

Groundwater Sampling Technical Memorandum (Revision 1)

NERT Remedial Investigation – Downgradient Study Area
Nevada Environmental Response Trust Site
Henderson, Nevada

Final



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Responsible Certified Environmental Manager (CEM) for this project

I hereby certify that I am responsible for the services described in this document and for the preparation of this document. The services described in this document have been provided in a manner consistent with the current standards of the profession and, to the best of my knowledge, comply with all applicable federal, state and local statutes, regulations and ordinances.



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August 1, 2017

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List of Acronyms

amsl	above mean sea level
BCL	Basic Comparison Level
GSP	Groundwater Sampling Plan
IDW	investigation-derived waste
LVW	Las Vegas Wash
mg/L	milligrams per liter
mL/min	milliliters per minute
MS/MSD	matrix spike/matrix spike duplicate
NAD	North American Datum
NDEP	Nevada Division of Environmental Protection
NERT	Nevada Environmental Response Trust
NTU	Nephelometric Turbidity Unit
QAPP	Quality Assurance Project Plan
RPD	relative percent difference
µg/L	micrograms per liter
UMCf	Upper Muddy Creek formation
USEPA	United States Environmental Protection Agency

1.0 Introduction

This technical memorandum (memo) describes the sampling locations and results of the initial groundwater sampling conducted for the Nevada Environmental Response Trust (NERT) Remedial Investigation (RI) - Downgradient Study Area in Henderson, Nevada (**Figure 1**). This memo was revised to respond to the comments received via email on March 7, 2017. The responses to each comment are provided in **Appendix A**. Except as noted in the Memorandum titled *Modified Groundwater Sampling Techniques for Wells with Slow Recharge Rates* (**Appendix B**), this work was conducted per the procedures and methods described in the Groundwater Sampling Plan (GSP) approved by Nevada Division of Environmental Protection (NDEP) on February 29, 2016.¹ This memorandum has been prepared as an interim deliverable in advance of the forthcoming NERT RI Report.

The objective of the investigation of the Downgradient Study Area is to identify subsurface pathways within the Downgradient Study Area through which perchlorate-impacted groundwater is entering Las Vegas Wash (LVW). Many of the existing groundwater monitoring wells within the Downgradient Study Area have not been sampled since 2009; therefore, current groundwater conditions beneath the Downgradient Study Area were not known. The initial groundwater sampling was conducted to evaluate the groundwater conditions, including current extent of perchlorate in the Downgradient Study Area. As an interim deliverable, the data presented herein in combination with the planned surface water investigation results will serve as the basis for the forthcoming Phase I Downgradient Study Area Groundwater Investigation Work Plan. All derived data will be further evaluated by NERT through the preparation of the RI report.

¹ AECOM, 2016. Groundwater Sampling Plan, NERT Remedial Investigation – Downgradient Study Area, Nevada Environmental Response Trust Site, Henderson, Nevada, Final, February 29.

2.0 Pre-Field Activities

Pre-field activities included updating the Health and Safety Plan, reviewing the Quality Assurance Project Plan (QAPP), obtaining access to the 78 wells that were identified for sampling, notifying land and well owners, conducting a preliminary biological survey, and conducting a well reconnaissance survey.

2.1 Access

Access was requested to the 78 wells listed in the GSP and to the properties where these wells are located. An access agreement, permit, or email permission was obtained from the various owners. Well ownership was obtained from the Ramboll-NERT Wells Database.² Property owners were identified using the Clark County Assessor's website.³ Records indicate that the 78 wells are located on various parcels owned by six different property owners. These property owners are:

- LandWell Company,
- Clark County Wetlands Park,
- City of Henderson,
- United States Bureau of Reclamation,
- Chimera Golf Club, and
- School Board of Trustees.

Seven well owners were identified for the 78 wells. The well owners are:

- American Pacific,
- LandWell Company,
- Chimera Golf Club,
- City of Henderson,
- NERT,
- School Board of Trustees, and
- Southern Nevada Water Authority.

In many instances, the owner of the well is not the owner of the property where the well is located. As such, access was obtained from both the well owner and property owner. A summary of the well and property owners is presented in **Table 1** and shown on **Figure 2**. Copies of the access agreements, permits and authorizations obtained are presented in **Appendix C**.

² Ownership data was obtained from Ramboll_NERT_Wells Database on February 18, 2016.

³ Clark County, 2016. Assessor Records and Maps, Accessed at: <http://www.clarkcountynv.gov/assessor/Pages/RecordSearch.aspx>. Accessed on: February 15, 2016.

2.2 Biological Survey

A preliminary biological survey was conducted of the areas identified for sampling or testing within the Downgradient Study Area. These areas included the monitoring well sites, proposed surface water sampling sites as described in the Surface Water Sampling Plan⁴, and the proposed geophysical pilot test sites as described in the Geophysical Pilot Test Plan.⁵ The purpose of the survey for groundwater sampling was to determine if sensitive or protected species or potentially critical habitat were present in the routes to the well sites or in the immediate vicinity of the well sites that were identified for sampling. The 78 well sites were surveyed but not all wells could be directly observed due to lack of physical access or because a particular well could not be located. A desk-top study of existing conditions was conducted using available aerial photographs and an environmental assessment of the LVW Stabilization Project.⁶ Field observations for the biological survey were made February 22 through March 3, 2016.

Special-status species with the potential to occur within or adjacent to the Downgradient Study Area include:

- Five species of birds – American bald eagle (*Haliaeetus leucocephalus*), American peregrine falcon (*Falco peregrinus*), southwestern willow flycatcher (*Empidonax traillii extimus*), western burrowing owl (*Athene cunicularia hypugaea*) and Yuma clapper rail (*Rallus longirostris yumanensis*)
- Two species of mammals – California leaf-nosed bat (*Macrotus californicus*) and spotted bat (*Euderma maculatum*)
- Three species of reptiles – banded gila monster (*Heloderma suspectum cinctum*), chuckwalla (*Sauromalus obesus*) and desert tortoise (*Gopherus agassizii*)
- One plant – Las Vegas bearpoppy (*Arctomecon Californica*)

No special-status species were observed within the Downgradient Study Area during the survey. Some creosote brush which is potentially tortoise habitat was observed. As a precaution, field sampling staff were trained to minimize disturbance of vegetation and to look for indications of desert tortoise activity and bird activity that could indicate nesting behavior.

The majority of the habit within the study area has been impacted by Las Vegas Wash restoration activities that include: invasive plant removal, re-contouring activities with heavy construction equipment, planting wetland and upland plants, and urban development. The urban development includes residential home construction, detention basin construction, and transportation infrastructure. Continual desert wetland restoration is ongoing and continues through the project area with new plantings and irrigation systems to assist with restoration success.

There are areas along the Las Vegas Wash where bird nesting could occur. In these areas before project activities occur; bird activities should be monitored for nests or nesting behavior. As an alternative project work could commence out of nesting season.

There are areas where patches of Creosote scrub (*Larrea tridentata*) occur, adjacent to urban development or transportation corridors. In typical desert plant communities areas with creosote can be desert tortoise (*Gopherus agassizii*) habitat. No desert tortoises or tortoise sign was observed in the areas examined during the preliminary biologic survey.

⁴ AECOM, 2016. Surface Water Sampling Plan, NERT Remedial Investigation – Downgradient Study Area, Nevada Environmental Response Trust Site, Henderson, Nevada, Final, April.

⁵ AECOM, 2016. Geophysical Pilot Test Plan, NERT Remedial Investigation – Downgradient Study Area, Nevada Environmental Response Trust Site, Henderson, Nevada, Final, July 11.

⁶ US Department of the Interior, 2001. National Park Service, Lake Mead National Recreation Area, Las Vegas Wash Stabilization Project Environmental Assessment, July.

Observations made during the survey indicate that no bird nests were present in the Downgradient Study Area and that impacts to bats are unlikely during field activities. Impacts to reptiles, especially the desert tortoise, are unlikely due to the poor habitat conditions resulting from recent disturbances and due to the proximity to extensive urban development and transportation corridors. No sensitive plant species or plant communities were observed within the Downgradient Study Area. Details of the preliminary biological survey, including summary tables of observations at each sampling location and photographs, are presented in the Preliminary Biological Survey Technical Memorandum (**Appendix D**).

2.3 Well Reconnaissance

Many of the 78 groundwater wells proposed for sampling in the GSP have not been sampled since 2009. Of the 78 wells, 68 are located within the Downgradient Study Area and 10 are located outside and east of the Downgradient Study Area. The 10 wells were added at the request of NDEP to provide data in an area with limited historical data. As such, a reconnaissance of the wells was conducted to verify if these wells were still present and to document the condition of the wells. During the reconnaissance, the depth to water and total depth of each well were obtained and general condition of the wells was noted. Each well was surveyed by a licensed land surveyor to update the horizontal location coordinates and elevation of each well. Locations were referenced to the State Plane Coordinate System and elevations were referenced to the North American Datum (NAD) 83 Nevada East Zone (2701) with vertical datum based on NAD 88 referenced to the City of Henderson Benchmark network. A copy of the licensed surveyor's report, including coordinates for each well is presented in **Appendix E**.

The well reconnaissance was conducted from April 4 to April 8, 2016. During the reconnaissance, eight additional wells were identified and added to the list of 78 wells identified in the GSP. Therefore, a total of 86 wells were surveyed over 5 days. Three Southern Nevada Water Authority wells were added to the list of GSP wells because they were located in easily accessible areas along the LVW. Four new wells (identified as "Active (new)" on **Figure 3**) were identified and surveyed at the City of Henderson Landfill. In addition, one well with an unknown identification was located on the south end of the Northern Rapid Infiltration Basins and surveyed but found to be dry. For the purposes of this investigation, the term "dry well" refers to a well containing no measureable water in the well casing. The following summarizes the results of the reconnaissance:

Well Status	Well Count
Total active wells	61
Active wells to be sampled via pumps ⁷	58
Wells that need bailer to sample	3
Dry wells	8
Plugged and abandoned wells	14
Wells with insufficient water to sample ⁸	1
Wells where access was not granted	1
Wells not able to locate	1
Total Wells in Reconnaissance	86

⁷ During the well reconnaissance, well UZO-17 was inaccessible; however, it was determined to be active through communication with Mr. Jeff Gibson with Endeavor. Email Communication, 2016. Mr. Jeff Gibson, RE: NDEP/NERT LV Wash Perchlorate Loading Well Sampling Schedule, April 13, 2016. Well UZO-17 was later sampled

⁸ "Wells with insufficient water to sample" indicates that groundwater could be measured in the well but at such low levels that it would not be possible to collect a sample using a bladder pump or bailer.

The results of the reconnaissance are shown on **Figure 3**. A summary of the data recorded during the well reconnaissance is provided in **Table 2**. Based on these results, the 61 active wells shown on **Figure 4** were included for the groundwater monitoring network for the Downgradient Study Area.

3.0 Field Procedures

Groundwater level measurements and sampling were conducted consistent with the Final GSP dated February 29, 2016.⁹ Details recorded when the samples were obtained are contained in the Field Data Sheets provided in **Appendix F**. This Appendix also contains the calibration logs for the field equipment used.

3.1 Water Level Measurements

During the well survey and before sampling, each groundwater monitoring well was sounded for depth to water from top of casing. An electronic sounder accurate to the nearest +/- 0.01 feet, was used to measure depth to water in each well. The electronic sounder was lowered down the casing to the top of the water column, and the graduated markings on the probe wire or tape was used to measure the depth to water from the surveyed point on the rim of the well casing.

3.2 Purging and Sampling Procedures

Groundwater purging and sampling was conducted using the "low-flow" method, in which low volumes of water are purged with little or no drawdown while allowing water quality field parameters to stabilize as specified in the field guidance document, if achievable between three successive measurements. If field parameters did not stabilize by the time six well casing volumes have been purged, then final water quality parameters were recorded and a sample of groundwater collected. Low-flow groundwater samples were collected using a bladder pump (except for the deviations discussed in Section 3.3). The pump intake was positioned at the approximate midpoint of the well screen if the well screen was known. If the well screen was not known, it was assumed that 10 feet of screen was located at the bottom of the well.

The well reconnaissance indicated that only three wells would need to be sampled using a bailer due to the low levels of groundwater in the well (less than 5 feet of water). However, three additional wells (MCF-05, MCF-18A, and MCF-20A) were purged using a bailer because the existing pumps in the wells were inoperable at the time of sampling. Six wells were purged and sampled using a bailer including MCF-20A. A second sample was collected from MCF-20A using low flow techniques. Bailers were used to purge and sample groundwater from AA-20, AA-22, MCF-05, MCF-06C, MCF-18A and MCF-20A.

During groundwater sampling, a water quality meter (equipped with a flow-through cell) was used during purging to track water quality field parameters and assess when stabilization of parameters had occurred. Samplers recorded in-field measurements for depth to water, pH, electrical conductivity, dissolved oxygen, oxidation-reduction potential, turbidity and temperature of groundwater samples.

3.3 Deviations from Sampling Method Protocols

Groundwater well sampling methods detailed in the approved GSP consist of low-flow sampling techniques in which low volumes of water are purged (using a bladder pump) with little (less than 4 inches) drawdown, while allowing water quality field parameters to stabilize. Field personnel reported that groundwater levels in several wells were being drawn down even at low pumping rates of 50 milliliters per minute (mL/min). The drawdown is the result of slow recharge rates, which may be caused by the low hydraulic conductivity of the formation and/or fouling of the well screen and gravel pack. Recovery rates as low as 50 percent of the initial water columns were observed over a 14.5-hour period, even after the screen interval was swabbed to try to improve recharge.

⁹ AECOM, 2016. Groundwater Sampling Plan, NERT Remedial Investigation – Downgradient Study Area, Nevada Environmental Response Trust Site, Henderson, Nevada, Final, February 29.

Drawdown at low pumping rates experienced at several wells does not fall within the sampling protocols in the approved GSP.¹⁰

These field conditions were discussed with NDEP and NERT on April 26, 2016, and the following modified sampling techniques were agreed to be used in the Downgradient Study Area when drawdown in a well occurs while pumping at 100 mL/min:

- Purge the complete pump system (hoses and flow-through cell).
- Record Field Parameters – collection of only one to two readings is acceptable. Field parameters do not need to stabilize before collecting a sample.
- Collect sample after pump system (pump and lines) has been purged completely.

Modified sampling procedures were implemented in the field on the morning of April 27, 2016. Implementation of these procedures reduced sampling times and minimized the volume of purge water generated. These sampling techniques are consistent with those used by Ramboll when they encounter wells with slow recharge rates. A memorandum documenting the changes to the groundwater sampling techniques for wells with slow recharge rates was submitted to NDEP on April 28, 2016 (**Appendix B**).

¹⁰ AECOM, 2016. Groundwater Sampling Plan, NERT Remedial Investigation – Downgradient Study Area, Nevada Environmental Response Trust Site, Henderson, Nevada, February 29.

4.0 Analytical Program

The analytical program was mainly focused on the analytes that may potentially affect water quality in the LVW. Bromide was added because it may be used as a tracer in future investigations. Groundwater samples were analyzed for the following constituents:

- Perchlorate (United States Environmental Protection Agency [USEPA] Method 314.0);
- Chlorate (USEPA Method 300.1);
- Chromium, Dissolved (USEPA Method 200.8 [ICP-MS]);
- Hexavalent Chromium, Dissolved (USEPA Method 218.7);
- Chloride (USEPA Method 300.0);
- Bromide (USEPA Method 300.0); and
- Total Dissolved Solids (Method SM 2540C).

As directed by NDEP, field-filtering of water samples for perchlorate analysis was not required. Filtering for dissolved chromium and hexavalent chromium analyses was conducted in the field using a 0.45-micron filter. Copies of the analytical results and chain-of-custody records are provided in **Appendix G**.

4.1 Sample Handling and Transportation

Per the procedures detailed in the Quality Assurance Project Plan (QAPP) and Groundwater Sampling Plan, all samples were collected, handled, and stored in such a manner that they were representative of their original condition and chemical composition. All samples were properly identified and maintained under chain-of-custody protocol to protect sample integrity. Groundwater sample containers were placed in a cooler with ice to chill and maintain a sample temperature of 4 degrees (± 2 degrees) Celsius. Samples were transported to the laboratories within their respective hold times. TestAmerica received samples designated for perchlorate, chlorate, dissolved chromium, chloride, bromide and total dissolved solids. Samples designated for hexavalent chromium analysis were transported to Silver State Laboratories.

5.0 Data Validation

Approximately 90 percent of the analytical data (58 out of 64 primary samples) were validated according to Stage 2B data validation procedures and approximately 10 percent of the analytical data (*six out of 64 primary samples for wet chemistry analyses and seven out of 64 primary samples for chromium analyses*) were validated according to Stage 4 data validation procedures. Although the number of wet chemistry analyses validated to Stage 4 was slightly less than the target, no impact on data quality is expected. The overall project requirements and completeness levels were met. As presented in **Table 3**, there were 64 primary samples and 15 quality control samples. The primary samples consist of one sample from 61 wells and three samples from three wells that were sampled twice. Each sample contained 7 analyses (perchlorate, chlorate, bromide, chloride, dissolved chromium, hexavalent chromium, and total dissolved solids) for a total of 448 results. A total of 64 results, or approximately 14 percent of the total, were qualified. However, no results were required to be rejected. Based upon the Stage 2B and Stage 4 data validation all other results are considered valid and usable for all purposes. The Data Validation Summary Report, provided in **Appendix H**, provides detailed information about the data reviewed and results that were qualified.

6.0 Summary of Groundwater Data

Groundwater samples were collected from 61 wells. Seven field duplicates, four field blanks, and four equipment blanks were collected. Three wells (MCF-05, MCF-18A, and MCF20A) were each sampled twice due to quick drawdown of water levels and slow recovery of groundwater in these wells. The first sample was collected prior to development and purging of the well to ensure that a sample was obtained in the event that the well did not recover enough for sample collection. The second sample was collected after the well was developed and allowed to recover to 80 percent of the initial water level. The results from the second sample collected are considered to be representative of concentrations in groundwater because this sample was collected using protocols that most closely followed the sampling protocols in the QAPP and modified sampling procedures (**Appendix B**). **Table 4** presents the analytical results of groundwater well sampling.

6.1 Groundwater Elevations

Groundwater elevations ranged from 1,440.26 feet above mean seal level (amsl) to 1,596.94 feet amsl (**Table 5**). Three wells completed in the Upper Muddy Creek formation (UMCf), MCF-08A, MCF-08B-R, and MCF-31A, exhibited artesian conditions. Five wells (MCF-05, MCF-06A-R, MCF-18A, MCF-20A, and MCF-31B) were completed in the deep water bearing zone of the UMCf. To be consistent with other RI investigations in the area the figures illustrating chemical concentrations in groundwater are presented for the Shallow Water Bearing Zone (0 – 90 feet below ground surface) and for the Middle and Deep Water Bearing Zones (>90 feet below ground surface). The Middle and Deep Water Bearing Zones were combined because only 8 wells were sampled from these two water bearing zones.

6.2 Field Water Quality Parameters

A flow through cell was used to record pH, electrical conductivity, dissolved oxygen, oxidation-reduction potential, turbidity and temperature of groundwater samples (**Table 6**). Temperature ranged from 16.40 to 29.92 degrees Celsius. The high temperatures recorded in groundwater are likely the result of ambient temperatures that ranged from 24 to 32 degrees Celsius and direct sunlight on the equipment during sampling resulting in elevated temperature readings for some of the groundwater samples. Electrical conductivity ranged from 2,030 to 244,157 micro-siemens per centimeter. Dissolved oxygen ranged from 0.32 to 8.42 milligrams per liter. Oxidation-reduction potential ranged from -117.60 to 247. Turbidity ranged from 0 to greater than 1,000 Nephelometric Turbidity Units (NTUs). Groundwater from 30 wells exhibited turbidity less than 4 NTUs and groundwater from the other 33 wells was greater than 4 NTUs indicating that groundwater in 54 percent of the wells was turbid when sampled.

6.3 Laboratory Analyses Results

Laboratory analytical results were compared to regulatory levels (i.e., basic comparison levels [BCLs]) as specified in the RI/FS Work Plan.¹¹ BCLs are updated by NDEP and the most current BCLs apply to investigation and remediation activities at the site. These BCLs were used for consistency in the comparison of data between the NERT RI and the NDEP Downgradient Study Area investigation. It should be noted that a BCL level of 15 micrograms per liter (µg/L) was used for perchlorate because it reflects the Federal Preliminary Remediation Goal and is what is applied under the RI/FS investigation of the NERT Site.

¹¹ ENVIRON International Corporation, 2014. Remedial Investigation and Feasibility Study Work Plan, Revision 2, Nevada Environmental Response Trust Site, Henderson, Nevada, June 19.

6.3.1 Perchlorate

Perchlorate was detected above the detection limit in groundwater from 49 wells. (Perchlorate concentrations ranged from <0.95 to 9,000 µg/L (DBMW-1) (**Figures 5 and 6**). Perchlorate concentrations above the BCL of 15 µg/L were detected in groundwater from 44 wells. The detection limit for seven wells is 95 µg/L due to sample dilution required because of high concentrations of other constituents. Perchlorate concentrations in these wells could potentially exceed the BCL of 15 µg/L.

6.3.2 Chlorate

Chlorate was detected above the detection limit in groundwater from 40 wells. Chlorate concentrations ranged from 120 to 100,000 µg/L (AA-22) (**Figures 7 and 8**). Chlorate concentrations above the BCL of 1,000 µg/L were detected in groundwater from 28 wells.

6.3.3 Dissolved Chromium and Hexavalent Chromium

Dissolved chromium was detected above the detection limit in groundwater from 39 wells. Chromium concentrations ranged from <4.0 to 110 µg/L (DBMW-5) (**Figures 9 and 10**). Chromium concentrations in all wells were below the BCL of 100 µg/L, except for the dissolved chromium concentration (110 µg/L) in well DBMW-5.

Hexavalent chromium was detected above the detection limit in groundwater from 39 wells. Hexavalent chromium concentrations ranged from <1.0 to 140 µg/L (DBMW-5) (**Figures 11 and 12**). Hexavalent chromium concentrations were above the BCL of 100 µg/L in one well (DBMW-5). The ratio of hexavalent chromium to dissolved chromium concentrations ranged from 2 to 157 percent. Six samples exhibited concentrations of hexavalent chromium where no dissolved chromium was detected; however, the method detection limit for dissolved chromium for those samples was higher than the detected value of hexavalent chromium. Although it is logical to expect the concentration of hexavalent chromium to be lower than dissolved chromium, this is not the case for groundwater from 29 of the wells where both dissolved chromium and hexavalent chromium were detected. These results are due to the use of two different laboratories for the analyses, the use of two different aliquots of water, and the use of two different analytical methods for analysis. Although hexavalent chromium concentrations were generally higher than dissolved chromium concentrations, the difference in the concentrations is considered to be a result of measurement variability within samples, between methods, and between laboratories.

Two samples were collected from MCF-05 because of a concern with slow recovery of water in the well. The first sample was collected prior to purging of the well and the second sample was collected after purging and recovery of the well. Analytical chromium results, from the first sample resulted in a concentration of 110 µg/L. Because the well was not purged, this result is considered less representative of groundwater concentrations than the second result (<25 µg/L) that was obtained after the well was purged and recovered per sampling protocols.

6.3.4 Total Dissolved Solids

Total dissolved solids were detected above the detection limit in groundwater from all 61 wells. Total dissolved solids concentrations ranged from 1,300 to 190,000 milligrams per liter (mg/L) (MCF-18A and MCF-31A) (**Figures 13 and 14**). There is no BCL for total dissolved solids. Total dissolved solids concentrations above the secondary Maximum Contaminant Level for drinking water (MCL) of 500 mg/L were detected in all groundwater samples.

6.3.5 Chloride and Bromide

Chloride was detected above the detection limit in groundwater from all 61 wells. Chloride concentrations ranged from 230 to 100,000 mg/L (MCF-18A). There is no BCL for chloride. Chloride concentrations in all wells were above the secondary MCL of 250 mg/L, except for one concentration (230 mg/L) in well WMW7.8N.

Bromide was detected above the detection limit in groundwater from 23 wells. Bromide concentrations ranged from 0.63 to 140 mg/L (MCF-31A). Bromide concentrations above the BCL of 11.3 mg/L were detected in groundwater from 3 wells (RIT-6, WMW3.5S, and WMW5.5S).

The ratio of chloride to bromide was calculated and is provided in **Table 4**. Where bromide was undetected, the detection limit was used as an estimate. The ratios were generally similar, with higher ratios noted in all but two of the deep MCF wells (MCF-05, MCF-8A, MCF-18A, MCF-20A, and MCF-31B) and a fairly high ratio (830) in one of the LVW samples (WMW7.8N). The ratio of chloride to bromide is shown on **Figures 15 and 16**.

6.3.6 Quality Control Samples

Quality control samples collected included field duplicates, field blanks, and equipment blanks. The laboratory ran the required quality control procedures including matrix spike and matrix spike duplicate (MS/MSD) analysis. A detailed discussion of quality control and data validation is contained in **Appendix G**.

Seven duplicate samples were collected (samples DBMW-7-20160418-FD, WMW6.9N-20160420-FD, MCF-08BR-20160427-FD, WMW3.5N-20160427-FD, MW-10-20160428-FD, PC-74-20160429-FD, and PC-76-20160429-FD) (**Table 4**). Acceptable relative percent difference (RPD) between the primary and duplicate sample was specified as 30 percent in the QAPP. Acceptable field and analytical precision was demonstrated for all field duplicate pairs with the following exceptions: bromide concentrations had a RPD of 61.3 percent and hexavalent chromium concentrations had a RPD of 40 percent from well PC-74. Qualifiers were added to the results for these field duplicate pairs during data validation due to the exceedance of RPD criteria.

Equipment blank samples were collected following decontamination of sampling equipment. Four equipment blank samples (DBMW-4-20160419-EB, PC-76-20160429-EB, WMW4.9N-20160427-EB, and WMW5.5S-20160422-EB) were prepared from distilled or deionized water following the sample collection from designated wells (**Table 4**). No contaminants were found with the following exceptions: chloride at a concentration of 0.30J mg/L (PC-76-20160429-EB) and dissolved chromium at a concentration of 0.80J µg/L (WMW5.5S-20160422-EB).

Four field blank samples (LNDMW2-20160427-FB, MW-25-20160421-FB, PC-74-20160429-FB, and RIT-10-201604220-FB) were prepared from distilled or deionized water following the sample collection from designated wells. No contaminants were found with the following exceptions: chloride at a concentration of 0.30J mg/L (PC-74-20160429-FB, and RIT-10-201604220-FB) and dissolved chromium at a concentration of 0.86J (MW-25-20160421-FB) .

Sample concentrations were compared to concentrations detected in the equipment and field blanks as required by the QAPP. No sample data were qualified based on the field blank or equipment blank results because the results associated with primary samples associated with the blank samples were either non detect or more than 10 times the concentration detected in the blanks.

MS/MSD samples were run as required by the laboratory. Due to MS/MSD recoveries that were outside of control criteria, less than 1 percent of the data were qualified as estimated ("UJ/J").

7.0 Investigative-Derived Waste

Investigation-derived waste (IDW) for the groundwater sampling event consisted of purged groundwater, equipment cleaning water, used personal protective equipment (disposable nitrile gloves), and household trash such as used paper towels. The liquid IDW was temporarily stored in a polyethylene tank; at the end of each day, the liquid IDW was transported to the Groundwater Extraction Treatment System at the NERT On-Site Study Area. Following sampling (by Tetra Tech) and analysis, it was discharged into the GW-11 pond that receives groundwater pumped from extraction wells at the Seep Area and Athens Road Well Fields. Analytical results for the liquid IDW is presented in **Appendix G**. The remaining IDW was double-bagged in plastic trash bags and disposed as municipal trash.

8.0 Conclusions

The data were collected consistent with the approved work plan with the exception of the field sampling procedures documented in Section 3.3 of this memo. The deviations from the work plan did not affect the data usability.

Low concentrations of chloride and chromium were detected in laboratory, field, and/or equipment blanks. However, no detections above the PQL were qualified based on the field blank or equipment blank results because the results of the primary samples associated with these blank samples were either below the PQL or were more than 10 times the concentrations detected in the blanks. Qualifiers were added to the results for bromide and hexavalent chromium in the field duplicate pair samples (PC-74-20160429 and PC-74-20160429-FD) from well PC-74 during data validation due to the exceedance of RPD criteria.

Based on the Stage 2B and Stage 4 data validation and review of sample collection procedures, the data collected are useable for the remedial investigation. Review of the results of the data validation indicates that no additional qualifiers were added due to the validation of instrument quality control checks (instrument quality controls are specific to Stage 2B validation). No additional data qualifiers resulted from the Stage 4 data validation. In addition, AECOM found that Stage 4 data validation and the validation of instrument quality control (which is specific to Stage 2B), resulted in no additional qualifiers being assigned and no changes to the usability of the data. Although reducing data validation to Stage 2A would result in cost savings, it would not be consistent with the NDEP guidance and the NERT RI Workplan.

Perchlorate was detected above the detection limit in groundwater from 49 wells. The highest perchlorate concentrations was detected at 9,000 µg/L in well DBMW-1 located in the south-central portion of the Downgradient Study Area. Perchlorate concentrations above the BCL of 15 µg/L were detected in groundwater from 44 wells. In general, the highest concentrations were detected along the southern boundary and central portion of the Downgradient Study Area. Perchlorate was also detected in four wells on the north side of the LVW from east of the Pabco Road Weir to the eastern boundary of the Downgradient Study Area. The highest concentration of perchlorate (1,500 µg/L) on the north side of LVW was detected just east of the Lower Narrow Weir in well LNDMW2. The source of the perchlorate and the pathways whereby it reached the north side of LVW are not known at this time.

Chlorate was detected in groundwater from 40 wells and concentrations in 28 wells exceeded the BCL of 1,000 µg/L.

Chloride was detected in groundwater from all 61 wells and concentrations in 28 wells exceeded the BCL of 1,000 µg/L. Bromide was detected above the detection limit in groundwater from 23 wells and concentrations in 3 wells exceeded the BCL of 11.3 µg/L. Detection of bromide above detection limits over such a broad area and at such a wide concentration range (0.43 – 140 mg/L) limits bromide's potential as a tracer chemical in this area.

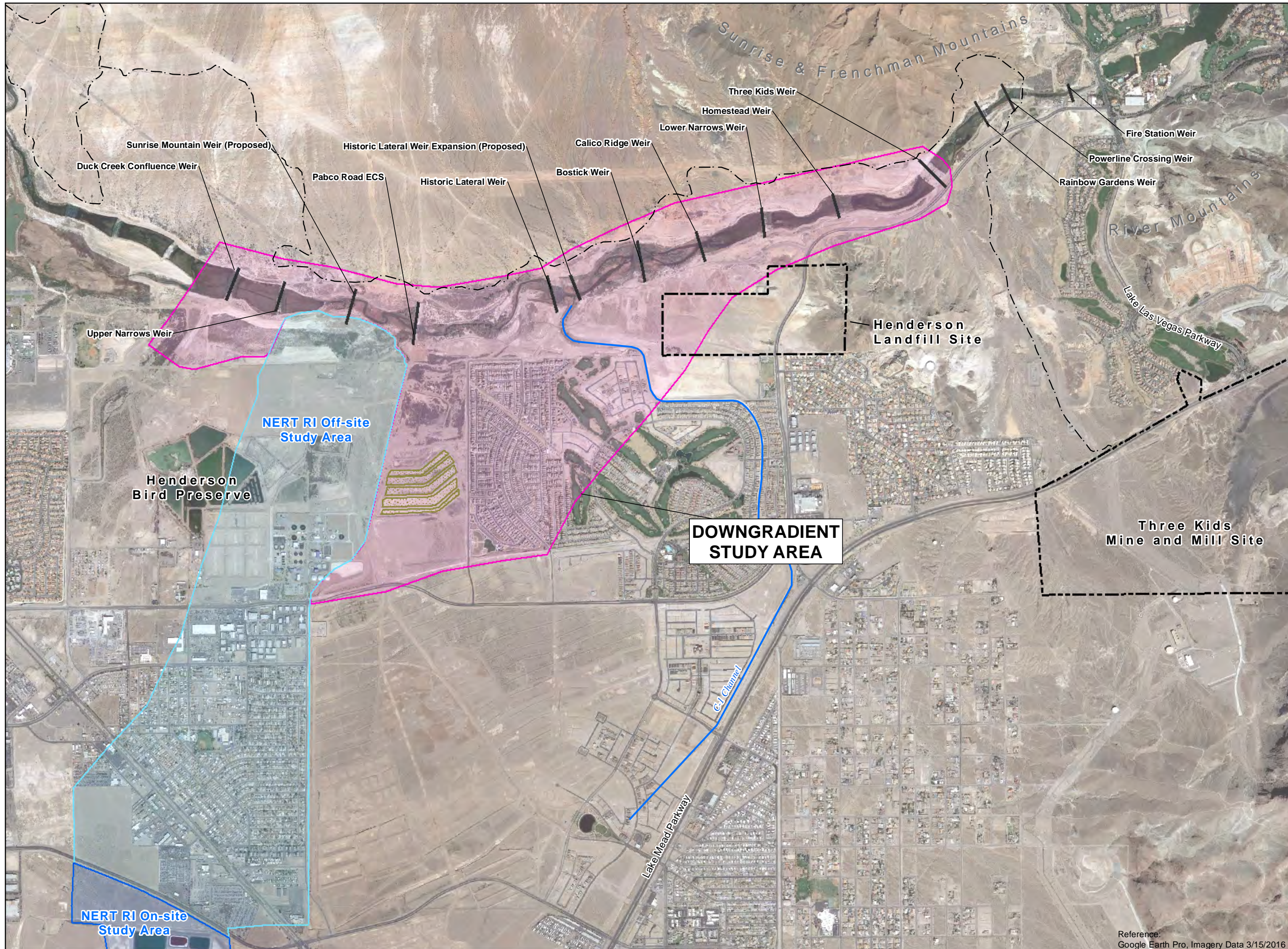
Patterns of bromide, and the chloride-to-bromide ratios were inconclusive. It is not clear why the ratios would be high in some of the deep wells and not others. In general, the ratios were not notably different in samples with high perchlorate (e.g., DBMW-1) than those where perchlorate was not detected, and in some cases the ratios were lower in samples where perchlorate was detected than in those samples where perchlorate was not detected. However, these conclusions should be considered preliminary given the limited dataset and the number of undetected bromide data.

9.0 Recommendations

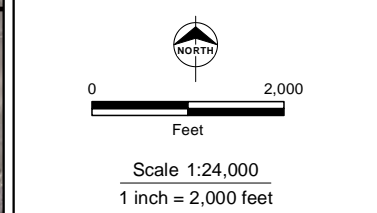
The objective of the Downgradient Study Area investigation is to identify subsurface pathways through which perchlorate-impacted groundwater is entering the LVW. This initial groundwater sampling event has provided a portion of the data that will be used to evaluate the subsurface pathways and should be used in conjunction with other existing datasets to better evaluate the subsurface conditions. As such, AECOM recommends the following:

- The “All Wells” database and other pertinent databases should be updated to reflect the most current information developed on the 86 wells investigated during the well reconnaissance, including which wells are no longer accessible. In addition, the new coordinate and elevation information, water levels and constituent concentrations should be added to the NERT and NDEP databases.
- In general, the analytical results appear to agree with historical analytical results; however, a detailed comparison of this new data to the historical data should be conducted to evaluate if there are any anomalies and/or trends in the complete dataset.
- Data gaps previously identified should be reviewed with the addition of this data to refine the identification of locations for additional wells or geophysical investigations. These data should also be combined with the surface water data to assess potential flux to the LVW.
- Perchlorate concentrations north of the LVW should be further evaluated in conjunction with the results of the initial surface water sampling and the planned surface water and subsurface geophysical investigations.
- Installation of transducers should be considered in select wells to evaluate groundwater level changes near LVW which could affect local flow and contaminant concentrations. Upon NDEP and NERT concurrence with this recommendation, AECOM will prepare a workplan for the installation of transducers in wells near the LVW.

Figures



- Legend**
- Wetlands Trail
 - Channels
 - Northern Rapid Infiltration Basins
 - NERT RI Downgradient Study Area
 - NERT RI Off-site Study Area
 - NERT RI On-site Study Area



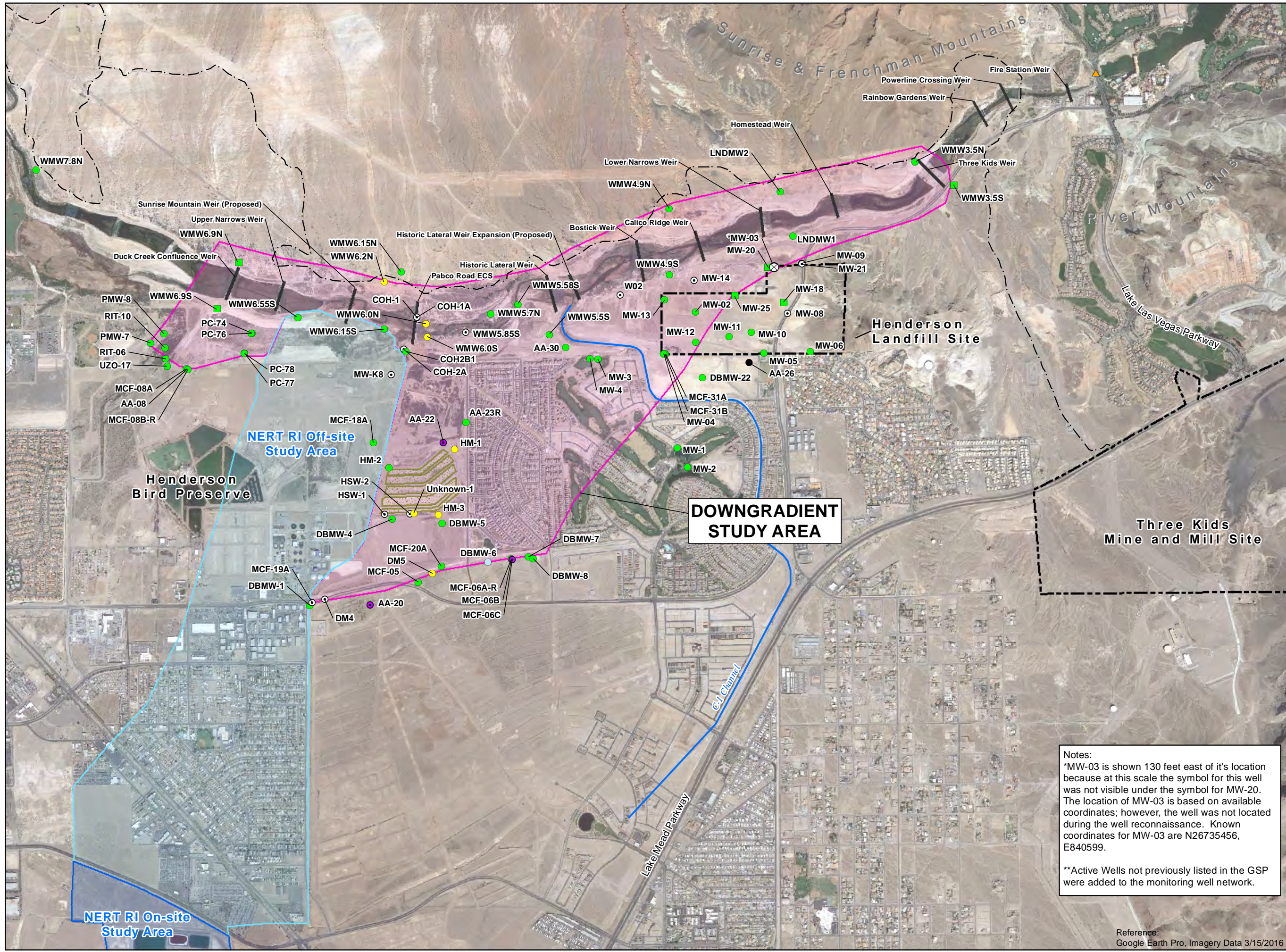
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NERT RI
Downgradient Study Area

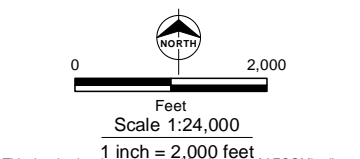
**DOWNGRADIENT
STUDY AREA
LOCATION MAP**

Date: 10/24/2016 Project: 60477365

AECOM Figure 1



- Legend**
- Active
 - Active (New)**
 - Use bailer to sample
 - Dry
 - Insufficient water to sample
 - ⊗ Unable to Locate
 - Plugged & Abandoned
 - Access not granted
 - ▲ Lake Las Vegas Intake
 - Wetlands Trail
 - Channels
 - Northern Rapid Infiltration Basins
 - Weir
 - NERT RI Downgradient Study Area
 - NERT RI Off-site Study Area
 - NERT RI On-site Study Area



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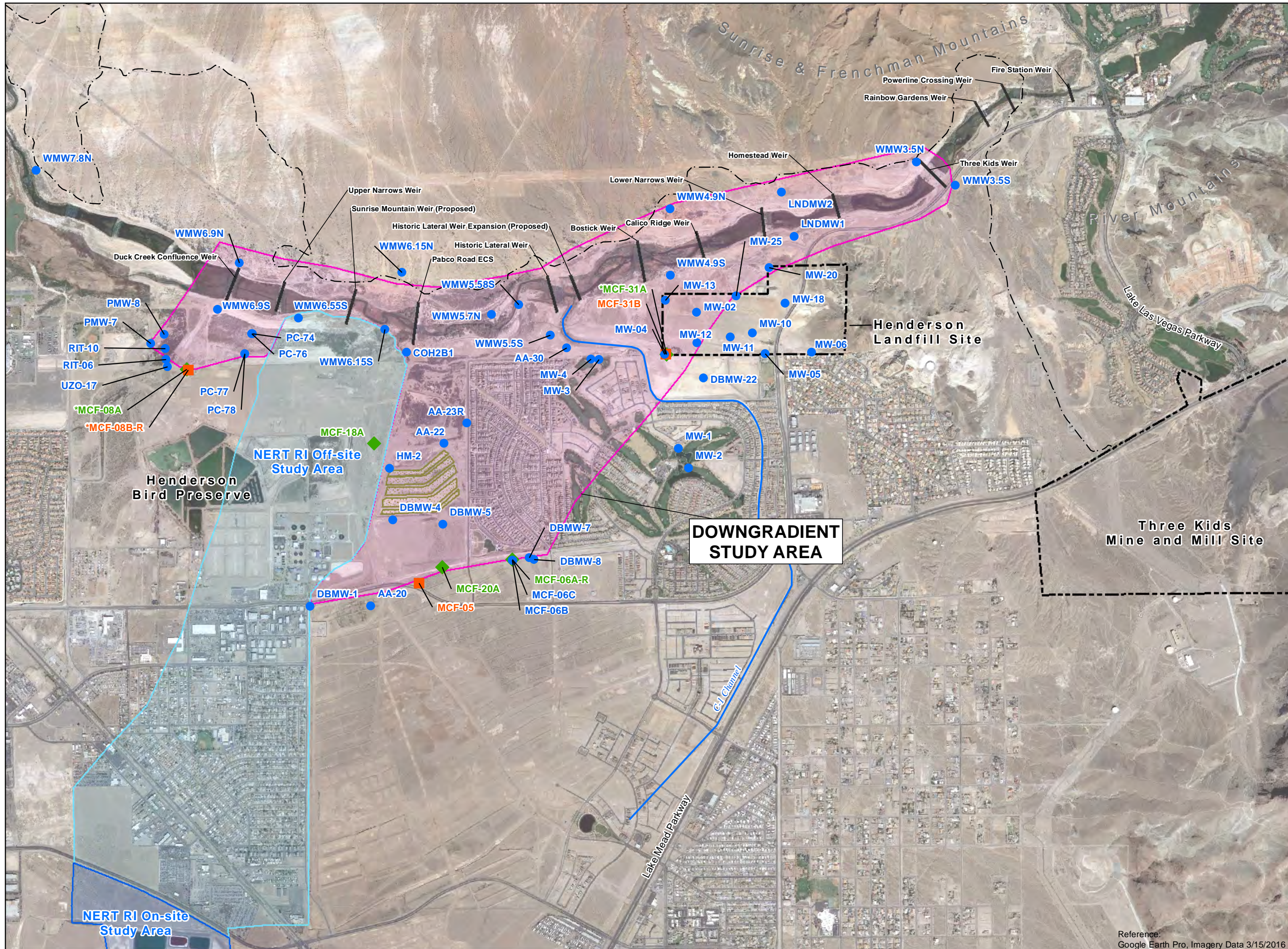
Notes:
 *MW-03 is shown 130 feet east of its location because at this scale the symbol for this well was not visible under the symbol for MW-20. The location of MW-03 is based on available coordinates; however, the well was not located during the well reconnaissance. Known coordinates for MW-03 are N26735456, E840599.
 **Active Wells not previously listed in the GSP were added to the monitoring well network.

NERT RI
Downgradient Study Area

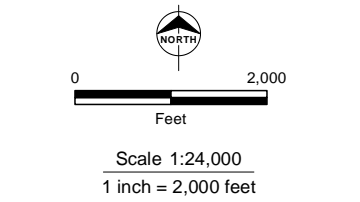
RESULTS OF WELL RECONNAISSANCE

Date: 10/24/2016 Project: 60477365

AECOM Figure 3



- Legend**
- Groundwater Monitoring Well in Shallow Water Bearing Zone
 - Groundwater Monitoring Well in Middle Water Bearing Zone
 - ◆ Groundwater Monitoring Well in Deep Water Bearing Zone
 - - - Wetlands Trail
 - Channels
 - Northern Rapid Infiltration Basins
 - NERT RI Downgradient Study Area
 - NERT RI Off-site Study Area
 - NERT RI On-site Study Area
 - * Artesian Well



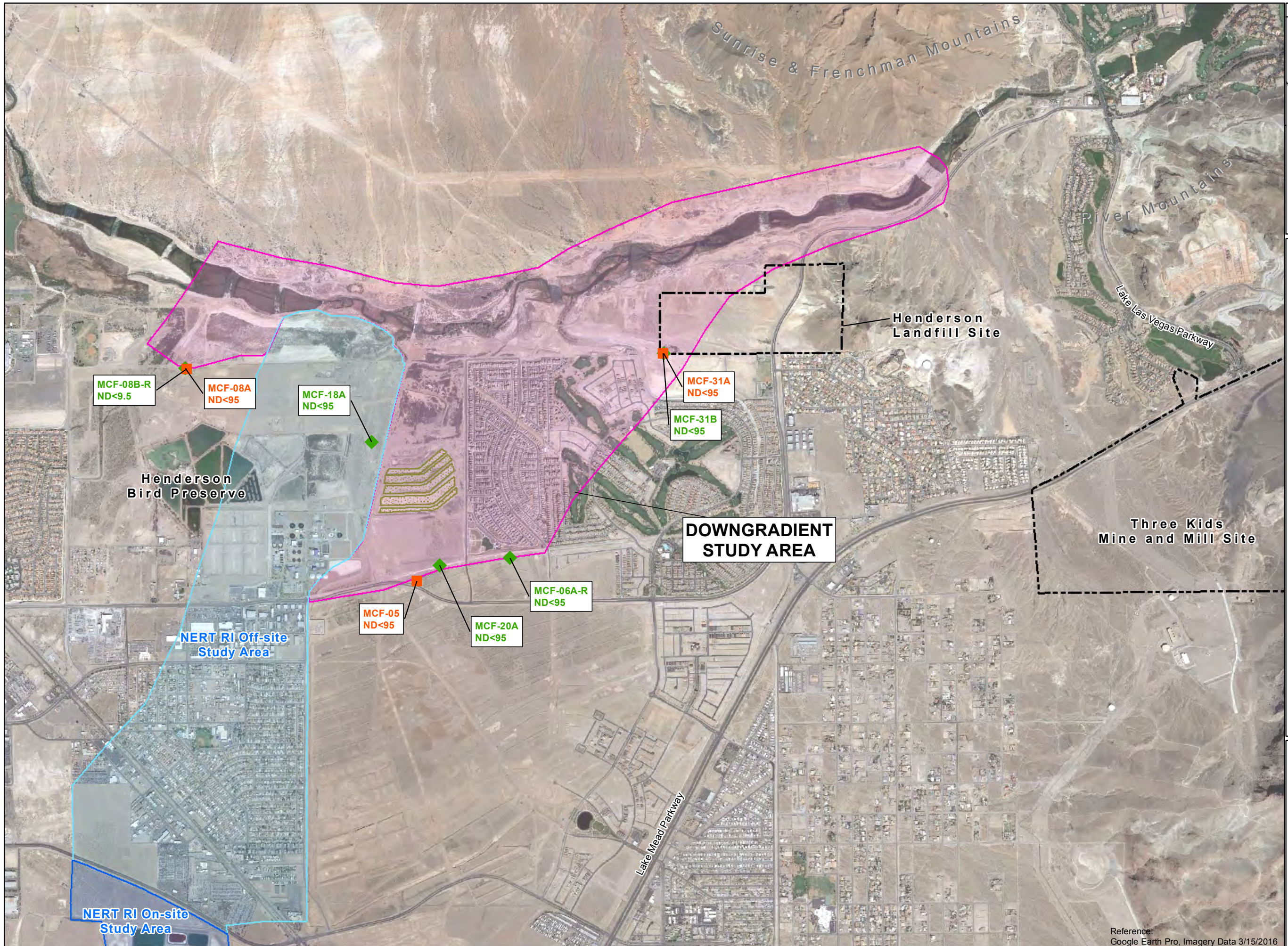
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NERT RI
Downgradient Study Area

**ACTIVE GROUNDWATER
MONITORING WELL
NETWORK**

Date: 10/24/2016 Project: 60477365

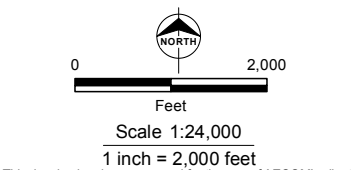
AECOM **Figure 4**



- Legend**
- Groundwater Monitoring Well in Middle Water Bearing Zone
 - ◆ Groundwater Monitoring Well in Deep Water Bearing Zone
 - Northern Rapid Infiltration Basins
 - NERT RI Downgradient Study Area
 - NERT RI Off-site Study Area
 - NERT RI On-site Study Area

Perchlorate Concentration in µg/L

ND - Not detected above method detection limit (MDL)
 µg/L - Micrograms per liter



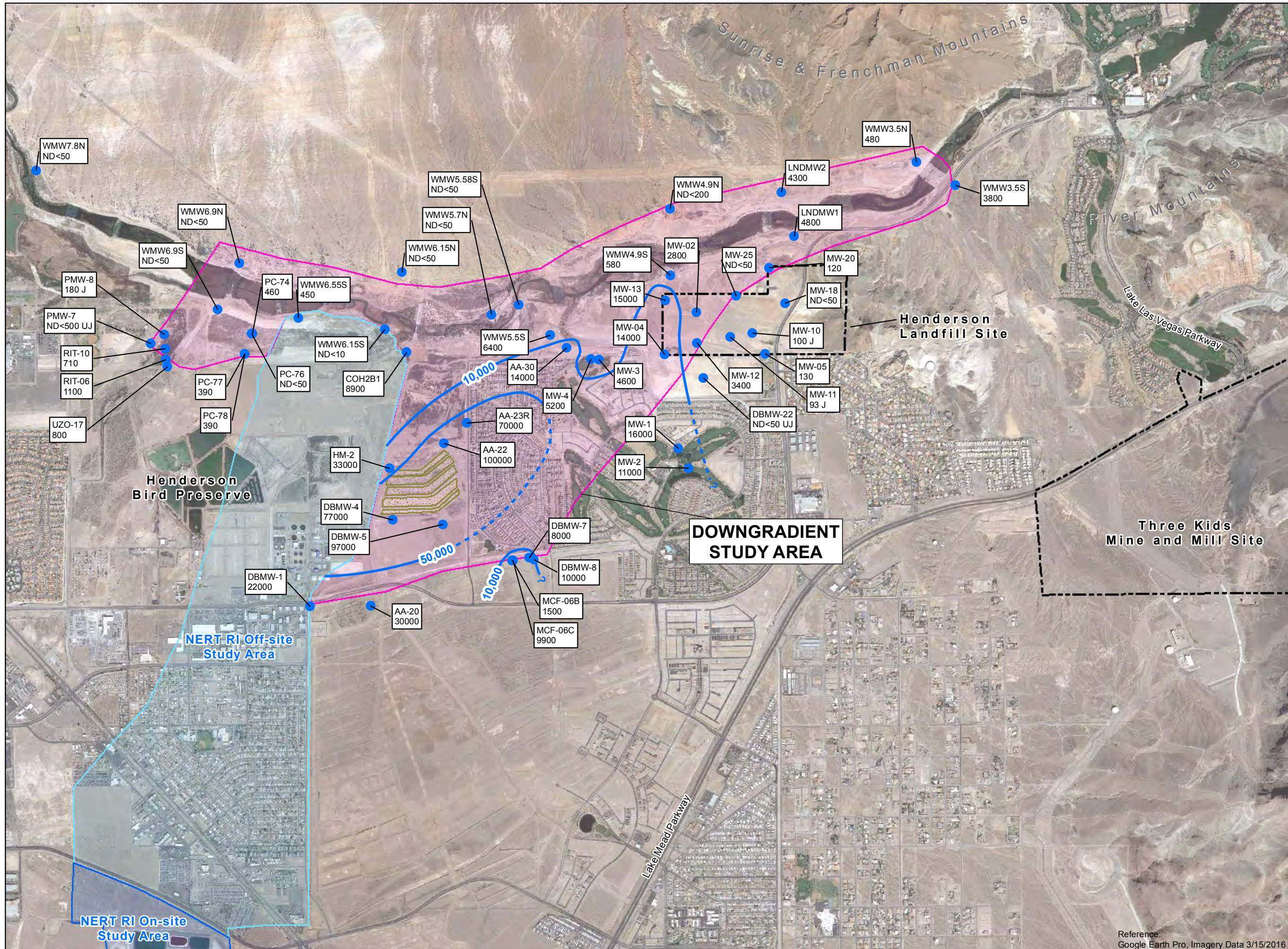
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NERT RI
Downgradient Study Area

**PERCHLORATE IN
MIDDLE AND DEEP
WATER BEARING ZONES
APRIL 2016**

Date: 10/24/2016 Project: 60477365

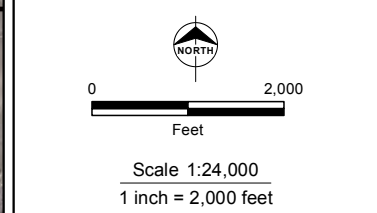
AECOM Figure 6



- Legend**
- Groundwater Monitoring Well in Shallow Water Bearing Zone
 - Chlorate Isoconcentration Contour (dashed where inferred)
 - Northern Rapid Infiltration Basins
 - NERT RI Downgradient Study Area
 - NERT RI Off-site Study Area
 - NERT RI On-site Study Area

Chlorate Concentration in µg/L

ND - Not detected above method detection limit (MDL)
 J - Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value
 UJ - Associated reporting limit is estimated
 µg/L - Micrograms per liter



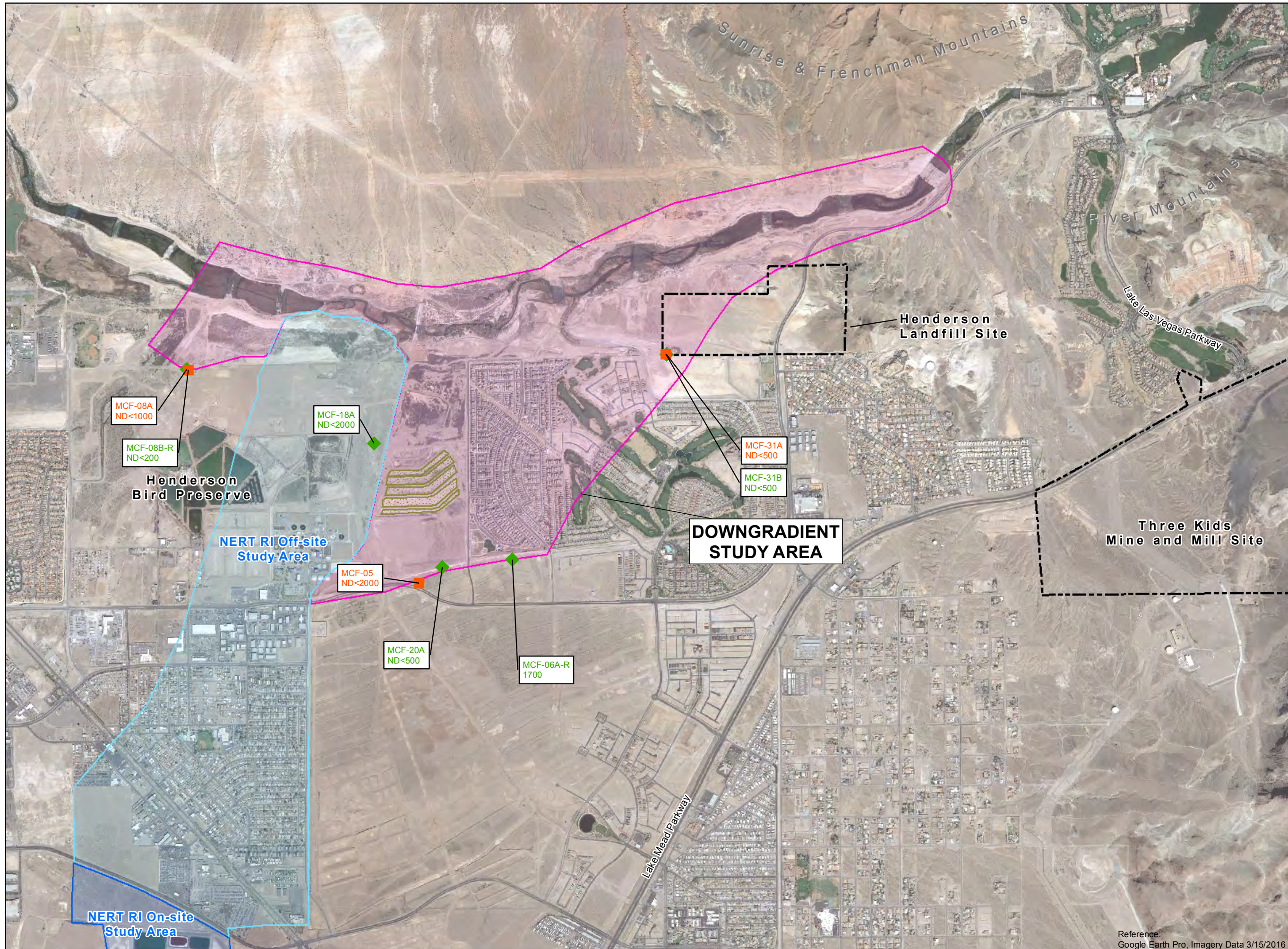
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NERT RI
Downgradient Study Area

**CHLORATE IN SHALLOW
WATER BEARING ZONE
APRIL 2016**

Date: 10/24/2016 Project: 60477365

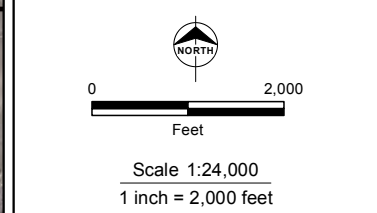
AECOM Figure 7



- Legend**
- Groundwater Monitoring Well in Middle Water Bearing Zone
 - ◆ Groundwater Monitoring Well in Deep Water Bearing Zone
 - Northern Rapid Infiltration Basins
 - NERT RI Downgradient Study Area
 - NERT RI Off-site Study Area
 - NERT RI On-site Study Area

Chlorate Concentration in µg/L

ND - Not detected above method detection limit (MDL)
 µg/L - Micrograms per liter



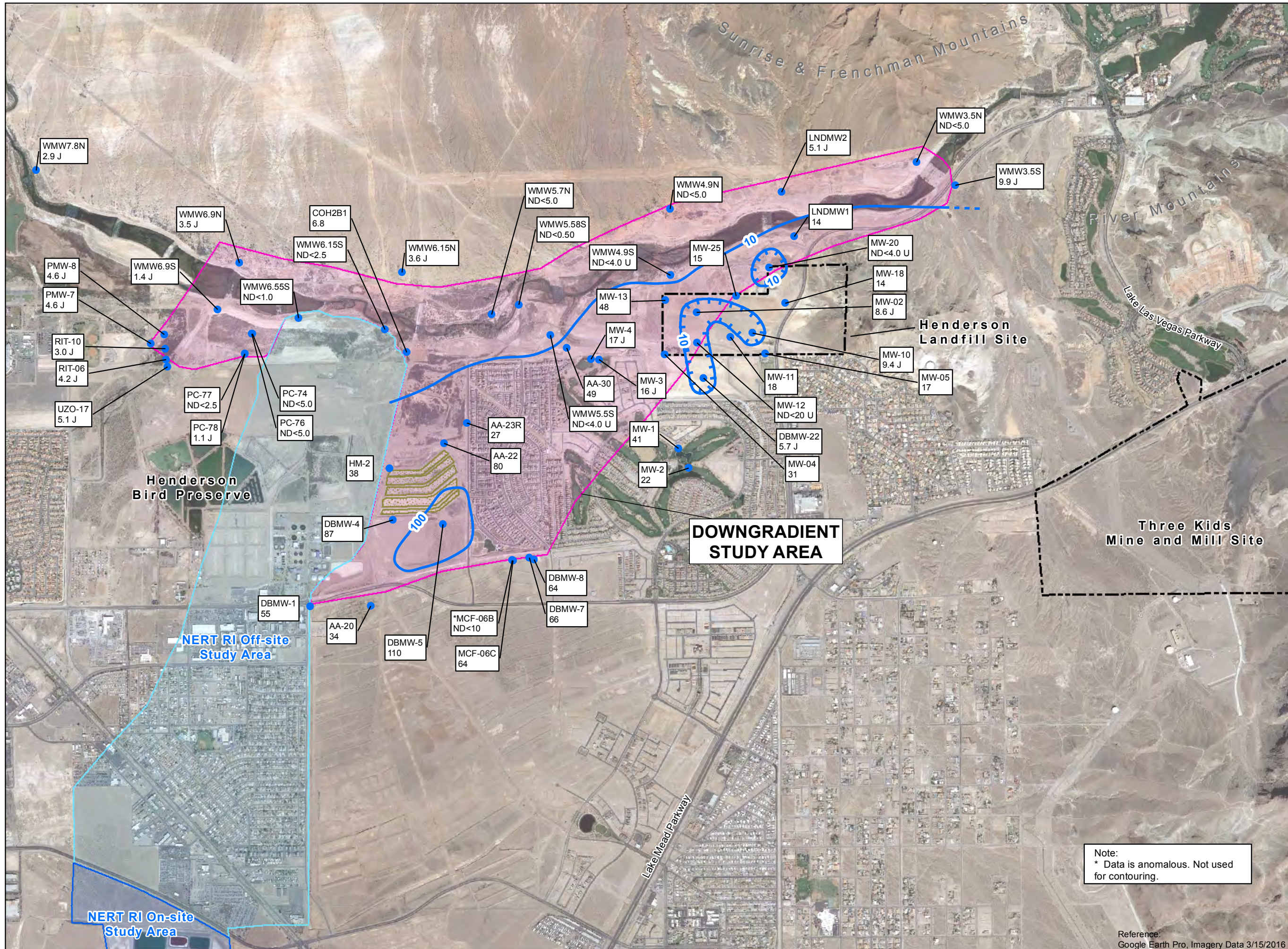
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NERT RI
Downgradient Study Area

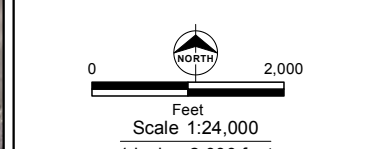
**CHLORATE IN
MIDDLE AND DEEP
WATER BEARING ZONES
APRIL 2016**

Date: 10/24/2016 Project: 60477365

AECOM Figure 8



- Legend**
- Groundwater Monitoring Well in Shallow Water Bearing Zone
 - Dissolved Chromium Isoconcentration Contour (dashed where inferred)
 - Dissolved Chromium Isoconcentration Contour (depression)
 - Northern Rapid Infiltration Basins
 - NERT RI Downgradient Study Area
 - NERT RI Off-site Study Area
 - NERT RI On-site Study Area
- Chromium Concentration in µg/L**
- ND - Not detected above method detection limit (MDL)
 - J - Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value
 - U - Concentration was reported as a detection, but was reclassified during validation
 - µg/L - Micrograms per liter



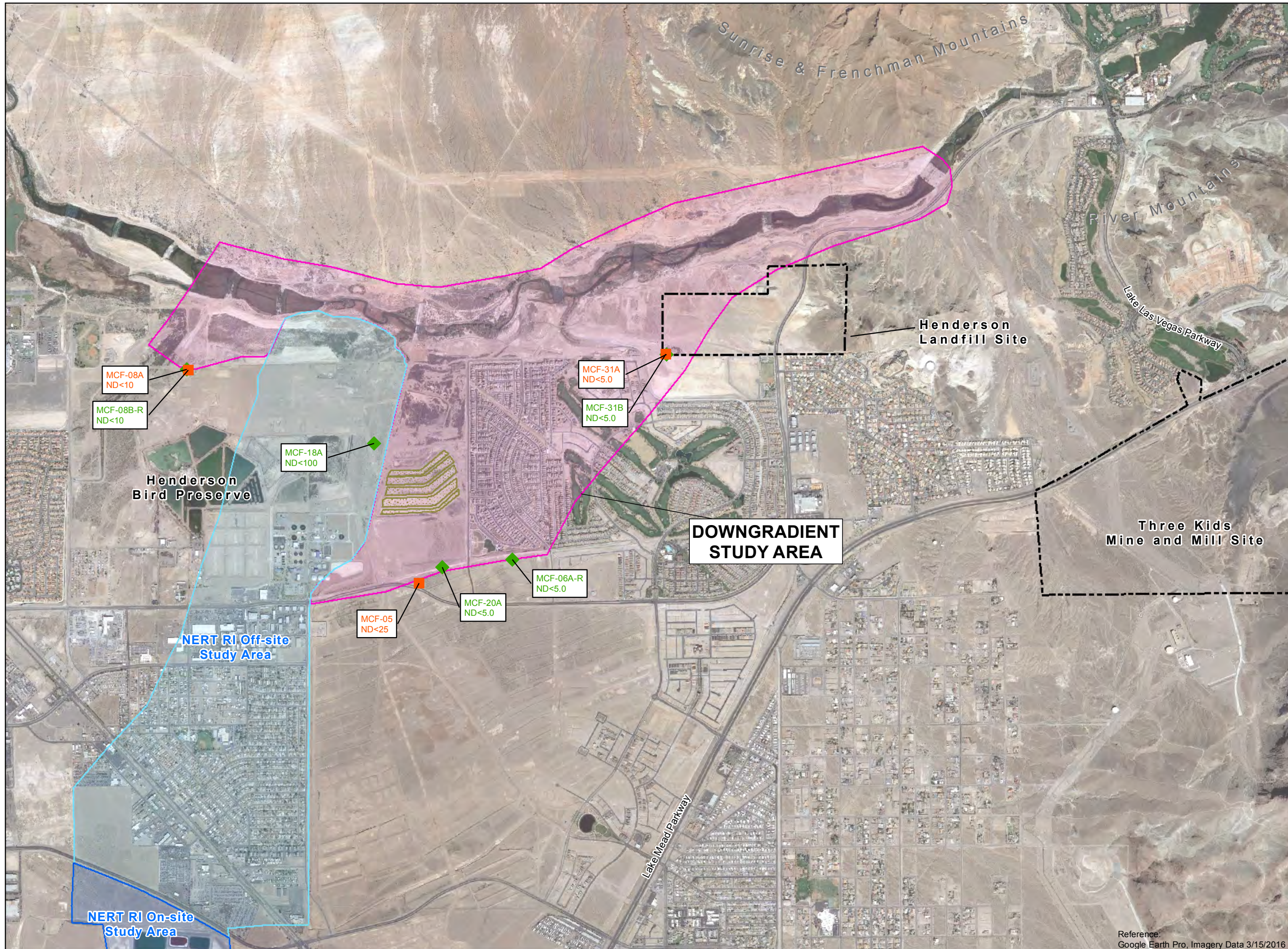
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NERT RI
Downgradient Study Area

**DISSOLVED CHROMIUM
SHALLOW WATER
BEARING ZONE
APRIL 2016**

Note:
* Data is anomalous. Not used for contouring.

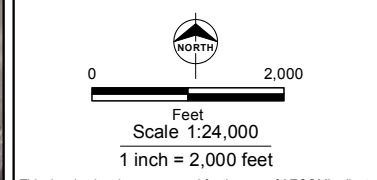
Date: 10/24/2016 Project: 60477365



- Legend**
- Groundwater Monitoring Well in Middle Water Bearing Zone
 - ◆ Groundwater Monitoring Well in Deep Water Bearing Zone
 - Northern Rapid Infiltration Basins
 - NERT RI Downgradient Study Area
 - NERT RI Off-site Study Area
 - NERT RI On-site Study Area

Chromium Concentration in µg/L

ND - Not detected above method detection limit (MDL)
 µg/L - Micrograms per liter



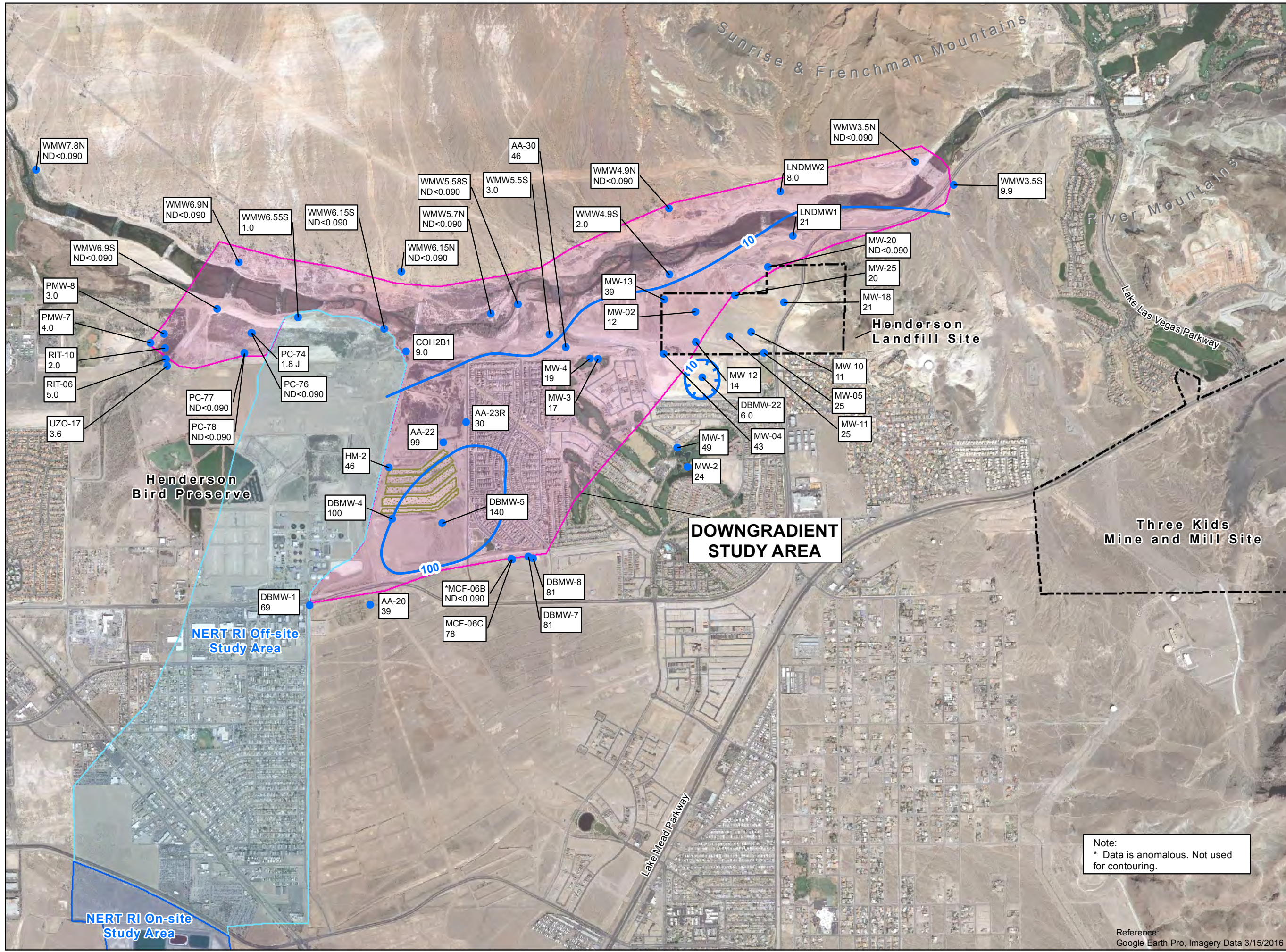
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NERT RI
Downgradient Study Area

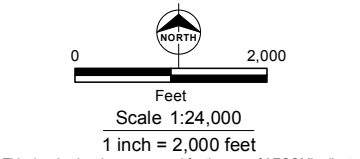
**DISSOLVED CHROMIUM
MIDDLE AND DEEP
WATER BEARING ZONES
APRIL 2016**

Date: 10/24/2016 Project: 60477365

AECOM Figure 10



- Legend**
- Groundwater Monitoring Well in Shallow Water Bearing Zone
 - Hexavalent Chromium Isoconcentration Contour (dashed where inferred)
 - Dissolved Chromium Isoconcentration Contour (depression)
 - Northern Rapid Infiltration Basins
 - NERT RI Downgradient Study Area
 - NERT RI Off-site Study Area
 - NERT RI On-site Study Area
- Hexavalent Chromium Concentration in µg/L**
- ND - Not detected above method detection limit (MDL)
 - µg/L - Micrograms per liter



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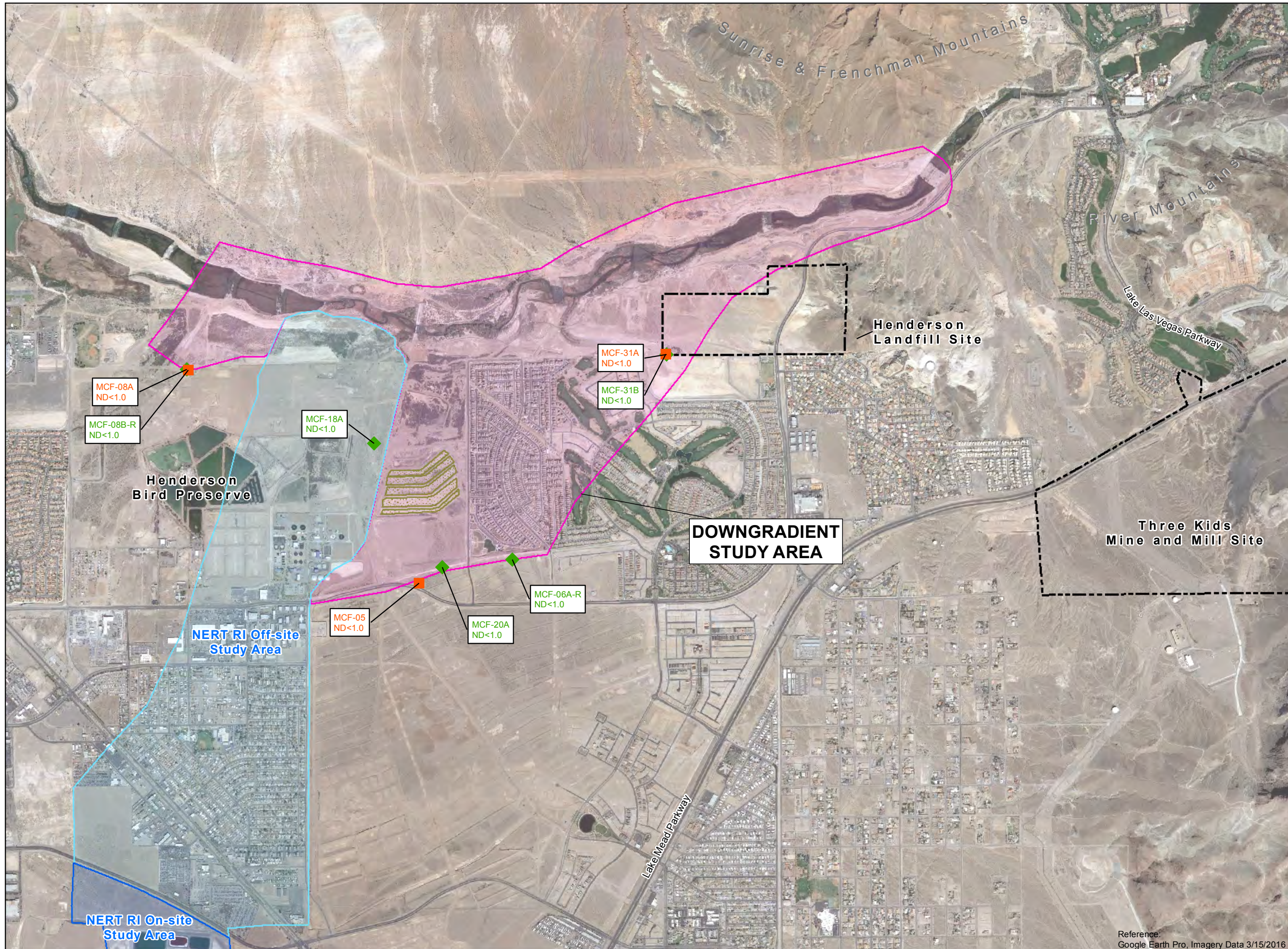
NERT RI
Downgradient Study Area

**HEXAVALENT CHROMIUM
SHALLOW WATER
BEARING ZONE
APRIL 2016**

Date: 10/24/2016 Project: 60477365

AECOM Figure 11

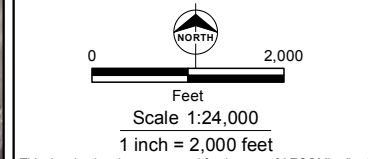
Note:
* Data is anomalous. Not used for contouring.



- Legend**
- Groundwater Monitoring Well in Middle Water Bearing Zone
 - ◆ Groundwater Monitoring Well in Deep Water Bearing Zone
 - Northern Rapid Infiltration Basins
 - NERT RI Downgradient Study Area
 - NERT RI Off-site Study Area
 - NERT RI On-site Study Area

Hexavalent Chromium Concentration in µg/L

ND - Not detected above method detection limit (MDL)
 µg/L - Micrograms per liter



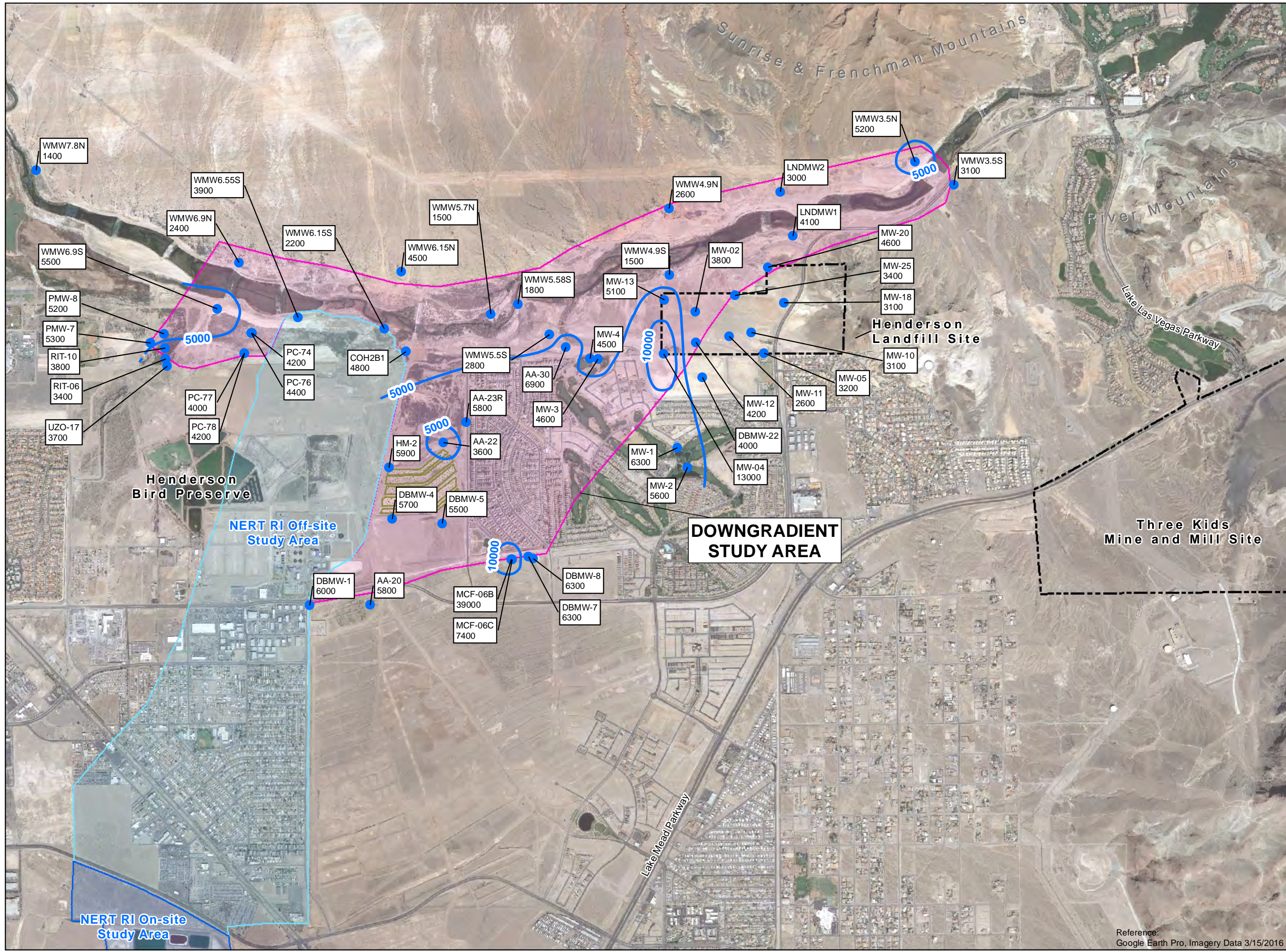
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NERT RI
Downgradient Study Area

**HEXAVALENT CHROMIUM
MIDDLE AND DEEP
WATER BEARING ZONES
APRIL 2016**

Date: 10/24/2016 Project: 60477365

AECOM Figure 12



- Legend**
- Groundwater Monitoring Well in Shallow Water Bearing Zone
 - Total Dissolved Solids Isoconcentration Contour (dashed where inferred)
 - Northern Rapid Infiltration Basins
 - NERT RI Downgradient Study Area
 - NERT RI Off-site Study Area
 - NERT RI On-site Study Area

Total Dissolved Solids Concentration in mg/L

mg/L - Milligrams per liter

Scale 1:24,000
1 inch = 2,000 feet

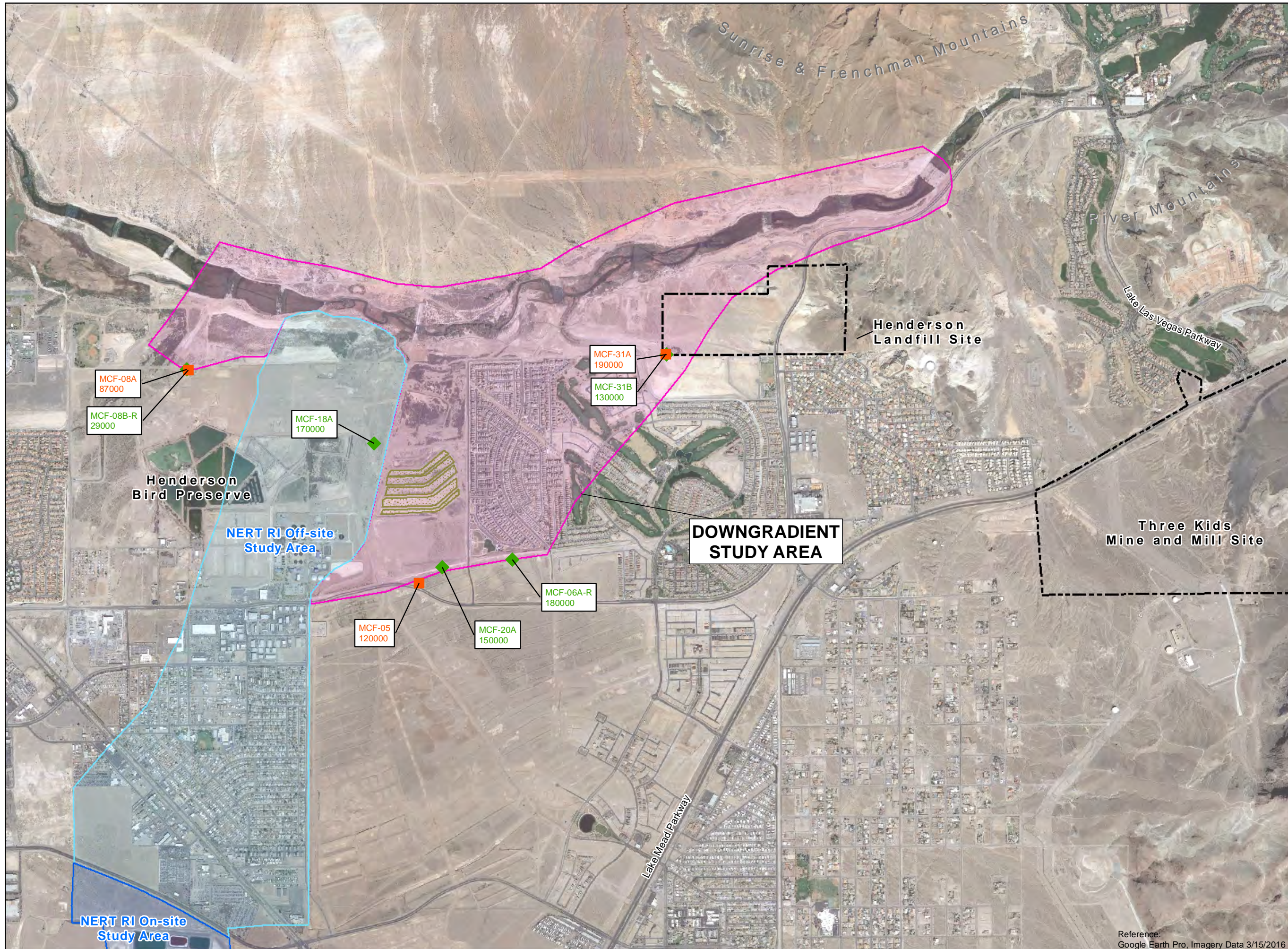
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NERT RI
Downgradient Study Area

**TOTAL DISSOLVED SOLIDS
IN SHALLOW WATER
BEARING ZONE
APRIL 2016**

Date: 10/24/2016 Project: 60477365

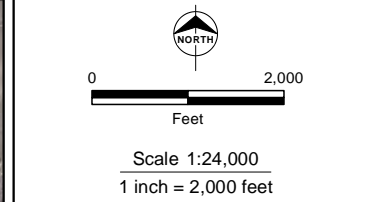
AECOM Figure 13



- Legend**
- Groundwater Monitoring Well in Middle Water Bearing Zone
 - ◆ Groundwater Monitoring Well in Deep Water Bearing Zone
 - Northern Rapid Infiltration Basins
 - NERT RI Downgradient Study Area
 - NERT RI Off-site Study Area
 - NERT RI On-site Study Area

Total Dissolved Solids Concentration in mg/L

mg/L - Milligrams per liter



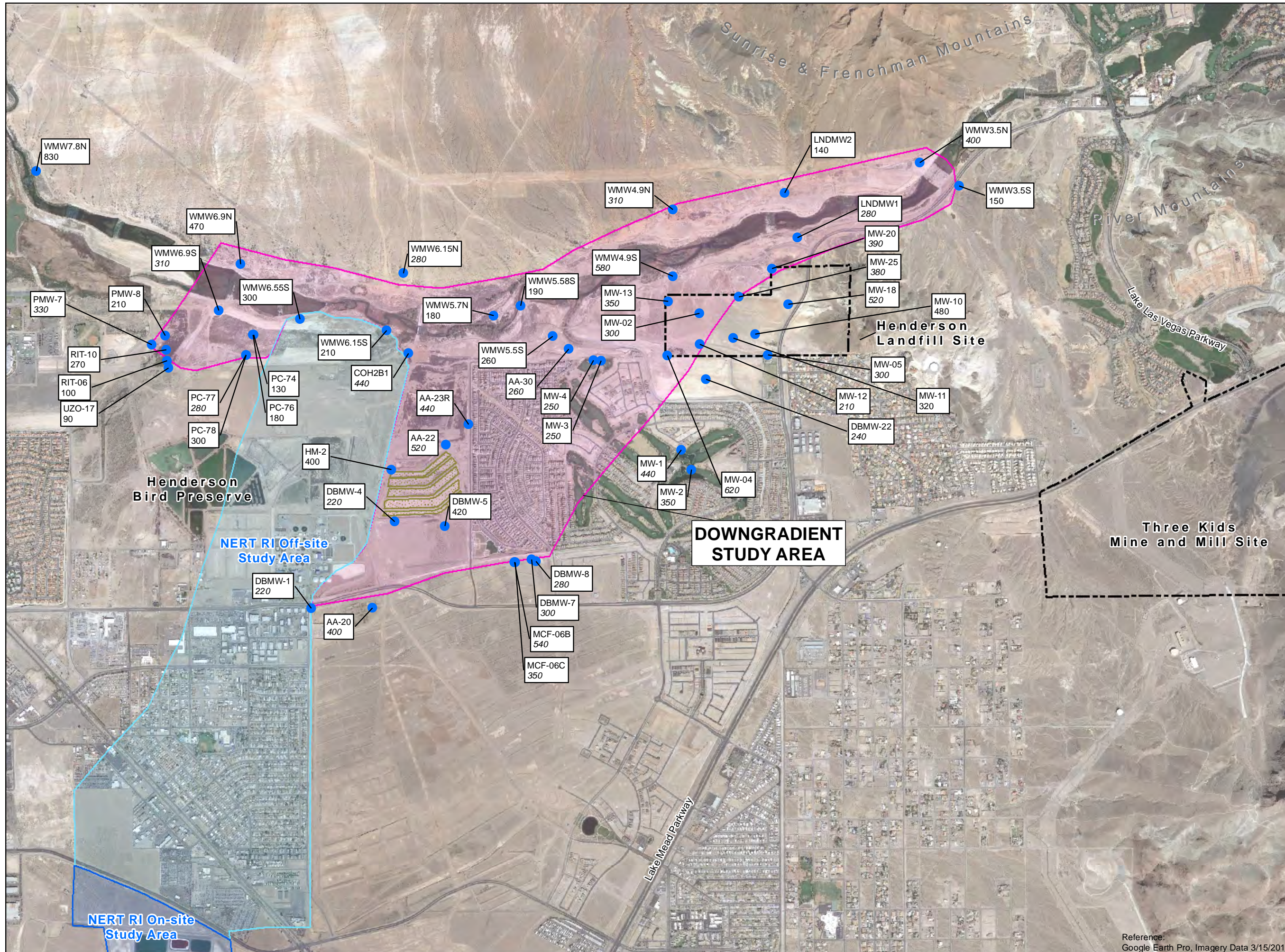
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NERT RI
Downgradient Study Area

**TOTAL DISSOLVED SOLIDS
IN MIDDLE AND DEEP
WATER BEARING ZONES
APRIL 2016**

Date: 10/24/2016 Project: 60477365

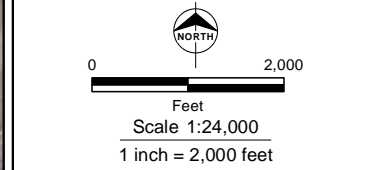
AECOM **Figure 14**



- Legend**
- Groundwater Monitoring Well in Shallow Water Bearing Zone
 - ▨ Northern Rapid Infiltration Basins
 - ▭ NERT RI Downgradient Study Area
 - ▭ NERT RI Off-site Study Area
 - ▭ NERT RI On-site Study Area

Chloride/Bromide Concentration Ratios

Note:
Ratios shown in italics represent non-detect values for bromide and are calculated using the bromide detection limit.



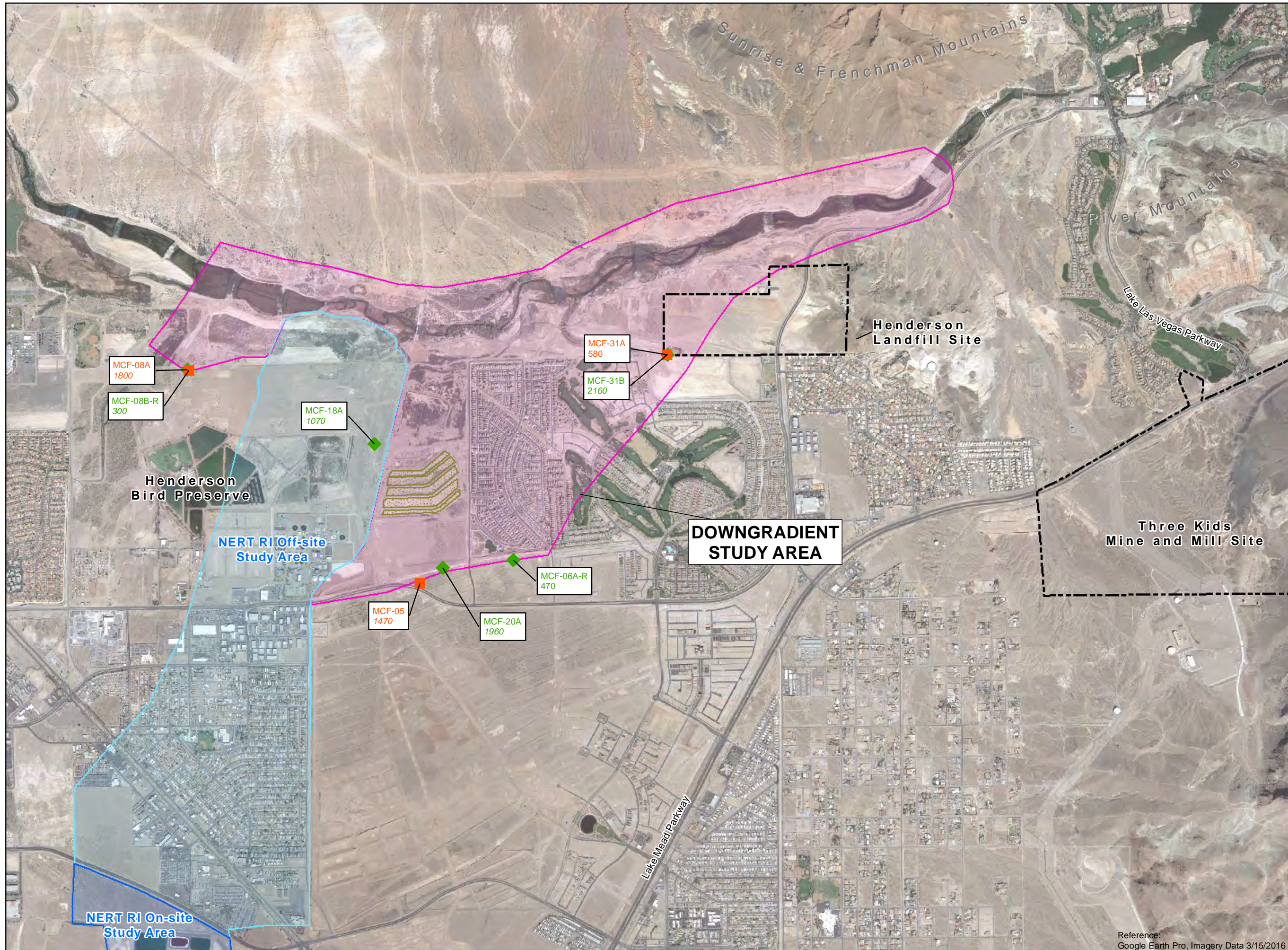
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NERT RI
Downgradient Study Area

**CHLORIDE/BROMIDE
RATIOS IN SHALLOW
WATER BEARING ZONE
APRIL 2016**

Date: 10/24/2016 Project: 60477365

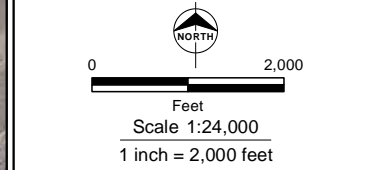
AECOM Figure 15



- Legend**
- Groundwater Monitoring Well in Middle Water Bearing Zone
 - ◆ Groundwater Monitoring Well in Deep Water Bearing Zone
 - Northern Rapid Infiltration Basins
 - NERT RI Downgradient Study Area
 - NERT RI Off-site Study Area
 - NERT RI On-site Study Area

Chloride/Bromide Concentration Ratios

Note:
Ratios shown in *italics* represent non-detect values for bromide and are calculated using the bromide detection limit.



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NERT RI
Downgradient Study Area

**CHLORIDE/BROMIDE
RATIOS IN MIDDLE AND
DEEP WATER BEARING
ZONES
APRIL 2016**

Date: 10/24/2016 Project: 60477365

AECOM Figure 16

Tables

Table 1
Summary of Well Owners and Property Owners
NERT Downgradient Study Area
Henderson, Nevada

Well ID	Well Group	Well Owner	Property Owner	Latitude	Longitude
MW-K8	BMI Well	AMPAC	BE	36.08495	-114.987332
PMW-7	BMI Well	AMPAC	CCPCS	36.086976	-115.005265
PMW-8	BMI Well	AMPAC	CCPCS	36.087522	-115.004274
RIT-06	BMI Well	AMPAC	CCPCS	36.085996	-115.004138
RIT-10	BMI Well	AMPAC	CCPCS	36.086671	-115.004191
UZO-17	BMI Well	AMPAC	CCPCS	36.085557	-115.004053
MW-1	Chimera Golf Club Well	CGC	CGC	36.08034	-114.966007
MW-2	Chimera Golf Club Well	CGC	CGC	36.079209	-114.965271
MW-3	Chimera Golf Club Well	CGC	CGC	36.085917	-114.972141
MW-4	Chimera Golf Club Well	CGC	CGC	36.085935	-114.972473
COH2B1	SNWA Well	COH	USBR	36.086373	-114.986215
MW-02	BMI Well	COH	USBR	36.08867	-114.964528
MW-03	BMI Well	COH	COH	36.091323	-114.959079
MW-04	BMI Well	COH	COH	36.086137	-114.966937
MW-05	City of Henderson Well	COH	COH	36.086128	-114.959447
MW-06	City of Henderson Well	COH	COH	36.086202	-114.955966
MW-08	City of Henderson Well	COH	COH	36.088529	-114.957667
MW-09	BMI Well	COH	COH	36.091571	-114.956573
MW-10	City of Henderson Well	COH	COH	36.087388	-114.960379
MW-11	City of Henderson Well	COH	COH	36.087115	-114.962021
MW-12	BMI Well	COH	COH	36.086808	-114.964524
MW-13	BMI Well	COH	COH	36.089402	-114.966849
MW-14	BMI Well	COH	COH	36.090565	-114.964635
AA-08	BMI Well	LWC	CCPCS	36.085369	-115.002588
AA-20	BMI Well	LWC	BE	36.071016	-114.988971
AA-22	BMI Well	LWC	COH	36.080818	-114.983436
AA-23R	BMI Well	LWC	COH	36.082064	-114.981824
AA-26	City of Henderson Well	LWC	USBR	36.085545	-114.960552
AA-30	BMI Well	LWC	USBR	36.086556	-114.974253
DBMW-1	BMI Well	LWC	COH	36.071015	-114.993513
DBMW-22	City of Henderson Well	LWC	COH	36.084672	-114.964128
DBMW-4	BMI Well	LWC	BE	36.076215	-114.987293
DBMW-5	BMI Well	LWC	BE	36.075933	-114.983563
DBMW-6	BMI Well	LWC	BE	36.073553	-114.980161
DBMW-7	BMI Well	LWC	COH	36.073875	-114.977129
DBMW-8	BMI Well	LWC	COH	36.073755	-114.976785
DM4	BMI Well	LWC	BE	36.07137	-114.992385
DM5	BMI Well	LWC	BE	36.072891	-114.984303
HM-1	BMI Well	LWC	COH	36.080583	-114.983084
HM-2	BMI Well	LWC	COH	36.079421	-114.987597
HM-3	BMI Well	LWC	COH	36.076749	-114.983316
HSW-1	BMI Well	LWC	BE	36.076486	-114.987883
HSW-2	BMI Well	LWC	COH	36.076496	-114.986235
MCF-05	BMI Well	LWC	BE	36.072385	-114.985376
MCF-06A-R	BMI Well	LWC	BE	36.073771	-114.978415
MCF-06B	BMI Well	LWC	COH	36.073723	-114.978396
MCF-06C	BMI Well	LWC	COH	36.073701	-114.978345
MCF-08A	BMI Well	LWC	CCPCS	36.085406	-115.002596
MCF-08B-R	BMI Well	LWC	CCPCS	36.085362	-115.002503
MCF-18A	BMI Well	LWC	BE	36.08085	-114.988687
MCF-19A	BMI Well	LWC	COH	36.071167	-114.993324
MCF-20A	BMI Well	LWC	BE	36.073333	-114.983657
MCF-31A	BMI Well	LWC	USBR	36.08613	-114.966806
MCF-31B	BMI Well	LWC	USBR	36.086135	-114.966851
PC-74	BMI Well	NERT	CCPCS	36.08753	-114.997675
PC-76	BMI Well	NERT	CCPCS	36.087539	-114.997741
PC-77	BMI Well	NERT	CCPCS	36.086336	-114.998265
PC-78	BMI Well	NERT	CCPCS	36.086315	-114.99826
COH-1	BMI Well	SNWA	USBR	36.088421	-114.985363
COH-1A	City of Henderson Well	SNWA	USBR	36.088435	-114.985363

Table 1
Summary of Well Owners and Property Owners
 NERT Downgradient Study Area
 Henderson, Nevada

Well ID	Well Group	Well Owner	Property Owner	Latitude	Longitude
COH-2A	BMI Well	SNWA	USBR	36.086487	-114.986358
LNDMW1	SNWA Well	SNWA	CCPCS	36.093214	-114.957216
LNDMW2	SNWA Well	SNWA	CCPCS	36.095908	-114.958173
W02	BMI Well	SNWA	CCPCS	36.0897	-114.970157
WMW3.5N	SNWA Well	SNWA	CCPCS	36.097719	-114.946619
WMW4.9N	SNWA Well	SNWA	CCPCS	36.094956	-114.96646
WMW4.9S	SNWA Well	SNWA	CCPCS	36.090891	-114.966462
WMW5.58S	SNWA Well	SNWA	USBR	36.089244	-114.977802
WMW5.5S	SNWA Well	SNWA	USBR	36.087371	-114.975448
WMW5.7N	SNWA Well	SNWA	USBR	36.08863	-114.979839
WMW5.85S	SNWA Well	SNWA	USBR	36.087508	-114.981722
WMW6.0N	SNWA Well	SNWA	CCPCS	36.088035	-114.984674
WMW6.0S	SNWA Well	SNWA	CCPCS	36.087277	-114.984605
WMW6.15N	SNWA Well	SNWA	CCPCS	36.091204	-114.986559
WMW6.15S	SNWA Well	SNWA	CCPCS	36.087727	-114.987825
WMW6.2N	SNWA Well	SNWA	CCPCS	36.090576	-114.987825
WMW6.55S	SNWA Well	SNWA	CCPCS	36.088998	-114.994223
WMW7.8N	SNWA Well	SNWA	CCPCS	36.097498	-115.013773

Notes:

AMPAC - American Pacific Corporation
 BE - Basic Environmental
 BMI - Basic Management Incorporated
 CCPCS - Clark County Parks and Community Services
 CGC - Chimera Golf Course
 COH - City of Henderson
 LWC - LandWell Company
 NERT - Nevada Environmental Response Trust
 SNWA - Southern Nevada Water Authority
 USBR - United States Bureau of Reclamation

Table 2
Summary of Well Reconnaissance Data
 NERT Downgradient Study Area
 Henderson, Nevada

Well ID	Status	Easting (1)	Northing (1)	Elevation TOC (1)	Date Gaged	Expected Total Depth (feet)	Total Measured Well Length/Depth (feet)	Depth to Water (feet)	Length of Water Column (feet)	GW Elev. (feet amsl)	Casing Diameter (in)/Material	Well Box Type (flush or monument)	Well # on the well box?	Well box concrete apron cracked?	Water present in well box?	Well casing capped?	Well casing Locked?	Well casing cracked?	Well cover bolted?	Screen Interval (feet, bgs)	Water-Bearing Zone	Lithology	Comments	Rationale for Sampling
AA-08	Dry	827756.55	26733208.28	1581.08	4/7/2016	36.64	13.23	Dry	Dry	Dry	4" PVC	Monument	Yes	No	No	Yes	Yes	No	No	5 - 35	Shallow	Qal	Soil around well is extremely soft and an easy place for vehicles to get stuck. Roots in well (came up w/ water level probe). Yellow monument with 4 yellow bumper posts. QED sample port well cap w/ dedicated tubing. In cluster of 7 wells.	Not being sampled - Dry.
AA-20	Use bailer to sample	831811.79	26728007.77	1628.46	4/7/2016	33	32.85	31.56	1.29	1596.90	4" PVC	Monument	Yes	No	No	Yes	Yes	No	No	10 - 30	Shallow	Qal	Has dedicated tubing inside well. Yellow monument with 4 bumper posts. Located approx. 15 feet from AA-20 QED.	Requested by NDEP, in area of interest.
AA-22	Use bailer to sample	833427.04	26731587.32	1579.85	4/4/2016	33.91	33.9	32.11	1.79	1547.74	4" PVC	Monument	Yes	No	No	Yes	Yes	No	NA	11 - 31	Shallow	Qal	Dedicated tubing inside well. Yellow monument with 4 yellow bumper posts around well. Lots of broken glass, downed barb wire fencing, and cut-off fence posts around well.	Requested by NDEP, in area of interest.
AA-23R	Active	833924.30	26732035.85	1561.68	4/7/2016	45	45.1	31.38	Dry	1530.30	4"PVC	Flush	No	No	No	Yes	No	No	Yes	20 - 45	Shallow	Qal	Previous coordinates plotted well along Weston Ridge Street (formerly Burkholder Blvd) west of sidewalk in the dirt. Did not observe well at that point, but noted about 25 feet of 2" PVC pipe laying on the ground, about 5 feet of the pipe was slotted screen. Approx. 25 feet east of expected location is a flush mount well box in the asphalt of Weston Ridge Street. All readings were taken from that location, which is assumed to be AA-23R. Well is 11 feet off the curb.	Requested by NDEP, in area of interest.
AA-26	Access not granted to AECOM	--	--	--	--	54.47	--	--	--	--	--	--	--	--	--	--	--	--	--	32 - 52	Shallow	Qal	While working near the landfill property a representative from McCarthy Construction was setting up a construction trailer on the adjacent lot containing AA-26.	Requested by NDEP, in area of interest.
AA-30	Active	836125.80	26733691.92	1532.35	4/7/2016	32	34.05	20.44	50.02	1511.91	4"PVC	Monument	Yes	No	No	Yes	Yes	No	No	11.7 - 31.7	Shallow	Qal	Southern-most well in a cluster of three wells. Square yellow monument well with 4 yellow bumper posts. There is a 1/4-inch dedicated tubing inside well.	Requested by NDEP, in area of interest. Near well WMW5.5S at approximately the same depth. May not need to sample both wells in the future depending on the initial sample analytical results.
COH-1	Plugged & Abandoned	832839.03	26734349.92	1531.42	4/8/2016	171.6	--	--	--	--	--	--	--	--	--	--	--	--	--	157.9 - 167.9	Middle	UMCF	Unable to locate well. Existing coordinates plot well inside concrete weir at Pabco Trailhead (i.e. on north side of Pabco Weir, along north bank of Las Vegas Wash).	Not being sampled - Plugged & Abandoned.
COH-1A	Plugged & Abandoned	832838.89	26734354.61	1531.60	4/8/2016	20	--	--	--	--	--	--	--	--	--	--	--	--	--	10 - 20	Shallow	Qal	Unable to locate well. Existing coordinates plot well approx. 5 feet north of COH-1 & inside concrete weir at Pabco trailhead on north side of Pabco Weir (i.e. north bank of Las Vegas Wash).	Not being sampled - Plugged & Abandoned.
COH-2A	Plugged & Abandoned	--	--	--	4/4/2016	52	--	--	--	--	--	--	--	--	--	--	--	--	--	40 - 50	Shallow	Qal	Unable to locate well.	Not being sampled - Plugged & Abandoned.
COH2B1	Active	832598.59	26733593.69	1546.95	4/5/2016	NK	67	16.98	50.02	1529.97	2" PVC	Monument	Yes	No	No	Yes	Yes	No	NA	TBD	TBD	TBD	Yellow monument inside Pabco Trailhead Park.	Requested by NDEP, in area of interest.
DBMW-1	Active	830469.80	26727999.08	1626.60	4/5/2016	50	51.3	37.08	14.22	1589.52	4" PVC	Monument	Yes	No	No	Yes	Yes	No	NA	19 - 49	Shallow	Qal/UMCF	Well located on southeast corner of Pabco & Galleria. Yellow monument with 4 yellow bumper posts around well.	Requested by NDEP, in area of interest.
DBMW-4	Active	832295.68	26729903.39	1605.83	4/4/2016	40	43.7	26.35	17.35	1579.48	4" PVC	Monument	Yes	No	No	Yes	Yes	No	NA	10 - 30	Shallow	Qal/UMCF	Dedicated tubing inside well. Well is located on a berm. Yellow monument with 4 yellow bumper posts around well.	Requested by NDEP, in area of interest.
DBMW-5	Active	833399.07	26729807.30	1609.61	4/4/2016	35	37.95	28.26	9.69	1581.35	4" PVC	Monument	Yes	No	No	Yes	Yes	No	NA	15 - 35	Shallow	UMCF	Dedicated tubing inside well. Yellow monument with 4 yellow bumper posts around well.	Requested by NDEP, in area of interest.
DBMW-6	Insufficient water to sample	834409.71	26728947.30	1632.43	4/7/2016	50	52.80	52.29	0.51	--	4" PVC	Monument	Yes	No	No	Yes	Yes	No	No	30 - 50	Shallow	Qal/UMCF	Yellow monument with 4 yellow bumper posts.	Not being sampled - Insufficient water to collect sample.
DBMW-7	Active	835304.94	26729069.98	1631.61	4/7/2016	70	73.30	58.50	14.80	1573.11	4" PVC	Monument	Yes	No	No	Yes	Yes	No	No	50 - 70	Shallow	UMCF	Must access from Weston Ridge Street (formerly Burkholder Blvd.). Yellow monument with 4 traffic bollards; 1/8" dedicated tubing in well.	Requested by NDEP, in area of interest.
DBMW-8	Active	835406.66	26729026.85	1632.03	4/7/2016	70	69.20	57.78	11.42	1574.25	4" PVC	Monument	Yes	No	No	Yes	Yes	No	No	47.5 - 67.5	Shallow	UMCF	No access from McCormick Road, must access from Weston Ridge Street (formerly Burkholder Blvd.). Yellow monument with 4 yellow bumper posts; 1/4" dedicated tubing in well.	Requested by NDEP, in area of interest.
DBMW-22	Active	839141.01	26733030.27	1535.03	4/7/2016	55	59.00	29.29	29.71	1505.74	4" PVC	Monument	Yes	No	No	Yes	Yes	No	No	35 - 55	Shallow	UMCF	Yellow monument with 4 yellow bumper posts; 1/4-inch dedicated tubing in well. Accessed well via gate on David Wood Circle. Secondary access to this well through landfill gate near MW-04, MCF-31A and MCF-31B (in southwest corner of landfill). Observed coves in this area on April 6, 2016.	Requested by NDEP, in area of interest.
DM-4	Plugged & Abandoned	--	--	--	4/7/2016	23	--	--	--	--	--	Monument	--	--	--	--	--	--	--	8 - 23	Shallow	Qal	Unable to locate well. Existing coordinates plot well 6 feet north of median in westbound lane of Galleria Drive.	Not being sampled - Plugged & Abandoned.
DM-5	Dry	833187.31	26728698.85	1625.40	4/7/2016	26.5	23.42	Dry	Dry	Dry	2" PVC	Monument	Yes	No	No	Yes	No	No	No	7 - 22	Shallow	Qal	Square gray monument.	Not being sampled - Dry.
HM-1	Dry	833668.24	26731447.15	1585.21	4/4/2016	NK	29.75	Dry	Dry	Dry	2" PVC	No well box	No, on slip cap	Yes-badly	NA	Yes	No	No	NA	TBD	Shallow	TBD	Original GPS coordinates do not match up with well location. No well box; 2" PVC pipe observed sticking up approx. 18" out of ground. Slip cap is labeled with well ID. Cannot park vehicle alongside well, since well sits inside fenced area with limited access.	Not being sampled - Dry.
HM-2	Active	832227.03	26731037.68	1587.05	4/4/2016	22	36	27.43	8.57	1559.62	2" PVC	No well box	No, on cap	Yes-badly	NA	Yes	No	No	NA	? - 36.89	Shallow	TBD	Original GPS coordinates do not match up with well location. No well box; 2" PVC was observed sticking up approx. 1 foot out of the ground. Slip cap is labeled with well ID. Well inside former fenced-in area; can get vehicle within 25 feet of well.	Requested by NDEP, in area of interest.
HM-3	Dry	833318.23	26729995.16	1603.37	4/6/2016	NK	16.37	Dry	Dry	Dry	2" PVC	No well box	--	--	--	No	No	Yes	--	TBD	Shallow	TBD	Original GPS coordinates do not match up with well location. No well box. Well is damaged; casing broken off at ground surface. Observed approx. 1" to 2" PVC stick-up with slip cap, which is labeled with well ID. Well is located inside fenced area; can get vehicle within 25 feet of well.	Not being sampled - Dry.
HSW-1	Plugged & Abandoned	--	--	--	4/4/2016	24	--	--	--	--	--	--	--	--	--	--	--	--	--	? - 23.78	TBD	TBD	Unable to locate well.	Not being sampled - Plugged & Abandoned.
HSW-2	Plugged & Abandoned	832690.34	26730013.56	1601.67	4/4/2016	NK	--	--	--	--	--	--	--	--	--	--	--	--	--	TBD	TBD	TBD	Unable to locate well. Found an unknown well located approx. 6 feet north & 82 feet east of existing coordinates for HSW-2.	Not being sampled - Plugged & Abandoned.
LNDMW1	Active	841145.67	26736145.45	1511.19	4/5/2016	NK	61.56	36.99	24.57	1474.20	2" ABS	Flush	Yes	No	No	Yes	No	No	Yes	TBD	Shallow	TBD	Well is secured with steel plate with four 3/4" bolts; underneath plate is well lid secured with two 3/4" bolts. Well ID number painted on steel plate; SNWA rep said it fades off quickly due to irrigation. Access well through gate (single chain) off E. Galleria Rd; drive down towards wash along bike trail; well box is in concrete vault approx. 3' x 3' x 1'.	Requested by NDEP, in area of interest.
LNDMW2	Active	840864.28	26737125.16	1501.98	4/5/2016	NK	55.05	34.39	20.66	1467.59	2" PVC	Concrete vault	Yes	No	No	Yes	No	No	Yes	TBD	Shallow	TBD	Soft/silty access road leads to well off gravel road. Not easy to see; a lot of low lying vegetation. Concrete vault 3' x 4' x 1.5' secured with steel plate and two 3/4" bolts. Well box is inside, secured with flush mount lid and two 3/4" bolts.	Requested by NDEP, in area of interest.
MCF-05	Active	832871.14	26728512.87	1627.26	4/7/2016	233.4	233.05	43.92	189.13	1583.34	4" PVC	Monument	Yes	No	No	Yes	Yes	No	No	221 - 231	Middle	UMCF	Has dedicated tubing (1/4" & 5/16") connected to QED sample port well cap. Yellow monument with 4 yellow bumper posts. Hinge on monument lid is extremely rusty and difficult to close/lock.	Requested by NDEP, in area of interest.
MCF-06A-R	Active	834929.39	26729028.09	1632.77	4/7/2016	373	376.65	103.13	273.52	1529.64	4" PVC	Monument	Yes	No	No	Yes	Yes	No	No	333 - 373	Deep	UMCF	In a cluster of three wells. Access off Weston Ridge Street (formerly Burkholder Blvd). Has 3/8" & 1/4" dedicated tubing in well, connected to QED sample port well cap. Yellow monument with 4 yellow bumper posts.	Requested by NDEP, in area of interest.
MCF-06B	Active	834930.85	26729012.56	1633.01	4/7/2016	85.23	85.15	57.86	27.29	1575.15	4" PVC	Monument	Yes	No	No	Yes	No	No	No	67 - 82	Shallow	UMCF	Lock has been torched off. Square yellow monument with 4 yellow bumper posts. In a cluster of three wells. Access off of Weston Ridge Street (formerly Burkholder Blvd). Has 3/8" & 1/4" dedicated tubing in well, connected to QED sample port well cap.	Requested by NDEP, in area of interest.
MCF-06C	Use bailer to sample	834945.70	26729004.80	1632.95	4/7/2016	62.42	62.30	57.67	4.63	1575.28	4" PVC	Monument	Yes	No	No	Yes	No	No	No	44 - 59	Shallow	UMCF	Square yellow monument protected by 4 yellow bumper posts. Observed 1/4" tubing that had fallen down into the well; would need a hook to retrieve it. Cluster of three wells. Access off of Weston Ridge Street (formerly Burkholder Blvd).	Requested by NDEP, in area of interest.
MCF-08A	Active	827753.95	26733221.82	1580.33	4/7/2016	371.5	373.1	1.66 (above ground surface)	--	--	4" PVC	Monument	Yes	No	No	Yes	Yes	No	No	350 - 370	Deep	UMCF	Severely rusted monument. Water level is above ground surface. Very soft soil surrounding well; extremely soft and an easy place for vehicles to get stuck. Among a cluster of seven wells.	Requested by NDEP, in area of interest. Deep well adjacent to 3 other wells, each with significantly different screened intervals providing vertical control.
MCF-08B-R	Active	827786.62	26733202.26	1580.39	4/7/2016	136.5	139.94	1.41 (above ground surface)	--	--	4" PVC	Monument	Yes	No	No	Yes	Yes	No	No	96.5 - 136.5	Middle	UMCF	Yellow monument with 4 yellow bumper posts. In a cluster of seven wells. QED sample port well cap w/ dedicated tubing. Very soft soil surrounds wells. Water level is above ground surface.	Requested by NDEP, in area of interest. Deep well adjacent to 3 other wells, each with significantly different screened intervals providing vertical control.
MCF-18A	Active	831877.31	26731585.95	1577.53	4/4/2016, 4/7/2016	400	403.85	22.93	380.92	1554.60	4" PVC	Monument	No	No	No	Yes	Yes	No	NA	360 - 400	Deep	UMCF	4/4/2016: Dedicated tubing inside well. Yellow monument with 4 yellow bumper posts around well. Difficult to gauge well and tag total depth. Two separate depth-to-water meters and a plunger both malfunctioning when measuring total depth. Total depth measurement initially performed by feel rather than by the instruments available. There was some sort of salt/precipitate/observed in the cap of the well. Needed extensive decon and attention afterwards. 4/7/2016: tagged total depth with new tape.	Requested by NDEP, in area of interest.
MCF-19A	Plugged & Abandoned	--	--	--	4/5/2016	360	--	--	--	--	--	--	--	--	--	--	--	--	--	320 - 360	Deep	UMCF	Unable to locate well; likely paved over.	Not being sampled - Plugged & Abandoned.
MCF-20A	Active	833381.19	26728860.07	1626.23	4/7/2016	380	384.50	73.01	311.49	1553.22	4" PVC	Monument	Yes	No	No	Yes	Yes	No	No	340 - 380	Deep	UMCF	Yellow monument with 4 yellow bumper posts.	Requested by NDEP, in area of interest.
MCF-31A	Active	838327.14	26733550.41	1526.66	4/6/2016	381	385.22	1.49 (above ground surface)	383.73	--	4" PVC	Monument	Yes	No	No	Yes	Yes	No	No	361 - 381	Deep	UMCF	Dedicated tubing (1/4" and 1/8") in well, connected to QED sample port well cap. Water level is above ground surface; taken from top of casing inside. Square yellow monument with 4 bumper posts, in cluster of 3 wells.	Requested by NDEP, in area of interest.
MCF-31B	Active	838313.65	26733552.59	1527.42	4/6/2016	381	234.75	17.79	216.96	1509.63	4" PVC	Monument	Yes	No	No	Yes	Yes	No	No	210 - 230	Middle	UMCF	Dedicated tubing (1/4" and 1/8") in well, connected to QED sample port well cap. Square yellow monument with 4 bumper posts, in cluster of 3 wells.	Requested by NDEP, in area of interest.
MW-02	Active	838994.12	26734478.11	1533.13	4/6/2016	45	44.83	40.12	4.71	1493.01	2" PVC	Monument	Well cap	No	No	Yes	Yes	No	No	32-42	Shallow	TBD	Rusty monument sticking up approx. 16" above ground surface.	Requested by NDEP, in area of interest.
MW-03	Unable to Locate	--	--	1513.08	4/7/2016	35	35	--	--	--	--	--	--	--	--	--	--	--	--	25-35	Shallow	Qal	Unable to locate well. Existing coordinates plot well within 10 feet of MW-20 inside COH Landfill area. Tall monument near MW-20 contains soil vapor probe.	Not being sampled - Unable to Locate.
MW-04	Active	838288.65	26733551.66	1530.64	4/6/2016	30	40.95	23.64	17.31	1507.00	2" PVC	Monument	Yes	No	No	Yes	Yes	No	No	29-39	Shallow	Qal	Round monument (yellow) in cluster of 3 wells. Well lid hinge broken.	Requested by NDEP, in area of interest.
MW-05	Active	840501.38	26733563.04	1569.13	4/6/2016 and 4/7/2016	66.7	66.45	44.99	21.46	1524.14	2" PVC	Monument	Yes	No	No	Yes	Yes	No	No	44-64	Shallow	TBD	4/6/16: Unable to open well with COH/McGinley key. Lock seized up; difficult to remove key. Lubricated lock and still would not open. 4/7/16: Jeri Prante (McGinley) gave permission to cut lock on well for access.	Requested by NDEP, in area of interest.
MW-06	Active	841529.98	26733596.69	1610.75	4/6/2016	52	49.72	32	17.72	1578.75	4" PVC	Monument	Yes	No	No	Yes	Yes	No	No	39-49	Shallow	TBD	Yellow monument. Access through the gate to this well is a little rocky and washed out.	Requested by NDEP, in area of interest.
MW-08	Plugged & Abandoned	--	--	1579.86	4/7/2016	NK	115	--	--	--	--	--	--	--	--	--	--	--	--	105-115	Middle	UMCF	Unable to locate well; presumed to be destroyed. Previous coordinates place well in westbound lane	

Table 2
Summary of Well Reconnaissance Data
 NERT Downgradient Study Area
 Henderson, Nevada

Well ID	Status	Easting ⁽¹⁾	Northing ⁽¹⁾	Elevation TOC ⁽¹⁾	Date Gaged	Expected Total Depth (feet)	Total Measured Well Length/Depth (feet)	Depth to Water (feet)	Length of Water Column (feet)	GW Elev. (feet amsl)	Casing Diameter (in)/Material	Well Box Type (flush or monument)	Well # on the well box?	Well box concrete apron cracked?	Water present in well box?	Well casing capped?	Well casing Locked?	Well casing cracked?	Well cover bolted?	Screen Interval (feet, bgs)	Water-Bearing Zone	Lithology	Comments	Rationale for Sampling
MW-18	Active	840946.07	26734674.06	1582.48	4/6/2016	NK	107	68.93	38.07	1513.55	2" PVC	Monument	Yes	No	No	Yes	Yes	No	No	90.6-105.6	Shallow	--	Yellow monument.	Outside of downgradient study area within landfill site, provides valuable information regarding potential contributions from the landfill. The well is located south of MW-08 (which is plugged and abandoned), so it can serve as a replacement well for MW-08. This well is also located near a surface water dry wash, so it could provide information regarding potential contributions from infiltration from the wash.
MW-20	Active	840590.41	26735460.67	1512.54	4/7/2016	NK	67.25	33.05	34.20	1479.49	2" PVC	Monument	Yes	No	No	Yes	Yes	No	No	50-65	Shallow	--	Yellow monument within 5 feet of another yellow monument that contains a soil vapor probe. Accessed via separate gate on North side of Landfill.	Provides valuable information regarding potential contributions from the landfill. Appears to be near the expected location of well MW-03, which the field crew was unable to locate. Provides information from the closest portion of the landfill to Las Vegas Wash.
MW-21	Plugged & Abandoned	--	--	1550.95	4/7/2016	NK	93	--	--	--	--	--	--	--	--	--	--	--	--	78-93	Shallow	--	Well presumed to be destroyed. Jen Prante w/ McGinley & Assoc. indicated that the well was believed to have been destroyed when East Galleria Drive was constructed.	Not being sampled - Plugged & Abandoned.
MW-25	Active	839862.75	26734834.10	1531.65	4/6/2016	NK	54.15	39.86	14.29	1491.79	4" PVC	Monument	Inside well lid	No	No	Yes	Yes	No	No	38-53	Shallow	--	Yellow monument at base of hill along northern boundary of landfill.	Adjacent to downgradient study area within landfill site; provides valuable information regarding potential contributions from the landfill
MW-K8 ⁽²⁾	Plugged & Abandoned	--	--	--	4/4/2016	50	--	--	--	--	--	--	--	--	--	--	--	--	--	7 - 50	Shallow	Qal	Unable to locate well; expected location was plotted on top of a man made dirt pile approx. 25 feet tall. Well PC-94 is nearby.	Not being sampled - Plugged & Abandoned.
PC-74	Active	829203.19	26734003.83	1565.32	4/8/2016	70	48.25	11.59	36.66	1553.73	2" PVC	Flush	Yes	No	No	Yes	No	No	No	39.5 - 49.5	Shallow	Qal	No vehicle access, well is located in wetlands. Sample w/ QED MP15 portable pack & N2 gas cylinder.	Requested by NDEP, in area of interest. Well is nested with another well with a different screened interval providing vertical control
PC-76	Active	829183.48	26734007.08	1565.05	4/8/2016	20.5	22.12	11.42	10.7	1553.63	2" PVC	Flush	Yes	No	No	Yes	No	No	No	15 - 20	Shallow	Qal	No vehicle access, well is located in wetlands. Has dedicated tubing (1/4"). Sample w/ QED MP15 portable pack & N2 gas cylinder.	Requested by NDEP, in area of interest. Well is nested with another well with a different screened interval providing vertical control
PC-77	Active	829031.31	26733568.45	1566.86	4/8/2016	45	38.87	7.19	31.68	1559.67	2" PVC	Flush	well cap	Yes	No	Yes	No	No	No	29.5 - 39.5	Shallow	Qal	Metal well lid cracked. Concrete cracked around well box. A lot of spiders inside well box. Dedicated tubing (about 1/2") inside well casing. Located within 5 feet of PC-78.	Requested by NDEP, in area of interest. Well is nested with another well with a different screened interval providing vertical control
PC-78	Active	829032.90	26733560.47	1566.77	4/8/2016	22	21.9	6.56	15.34	1560.21	2" PVC	Flush	Well cap	Yes	No	Yes	No	No	No	11.5 - 21.5	Shallow	Qal	Well is within 5 feet of PC-77.	Requested by NDEP, in area of interest. Well is nested with another well with a different screened interval providing vertical control
PMW-7	Active	826962.08	26733788.69	1579.81	4/8/2016	39	39.21	10.45	28.76	1569.36	4" PVC	Flush	Yes	No	No	Yes	No	No	Yes	20 - 40	Shallow	Qal/xMCF	Has 1/2" dedicated tubing.	Requested by NDEP, in area of interest. Close to PMW-8, RIT-6, and RIT-10. Each of these wells is screened in the shallow alluvial zone (about 17 - 40 feet bgs). Historic results from these wells indicate large concentration changes between wells, suggesting all should be sampled.
PMW-8	Active	827253.76	26733988.93	1576.37	4/8/2016	41	41.05	8.67	32.38	1567.70	4" PVC	Flush	Yes	No	No	No	No	No	Yes	21 - 41	Shallow	Qal/xMCF	Well is located approx. 50 feet within Archery Range wire fence. Single chain is serving as a gate and has 3 padlocks on it. Has dedicated tubing (1/2").	Requested by NDEP, in area of interest. Close to RIT-6, RIT-10, and PMW-7. Each of these wells is screened in the shallow alluvial zone (about 17 - 40 feet bgs). Historic results from these wells indicate large concentration changes between wells, suggesting all should be sampled.
RIT-06	Active	827297.20	26733433.87	1580.05	4/8/2016	42	37.70	10.88	26.82	1569.17	4" PVC	Flush	Yes	Yes	No	Yes	No	No	Yes	32 - 42	Shallow	Qal	Has dedicated tubing (1/2"). Area is very disturbed; vehicle access could be tricky due to rocks and debris.	Requested by NDEP, in area of interest. Close to RIT-10, PMW-7 and PMW-8; however, screened across a 12-foot zone where the other wells in the area have 20-foot or longer screened zones. Each of these wells is screened in the shallow alluvial zone (about 17 - 40 feet bgs). Historic results from these wells indicate large concentration changes between wells, suggesting all should be sampled.
RIT-10	Active	827280.16	26733679.41	1576.44	4/8/2016	40	40.05	7.77	32.28	1568.67	4" PVC	Flush	Inside well box	No	No	Yes	No	No	Yes	25 - 40	Shallow	Qal	This well has very difficult vehicle access; a four wheel drive vehicle might be able to access the well. The road to the well is a soft sandy road with overgrown vegetation. Well was buried in sand - very difficult to find. Recommend cutting back some brush before attempting to drive in. Well has dedicated tubing (1/2").	Requested by NDEP, in area of interest. Close to RIT-6, PMW-7, and PMW-8. Each of these wells is screened in the shallow alluvial zone (about 17 - 40 feet bgs). Historic results from these wells indicate large concentration changes between wells, suggesting all should be sampled.
Unknown-1	Dry	--	--	--	4/4/2016	NK	18.15	Dry	Dry	Dry	2" PVC	No well box	No well box	No concrete	NA	No	No	No	NA	--	Shallow	--	Unknown well located approx. 6 feet south and 82 feet east of existing coordinates for HSW-2. There is no well box. Well is obstructed from view by vegetation. Approx. 1.5 feet of casing was observed sticking up from ground surface. Dedicated tubing inside well.	Not being sampled - Dry.
UZO-17 ⁽³⁾	Active	827323.40	26733274.00	1583.50	4/8/2016	47	--	--	--	--	2" PVC	Monument	Yes, UZO-16	No	No	--	Yes	--	No	17 - 47	Shallow	Qal/xMCF	4/8/16: Could not access well during reconnaissance/survey (previously reported coordinates and elevation are listed). Well has ID plate listing well ID as UZO-16; however, existing coordinates place UZO-17 within 0.25 feet of this location. Yellow monument protected by 4 yellow bumper posts. 4/29/16: Able to access well for sampling. Dedicated tubing inside well.	Requested by NDEP, in area of interest.
W02	Plugged & Abandoned	--	--	--	4/5/2016	NK	--	--	--	--	--	--	--	--	--	--	--	--	--	TBD	Middle	UMCF	Unable to locate well. SNWA rep believes the well was cemented in about 4 years ago, and should have had a 6" flush mounted well box.	Not being sampled - Plugged & Abandoned.
WMW3.5N	Active	843836.97	26737791.35	1482.54	4/5/2016	NK	56.6	35.64	20.96	1446.90	2" PVC	Flush	Yes	No	No	Yes	Yes	No	Yes	TBD	TBD	TBD	Metal "wings" welded to bolts; use hammer to tap wings and loosen bolts.	Requested by NDEP, in area of interest.
WMW3.5S	Active	844697.76	26737275.90	1483.54	4/5/2016	NK	59.80	43.60	16.20	1439.94	2" PVC	Flush	Yes	No	No	Yes	No	No	Yes	--	Shallow	--	Small 6" flush mount well box spray painted orange, 2-3 rocks also painted orange sitting on top of well. Have to hop a curb onto shoulder to access well. Well is the middle well in a line of three flush mounted wells.	Adjacent to downgradient study area near Three Kids weir. Could provide important information on contributions in this area, which is complex due to showing perchlorate impacts surfacing on north side of Las Vegas Wash. Very few data points are present on the south side of the wash in this area.
WMW4.9N	Active	838408.40	26736756.98	1523.37	4/5/2016	NK	53.00	31.91	21.09	1491.46	2" PVC	Monument	Yes	No	No	Yes	Yes	No	No	TBD	Shallow	TBD	Soft silty/sand access road to well off gravel road. Strong recommendation for a four wheel drive vehicle during sampling as some of the wells on the north side of the wash are in very soft soil; this one specifically has very soft soil leading up to the well. SNWA rep mentioned he has had difficulty getting his sampling pump into the well between 20-25 feet.	Requested by NDEP, in area of interest.
WMW4.9S	Active	838411.85	26735290.15	1518.84	4/5/2016	NK	46.75	26.58	20.17	1492.26	4" PVC	Concrete vault	Yes	No	No	Yes	Yes	No	Yes	TBD	Shallow	TBD	Well located on north side of bike path in concrete vault (3' x 4' x 2.5') secured w/ heavy steel plate, pad lock, two 3/4" bolts. SNWA rep says well box usually has black widows inside.	Requested by NDEP, in area of interest.
WMW5.58S	Active	835070.11	26734647.03	1526.08	4/5/2016	NK	40.95	10.48	30.47	1515.60	4" PVC	Monument	Yes	No	No	Yes	Yes	No	Yes	TBD	Shallow	TBD	Yellow monument well in a cluster of three wells.	Requested by NDEP, in area of interest.
WMW5.5S	Active	835768.11	26733971.74	1528.22	4/5/2016	NK	38.3	15.51	22.79	1512.71	4" PVC	Concrete Vault	Yes	No	No	Yes	No	No	Yes	TBD	Shallow	TBD	Well has 3' x 4' concrete well vault secured with heavy steel plate and two 3/4" bolts. Vault is almost flush with ground surface.	Requested by NDEP, in area of interest. Near well AA-30 at approximately the same depth. May not need to sample both wells in the future depending on the initial sample analytical results.
WMW5.7N	Active	834471.76	26734425.52	1528.50	4/5/2016	NK	21	9.47	11.53	1519.03	4" PVC	Monument	Yes	No	Yes	Yes	No	Yes	TBD	Shallow	TBD	Need open end 3/4" wrench to open. Strong recommendation for a four wheel drive vehicle during sampling as some of the wells on the north side of the wash are in very soft soil; several vehicles are getting stuck at this well. The access road (soft and sandy terrain) to WMW5.7 is a big loop as there is no place to turn around and is slightly overgrown with vegetation (western portion, vehicles will get scratched).	Requested by NDEP, in area of interest.	
WMW5.85S	Plugged & Abandoned	--	--	--	4/7/2016	NK	--	--	--	--	--	--	--	--	--	--	--	--	--	TBD	TBD	TBD	Unable to locate well - WMW5.85S presumed to be destroyed. Robert Huenig (SNWA) recalls the well having been destroyed.	Not being sampled - Plugged & Abandoned.
WMW6.0N	Dry	833041.48	26734212.99	1532.96	4/8/2016	NK	3.15	Dry	Dry	Dry	6" PVC	--	--	--	--	--	--	--	--	TBD	TBD	TBD	Fiberglass irrigation box with 6" PVC pipe; sand is visible inside the 6" pipe. SNWA rep says WMW6.0N is an irrigation pipe rather than a well. WMW6.0S goes down several feet, makes a 90° turn to cross under the wash (horizontal perforated pipe), then makes another 90° turn to come up on the north side of the wash as well WMW6.0N. This well is located in heavy vegetation along the wash. Total depth 3.15 feet.	Not being sampled - Dry.
WMW6.0S	Dry	833075.47	26733927.75	1533.74	4/5/2016	NK	--	Dry	Dry	Dry	6" PVC	--	--	--	--	--	--	--	--	TBD	TBD	TBD	WMW6.0S is destroyed. WMW6.0S goes down several feet, makes a 90° turn to cross under the wash (horizontal perforated pipe), then makes another 90° turn to come up on the north side of the wash as well WMW6.0N.	Not being sampled - Dry.
WMW6.15N	Active	832493.06	26735359.77	1552.55	4/5/2016	NK	38.4	23.3	15.1	1529.25	2" PVC	Monument	Yes	No	No	Yes	Yes	--	No	--	Shallow	--	There is an obstruction in the well around 23 feet. SNWA rep says it can be difficult to get the pump down into the well.	Requested by NDEP, in area of interest.
WMW6.15S	Active	832119.74	26734098.93	1545.08	4/5/2016	NK	19.41	10.28	9.13	1534.80	4" PVC	Monument	Yes	No	No	Yes	Yes	No	Yes	TBD	Shallow	TBD	SNWA rep mentioned he has had difficulty getting his sampling pump into well; there is a dedicated sampling pump (Aqua Troll) in well. Yellow monument well between two large rocks.	Requested by NDEP, in area of interest.
WMW6.2N	Dry	832116.78	26735142.86	1552.68	4/5/2016	NK	20.6	Dry	Dry	Dry	4" PVC	Concrete vault	Yes	No	No	Yes	No	No	No	TBD	Shallow	TBD	Dry well. Concrete vault is 3' x 4' x 2.5'	Not being sampled - Dry.
WMW6.55S	Active	830218.73	26734351.02	1559.25	4/5/2016	NK	40.67	16.03	24.64	1543.22	2" PVC	Monument	Yes	No	No	Yes	Yes	No	No	TBD	Shallow	TBD	Hinge on lid is currently broken and well can be opened without key. Yellow monument well centered between four large rocks.	Requested by NDEP, in area of interest.
WMW6.9N	Active	828913.10	26735560.65	1573.16	4/5/2016	NK	48.55	18.42	30.13	1554.74	2" PVC	Monument	Yes	No	No	Yes	Yes	No	No	--	Shallow	--	A lot of 3" irrigation pipes were observed around the well; there is still vehicle access.	Within the downgradient study area north and adjacent to Duck Creek weir. Could provide important information in this area. Very few data points on north side of Las Vegas Wash in this area.
WMW6.9S	Active	828430.55	26734539.19	1570.60	4/5/2016	NK	51.55	11.43	40.12	1559.17	2" PVC	Monument	Yes	No	No	Yes	Yes	No	No	--	Shallow	--	Yellow monument well mostly hidden by vegetation.	Within the downgradient study area south and adjacent to Duck Creek weir. Could provide important information in this area. Very few data points south and immediately adjacent to Las Vegas Wash in this area.
WMW7.8N	Active	824429.00	26737603.43	1606.56	4/5/2016	NK	38	11.17	26.83	1595.39	4" PVC	Concrete vault	Yes	No	No	Yes	Yes	No	Yes	TBD	Shallow	TBD	Concrete well vault 3' x 4' x 2.5' secured with heavy steel plate, two 3/4" bolts, and a pad lock	Requested by NDEP, in area of interest
MW-1	Active	838593.43	26731476.23	1563.29	4/6/2016	NK	42.75	5.75	37	1557.54	4" PVC	Flush	Yes	Yes-badly	No	Yes	No	No	Yes	TBD	Shallow	TBD	Chimera Golf Course Hole #17. Dedicated 1/8" tubing inside well. All three bolts observed stripped	Requested by NDEP, in area of interest
MW-2	Active	838816.81	26731044.43	1579.96	4/6/2016	NK	44.9	25.71	19.19	1554.25	4" PVC	Flush	Yes	No	No	Yes	No	No	Yes	TBD	Shallow	TBD	Chimera Golf Course Hole #9. Dedicated 1/8" tubing inside well. All three bolts observed stripped	Requested by NDEP, in area of interest
MW-3	Active	836835.36	26733434.90	1523.29	4/6/2016	NK	13	3.25	9.75	1520.04	4" PVC	Flush	Yes	No	No	Yes	No	No	No	TBD	Shallow	TBD	Chimera Golf Course Hole #12 (near rip rap and green for Hole #12). Dedicated 1/8" tubing inside well. Bolts broken off and rusted to fastening point. Well is in line of fire for Hole #12.	Requested by NDEP, in area of interest. Located near MW-4 at approximately same depth. May not need to sample both wells in the future depending on similarity of initial sample analytical result.
MW-4	Active	836666.49	26733446.64	1526.35	4/6/2016	NK	14.5	6.39	8.11	1519.96	4" PVC	Flush	Yes	No	No	Yes	No	No	No	TBD	Shallow	TBD	Chimera Golf Course Hole #12. Dedicated 1/8" tubing inside well.	Requested by NDEP, in area of interest. Located near MW-3 at approximately same depth. May not need to sample both wells in the future depending on similarity of initial sample analytical result.

Status	Well Count
Active	58
Active - Use bailer to sample	3
Active - Inaccessible	0
Dry	8
Plugged & Abandoned	14
Insufficient water to sample	1
Access not granted to AECOM	1
Unable to Locate	1
Total Wells in Reconnaissance	86

Wells Proposed for Sampling 61

Table 2
Summary of Well Reconnaissance Data
 NERT Downgradient Study Area
 Henderson, Nevada

Well ID	Status	Easting ⁽¹⁾	Northing ⁽¹⁾	Elevation TOC ⁽¹⁾	Date Gaged	Expected Total Depth (feet)	Total Measured Well Length/ Depth (feet)	Depth to Water (feet)	Length of Water Column (feet)	GW Elev. (feet amsl)	Casing Diameter (in)/ Material	Well Box Type (flush or monument)	Well # on the well box?	Well box concrete apron cracked?	Water present in well box?	Well casing capped?	Well casing Locked?	Well casing cracked?	Well cover bolted?	Screen Interval (feet, bgs)	Water-Bearing Zone	Lithology	Comments	Rationale for Sampling
<p>Notes:</p> <p>(1). Well coordinates and elevations surveyed by licensed surveyor (Stanley) April 4 through 8, 2016. Coordinate system: State Plane Coordinate System; Elevations are referenced to the North American Datum (NAD) 83 Nevada East Zone (2701) with vertical datum based on NAVD 88 referenced to the City of Henderson Benchmark network.</p> <p>(2). Well abandoned in the summer of 2015 due to damage. Email communication, Gary Carter, April 12, 2016</p> <p>(3). Well was not accessible during well reconnaissance. Mr. Jeff Gibson provided information on 4/18/16 that well is active. Previously reported coordinates are listed in tab</p> <p>-- = No data available AMPAC = American Pacific Corporation bgs = below ground surface CCPCS = Clark County Parks and Community Services CGC = Chimera Golf Course COH = City of Henderson LWC = LandWell Company NA = Not applicable NDEP = Nevada Division of Environmental Protection NK = Not known PVC = Polyvinyl chloride SNWA = Southern Nevada Water Authority TBD = To be determined TOC = Top of Casing USBR = United States Bureau of Reclamation</p>																								

Table 3
Summary of Data Validation Results
 NERT RI Downgradient Investigation
 Henderson, Nevada

	Number	Analyses per sample	Results	Lab Qualified Results	Percent of Results that were Lab Qualified	All Qualified Results	Percent of all Results that were Qualified	Rejected Results	Percent of all Results that were Rejected
Primary Samples	64	7	455	47	10%	53	12%	0	0%
Quality Control Samples	15	7	98	9	9%	11	11%	0	0%
Total Samples	79	7	553	56	10%	64	12%	0	0%

Primary Samples = Samples from 61 wells and 3 wells sampled twice = 64 primary samples

Quality Control Samples = Field duplicates, equipment blanks and field blanks.

Table 4
Analytical Results of Groundwater Well Sampling April 2016
 NERT Downgradient Study Area
 Henderson, Nevada

Well ID	Sample ID	Date	Bromide (mg/L)	Chlorate (µg/L)	Chloride (mg/L)	Dissolved Chromium (µg/L)	Hexavalent Chromium (µg/L)	Perchlorate (µg/L)	Total Dissolved Solids (mg/L)
	Method		300.0	300.1B	300.0	200.8	218.7	314	SM 2540C
	Screening Level		11.3	1,000	250 mg/L	100 (µg/L)	100 (µg/L)	15 (µg/L)	500 mg/L
	Source		BCL	BCL	2nd MCL	MCL	BCL	BCL	2nd MCL
AA-20	AA-20-20160419	04/19/16	ND (<2.5) UJ	30000	1000 B	34	39	4400	5800
AA-22	AA-22-20160420	04/20/16	ND (<2.5)	100000	1300	80	99	7100	3600
AA-23R	AA-23R-20160418	04/18/16	ND (<2.5)	70000	1100	27	30	5500	5800
AA-30	AA-30-20160422	04/22/16	ND (<5.0)	14000	1300	49	46	4400	6900
COH2B1	COH2B1-20160421	04/21/16	ND (<2.5)	8900	1100	6.8	9.0	5600	4800
DBMW-1	DBMW-1-20160419	04/19/16	ND (<5.0) UJ	22000	1100 B	55	69	9000 F1	6000
DBMW-4	DBMW-4-20160419	04/19/16	ND (<5.0)	77000	1100 B	87	100	6000	5700
DBMW-5	DBMW-5-20160419	04/19/16	2.9 J	97000	1200 B	110	140	6900	5500
DBMW-7	DBMW-7-20160418	04/18/16	ND (<5.0)	8000	1500	66	81	4400	6300
DBMW-7	DBMW-7-20160418-FD	04/18/16	ND (<5.0)	7600	1400	63	79	4600	6300
DBMW-8	DBMW-8-20160418	04/18/16	ND (<5.0)	10000	1400	64	81	7000	6300
DBMW-22	DBMW-22-20160422	04/22/16	ND (<1.3)	ND (<50) UJ	300	5.7 J	6.0	56	4000
HM-2	HM-2-20160428	04/28/16	2.5 J	33000	1000 J-	38	46	6000	5900
LNDMW1	LNDMW1-20160422	04/22/16	ND (<2.5)	4800	680	14	21	1900	4100
LNDMW2	LNDMW2-20160427	04/27/16	3.5 J-	4300	470	5.1 J	8.0	1500	3000
MCF-05	MCF-05-20160425	04/25/16	ND (<13) UF1	ND (<500) UJ	19000	110 F1	2.0	630	7600
MCF-05	MCF-05-20160426	04/26/16	ND (<25)	ND (<2000)	27000	ND (<25)	ND (<0.090)	ND (<95)	120000
MCF-06A-R	MCF-06A-R-20160428	04/28/16	120	1700	56000 J-	ND (<5.0)	ND (<0.090)	ND (<95)	180000
MCF-06B	MCF-06B-20160421	04/21/16	ND (<13)	1500	7000	ND (<10)	ND (<0.090)	2800	39000
MCF-06C	MCF-06C-20160419	04/19/16	ND (<5.0) UJ	9900	1700 B	64	78	5600	7400
MCF-08A	MCF-08A-20160427	04/27/16	ND (<25)	ND (<1000)	45000	ND (<10)	ND (<0.090)	ND (<95)	87000
MCF-08B-R	MCF-08BR-20160427	04/27/16	ND (<25)	ND (<200)	7300	ND (<10)	ND (<0.090)	ND (<9.5)	29000
MCF-08B-R	MCF-08BR-20160427-FD	04/27/16	ND (<25)	ND (<200)	7200	ND (<10)	ND (<0.090)	ND (<9.5)	28000
MCF-18A	MCF-18A-20160426-0800	04/26/16	94	ND (<2000)	100000	ND (<100)	ND (<0.090)	ND (<95)	170000
MCF-18A	MCF-18A-20160427	04/27/16	ND (<25) UF1	ND (<1000)	100000	ND (<20)	ND (<0.090)	ND (<95)	190000
MCF-20A	MCF-20A-20160425	04/25/16	ND (<25) UF1	ND (<2000) UJ	49000	ND (<2.5)	ND (<0.090)	ND (<95)	160000
MCF-20A	MCF-20A-20160427	04/27/16	ND (<25)	ND (<500)	50000 J-	ND (<5.0)	ND (<0.090)	ND (<95)	150000
MCF-31A	MCF-31A-20160428	04/28/16	140	ND (<500)	81000 J-	ND (<5.0)	ND (<0.090)	ND (<95)	190000
MCF-31B	MCF-31B-20160428	04/28/16	ND (<25)	ND (<500)	54000 J-	ND (<5.0)	ND (<0.090)	ND (<95)	130000
MW-02	MW-02-20160428	04/28/16	ND (<1.3)	2800	380 J-	8.6 J	12	2100	3800
MW-04	MW-04-20160420	04/20/16	ND (<5.0)	14000	3100	31	43	8700	13000
MW-05	MW-05-20160420	04/20/16	ND (<1.3)	130	390	17	25	14	3200
MW-06	MW-06-20160428	04/28/16	1.4	ND (<50)	180 J-	8.9 J	5.0	ND (<0.95)	1300
MW-1	MW-1-20160426	04/26/16	ND (<2.5)	16000	1100	41	49	8800	6300
MW-2	MW-2-20160426	04/26/16	ND (<2.5)	11000	870	22	24	7400	5600
MW-3	MW-3-20160426	04/26/16	ND (<2.5)	4600	610	16 J	17	2300	4600
MW-4	MW-4-20160426	04/26/16	ND (<2.5)	5200	610	17 J	19	2600	4500
MW-10	MW-10-20160428	04/28/16	0.63	100 J	300 J-	9.4 J	11	9.8	3100
MW-10	MW-10-20160428-FD	04/28/16	0.67	110 J	280 J-	9.5 J	10	8.2	3200
MW-11	MW-11-20160420	04/20/16	1.0	93 J	320	18	25	24	2600
MW-12	MW-12-20160421	04/21/16	ND (<2.5)	3400	520	ND (<5.0) U	14	2400	4200
MW-13	MW-13-20160421	04/21/16	ND (<2.5)	15000	860	48	39	3800	5100
MW-18	MW-18-20160420	04/20/16	ND (<1.3)	ND (<50)	670	14	21	3.4 J	3100
MW-20	MW-20-20160422	04/22/16	ND (<2.5)	120	970	ND (<1.0) U	ND (<0.090)	160	4600
MW-25	MW-25-20160421	04/21/16	ND (<1.3)	ND (<50)	490	15	20	4.7	3400
PC-74	PC-74-20160429	04/29/16	4.9 J	460	590	ND (<5.0)	1.8 J	1700	4200
PC-74	PC-74-20160429-FD	04/29/16	2.6 J	400	580	ND (<5.0)	2.7 J	2100	4100
PC-76	PC-76-20160429	04/29/16	3.5 J	ND (<50)	630	ND (<5.0)	ND (<0.090)	800	4400
PC-76	PC-76-20160429-FD	04/29/16	3.1	ND (<50)	640	ND (<5.0)	ND (<0.090)	950	4500
PC-77	PC-77-20160421	04/21/16	ND (<2.5)	390	700	ND (<2.5)	ND (<0.090)	2800	4000
PC-78	PC-78-20160421	04/21/16	2.6 J	390	780	1.1 J	ND (<0.090)	2900	4200
PMW-7	PMW-7-20160422	04/22/16	ND (<2.5)	ND (<500) UJ	820	4.6 J	4.0	53	5300
PMW-8	PMW-8-20160422	04/22/16	3.8 J+	180 J-	790	4.6 J	3.0	57	5200
RIT-6	RIT-6-20160422	04/22/16	4.9 J+	1100	460	4.2 J	5.0	3400	3400
RIT-10	RIT-10-20160422	04/22/16	2.0 J+	710	540	3.0 J	2.0	1300	3800
UZO-17	UZO-17-20160429	04/29/16	5.9	800	520	5.1 J	3.6	2500	3700
WMW3.5N	WMW3.5N-20160427	04/27/16	ND (<2.5)	480	1000	ND (<5.0)	ND (<0.090)	340	5200
WMW3.5N	WMW3.5N-20160427-FD	04/27/16	ND (<2.5)	480	1000	ND (<5.0)	ND (<0.090)	360	5100
WMW3.5S	WMW3.5S-20160428	04/29/16	3.2	3800	480	9.9 J	9.9	1400	2100
WMW4.9N	WMW4.9N-20160427	04/27/16	ND (<1.3)	ND (<200)	400	ND (<5.0)	ND (<0.090)	890	2600
WMW4.9S	WMW4.9S-20160422	04/22/16	ND (<0.50)	580	290 J-	ND (<1.0) U	2.0	270	1500
WMW5.5S	WMW5.5S-20160505	05/05/16	1.7	ND (<50)	320	ND (<0.50)	ND (<0.090)	510	1800
WMW5.5S	WMW5.5S-20160422	04/22/16	2.2 J	6400	570	ND (<1.0) U	3.0	3200	2800
WMW5.7N	WMW5.7N-20160428	04/28/16	1.6	ND (<50)	280	ND (<5.0)	ND (<0.090)	4.8	1500
WMW6.15N	WMW6.15N-20160420	04/20/16	ND (<1.3)	ND (<50)	360	3.6 J	ND (<0.090)	ND (<0.95)	4500
WMW6.15S	WMW6.15S-20160422	04/22/16	2.0 J+	ND (<10)	410	ND (<2.5)	ND (<0.090)	360	2200
WMW6.55S	WMW6.55S-20160421	04/21/16	2.2 J	450	640	ND (<1.0)	1.0	1800	3900
WMW6.9N	WMW6.9N-20160420	04/20/16	0.67 J	ND (<50)	310	3.5 J	ND (<0.090)	ND (<0.95)	2400
WMW6.9N	WMW6.9N-20160420-FD	04/20/16	0.72 J	ND (<50)	300	3.9 J	ND (<0.090)	ND (<0.95)	2400
WMW6.9S	WMW6.9S-20160421	04/21/16	ND (<2.5)	ND (<50)	760	1.4 J	ND (<0.090)	12	5500
WMW7.8N	WMW7.8N-20160420	04/20/16	0.28 J	ND (<50)	230	2.9 J	ND (<0.090)	ND (<0.95)	1400
Equipment Blank	DBMW-4-20160419-EB	04/19/16	ND (<0.25)	ND (<10)	ND (<0.25)	ND (<0.50)	ND (<0.090)	ND (<0.95)	ND (<5.0)
Equipment Blank	PC-76-20160429-EB	04/29/16	ND (<0.25)	ND (<10)	0.30 J	ND (<0.50)	ND (<0.090)	ND (<0.95)	ND (<5.0)
Equipment Blank	WMW4.9N-20160427-EB	04/27/16	ND (<0.25)	ND (<10)	ND (<0.25)	ND (<0.50)	ND (<0.090)	ND (<0.95)	ND (<5.0)

Table 4
Analytical Results of Groundwater Well Sampling April 2016
 NERT Downgradient Study Area
 Henderson, Nevada

Well ID	Sample ID	Date	Bromide (mg/L)	Chlorate (µg/L)	Chloride (mg/L)	Dissolved Chromium (µg/L)	Hexavalent Chromium (µg/L)	Perchlorate (µg/L)	Total Dissolved Solids (mg/L)
Equipment Blank	WMW5.5S-20160422-EB	04/22/16	ND (<0.25)	ND (<10)	ND (<0.25)	0.86 J	ND (<0.090)	ND (<0.95)	ND (<5.0)
Field Blank	LNDMW2-20160427-FB	04/27/16	ND (<0.25)	ND (<10)	ND (<0.25)	ND (<0.50)	ND (<0.090)	ND (<0.95)	ND (<5.0)
Field Blank	MW-25-20160421-FB	04/21/16	ND (<0.25)	ND (<10)	ND (<0.25)	0.80 J	ND (<0.090)	ND (<0.95)	ND (<5.0)
Field Blank	PC-74-20160429-FB	04/29/16	ND (<0.25)	ND (<10)	0.30 J	ND (<0.50)	ND (<0.090)	ND (<0.95)	ND (<5.0)
Field Blank	RIT-10-20160422-FB	04/22/16	ND (<0.25)	ND (<10)	0.30 J	ND (<2.5)	ND (<0.090)	ND (<0.95)	ND (<5.0)

Source: AECOM 2016. Quality Assurance Project Plan, NERT Remedial Investigation – Downgradient Study Area, Nevada Environmental Response Trust Site Henderson, Nevada. March.

BCL = Basic Comparison Level: Residential water basic comparison levels in NDEP August 2013 BCL Spreadsheet (NDEP 2013).

BCL for perchlorate is identified as 15 ug/l to include the Federal Preliminary Remediation Goal and to be consistent with the NERT Ri/FS work

MCL = Maximum Contaminant Level: Primary United States Environmental Protections Agency maximum contaminant level (USEPA 40 CFR Part 141).

2nd MCL = 2nd Maximum Contaminant Level: National Secondary Drinking Water Regulations (USEPA, 40 CFR Part 143).

Gray Shading = Value exceeds screening level

ND - Not Detected above associated method detection limit

B - Analyte was detected in associated blank

F1 -MS and/or MSD Recovery is outside acceptance limits

J - Associated concentration is estimated

J+ - Associated concentration is estimated potentially biased high

J- - Associated concentration is estimated potentially biased low

U - Concentration was reported as a detection, but was reclassified during validation

UJ - Associated reporting limit is estimated

µg/L - Micrograms per liter

mg/L - Milligrams per liter

Silver State performed hexavalent chromium analysis

TestAmerica performed bromide, chlorate, chromium, perchlorate and total dissolved solids analysis

Table 5
Groundwater Elevations April 2016
 NERT Downgradient Study Area
 Henderson, Nevada

Well ID	Easting ⁽¹⁾	Northing ⁽¹⁾	Elevation ⁽¹⁾ (feet amsl, TOC)	Date Gaged	Depth to Water (feet, TOC)	Elevation (feet amsl)
AA-20	831811.79	26728007.77	1628.46	4/19/2016	31.52	1596.94
AA-22	833427.04	26731587.32	1579.85	4/19/2016	32.05	1547.80
AA-23R	833924.30	26732035.85	1561.68	4/18/2016	31.22	1530.46
AA-30	836125.80	26733691.92	1532.35	4/22/2016	19.45	1512.90
COH2B1	832598.59	26733593.69	1546.95	4/21/2016	16.11	1530.84
DBMW-1	830469.80	26727999.08	1626.60	4/19/2016	37.09	1589.51
DBMW-4	832295.68	26729903.39	1605.83	4/19/2016	26.11	1579.72
DBMW-5	833399.07	26729807.30	1609.61	4/19/2016	28.21	1581.40
DBMW-7	835304.94	26729069.98	1631.61	4/18/2016	58.45	1573.16
DBMW-8	835406.66	26729026.85	1632.03	4/18/2016	57.73	1574.30
DBMW-22	839141.01	26733030.27	1535.03	4/22/2016	29.16	1505.87
HM-2	832227.03	26731037.68	1587.05	4/28/2016	27.54	1559.51
LNDMW1	841145.67	26736145.45	1511.19	4/22/2016	36.55	1474.64
LNDMW2	840864.28	26737125.16	1501.98	4/27/2016	34.40	1467.58
MCF-05	832871.14	26728512.87	1627.26	4/25/2016	43.85	1583.41
MCF-06A-R	834929.39	26729028.09	1632.77	4/28/2016	107.85	1524.92
MCF-06B	834930.85	26729012.56	1633.01	4/21/2016	57.88	1575.13
MCF-06C	834945.70	26729004.80	1632.95	4/18/2016	56.61	1576.34
MCF-08A ⁽²⁾	827753.95	26733221.82	1580.33	4/27/2016	1.56	1578.77
MCF-08B-R ⁽²⁾	827786.62	26733202.26	1580.39	4/27/2016	1.19	1579.20
MCF-18A	831877.31	26731585.95	1577.53	4/27/2016	23.00	1554.53
MCF-20A	833381.19	26728860.07	1626.23	4/25/2016	73.06	1553.17
MCF-31A ⁽²⁾	838327.14	26733550.41	1526.66	4/28/2016	1.54	1525.12
MCF-31B	838313.65	26733552.59	1527.42	4/28/2016	20.27	1507.15
MW-1	838593.43	26731476.23	1563.29	4/26/2016	5.81	1557.48
MW-2	838816.81	26731044.43	1579.96	4/26/2016	25.04	1554.92
MW-3	836835.36	26733434.90	1523.29	4/26/2016	3.02	1520.27
MW-4	836666.49	26733446.64	1526.35	4/26/2016	6.2	1520.15
MW-02	838994.12	26734478.11	1533.13	4/28/2016	39.91	1493.22
MW-04	838288.65	26733551.66	1530.64	4/20/2016	23.09	1507.55
MW-05	840501.38	26733563.04	1569.13	4/20/2016	44.65	1524.48
MW-06	841529.98	26733596.69	1610.75	4/28/2016	31.83	1578.92
MW-10	840223.23	26734019.86	1546.44	4/28/2016	37.20	1509.24
MW-11	839738.37	26733930.02	1543.35	4/20/2016	47.96	1495.39
MW-12	838999.98	26733800.85	1547.26	4/21/2016	51.89	1495.37
MW-13	838306.91	26734740.22	1529.84	4/21/2016	35.27	1494.57
MW-18	840946.07	26734674.06	1582.48	4/20/2016	68.77	1513.71
MW-20	840590.41	26735460.67	1512.54	4/22/2016	32.61	1479.93
MW-25	839862.75	26734834.10	1531.65	4/21/2016	39.65	1492.00
PC-74	829203.19	26734003.83	1565.32	4/29/2016	11.00	1554.32
PC-76	829183.48	26734007.08	1565.05	4/29/2016	10.86	1554.19
PC-77	829031.31	26733568.45	1566.86	4/21/2016	6.62	1560.24
PC-78	829032.90	26733560.47	1566.77	4/21/2016	5.89	1560.88
PMW-7	826962.08	26733788.69	1579.81	4/22/2016	9.5	1570.31
PMW-8	827253.76	26733988.93	1576.37	4/22/2016	7.78	1568.59
RIT-06	827297.20	26733433.87	1580.05	4/22/2016	9.93	1570.12
RIT-10	827280.16	26733679.41	1576.44	4/22/2016	6.85	1569.59
UZO-17 ⁽³⁾	827323.40	26733274.00	1583.50	4/29/2016	12.28	1571.22
WMW3.5N	843836.97	26737791.35	1482.54	4/27/2016	35.65	1446.89
WMW3.5S	844697.76	26737275.90	1483.54	4/29/2016	43.28	1440.26
WMW4.9N	838408.40	26736756.98	1523.37	4/27/2016	31.79	1491.58
WMW4.9S	838411.85	26735290.15	1518.84	4/22/2016	26.44	1492.40
WMW5.5S	835768.11	26733971.74	1528.22	4/22/2016	14.46	1513.76
WMW5.58S	835070.11	26734647.03	1526.08	5/5/2016	8.00	1518.08
WMW5.7N	834471.76	26734425.52	1528.50	4/28/2016	7.80	1520.70
WMW6.15N	832493.06	26735359.77	1552.55	4/20/2016	22.28	1530.27
WMW6.15S	832119.74	26734098.93	1545.08	4/22/2016	9.05	1536.03
WMW6.55S	830218.73	26734351.02	1559.25	4/21/2016	15.95	1543.30
WMW6.9N	828913.10	26735560.65	1573.16	4/20/2016	18.32	1554.84

Table 5
Groundwater Elevations April 2016
 NERT Downgradient Study Area
 Henderson, Nevada

Well ID	Easting ⁽¹⁾	Northing ⁽¹⁾	Elevation ⁽¹⁾ (feet amsl, TOC)	Date Gaged	Depth to Water (feet, TOC)	Elevation (feet amsl)
WMW6.9S	828430.55	26734539.19	1570.60	4/21/2016	10.95	1559.65
WMW7.8N	824429.00	26737603.43	1606.56	4/20/2016	11.06	1595.50

Notes:

- (1) Well coordinates and elevations surveyed by licensed surveyor (Stanley) April 4 through 8, 2016.
 Coordinate system: State Plane Coordinate System; Elevations are referenced to the North American Datum (NAD) 83 Nevada East Zone (2701) with vertical datum based on NAVD 88 referenced to the City of Henderson Benchmark network.
- (2) Artesian Well - Groundwater levels were observed to be above the ground surface during the sampling event. These wells were not used to contour groundwater elevations.
- (3) Well was not accessible during survey, later made accessible for sampling. Previously reported coordinates and elevation are listed. Well will be surveyed during the geophysical pilot test study.

amsl = Above mean sea level

TOC = Top of casing

Table 6
Water Quality Parameters April 2016
 NERT Downgradient Study Area
 Henderson, Nevada

Well ID	Screen Interval (feet, bgs)	Water-Bearing Zone	Lithology	Time (24 hour)	Volume Removed (Liters)	Temp (°C)	pH	EC (µS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Depth to water (feet)	Color / Odor	Comments
AA-20	10 - 30	Shallow	Qal	9:22	10.00	24.80	7.22	7294	6.33	41.90	51.9		31.57	Light Cloudy	Well was purged and sampled using a bailer. Turbidity reading not within range. DTW at sample collection = 31.53.
AA-22	11 - 31	Shallow	Qal	13:17	12.50	23.30	7.26	7132	5.13	43.30	181	NA	33	Tan/ No Odor	4/19/16: Well AA-22 purged 3 volumes 4/19 using a bailer; no sample recovered. Turbidity readings not within range. 4/20: Well was purged and sampled using a bailer. DTW at sample collection = 32.15.
AA-23R	20 - 45	Shallow	Qal	9:57	5.5	23.6	7.22	7194	5.58	163.8	3.16	250	31.25	Clear/ None	Pump set at 40 feet bgs.
AA-30	11.7 - 31.7	Shallow	Qal	7:59	5	23.89	7.05	9115	0.58	181.7	0.45	200	19.46	Clear/ None	Screen interval at 11.7-31.7 feet. Pump set at 27 feet.
COH2B1	TBD	TBD	TBD	8:55	8	22.4	7.23	6237	0.41	1.5	125	120	16.12	Light Tan/ No Odor	Initial pump rate at 250 mL/min. Water turbid, lowered pump rate to 120 mL/min due to high turbidity. Pump set at 62 feet below TOC; assume well screen interval from 57-67 feet.
DBMW-1	19 - 49	Shallow	Qal/UMCf	10:43	5	25.6	7.13	7852	4.69	12.1	0.56	125	37.67	Clear/ None	Pump set at 45 feet; 10:21 lowered pump rate to 125 mL/min; MS/MSD samples collected.
DBMW-4	10 - 30	Shallow	Qal/UMCf	10:56	4	25.33	7.3	7355	4.53	154.1	0.37	210	26.23	Clear/ None	Pump set at 29 feet.
DBMW-5	15 - 35	Shallow	UMCf	9:24	6	24.04	7.32	7021	5.21	173.7	30.6	225	25.31	Clear/ None	Pump set at 32 feet.
DBMW-7	50 - 70	Shallow	UMCf	14:45	2.625	25.31	7.34	8168	6.12	185.2	0.11	175	58.55	Clear/ None	Pump set at 65 feet.
DBMW-8	47.5 - 67.5	Shallow	UMCf	12:08	2.25	27	7.19	8595	6.2	46.8	1.36	125	57.88	Clear/ None	Pump set at 65 feet.
DBMW-22	35 - 55	Shallow	UMCf	14:58	1.23	29.92	7.72	5254	0.67	116.2	0.74	35	29.76	Clear/ None	Parameters not stabilized; unable to keep well from drawing down. Screen interval set at 35-55 feet. Pump set at 45 feet.
HM-2	? - 36.89	Shallow	TBD	9:28	10.5	16.6	7.91	7060	0.83	147	22.3	100	27.72	Clear/ No Odor	No screen interval listed; assuming 10 foot screen at 26-36 feet. Pump set at 31 feet.
LNDMW1	TBD	TBD	TBD	13:14	2.25	28.72	7.12	6254	2.11	147.8	5.04	75	36.68	Clear/ None	Assumed well screened from 51.56-61.56 feet. Pump set at 56.5 feet.
LNDMW2	TBD	TBD	TBD	11:22	5	18.8	6.91	4240	1.18	176	2.19	210	34.41	Light Tan/ None	No screen interval listed; assuming 10 foot screen from 45-55 feet. Pump set at 50 feet.
MCF-05	221 - 231	Middle	UMCf	13:45	6	24.28	9.34	73970	1.95	123.5	423	--	54.17	Cloudy/ None	Well was purged and sampled using a bailer. Screen interval at 221-231 feet. Could not purge wells so pulled existing bladder pump from the well.
MCF-06A-R	333 - 373	Deep	UMCf	7:40	3	22.18	8.62	156805	1.19	-21.2	2.94	160	106.32	Clear/ None	4/21: Difficultly purging this deep well; 4/28/16: Screen interval set at 333-373 feet. Pump set at 353 feet.
MCF-06B	67 - 82	Shallow	UMCf	8:07	4.7	23.36	8.2	38333	1.87	229	0.41	50	59.67	Clear/ None	4/21: used flow rate of 50 mL/min but was still drawing down the water level. Screen interval set at 67-82 feet. 1 gallon pumped to clear stagnant water tubing and pump; unable to control drawdown.
MCF-06C	44 - 59	Shallow	UMCf	14:10	13	24.3	7.1	9267	4.8	36.5	50.2	NA	61.25	Light Brown	4/18/16: Well MCF-06C was hand bailed and went dry. The well did not recover to 85% before the day was over. Turbidity reading not within range. Well dry at 17.5 L. As of 15:29 well recharged to 58.94. Water level was at 57.63 when sample was collected using a bailer (4/19/16 08:05).
MCF-08A	350 - 370	Deep	UMCf	8:59	10.2	23.53	7.22	135540	0.32	17.5	23.6	100	6.25	Clear/ None	Screen interval set at 350-370 feet. Assume pump set at 260 feet; pump at 40 psi. Cleared 2.5 gallons of stagnant water from tubing and pump before started to collect field parameters.
MCF-08B-R	96.5 - 136.5	Middle	UMCf	9:54	6.5	24.74	7.62	39191	0.44	-117.6	1.81	200	4.4	Clear/ None	Screen interval at 96.5-136.5 feet. Assume pump set at 116.5. Clear 1 gallon stagnant water from tubing before collecting field parameters.
MCF-18A	360 - 400	Deep	UMCf	7:00	--	26.37	7.04	244157	0.56	168.7	61.2	--	393.4	Clear/ None	Well was purged and sampled using a bailer. Screen interval set at 360-400 feet. Sample collected at 397 feet.
MCF-20A	340 - 380	Deep	UMCf	10:25	6	24.8	6.86	160300	0.63	14.1	26	--	87.36	Clear/ None	4/25/16: Screen interval at 340-380 feet. Assume pump set at 360 feet. Attempted to purge well but no water came up through the existing pump; so pulled existing pump from the well and bailed approx. 9 gallons from the well. Sample collected using bailer. 4/27/16: Pump set at 360 feet. Difficulty setting pump and purging well; unable to control drawdown.

Table 6
Water Quality Parameters April 2016
 NERT Downgradient Study Area
 Henderson, Nevada

Well ID	Screen Interval (feet, bgs)	Water-Bearing Zone	Lithology	Time (24 hour)	Volume Removed (Liters)	Temp (°C)	pH	EC (µS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Depth to water (feet)	Color / Odor	Comments
MCF-31A	361 - 381	Deep	UMCf	10:30	1.75	20.95	6.91	175827	0.63	-59.3	32.9	75	2.6	Clear/None	4/21/16: MCF-31A is located in cluster as MCF-31B. Well has DTW 1.40 feet above ground surface, also seemed to draw down and not recover when purged. Pumped 5 gallons of water out of 500 mL/min to clear stagnant water from pump and dedicated tubing. Water level was at 4.25 feet when sample was collected. 4/28/16: Screen interval set at 361-381 feet. Pump set at approximately 371 feet.
MCF-31B	210 - 230	Middle	UMCf	9:54	3	22.96	7.1	151889	0.44	-64.6	3.3	180	22.46	Clear/None	4/21/16: Crew pumped well at 200 mL/min for a total of 30 min (15:00-15:30) to ensure all stagnant water was cleared from dedicated tubing and pump prior to sampling; this resulted in 6 L of water. When we returned to purge and sample the well the next day at 15:00, DTW was 20.56, the water level in the well hadn't recovered (initial DTW 17.79.) 4/28/2016: Screen interval set at 210-230 feet. Assume pump set at 220 feet. Pump rate of 175 mL/min.
MW-02	? - 45	Shallow	TBD	13:05	4	18.3	7.66	4530	2.98	179	0	175	39.92	Clear/ No Odor	
MW-04	? - 30	Shallow	Qal	13:44	3.2	27.63	7.5	21457	2.22	140.2	1.63	50	23.74	Clear/None	Screen interval at 29-39 feet. Pump set at 34 feet. Difficulty with drawdown even at 50 mL/min. Well slow to recover even when pump was stopped.
MW-05	? - 66.7	Shallow	TBD	10:14	6.5	25.13	7.32	5267	4.28	170.6	8.58	140	44.88	Clear/None	Screen interval at 44-64 feet. Pump set at 54.5 feet. Small pieces of brown algae/moss observed in purge water; lots of algae/moss on pump when removed from well.
MW-06	? - 52	Shallow	TBD	14:40	--	16.4	8.3	2030	2.04	20	2.5	20	32.25	Clear/ No Odor	No screen interval listed; assuming 10 foot screen from 42-52 feet (TD listed at 52 feet). Set pump at 47 feet. Paused flow 14:01-14:06 due to excess drawdown.
MW-10	? - 60	Shallow	TBD	12:32	5	21.9	7.67	4278	1.95	33.5	2.41	200	37.22	Clear/None	Screen interval set at 45-55 feet. Pump set at 50 feet.
MW-11	? - 70	Shallow	TBD	8:31	4	24.09	7.48	4012	4.75	247	1.03	200	48	Clear/None	Pump set at 60 feet. Bottom of screen at 70 feet. Top of screen unknown.
MW-12	? - 61	Shallow	TBD	13:41	4.1	24.73	7.32	5016	5.37	169.8	2.65	200	51.9	Clear/None	Screen interval at 51-61 feet. Pump set at 56 feet.
MW-13	? - 48	Shallow	Qal	12:24	4	23.96	7.07	6066	2.92	170.1	1.12	200	35.3	Clear/None	Screen interval at 38-48 feet. Pump set at 43 feet.
MW-18	--	--	--	12:00	2.5	27.56	7.48	5516	3.36	157.2	2.62	80	68.78	Clear/None	Screen interval at 90.6-105.6 feet. Pump set at 99 feet. Difficulty pulling pump from 99 to 90 when removing it from well.
MW-20	--	--	--	11:44	2.25	26.32	7.33	6984	0.84	129.9	2	80	32.77	Clear/None	Screen interval set at 50-65 feet. Pump set at 58 feet.
MW-25	--	--	--	11:03	4	26.46	7.24	4590	3.73	179.4	3.52	160	39.66	Clear/None	Screen interval at 38-53 feet. Pump set at 47 feet.
MW-1	TBD	TBD	TBD	10:24	15	18.2	7.63	8230	3.33	197	162	125	6.05	Light Tan/None	4/26/16: Pump at initial rate of 30 mL/min; water level drawing down approaching 3 inches. Periodically adjusting flow rate but having issues getting water while pumping lower than 100 mL/min after 5L. No screen interval listed; assuming 10 feet screen from 33-45 feet; pump set at 38 feet below TOC.
MW-2	TBD	TBD	TBD	11:43	2.25	18	7.56	7140	3.34	184	1.71	50	25.23	Clear/ No Odor	No screen interval listed; assuming screen set at 35-45 feet. Set pump at 40 feet. Existing tubing removed and bagged prior to purging; placed back in well after sampling.
MW-3	TBD	TBD	TBD	13:07	6	17.4	7.47	5750	3.47	180	0	185	3.03	Clear/None	No screen interval listed; assuming 10 foot screen from 3-13 feet. Set pump at 8 feet. Existing tubing removed and bagged prior to purging; placed back in well after sample.
MW-4	TBD	TBD	TBD	14:00	6	18.2	7.32	5630	3.32	198	0	190	6.2	Clear/None	No screen interval listed; assuming 10 foot screen from 5-15 feet. Pump set at 10 feet. Existing tubing removed and bagged prior to purging; placed back in well after sampling.
PC-74	39.5 - 49.5	Shallow	Qal	10:54	6	18	7.73	5380	0.9	148	48.5	200	11	Clear/ No Odor	Screen interval set at 39.5-49.5 feet. Pump set at 44.5 feet.
PC-76	15 - 20	Shallow	Qal	11:54	0.25	21.6	8.04	5720	1.31	152	11.5	20	11.08	Clear/ No Odor	Screen interval set at 15-20 feet. Set pump at 17.5 feet. Well drawdown approximately 4 inches at start up; turned off pump, wait for recharge; well level at 11.23 feet at 10:56.
PC-77	29.5 - 39.5	Shallow	Qal	14:50	8	27.1	7.27	6151	0.96	-6.9	21.6	190	6.83	Clear/ No Odor	Screen interval listed at 29.5-39.5 feet. Set pump at 34.5 feet below TOC.
PC-78	11.5 - 21.5	Shallow	Qal	13:31	8	24	7.64	6198	5.08	19.1	11.73	200	5.91	Clear/ No Odor	Screen interval listed as 11.5-21.5 feet. Set pump at 16.5 feet below TOC.
PMW-7	20 - 40	Shallow	Qal/xMcf	10:08	5	23.7	7.06	6784	2.65	-24.3	1.87	275	9.5	Clear/ No Odor	Well screen interval listed at 20-40 feet. Set pump at 30 feet below TOC.

Table 6
Water Quality Parameters April 2016
 NERT Downgradient Study Area
 Henderson, Nevada

Well ID	Screen Interval (feet, bgs)	Water-Bearing Zone	Lithology	Time (24 hour)	Volume Removed (Liters)	Temp (°C)	pH	EC (µS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Depth to water (feet)	Color / Odor	Comments
PMW-8	21 - 41	Shallow	Qal/xMCf	11:23	5	24.3	7.15	6813	4.4	-2.8	1.08	250	7.64	Clear/ No Odor	Well screen interval listed at 21-41 feet. Set pump at 31 feet below TOC. Water level increased to 7.63 feet after placing pump in well.
RIT-06	32 - 42	Shallow	Qal	12:38	5	23	7.22	4513	3.75	20.5	0.02	210	9.95	Clear/ No Odor	Well screen interval listed at 32-42 feet. Set pump at 37 feet below TOC.
RIT-10	25 - 40	Shallow	Qal	13:52	8	24.8	7.13	5191	2.49	18.2	0	250	6.85	Clear/ No Odor	Well screen interval listed at 25-40 feet. Set pump at 32.5 feet below TOC.
UZO-17	17 - 47	Shallow	Qal/xMCf	9:15	5	17.5	7.81	4890	2.18	169	0	240	12.29	Clear/ No Odor	Well screen interval listed at 17-47 feet. Set pump at 32 feet.
WMW3.5N	TBD	TBD	TBD	8:48	6.25	17.9	7.06	6970	2.65	215	>1000	40	35.67	Red Brown/ None	Turbidity reading over 1000 throughout purge. No screen interval listed; assuming 10 foot screen from 37-57 feet. Place pump at 52 feet below TOC. Water level at 35.30 feet after placing pump in well.
WMW3.5S	--	--	--	7:47	7.5	17.6	7.74	4300	0.97	98	4.8	200	43.33	Clear/ No Odor	No screen interval listed; assuming 10 foot screen from 59.80 to 49.80 feet.
WMW4.9N	TBD	TBD	TBD	13:18	13	18.5	6.88	3790	0.55	109	6.2	160	31.83	Clear/ No Odor	No screen interval listed; assuming 10 foot screen from 43-53 feet. Pump set at 48 feet.
WMW4.9S	TBD	TBD	TBD	10:37	4	25.46	7	2647	1.64	163.3	4.98	160	26.46	Clear/ None	Assume well screen from 26.75-46.75 feet. Pump set at 42 feet.
WMW5.5S	TBD	TBD	TBD	9:20	5.5	22.87	7.09	4056	3.56	167.3	9.2	180	14.47	Clear/ None	Assumed well screened from 28-38 feet. Set pump at 33 feet.
WMW5.58S	TBD	TBD	TBD		2.75	19.63	6.21	2850	8.42	175	35.3	150	8.04	Clear/ None	Need SNWA key to unlock. Yellow monument well in a cluster of three wells.
WMW5.7N	TBD	TBD	TBD	14:23	2	21.14	7.23	2613	0.53	47.6	1.67	100	7.8	Clear/ None	Assume screen interval set at 11-21 feet. Set pump at 16 feet.
WMW6.15N	--	--	--	14:07	14	24.5	7.11	5142	2.46	-11	7.7	250	22.37	Clear/H2S Odor	Assume 10 foot screen from 28.4-28.4. Set pump at 33.5 feet below TOC.
WMW6.15S	TBD	TBD	TBD	8:04	8	19.4	7.38	3177	6.35	<0.7	6.74	200	9.06	Clear/ None	Well screen interval not listed. Assume TD is 20 feet and screened at 10-20 feet. Set pump at 15 feet below TOC.
WMW6.55S	TBD	TBD	TBD	10:47	8	23.4	7.23	5426	3.87	-6	6.13	225	15.95	Clear/ No Odor	Assume well screen from 31-41 feet. Set pump at 36 feet below TOC.
WMW6.9N	--	--	--	12:13	12	26.6	7.12	3650	1.52	3.5	66.4	140	18.37	Clear/ None	Assume 10 foot screen from 38.5-48.5 below TOC. Set pump at 43.5 feet.
WMW6.9S	--	--	--	12:07	8	22.4	7.09	6926	0.5	5.2	27.4	200	10.98	Clear/ No Odor	Assume screen interval at 41.5-51.5 feet. Set pump at 46.5 below TOC.
WMW7.8N	TBD	TBD	TBD	9:49	8	25	7.32	2304	1.43	-0.1	0	270	11.1	Clear/ No Odor	Assume screen interval 10 feet from 28-38 feet. Set pump at 33 feet below TOC.

Notes:

-- = No data available
 bgs = below ground surface
 °C = Degrees Celsius
 DO = Dissolved Oxygen
 EC = Electrical Conductivity
 ORP - Oxidation reduction potential
 mg/L = milligrams per liter
 mL/min = milliliters per minute
 mV = millivolts
 NA = Not applicable
 NTU = Nephelometric Turbidity Units
 TBD = To be determined
 TOC = Top of Casing
 µS/cm = microSiemens per centimeter