data validation will be performed as described in Section 6.1.3 of the Work Plan Addendum.
 - The cost of dye analysis is estimated based on 2019 rates provided by OUL and assumes rates remain unchanged for the duration of the pilot study. Costs include analysis of all charcoal samples for the presence of dye, and assumes 50% of these samples will test positive, and therefore, the associated water sample will be analyzed for fluorescence. Field QA/QC samples will also be collected and will include 7 field duplicates and 14 equipment/rinsate blanks. Data validation costs for samples associated with the dye study are based on validation of a total of 70 samples (49 samples plus 21 quality control samples). Data validation will be performed as described in Section 6.1.3 of the Work Plan Addendum.
 - ODCs include shipping costs and weights for installation of charcoal samplers and miscellaneous field consumables.
 - Surface water analytical results will be summarized in the monthly progress reports submitted to NDEP throughout the duration of the pilot study.
- Aquifer Testing – In accordance with Section 6.3 of the Work Plan Addendum, Tetra Tech will perform periodic slug tests to examine changes in hydraulic conductivity following injections. Aquifer testing results will be summarized in the monthly progress reports submitted to NDEP throughout the duration of the pilot study. The budgeted scope of work consists of field labor to perform three rounds of slug tests on up to 36 monitoring wells during each round. The estimated budget includes non-field work labor hours to process the data collected during slug testing and prepare summary tables and AQTESOLV interpretation plots.
 - Quarterly Transducer Download – In addition to slug testing, data will be downloaded from previously installed transducers on a quarterly basis for the duration of the pilot study as described in Work Plan Addendum Section 6.3 (total of 8 events included in basis of estimate). Transducer data downloads will be summarized in the monthly progress reports submitted to NDEP throughout the duration of the pilot study.

4.2 TASK 2 – REPORTING

This task includes engineering and technical labor to prepare UIC semi-annual reports, annual extraction reports associated with the Water Appropriations Permit, monthly progress updates, and the final Las Vegas Wash Bioremediation Pilot Study Results Report that includes the components listed in Section 8.0 of the Work Plan Addendum. The budget includes an estimate to prepare and submit the following documents:

- UIC Semi-Annual Reports (Section 7.2.4 of the Work Plan Addendum) – budget estimate includes six reports with projected dates of February 2020, August 2020, February 2021, August 2021, February 2022, and August 2022. Although Phase 2 injections will not have occurred by February 2020, a report will be required for the open permit associated with previous borehole dilution testing that included water injections.
- Water Appropriations Annual Report (Section 7.2.5 of the Work Plan Addendum) – budget estimate includes two reports with projected dates of January 2021 and January 2022.

- Monthly progress updates (Section 8.0 of the Work Plan Addendum) – budget estimate includes 32 reports, beginning in January 2020 and continuing through August 2022.
- Las Vegas Wash Bioremediation Pilot Study Results Report (Section 8.0 of the Work Plan Addendum) – budget estimate includes preparation and submittal of the results report, which includes a data validation summary report for both Phase 1 and 2 samples. The basis of estimate includes draft submittal for Trust review and comment, revised draft submittal addressing Trust comments, assembling a final report for Trust submittal to NDEP, and revised report and response to comment matrix addressing NDEP and Stakeholder comments. The budget for this report is based on prior experience with treatability/pilot study reporting, including anticipated level of effort required to respond to comments received from the Trust, NDEP, and Stakeholders.

5.0 SCHEDULE

Task milestone targets are based on the schedule durations presented in the Work Plan Addendum and receipt of the approved work authorization and notice to proceed in November 2019.

Tables

Table 1 - Detailed Budget
 Las Vegas Wash Bioremediation Pilot Study - Phase 2 Implementation
 Nevada Environmental Response Trust Attention: Andrew Steinberg

Phases / Tasks				Task 1.1 - Access and Permitting		Task 1.2 - Site Preparation		Task 1.3a - Pilot Boring Testing Program		Task 1.3 Injection/Monitoring Well Installation		Task 1.4 - Baseline Groundwater Sampling		Task 1.5 - Baseline Aquifer Testing		Task 1.6 - Injections		Task 1.7 - Effectiveness Monitoring		Task 2 - Reporting	
				Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost
Tetra Tech Labor	Hrly Rate	Tot Est. Hrs	Total Est. Cost																		
Principal Specialist	\$258.00	543.0	\$ 140,094.00	-	\$ -	-	\$ -	20.0	\$ 5,160.00	120.0	\$ 30,960.00	16.0	\$ 4,128.00	8.0	\$ 2,064.00	112.0	\$ 28,896.00	-	\$ -	267.0	\$ 68,886.00
Sr Program Manager	\$225.00	230.0	\$ 51,750.00	6.0	\$ 1,350.00	10.0	\$ 2,250.00	12.0	\$ 2,700.00	20.0	\$ 4,500.00	6.0	\$ 1,350.00	6.0	\$ 1,350.00	30.0	\$ 6,750.00	60.0	\$ 13,500.00	80.0	\$ 18,000.00
Principal	\$213.00	144.0	\$ 30,672.00	68.0	\$ 14,484.00	12.0	\$ 2,556.00	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	64.0	\$ 13,632.00		
Sr Consultant	\$210.00	1,289.5	\$ 270,795.00	56.0	\$ 11,760.00	24.0	\$ 5,040.00	32.0	\$ 6,720.00	196.0	\$ 41,160.00	44.0	\$ 9,240.00	20.0	\$ 4,200.00	300.0	\$ 63,000.00	241.5	\$ 50,715.00	376.0	\$ 78,960.00
Sr Project Manager	\$188.00	1,178.0	\$ 221,464.00	16.0	\$ 3,008.00	42.0	\$ 7,896.00	16.0	\$ 3,008.00	84.0	\$ 15,792.00	64.0	\$ 12,032.00	-	\$ -	42.0	\$ 7,896.00	750.0	\$ 141,000.00	164.0	\$ 30,832.00
Project Engineer/Scientist III	\$175.00	348.0	\$ 60,900.00	-	\$ -	48.0	\$ 8,400.00	-	\$ -	300.0	\$ 52,500.00	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -
Project Engineer/Scientist II	\$165.00	1,529.0	\$ 252,285.00	-	\$ -	-	\$ -	42.0	\$ 6,930.00	120.0	\$ 19,800.00	121.0	\$ 19,965.00	60.0	\$ 9,900.00	36.0	\$ 5,940.00	927.0	\$ 152,955.00	223.0	\$ 36,795.00
Sr Staff	\$137.00	4,132.0	\$ 566,084.00	-	\$ -	54.0	\$ 7,398.00	204.0	\$ 27,948.00	1,594.0	\$ 218,378.00	108.0	\$ 14,796.00	190.0	\$ 26,030.00	578.0	\$ 79,186.00	1,384.0	\$ 189,608.00	20.0	\$ 2,740.00
Staff II	\$127.00	4,386.0	\$ 557,022.00	71.0	\$ 9,017.00	65.0	\$ 8,255.00	208.0	\$ 26,416.00	1,698.0	\$ 215,646.00	94.0	\$ 11,938.00	117.0	\$ 14,859.00	90.0	\$ 11,430.00	1,732.0	\$ 219,964.00	311.0	\$ 39,497.00
Staff I	\$117.00	1,455.0	\$ 170,235.00	-	\$ -	-	\$ -	54.0	\$ 6,318.00	1,030.0	\$ 120,510.00	107.0	\$ 12,519.00	-	\$ -	34.0	\$ 3,978.00	110.0	\$ 12,870.00	120.0	\$ 14,040.00
Sr Technician	\$100.00	2,916.0	\$ 291,600.00	34.0	\$ 3,400.00	-	\$ -	174.0	\$ 17,400.00	474.0	\$ 47,400.00	207.0	\$ 20,700.00	289.0	\$ 28,900.00	286.0	\$ 28,600.00	1,399.0	\$ 139,900.00	53.0	\$ 5,300.00
Document Management	\$95.00	442.0	\$ 41,990.00	18.0	\$ 1,710.00	26.0	\$ 2,470.00	16.0	\$ 1,520.00	46.0	\$ 4,370.00	8.0	\$ 760.00	-	\$ -	44.0	\$ 4,180.00	96.0	\$ 9,120.00	188.0	\$ 17,860.00
Technician	\$90.00	1,940.0	\$ 174,600.00	-	\$ -	-	\$ -	25.0	\$ 2,250.00	594.0	\$ 53,460.00	153.0	\$ 13,770.00	-	\$ -	40.0	\$ 3,600.00	1,048.0	\$ 94,320.00	80.0	\$ 7,200.00
Subtotal Tetra Tech Labor		20,532.5 hrs	\$ 2,829,491.00	269.0	\$ 44,729.00	281.0	\$ 44,265.00	803.0	\$ 106,370.00	6,276.0	\$ 824,476.00	928.0	\$ 121,198.00	690.0	\$ 87,303.00	1,592.0	\$ 243,456.00	7,747.5	\$ 1,023,952.00	1,946.0	\$ 333,742.00
--Total Tetra Tech Labor			\$ 2,829,491.00		\$ 44,729.00		\$ 44,265.00		\$ 106,370.00		\$ 824,476.00		\$ 121,198.00		\$ 87,303.00		\$ 243,456.00		\$ 1,023,952.00		\$ 333,742.00
Subcontractors		Total Est. Cost		Cost		Cost		Cost		Cost		Cost		Cost		Cost		Cost		Cost	
Survey		\$ 18,427.50		\$ 3,675.00		\$ 7,087.50		\$ -		\$ 7,665.00		\$ -		\$ -		\$ -		\$ -		\$ -	
Road Improvement		\$ 86,625.00		\$ -		\$ 86,625.00		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -	
Electrical		\$ 1,575.00		\$ -		\$ 1,575.00		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -	
Drilling		\$ 2,630,565.00		\$ -		\$ -		\$ 252,315.00		\$ 2,378,250.00		\$ -		\$ -		\$ -		\$ -		\$ -	
Analytical Laboratory		\$ 511,812.00		\$ -		\$ -		\$ 630.00		\$ -		\$ 49,455.00		\$ -		\$ -		\$ 461,727.00		\$ -	
Dye Laboratory		\$ 133,875.00		\$ -		\$ -		\$ -		\$ -		\$ 13,965.00		\$ -		\$ 20,160.00		\$ 99,750.00		\$ -	
Substrate Injection		\$ 652,092.00		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ 652,092.00		\$ -		\$ -	
Subtotal Subcontractors		\$ 4,034,971.50		\$ 3,675.00		\$ 95,287.50		\$ 252,945.00		\$ 2,385,915.00		\$ 63,420.00		\$ -		\$ 672,252.00		\$ 561,477.00		\$ -	
--Total Subcontractors		\$ 4,034,971.50		\$ 3,675.00		\$ 95,287.50		\$ 252,945.00		\$ 2,385,915.00		\$ 63,420.00		\$ -		\$ 672,252.00		\$ 561,477.00		\$ -	
Other Direct Costs		Total Est. Cost		Cost		Cost		Cost		Cost		Cost		Cost		Cost		Cost		Cost	
Field Office		\$ 16,537.50		\$ -		\$ 16,537.50		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -	
Travel Allocation		\$ 257,748.75		\$ -		\$ -		\$ 8,505.00		\$ 111,483.75		\$ 11,025.00		\$ 4,410.00		\$ 1,890.00		\$ 115,447.50		\$ 4,987.50	
Field Equipment		\$ 250,425.00		\$ -		\$ -		\$ 19,005.00		\$ 43,470.00		\$ 39,795.00		\$ 14,490.00		\$ 11,025.00		\$ 122,640.00		\$ -	
Carbon Substrate		\$ 675,727.50		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ 675,727.50		\$ -		\$ -	
Amendments		\$ 23,677.50		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ 23,677.50		\$ -		\$ -	
Dye		\$ 7,875.00		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ 7,875.00		\$ -		\$ -	
Subtotal Other Direct Costs		\$ 1,231,991.25		\$ -		\$ 16,537.50		\$ 27,510.00		\$ 154,953.75		\$ 50,820.00		\$ 18,900.00		\$ 720,195.00		\$ 238,087.50		\$ 4,987.50	
--Total Other Direct Costs		\$ 1,231,991.25		\$ -		\$ 16,537.50		\$ 27,510.00		\$ 154,953.75		\$ 50,820.00		\$ 18,900.00		\$ 720,195.00		\$ 238,087.50		\$ 4,987.50	
Project/Task --Total		\$ 8,096,453.75		\$ 48,404.00		\$ 156,090.00		\$ 386,825.00		\$ 3,365,344.75		\$ 235,438.00		\$ 106,203.00		\$ 1,635,903.00		\$ 1,823,516.50		\$ 338,729.50	
PROJECT Total		\$ 8,096,453.75																			

Note: Indicative price quotes were obtained in May/June 2019 from construction, drilling, injection, surveying and laboratory subcontractors and carbon substrate and amendment suppliers based on available information at that time.