

April 9, 2018

TECHNICAL MEMORANDUM

To: Steve Clough
Nevada Environmental Response Trust

From: John Pekala, CEM#2347, Expires 9/20/2018, Ramboll
Jessica Donovan and Chris Stubbs, Ramboll

Re: **RI Phase 3 Modification No. 2**
Nevada Environmental Response Trust Site
Henderson, Nevada
Ramboll Project No. 1690006943-036

This Technical Memorandum presents Ramboll’s recommended Modification No. 2 to the scope of work for the Remedial Investigation (RI) Phase 3 Investigation currently in progress at the Nevada Environmental Response Trust Site (the “Site”) located in Henderson, Nevada. This modification includes three separate field activities as detailed below.

Activity One – AECOM Downgradient Study Monitoring Well Installations

Activity one includes the installation of ten wells (locations NERT5.91S1, NERT5.49S1, NERT5.11S1, NERT4.93S1, NERT4.71S1, NERT4.51S1, NERT4.38N1, NERT4.21N1, NERT3.80S1, NERT3.65S1) on Bureau of Reclamation and Clark County properties (see Figure 1). These well locations were originally proposed in AECOM’s Data Gap Investigation Plan – Phase I Groundwater Monitoring Well Installation (Investigation Plan) within the Downgradient Study Area. At the request of NDEP, the Trust will perform the installation of these wells.

Definition of Roles:

To ensure the timely completion of these well locations for incorporation into the Remedial Investigation (RI) reporting process, Ramboll will contract with the driller/developer for completion of the ten wells and provide a geologist during drilling. Ramboll’s project role will be to manage the driller/developer’s efforts, observe field conditions, and collect soil samples. AECOM’s project role will be to conduct geologic logging during drilling activities, collect groundwater samples following well completion, conduct induction logging of each well, and install transducers in each well as described in the original Data Gap Investigation Work Plan.

Scope Modification:

Ramboll proposes the following three modifications to the scope of the Investigation Plan:

- 1) Drilling activities will be completed by NERT as opposed to AECOM as originally anticipated in the Investigation Plan. As part of this activity NERT will obtain access

from Clark County, obtain all necessary permits to install the wells, and take ownership of the monitoring wells.

- 2) All ten borings will be drilled to a depth of 90 feet below ground surface (bgs) or refusal, whichever comes first, rather than depths of 40-70 feet bgs outlined in the original Investigation Plan. This change is designed to define the vertical extent of contamination along the Las Vegas Wash (LVW) and obtain critical data to be used in determining the need for deeper wells along the LVW. The wells will be completed consistent with the original Investigation Plan (i.e., using the same screened intervals).
- 3) Soil samples will be collected every 10 feet bgs for laboratory analysis (perchlorate, chlorate, total chromium and moisture content), to a total depth of 90 feet bgs. The original scope of work did not include soil sampling but recent sampling indicates the presence of perchlorate in soil along the LVW to depths of 70 below grade. The field geologist will select a subset of soil samples for physical tests including grain size distribution, porosity, bulk density, and fraction organic carbon (foc) to support soil descriptions and dissolved mass calculations. This modification will provide additional information on the distribution of contaminants in the subsurface outside of the screened interval and is consistent with the sampling program for the Phase 3 RI Work Plan within the Northeast Sub-Area (Ramboll Environ, 2017).

Activity Two – Subdrain Discharge Sample Collection

Ramboll identified two subdrains discharging to the C-1 channel located just north of the Chimera Golf Course while conducting a reconnaissance of the area in early March (see Figure 2). These subdrains appear to collect groundwater from beneath the golf course development. After discussion of this issue with NERT, Ramboll proposes to collect a groundwater sample from each subdrain discharge, if water is present. Samples will be analyzed for perchlorate, chlorate, and TDS. Depending on whether continuous flow is observed and on the analytical results, Ramboll may recommend adding these discharge drains to the monthly LVW sampling currently conducted by the Trust. Ramboll will also estimate the discharge rate from the pipe so that perchlorate mass flux can be calculated.

Activity Three – Groundwater Sample Collection: Additional Existing Northeast Sub-Area Monitoring Wells

Seven City of Henderson (COH) wells (M-16, MW-17, MW-19, MW21R, MW-22, MW-23, and MW-24) were identified during Ramboll's recent inspection of known wells located within the COH landfill area conducted in early March (see Figure 3). These wells were not included in the Phase 3 RI Baseline and Eastside Study Area sampling events as their existence was unknown until access to the COH landfill property was recently obtained. As approved by NERT, Ramboll proposes to add these seven wells to the Eastside Study Area sampling event currently underway.

In addition, Ramboll proposes to add five COH wells previously sampled by AECOM as part of their Downgradient Study Area Investigation (MW-06, MW-12, MW-15, MW-20, and MW-25) to the Phase 3 RI Eastside Study Area sampling event to provide a more comprehensive analytical data set for the Northeast Sub-Area.

Please contact us should you have any questions about the recommended scope modifications to the Phase 3 RI.

Attachments

- Table 1 Revised AECOM Downgradient Investigation Monitoring Well Installation
- Figure 1 AECOM Downgradient Investigation Monitoring Well Installation Locations
- Figure 2 Planned Subdrain Discharge Sample Locations
- Figure 3 Existing Northeast Sub-Area Wells

References:

AECOM, 2017. Data Gap Investigation Plan – Phase I Groundwater Well Installation, NERT Remedial Investigation – Downgradient Study Area, Nevada Environmental Response Trust Site, Henderson, Nevada. May.

Ramboll Environ, 2017. RI/FS Work Plan Addendum: Phase 3 Remedial Investigation, Revision 1, Nevada Environmental Response Trust Site, Henderson, Nevada. October 27.

**TABLE 1. REVISED AECOM DATA GAP INVESTIGATION PLAN - PHASE 1 GROUNDWATER MONITORING WELL INSTALLATION
RI Phase 3 Modification No. 2
Nevada Environmental Response Trust Site; Henderson, Nevada**

| Monitoring Well ID | Initial Planned Well Construction Details | | | | | | Revised Planned Well Construction Details* | | | | | | |
|--|---|--------------------------|----------------------|----------------------------|-----------------------------|----------------|--|--------------------------|----------------------|----------------------------|-----------------------------|----------------|----------|
| | Pilot Boring Depth (ft bgs) | Casing Diameter and Type | Screen Size (inches) | Screened Interval (ft bgs) | Sand Pack Interval (ft bgs) | Sand Pack Size | Pilot Boring Depth (ft bgs) | Casing Diameter and Type | Screen Size (inches) | Screened Interval (ft bgs) | Sand Pack Interval (ft bgs) | Sand Pack Size | Notes |
| Downgradient Study Area - Phase 1 Well Specifications | | | | | | | | | | | | | |
| NERT5.91S1 | 70 | 4" PVC | 0.02 | 40 - 50 | 38 - 50 | No. 3 | 90 | 4" PVC | 0.02 | 40 - 50 | 38 - 50 | No. 3 | [a], [b] |
| NERT5.49S1 | 60 | 4" PVC | 0.02 | 30 - 40 | 28 - 40 | No. 3 | 90 | 4" PVC | 0.02 | 30 - 40 | 28 - 40 | No. 3 | [a], [b] |
| NERT5.11S1 | 60 | 4" PVC | 0.02 | 35 - 45 | 33 - 45 | No. 3 | 90 | 4" PVC | 0.02 | 35 - 45 | 33 - 45 | No. 3 | [a], [b] |
| NERT4.93S1 | 60 | 4" PVC | 0.02 | 40 - 50 | 38 - 50 | No. 3 | 90 | 4" PVC | 0.02 | 40 - 50 | 38 - 50 | No. 3 | [a], [b] |
| NERT4.71S1 | 60 | 4" PVC | 0.02 | 40 - 50 | 38 - 50 | No. 3 | 90 | 4" PVC | 0.02 | 40 - 50 | 38 - 50 | No. 3 | [a], [b] |
| NERT4.51S1 | 60 | 4" PVC | 0.02 | 40 - 50 | 38 - 50 | No. 3 | 90 | 4" PVC | 0.02 | 40 - 50 | 38 - 50 | No. 3 | [a], [b] |
| NERT4.38N1 | 60 | 4" PVC | 0.02 | 45 - 55 | 43 - 55 | No. 3 | 90 | 4" PVC | 0.02 | 45 - 55 | 43 - 55 | No. 3 | [a], [b] |
| NERT4.21N1 | 60 | 4" PVC | 0.02 | 45 - 55 | 43 - 55 | No. 3 | 90 | 4" PVC | 0.02 | 45 - 55 | 43 - 55 | No. 3 | [a], [b] |
| NERT3.80S1 | 60 | 4" PVC | 0.02 | 50 - 60 | 48 - 60 | No. 3 | 90 | 4" PVC | 0.02 | 50 - 60 | 48 - 60 | No. 3 | [a], [b] |
| NERT3.65S1 | 60 | 4" PVC | 0.02 | 50 - 60 | 48 - 60 | No. 3 | 90 | 4" PVC | 0.02 | 50 - 60 | 48 - 60 | No. 3 | [a], [b] |

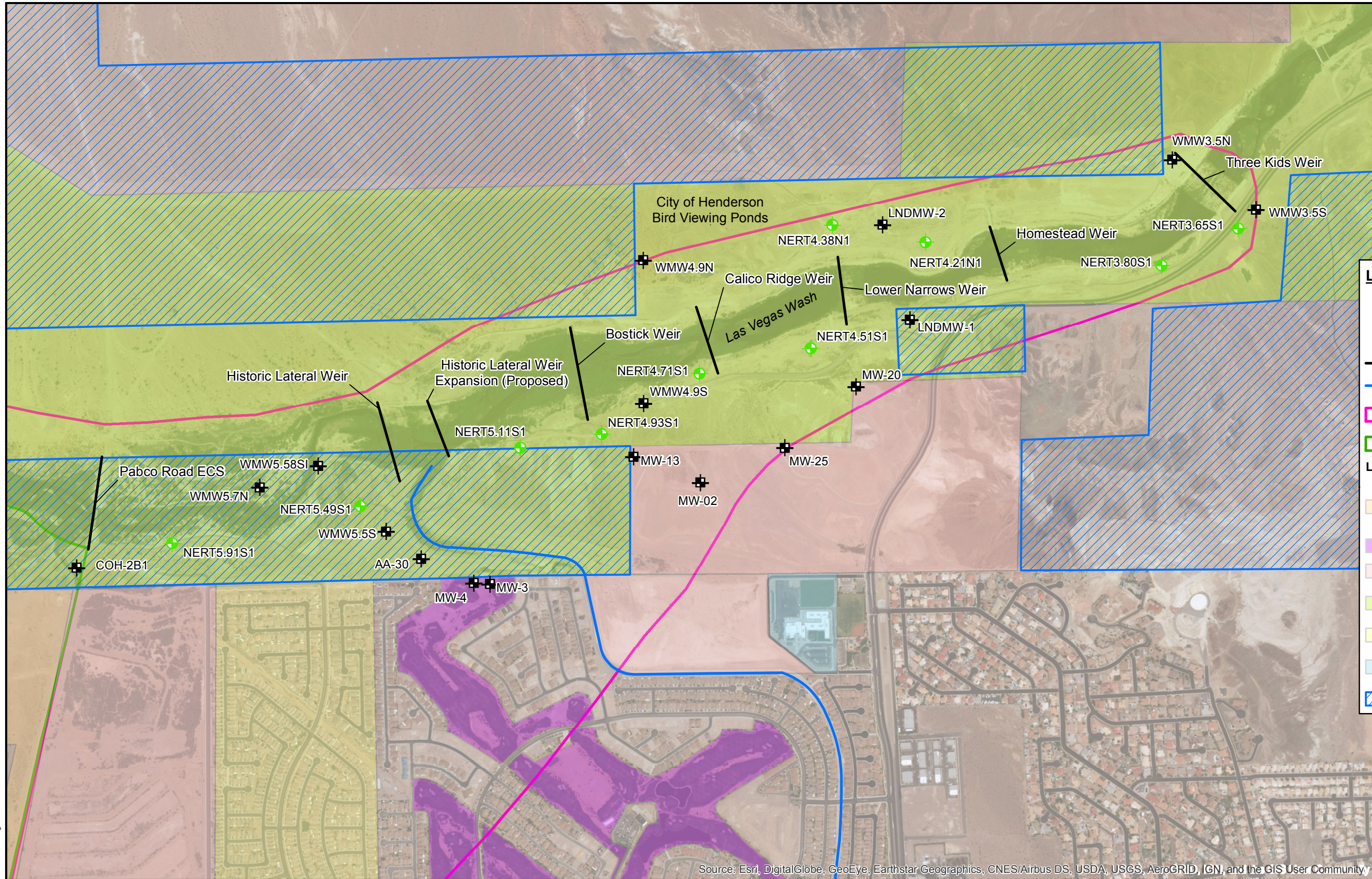
Notes:

* Soil sample depths and well construction details may be modified based on subsurface lithologies encountered during drilling.

ft bgs: feet below ground surface

[a] Soil samples will be collected for chemical analysis from depths of 10, 20, 30, 40, 50, 60, 70, 80, and 90 ft bgs. The soil samples will be analyzed for perchlorate, chlorate, total chromium, and moisture content. Each pilot borehole will be sealed with bentonite from the total depth of 90 ft bgs to a depth of one foot below the base of the planned well screen.

[b] Approximately 20% of the soil samples will be tested for physical properties, including Atterberg Limits (ASTM D4318), USCS Classification (ASTM D2487), grain size distribution (ASTM D422/D4464 combined or ASTM 4464 laser method), porosity (ASTM D425 modified), bulk density (ASTM D2937), and fraction organic carbon (foc) (Walkley Black). Approximately 5% of the soil samples will be selected for vertical permeability testing.

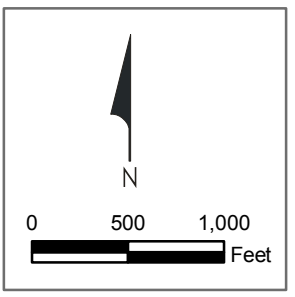


Legend

- Existing Well
- Planned Well Alluvium
- WEIR
- C-1 Channel
- NERT RI Downgradient Study Area
- NERT Off-Site Study Area

Land Owner

- Basic Environmental Company/Land Well Company
- Chimera Golf Club
- City of Henderson
- Clark County Wetlands Park
- Private Residences
- School Board of Trustees
- Bureau of Reclamation



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

AECOM Phase I Investigation Planned Wells
 Phase 3 RI Work Plan Modification No. 2
 Nevada Environmental Response Trust Site
 Henderson, Nevada

Drafter: RS Date: 4/9/2018 Contract Number: 169 000 6943-058 Approved by: Revised:



Figure
1

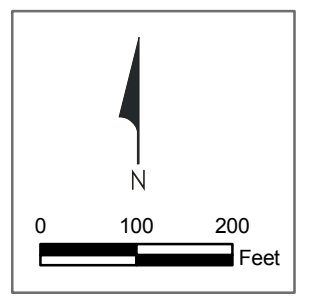
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LEGEND

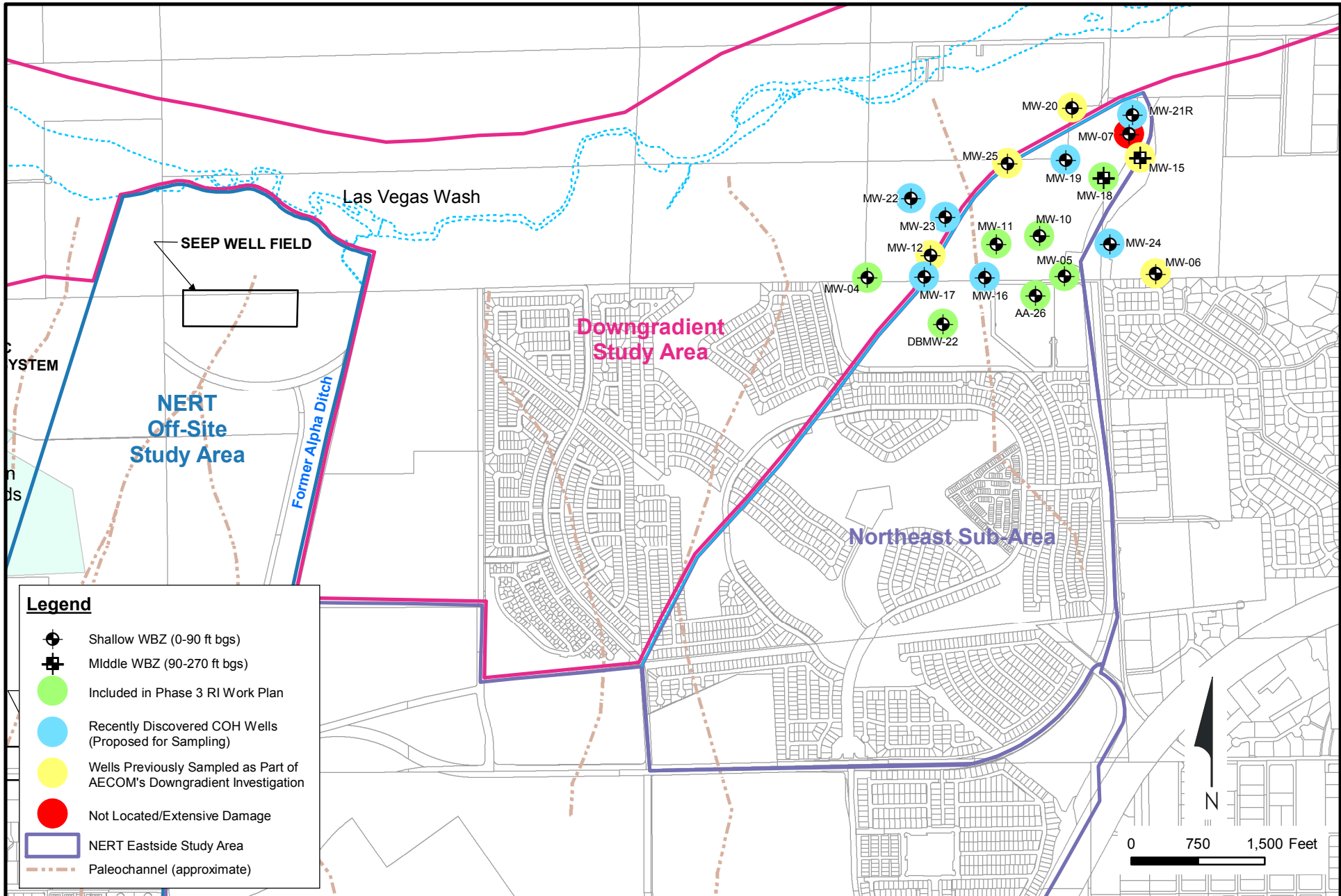
- Subdrain Discharge Sample Location
- ~ C-1 Channel



Planned Subdrain Sampling Locations

Phase 3 RI Work Plan Modification 2
Nevada Environmental Response Trust Site
Henderson, Nevada

| | | |
|-------------------|--------------------------------------|----------|
| Date: 4/9/2018 | Contract Number: 169 000 6943-058 | Figure |
| Drafter: AS/RS | Approved: | Revised: |



Existing Northeast Sub-Area Wells
 Phase 3 RI Work Plan, Modification No. 2
 Nevada Environmental Response Trust Site
 Henderson, Nevada

Figure

3

