TETRA TECH

TECHNICAL MEMORANDUM

To:	Nevada Environmental Response Trust
Cc:	Nevada Division of Environmental Protection United States Environmental Protection Agency
From:	Dan Pastor and Dana Grady, Tetra Tech, Inc.
Date:	July 30, 2018
Subject:	**Las Vegas Wash Bioremediation Pilot Study Monthly Progress Report**

At the direction of the Nevada Environmental Response Trust (NERT or Trust), Tetra Tech, Inc. (Tetra Tech) has prepared this memorandum which summarizes Tetra Tech's progress during June 2018 toward successfully implementing the Las Vegas Wash Bioremediation Pilot Study.

Task Progress Update: June 2018

Task M19 – Las Vegas Wash Pilot Study

- Task Leader – Dana Grady/Dan Pastor
- Current Status
    - Phase 1 pre-design field activities are being performed to gather relevant data and information required to optimize the final pilot study locations and design (targeted treatment interval and depth, contaminant concentrations, etc.). The Phase 1 findings and resulting Phase 2 pilot study design will be presented in the third quarter 2018 to NDEP, EPA and the NERT Stakeholders, followed by third-party review and submittal of the Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum.
    - A figure set has been provided to include an overview figure (Figure 1) and Phase 1 pre-design soil boring/monitoring well location figures (Figures 2 and 3).
    - Phase 1 pre-design field activities in the planned Transect 1A area located on the City of Henderson (COH) parcel (Figure 2) began on March 26, 2018 and were completed in June 2018. The following activities were completed in June 2018:
        - Bio-traps were placed in monitoring wells LVWPS-MW103B and LVWPS-MW107A/B on May 24, 2018 and retrieved on June 20, 2018. Bio-traps® were sent to Microbial Insights for testing of phospholipid fatty acids and perchlorate reductase. Results will be presented once the complete data set has been received.
        - Nuclear magnetic resonance (NMR) logging of the deepest well in each of the twelve locations (LVWPS-MW101 through LVWPS-MW112) began on May 29, 2018 and was

Tetra Tech, Inc.
150 S. 4th Street, Unit A, Henderson, NV 89015
Tel 702-854-2295 tetratech.com

completed on June 8, 2018. Data processing is ongoing, and a brief summary of the results will be provided once the processing is complete.

- Borehole dilution testing of monitoring wells LVWPS-MW107A and LVWPS-MW107B was completed the week of June 18, 2018. Data processing is ongoing, and a brief summary of the results will be provided once the processing is complete.
- Results of the slug testing performed in May 2018 indicate a range of hydraulic conductivities (K). Specifically:
    - Alluvial wells had K values in the 3 to 85 ft/day range.
    - UMCf wells had K values less than approximately 5 ft/day, with some values as low as 0.001 ft/day depending on the degree of cementation and consolidation present. The average K value was 1 ft/day for UMCf wells.
    - Slug test data from well LVWPS-MW103B could not be analyzed because, due to low K of the screened interval, the water levels were still recovering from well development and continued to do so for several additional weeks.
- Table 1 provides an updated well construction table that includes ground surface elevations and depth to water at each monitoring well location. Figure 2 provides a map of these monitoring well locations for reference.
- Table 2 presents the analytical results for soil samples collected during soil boring and well installation. Perchlorate was detected in soil samples collected from the saturated alluvium (Qal) at concentrations ranging from non-detect (<0.012) to 5.3 milligrams per kilogram (mg/kg). Perchlorate was detected in soil samples collected from the Upper Muddy Creek formation (UMCf) at concentrations ranging from non-detect (<0.012) to 3.8 mg/kg. In general, perchlorate was primarily detected in soil at depths less than 65 feet bgs. However, one soil sample collected from 76.5 feet bgs at location LVWPS-MW111B had a perchlorate concentration of 1.1 mg/kg. Perchlorate was not detected in any soil samples collected between 80 and 120 feet bgs.
- Table 3 presents the microbial analyses of phospholipid fatty acids and perchlorate reductase in soil collected from soil borings. The perchlorate reductase gene is not present in the soil samples; however, the total biomass population is in range of the 10^5 cells per gram, which indicates a healthy microbial environment. These results will be discussed in more detail in the Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum.
- Discrete-depth groundwater samples were collected at select locations to assist in vertically profiling the extent of perchlorate contamination. Location and depths of discrete groundwater samples were determined in the field based on lithology encountered and planned monitoring well screened intervals. Table 4 presents the analytical results for discrete-depth groundwater samples collected during soil boring and well installation. Perchlorate concentrations in two discrete-depth groundwater samples collected from the saturated Qal at LVWPS-MW102A at 20 feet bgs and at LVWPS-112A at 25 feet bgs during drilling measured 5.7 and 4.9 milligrams per liter (mg/L), respectively. Perchlorate concentrations detected in discrete-depth groundwater samples collected from the UMCf during drilling activities ranged from 0.0085 to 4.3 mg/L.
- Table 5 presents the analytical results for the groundwater sampling event conducted the week of May 14, 2018. Perchlorate concentrations in groundwater at monitoring wells screened in the Qal ranged from 2.5 to 7.7 mg/L. Perchlorate concentrations in groundwater at monitoring wells screened in the UMCf ranged from non-detect (<0.0025)

to 9.4 mg/L. Perchlorate was not detected in groundwater at any of the four monitoring wells screened deeper than 75 feet bgs.

- Upon reaching groundwater, undisturbed soil samples were collected using Shelby tubes from three borehole locations at three different depths within each borehole. Shelby tubes were submitted for laboratory analysis of physical parameters including moisture content, porosity, soil density, specific gravity, and soil grain size distribution. Table 6 presents a summary of these results.

  - Phase 1 pre-design field activities in the planned Transect 1B area located on the Clark County parcels (Figure 3) began on May 16, 2018 and are on-going. The following activities were completed in June 2018:
    - Drilling on the Clark County parcel began on May 21, 2018 and was completed on June 8, 2018. As part of this drilling effort, soil borings were advanced at 16 locations throughout the study area to a depth of approximately 120 feet below ground surface (ft bgs) to obtain area-specific lithological information as described in the Las Vegas Wash Bioremediation Pilot Study Work Plan. Soil samples were collected on approximately 10-foot intervals from the top of the water table to the base of the boring and analyzed for perchlorate.
    - A total of 27 wells were installed at 16 locations within the planned Transect 1B area as prescribed in the Las Vegas Wash Bioremediation Pilot Study Work Plan. All 16 soil borings were converted to permanent monitoring wells. As described in the work plan, a set of paired or clustered wells were installed at select locations with different screened intervals in the alluvium and UMCf to evaluate the vertical profile of perchlorate contamination and hydraulic gradient changes at depth. Specifically, one additional well was installed at eight adjacent locations (paired well) and two additional wells were installed at three locations (clustered wells) . Monitoring wells were screened in the saturated alluvium and both upper and lower portions of the Upper Muddy Creek formation (UMCf). Monitoring wells were surveyed by a land surveyor, which included both horizontal coordinates and the elevation of the ground surface and top of well casing relative to North American Vertical Datum 88. The attached Table 7 presents monitoring well construction details and the attached Figure 3 provides a map of the Phase 1 pre-design monitoring wells installed in the vicinity of the planned Transect 1B.
    - Following well development, groundwater sampling was performed the week of June 25, 2018 in accordance with the Las Vegas Wash Bioremediation Pilot Study Work Plan.
    - Bio-traps® were placed in monitoring wells LVWPS-MW210A/B/C, LVWPS-MW203B, and LVWPS-MW206C on June 28, 2018. Bio-traps® will be left in the monitoring wells for approximately 4 weeks and then removed for testing of phospholipid fatty acids and perchlorate reductase.

- Schedule and Progress Updates
  - Task remains on schedule.
  - Slug testing, borehole dilution testing, and NMR logging are scheduled to be performed the week of July 9, 2018 for recently installed monitoring wells located near the planned Transect 1B (Figure 3).
  - Surface water sampling will be performed the week of July 23, 2018.
- Health and Safety
  - There were no safety incidents related to Task M19 during June 2018.

CERTIFICATION

Las Vegas Wash Bioremediation Pilot Study Monthly Progress Report

Nevada Environmental Response Trust Site
(Former Tronox LLC Site)
Henderson, Nevada

Nevada Environmental Response Trust (NERT) Representative Certification
I certify that this document and all attachments submitted to the Division were prepared at the request of, or under the direction or supervision of NERT. Based on my own involvement and/or my inquiry of the person or persons who manage the systems(s) or those directly responsible for gathering the information or preparing the document, or the immediate supervisor of such person(s), the information submitted and provided herein is, to the best of my knowledge and belief, true, accurate, and complete in all material respects.

Office of the Nevada Environmental Response Trust

Le Petomane XXVII, not individually, but solely in its representative capacity as the Nevada Environmental Response Trust Trustee

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

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

Title: Solely as President and not individually

Company: Le Petomane XXVII, Inc., not individually, but solely in its representative capacity as the Nevada Environmental Response Trust Trustee

Date: 7/30/18

CERTIFICATION

I hereby certify that I am responsible for the services described in this document and for the preparation of this document. The services described in this document have been prepared in a manner consistent with the current standards of the profession, and to the best of my knowledge, comply with all applicable federal, state, and local statutes, regulations, and ordinances. I hereby certify that all laboratory analytical data was generated by a laboratory certified by the NDEP for each constituent and media presented herein.

Description of Services Provided: Las Vegas Wash Bioremediation Pilot Study Monthly Progress Report, Nevada Environmental Response Trust Site, Henderson, Nevada.

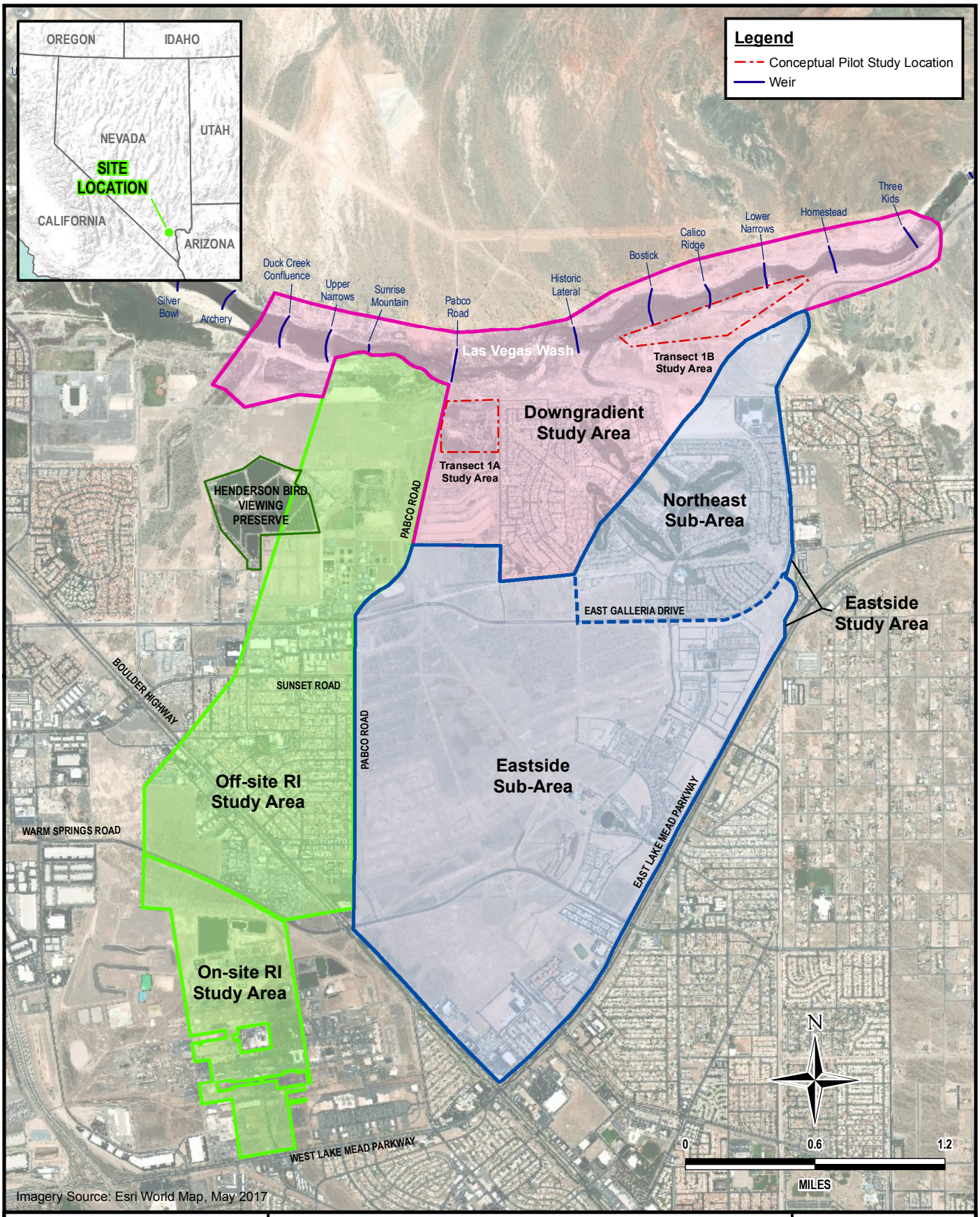
July 30, 2018

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

Date

Nevada CEM Certificate Number: 2167
Nevada CEM Expiration Date: September 18, 2018

Figures



\\TTS100FS1\PROJECTS\NERT\GIS FIGURE DATABASE\MXD\M19MPU\FIGURE1.MXD

TETRA TECH
www.tetratech.com
150 S. 4th Street, Unit A
Henderson, Nevada 89015
Phone: (702) 854-2293

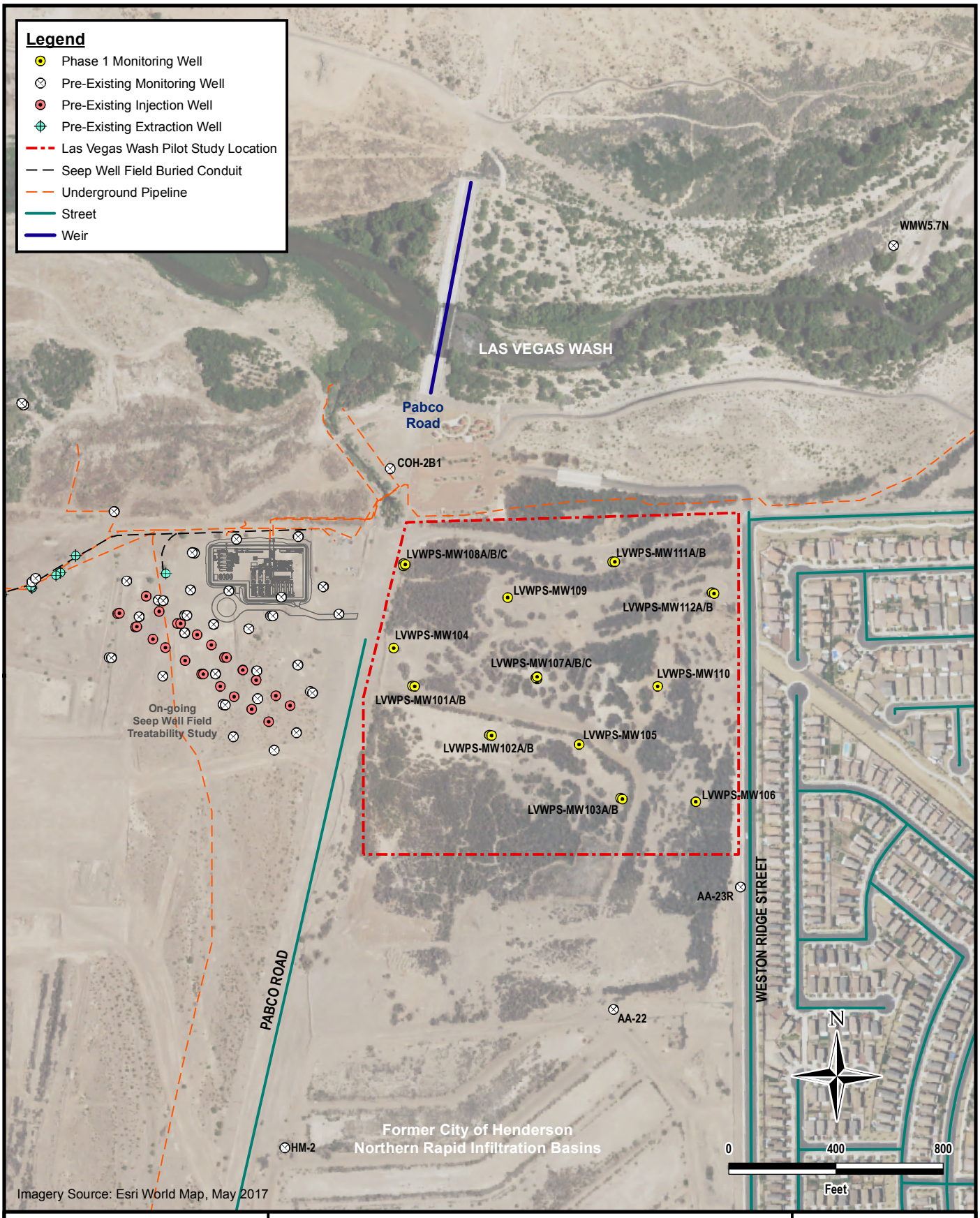
NEVADA ENVIRONMENTAL RESPONSE TRUST

MONTHLY PROGRESS REPORT

TREATABILITY STUDY LOCATION

Project No.:	117-7502018
Date:	JULY 09, 2018
Designed By:	SRA

Figure No.
1



\\TTS100FS1\PROJECTS\NERT\GIS FIGURE DATABASE\MXD\M19\MPU\FIGURE2.MXD

TETRA TECH
www.tetratech.com
150 S. 4th Street, Unit A
Henderson, Nevada 89015
Phone: (702) 854-2293

NEVADA ENVIRONMENTAL RESPONSE TRUST

MONTHLY PROGRESS REPORT

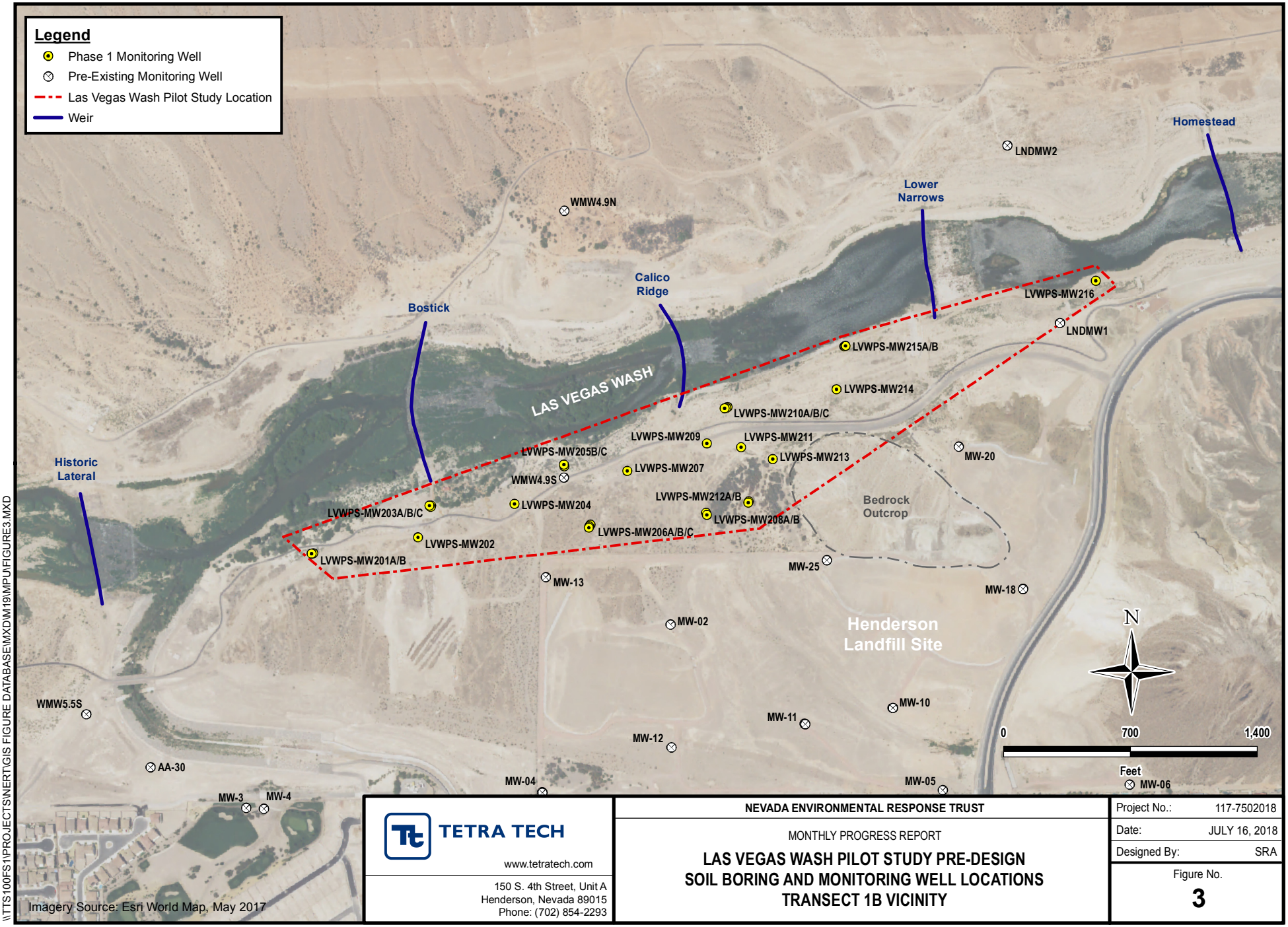
LAS VEGAS WASH PILOT STUDY PRE-DESIGN SOIL BORING AND MONITORING WELL LOCATIONS TRANSECT 1A VICINITY

Project No.:	117-7502018
Date:	JULY 09, 2018
Designed By:	SRA

Figure No.

2

DRAFT



\\TTS100FS1\PROJECTS\NERT\GIS FIGURE DATABASE\MXD\M119\MPU\FIGURE3.MXD

TETRA TECH
www.tetratech.com
150 S. 4th Street, Unit A
Henderson, Nevada 89015
Phone: (702) 854-2293

NEVADA ENVIRONMENTAL RESPONSE TRUST

MONTHLY PROGRESS REPORT

LAS VEGAS WASH PILOT STUDY PRE-DESIGN
SOIL BORING AND MONITORING WELL LOCATIONS
TRANSECT 1B VICINITY

Project No.:	117-7502018
Date:	JULY 16, 2018
Designed By:	SRA

Figure No.
3

Tables

DRAFT

Table 1
Transect 1A Monitoring Wells
Las Vegas Wash Bioremediation Pilot Study

Monitoring Well/Borehole ID	Northing	Easting	Ground Surface Elevation	Top of Casing Elevation	Depth to Water[1]	Well Diameter	Borehole Diameter	Borehole Total Depth	Well Total Depth	Bottom of Screen	Top of Screen	Screen Length	Slot Size
			feet amsl	feet amsl	feet bTOC	inches	inches	feet bgs	feet bgs	feet bgs	feet bgs	feet	inches
LVWPS-MW101A	26732789.490	832678.440	1549.80	1549.34	18.40	2	6	34	33.5	33	23.3	10	0.020
LVWPS-MW101B	26732788.370	832686.182	1549.57	1549.13	9.41	2	6	120	65	64.5	44.8	20	0.010
LVWPS-MW102A	26732606.347	832965.930	1547.23	1546.82	10.45	2	6	67.5	67.1	66.6	47.0	20	0.010
LVWPS-MW102B	26732605.063	832973.676	1547.14	1546.78	5.05	2	6	120	97	96.5	76.8	20	0.010
LVWPS-MW103A	26732371.526	833455.958	1548.77	1548.39	20.20	2	6	40.5	40	39.5	29.8	10	0.010
LVWPS-MW103B	26732368.314	833461.755	1548.93	1548.68	62.81	2	6	120	97	96.5	76.8	20	0.010
LVWPS-MW104	26732930.154	832609.252	1548.05	1547.69	16.95	2	6	120	34	33.5	23.8	10	0.020
LVWPS-MW105	26732570.242	833300.908	1547.66	1547.32	21.25	2	6	120	26.7	26.2	16.5	10	0.020
LVWPS-MW106	26732357.821	833734.567	1549.01	1548.62	10.41	2	6	120	50.6	50.1	30.4	20	0.010
LVWPS-MW107A	26732823.904	833144.179	1548.14	1547.58	21.08	4	8	35.5	35	34.5	24.8	10	0.020
LVWPS-MW107B	26732816.678	833144.438	1548.20	1547.82	16.96	4	8	67	66.3	65.8	46.0	20	0.010
LVWPS-MW107C	26732819.925	833138.100	1548.33	1547.93	6.21	2	6	121	120.5	120	100.3	20	0.010
LVWPS-MW108A	26733238.093	832645.506	1543.91	1543.56	12.44	2	6	42	41.4	40.7	20.8	20	0.020
LVWPS-MW108B	26733242.515	832652.043	1543.85	1543.33	5.73	2	6	67	66.5	66	46.3	20	0.010
LVWPS-MW108C	26733245.537	832645.332	1544.05	1543.62	3.44	2	6	120	119.8	119.3	99.6	20	0.010
LVWPS-MW109	26733119.003	833034.224	1544.91	1544.63	17.00	2	6	120	52	51.5	36.8	15	0.020
LVWPS-MW110	26732788.020	833593.175	1545.95	1545.68	19.51	2	6	120	68	67.5	47.8	20	0.010
LVWPS-MW111A	26733253.381	833424.951	1541.06	1540.64	16.65	2	6	41.5	41	40.5	20.8	20	0.020
LVWPS-MW111B	26733253.324	833432.864	1540.72	1540.22	12.24	2	6	120	78	77.5	57.8	20	0.010
LVWPS-MW112A	26733137.422	833795.120	1538.61	1537.99	16.40	2	6	49.5	48.5	48	28.3	20	0.020
LVWPS-MW112B	26733134.160	833803.808	1538.84	1538.24	19.07	2	6	120	74.5	74	54.3	20	0.010

Notes:
amsl - above mean sea level
bTOC - below top of casing
bgs - below ground surface
1. Depth to water measurements collected on May 14, 2018.

DRAFT

Table 2
Soil Analytical Results - Transect 1A Area
Las Vegas Wash Pilot Study

Location	Sample Date	QCType	Depth (ft bgs)	Lab SampleID	EPA 314.0	Anions by EPA 300.0 (soluble)			EPA 300.1B	EPA 351.2	SW6010B	SM 2320B (soluble)			SM 2540C (soluble)	SW9060A	SW6010B (soluble)				SW6020 (soluble)				SW7199	SW9045
Parameter	Sample Date	QCType	start_depth		Perchlorate	Chloride (as Cl)	Nitrate (as NO3)	Sulfate	Chlorate	Total Kjeldahl Nitrogen (TKN)	Phosphorus	Alkalinity as CaCO3	Bicarbonate ion as HCO3	Carbonate (as CO3)	Total Dissolved Solids	Total Organic Carbon	Calcium	Magnesium	Potassium	Sodium	Arsenic	Chromium	Iron	Manganese	Chromium, Hexavalent	pH
Units	Sample Date	QCType	start_depth		mg/kg	mg/L	mg/L	mg/L	ug/kg	mg/kg	mg/kg	mg/L	mg/L	mg/L	mg/L	mg/kg	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	ug/L	ug/L	mg/kg	SU
LVWPS-MW101B	4/3/2018	N	21.5	440-207959-14	<0.012	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW101B	4/3/2018	N	37.5	440-207959-15	0.048 J	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW101B	4/3/2018	N	51	440-207959-16	<0.018	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW101B	4/3/2018	N	62	440-207959-17	1.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW101B	4/3/2018	FD	62	440-207959-18	1.0	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW101B	4/3/2018	N	90.5	440-207959-19	<0.013	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW101B	4/3/2018	N	102	440-207959-20	<0.014	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW102B	4/4/2018	N	27.5	440-208225-1	2.0	18	0.84	62	4,000 J	83 J	690	11	13	<2.4	160	15,000 J	12	5.7	9.5	20	4.0 J	<2.5	330	4.8 J	<0.21	7.7
LVWPS-MW102B	4/4/2018	N	42.5	440-208225-2	0.30	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW102B	4/4/2018	N	58	440-208225-3	<0.013	18	<0.25	41	190 J	220 J	300	17	21	<2.4	160	69,000 J	8.5	7.1	9.6	19	820	<2.5	970	33	<0.20	7.3
LVWPS-MW102B	4/4/2018	N	83	440-208225-4	<0.014	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW102B	4/4/2018	N	99.5	440-208225-5	<0.074 UJ	260	<0.25	1,200	<78 UJ	150 J	790	9.9	12	<2.4	3,900	11,000 J	160	110	200	210	<2.5	<2.5	<40	14	<0.23	7.3
LVWPS-MW102B	4/5/2018	N	119	440-208225-6	<0.062	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW103B	4/19/2018	N	27.5	440-209332-4	5.3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW103B	4/19/2018	N	41	440-209332-5	0.079 J	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW103B	4/19/2018	N	62	440-209332-6	<0.059 UJ	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW103B	4/19/2018	N	79	440-209332-7	<0.069	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW103B	4/19/2018	FD	79	440-209332-8	<0.071	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW103B	4/19/2018	N	92	440-209332-9	<0.24	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW103B	4/19/2018	N	105.5	440-209332-10	<0.063	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW104	4/2/2018	N	24.5	440-207959-1	0.64	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW104	4/2/2018	N	31	440-207959-2	0.56	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW104	4/2/2018	N	40	440-207959-3	<0.014	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW104	4/2/2018	N	53.5	440-207959-4	2.0	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW104	4/2/2018	FD	53.5	440-207959-5	1.9	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW104	4/2/2018	N	63	440-207959-6	0.047 J	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW104	4/2/2018	N	75	440-207959-7	<0.012	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW104	4/2/2018	N	86.5	440-207959-8	<0.013	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW104	4/2/2018	N	93	440-207959-9	<0.013	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW104	4/2/2018	N	103	440-207959-10	<0.013	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW104	4/2/2018	N	114	440-207959-11	<0.013	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW105	4/23/2018	N	21.5	440-209756-1	0.65	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW105	4/23/2018	N	31.5	440-209756-2	1.4	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW105	4/23/2018	N	41.5	440-209756-3	<0.013	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW105	4/23/2018	N	51.5	440-209756-4	<0.013	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW105	4/23/2018	N	63	440-209756-5	<0.014	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW105	4/23/2018	N	71.5	440-209756-6	<0.015	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW105	4/23/2018	FD	71.5	440-209756-7	<0.015	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW105	4/24/2018	N	81.5	440-209756-8	<0.070	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW105	4/24/2018	N	93	440-209756-9	<0.069	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW105	4/24/2018	N	99.5	440-209756-10	<0.066	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW105	4/24/2018	N	113	440-209756-11	<0.068	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW106	4/24/2018	N	24	440-209884-1	1.4	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW106	4/25/2018	N	44.5	440-209884-2	<0.071	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW106	4/25/2018	N	67	440-209884-3	<0.061	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW106	4/25/2018	N	86	440-209884-4	<0.071	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW106	4/25/2018	N	100	440-209884-5	<0.058	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW106	4/25/2018	N	119	440-209884-6	<0.070	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW107C	3/29/2018	N	29.5	440-207701-1	1.2	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW107C	3/29/2018	N	37	440-207701-2	2.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW107C	3/29/2018	N	44.5	440-207701-3	0.059	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW107C	3/29/2018	N	48.5	440-207701-4	<0.013	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW107C	3/30/2018	N	60	440-207701-5	<0.014	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW107C	3/30/2018	N	70	440-207701-6	<0.016	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW107C	3/30/2018	N	84.5	440-207701-7	<0.016	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW107C	3/30/2018	N	96	440-207701-8	<0.013	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW107C	3/30/2018	FD	96	440-207701-9	<0.013	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW107C	3/30/2018	N	106	440-207701-10	<0.014	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW107C	3/30/2018	N	118	440-207701-11	<0.014	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW108C	3/27/2018	N	33	440-207470-1	1.4	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW108C	3/27/2018	N	47.5	440-207470-2	0.37	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW108C	3/27/2018	N	57	440-207470-3	3.8	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW108C	3/27/2018	N	75	440-207470-4	<0.013	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW108C	3/27/2018	N	82.5	440-207470-5	<0.014	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW108C	3/27/2018	N	112	440-207470-6	<0.012	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW109	4/17/2018	N	28	440-209165-1	1.2	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW109	4/17/2018	N	53.5	440-209165-2	2.1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW109	4/17/2018	N	66	440-209165-3	<0.090	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW109	4/17/2018	N	75	440-209332-1	<0.066	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW109	4/17/2018	N	93	440-209332-2	<0.072	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW109	4/17/2018	N	110	440-209332-3	<0.067	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW110	4/5/2018	N	29	440-208267-1	2.7	31	1.5	130	8,000 J	120 J	1,200	16	19	<2.4	250	<600 UJ	19	7.4	16	36	11	36	190	3.6 J	<0.27	7.2 J
LVWPS-MW110	4/5/2018	N	46	440-208267-2	0.056 J	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW110	4/5/2018	N	58	440-208267-3	<0.014	24	<0.25	130	870 J	630 J	390	17	21	<2.4	310	62,000 J	22	13	30	23	<2.5	<2.5	40 J	16	<0.23	7.2 J
LVWPS-MW110	4/5/2018	FD	58	440-208267-4	<0.015	24	<0.25	120	910 J	430 J	410	14	17	<2.4	310	55,000 J	23	12	27	21	<2.5	12	43 J	15	<0.24	7.2 J
LVWPS-MW110	4/5/2018	N	66	440-208267-5	<0.012	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW110	4/6/2018	N	86	440-208267-6	<0.065	140	<1.3	2,300	<340 UJ	36 J	540	<4.0	<4.8	<2.4	3,400	<600 UJ	410	180	310	150	<2.5	<2.5	56 J	11	<0.21	7.1 J
LVWPS-MW110	4/6/2018	N	117	440-208267-7	<0.065	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW111B	4/12/2018	N	25	440-208888-1	1.8	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW111B	4/12/2018	FD	25	440-208888-2	1.6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW111B	4/12/2018	N	35	440-208888-3	1.6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW111B	4/12/2018	N	45	440-208888-4	1.3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW111B	4/12/2018	N	55	440-208888-5	0.93	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW111B	4/12/2018	N	68	440-208888-7	<0.079	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW111B	4/12/2018	N	76.5	440-208888-6	1.1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW111B	4/12/2018	N	89.5	440-208888-8	<0.077	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW111B	4/12/2018	N	103	440-208888-9	<0.053	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW111B	4/12/2018	N	111	440-208888-10	<0.068 UJ	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

DRAFT

Table 2
Soil Analytical Results - Transect 1A Area
Las Vegas Wash Pilot Study

Location	Sample Date	QCType	Depth (ft bgs)	Lab SampleID	EPA 314.0	Anions by EPA 300.0 (soluble)			EPA 300.1B	EPA 351.2	SW6010B	SM 2320B (soluble)			SM 2540C (soluble)	SW9060A	SW6010B (soluble)				SW6020 (soluble)				SW7199	SW9045
Parameter	Sample Date	QCType	start_depth		Perchlorate	Chloride (as Cl)	Nitrate (as NO3)	Sulfate	Chlorate	Total Kjeldahl Nitrogen (TKN)	Phosphorus	Alkalinity as CaCO3	Bicarbonate ion as HCO3	Carbonate (as CO3)	Total Dissolved Solids	Total Organic Carbon	Calcium	Magnesium	Potassium	Sodium	Arsenic	Chromium	Iron	Manganese	Chromium, Hexavalent	pH
Units	Sample Date	QCType	start_depth		mg/kg	mg/L	mg/L	mg/L	ug/kg	mg/kg	mg/kg	mg/L	mg/L	mg/L	mg/L	mg/kg	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	ug/L	ug/L	mg/kg	SU
LVWPS-MW111B	4/12/2018	N	120	440-208888-11	<0.064	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW111B	4/12/2018	FD	120	440-208888-12	<0.066	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW112B	4/11/2018	N	27.5	440-208804-1	0.52	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW112B	4/11/2018	N	35.5	440-208804-2	0.76	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW112B	4/11/2018	N	47	440-208804-3	3.2	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW112B	4/11/2018	N	66	440-208804-4	<0.013	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW112B	4/11/2018	N	86	440-208804-5	<0.012	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW112B	4/12/2018	N	101	440-208804-6	<0.013	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
LVWPS-MW112B	4/12/2018	N	118.5	440-208804-7	<0.062	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Notes

ft	feet	ug/L	micrograms per liter
ft bgs	below ground surface	SU	Standard Units
mg/kg	milligrams per kilogram	FD	Field duplicate
mg/L	milligrams per liter	N	Normal field sample
ug/kg	micrograms per kilogram		

<	The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
UJ	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

DRAFT

Table 3
Soil Microbial Results - Transect 1A Area
Las Vegas Wash Pilot Study

Location	Sample Date	Depth (ft bgs)	Sample Matrix	Microbial Census	Microbial Phospholipid Fatty Acid Analysis (PLFA)								
				Perchlorate reductase gene (pcrA)	Total Biomass	Proteobacteria (Monos)	Firmicutes (TerBrSats)	Anaerobic metal reducers (BrMonos)	SRB/Actinomycetes (MidBrSats)	General (Nsats)	Eukaryotes (polyenoics)	Slowed Growth	Decreased Permeability
				cells/gram	cells/gram	%	%	%	%	%	%	ratio cy/cis	ratio trans/cis
LVWPS-MW102B	4/4/2018	22.5-23	Soil	<2.50E+04 (I)	8.45E+05	19.42	16.79	0.81	0	47.95	15.03	0.00	0.00
LVWPS-MW102B	4/4/2018	58-58.5	Soil	<2.50E+04 (I)	7.23E+05	14.27	19.30	2.68	8.01	37.88	17.85	0.68	0.00
LVWPS-MW110	4/5/2018	29-29.5	Soil	<2.50E+04 (I)	<9.63E+05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LVWPS-MW110	4/5/2018	46-46.5	Soil	<2.50E+04 (I)	<9.73E+05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Notes

ft bgs	below ground surface
Monos	Monoenoic
TerBrSats	Terminally Branched Saturated
BrMonos	Branched Monoenoic
MidBrSats	Mid-Chain Branched Saturated
Nsats	Normal Saturated
<	Not detected
(I)	Inhibited

DRAFT

Table 4
Discrete-Depth Groundwater Analytical Results
Las Vegas Wash Pilot Study

Location	Sample Depth (ft bgs)	Sample Date	QCType	Lab SampleID	EPA 314.0 Perchlorate ug/L	EPA 300.1 Chlorate ug/L	EPA 300.0 Nitrate (as N) mg/L
LVWPS-MW102A	20	4/9/2018	N	440-208520-1	5,700	15,000	10
LVWPS-MW105	56	4/23/2018	N	440-209762-1	8.5	---	---
LVWPS-MW109	57	4/17/2018	N	440-209162-1	450	---	---
LVWPS-MW110	40	4/5/2018	N	440-208268-1	4,300	---	---
LVWPS-MW110	75	4/6/2018	N	440-208268-2	710	940	1.7
LVWPS-MW112A	25	4/26/2018	N	440-209994-1	4,900	---	---
LVWPS-MW112A	25	4/26/2018	FD	440-209994-2	5,300	---	---

Notes

ft bgs below ground surface
mg/L milligrams per liter
FD Field duplicate
N Normal field sample

DRAFT

Table 5
Groundwater Analysis Results - Transect 1A Area
Las Vegas Wash Pilot Study

Location	Sample Date	QCType	Lab SampleID	EPA 314.0	Anions by EPA 300.0				EPA 300.1	EPA 351.2	EPA 365.3	EPA 218.6	Field Tests	
				Perchlorate	Chloride (as Cl)	Nitrate (as N)	Nitrite (as N)	Sulfate	Chlorate	Total Kjeldahl Nitrogen (TKN)	Phosphorus	Chromium, Hexavalent	Dissolved Oxygen	Ferrous Iron
				ug/L	mg/L	mg/L	mg/L	mg/L	ug/L	mg/L	mg/L	ug/L	mg/L	mg/L
LVWPS-MW101A	5/16/2018	N	440-211479-3	2,500	700	14	<0.70	2,100	24,000	<0.10	0.11	25	2.62	0.0
LVWPS-MW101B	5/16/2018	N	440-211479-4	7,200	1,300	6.2	<1.4	2,700	17,000	<0.10	0.063	5.5	1.90	0.0
LVWPS-MW102A	5/16/2018	N	440-211479-5	1,300	1,300	1.7 J	<1.4	2,600	3,600	<0.10	0.11	3.9	2.20	0.0
LVWPS-MW102B	5/16/2018	N	440-211479-6	<50	11,000	<5.5	<7.0	33,000	<250	3.4	0.40	<0.25	0.05	0.0
LVWPS-MW103A	5/18/2018	N	440-211687-2	6,000	820	11	<0.70	3,200	14,000	<0.10	0.050	45	0.81	0.0
LVWPS-MW103B	5/18/2018	N	440-211687-3	<50	15,000	<5.5	<7.0	80,000	580 J	19	0.42	<0.25	3.24	0.0
LVWPS-MW104	5/16/2018	N	440-211479-1	3,700 J+	920	11	<1.4	2,100	31,000	<0.10	0.045 J	25	4.81	0.0
LVWPS-MW105	5/17/2018	N	440-211577-5	5,100	970	9.9	<1.4	2,500	18,000	<0.10	<0.025	19	0.28	0.0
LVWPS-MW106	5/17/2018	N	440-211576-4	7,200	1,100	17	<1.4	2,500	71,000	<0.10	0.073	46	5.36	0.0
LVWPS-MW107A	5/15/2018	N	440-211381-4	4,000	880	6.4	<0.70	3,000	8,400	<0.10	0.043 J	15	4.18	0.0
LVWPS-MW107B	5/15/2018	N	440-211381-5	<2.5	1,100	<1.1	<1.4	2,500	<50	0.30	0.037 J	<0.25	0.14	0.0
LVWPS-MW107C	5/16/2018	N	440-211479-2	<50	13,000	<5.5	<7.0	37,000	<250	3.8	0.37	<0.25	0.20	0.0
LVWPS-MW108A	5/15/2018	N	440-211381-3	6,300	1,200	5.7	<0.70	1,500	19,000	<0.10	0.027 J	5.4	0.50	0.0
LVWPS-MW108B	5/15/2018	N	440-211381-2	9,400	1,500	11	<1.4	3,000	30,000	<0.10	0.080	39	3.52	0.0
LVWPS-MW108C	5/15/2018	N	440-211381-1	<50	10,000	<5.5	<7.0	26,000	<250	2.6	0.19	<0.25	0.18	0.25
LVWPS-MW109	5/17/2018	N	440-211577-3	5,900	1,000	7.0	<0.70	1,800	25,000	<0.10	<0.025	2.7	0.30	0.0
LVWPS-MW109	5/17/2018	FD	440-211577-4	5,900	1,000	7.1	<0.70	1,700	25,000	<0.10	<0.025	2.7	---	---
LVWPS-MW110	5/14/2018	N	440-211274-1	<5.0	1,200	<1.1	<1.4	3,700	<50	0.21	0.033 J	<0.25	2.85	0.0
LVWPS-MW111A	5/17/2018	N	440-211576-1	7,700	1,100	6.9	<1.4	1,800	14,000	<0.10	0.085	7.6	2.44	0.0
LVWPS-MW111B	5/17/2018	N	440-211577-1	3,000	1,500	2.3	<1.4	3,800	4,600	0.31	0.036 J	3.4	0.29	0.0
LVWPS-MW112A	5/17/2018	N	440-211576-2	5,600	940	9.3	<0.70	1,900	24,000	<0.10	0.15	8.4	3.90	0.0
LVWPS-MW112B	5/17/2018	N	440-211577-2	3,900	3,400	<5.5	<7.0	22,000	<100	2.2	0.23	<0.25	0.26	0.25

Notes

ug/L	micrograms per liter	SU	Standard Units
mg/L	milligrams per liter	mS/cm	milliSiemens per centimeter
mV	milliVolts	C	degrees Celsius
FD	Field duplicate	NTU	Nephelometric Turbidity Unit
N	Normal field sample		

<	The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
J-	The result is an estimated quantity, but the result may be biased low.
J+	The result is an estimated quantity, but the result may be biased high.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
UJ	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

DRAFT

Table 5
Groundwater Analysis Results - Transect 1A Area
Las Vegas Wash Pilot Study

Location	Sample Date	QCType	Lab SampleID	Field Tests						NTOTAL	RSK175	SM 2320B				SM 2540C	SM 5310B
				Oxidation-Reduction Potential	pH	Specific Conductivity	Sulfide	Temperature	Turbidity	Nitrogen, Total	Methane	Alkalinity as CaCO3	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Dissolved Solids	Total Organic Carbon
				mV	SU	mS/cm	mg/L	C	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LVWPS-MW101A	5/16/2018	N	440-211479-3	37.5	7.45	6.71	0.0	25.86	49.3	14	<0.00025	110	110	<4.0	<4.0	4,600	1.2
LVWPS-MW101B	5/16/2018	N	440-211479-4	283	7.35	7.87	0.0	22.28	260	6.2	<0.00025	86	86	<4.0	<4.0	7,300	<0.65
LVWPS-MW102A	5/16/2018	N	440-211479-5	268	7.40	7.67	0.0	21.17	197	1.7	<0.00025	83	83	<4.0	<4.0	7,000	<0.65
LVWPS-MW102B	5/16/2018	N	440-211479-6	-284.3	7.95	72.26	0.4	28.72	84.3	3.4	0.044	98	98	<4.0	<4.0	71,000	3.7
LVWPS-MW103A	5/18/2018	N	440-211687-2	30.6	7.78	8.30	0.0	23.06	13.86	11	<0.00025	79	79	<4.0	<4.0	6,700	<0.65
LVWPS-MW103B	5/18/2018	N	440-211687-3	290	7.86	88.9	0.0	21.04	19	19	0.00094 J	200	200	<4.0	<4.0	130,000	7.1
LVWPS-MW104	5/16/2018	N	440-211479-1	350	7.14	6.56	0.0	19.31	50	11	<0.00025	150	150	<4.0	<4.0	5,600	1.2
LVWPS-MW105	5/17/2018	N	440-211577-5	58.0	7.31	7.62	0.0	23.61	8.27	9.9	<0.00025	83	83	<4.0	<4.0	6,200	1.2
LVWPS-MW106	5/17/2018	N	440-211576-4	325	7.56	7.19	0.0	20.71	89	17	<0.00025	92	92	<4.0	<4.0	6,500	1.3
LVWPS-MW107A	5/15/2018	N	440-211381-4	316	7.55	6.72	0.0	20.05	2	6.4	<0.00025	140	140	<4.0	<4.0	6,200	2.1
LVWPS-MW107B	5/15/2018	N	440-211381-5	-230.0	7.83	8.75	0.2	25.97	8.04	0.30	0.0023	100	100	<4.0	<4.0	6,100	<0.65
LVWPS-MW107C	5/16/2018	N	440-211479-2	-235.8	8.00	72.24	1.9	23.49	24.5	3.8	0.047	93	93	<4.0	<4.0	74,000	4.5
LVWPS-MW108A	5/15/2018	N	440-211381-3	18.9	7.16	7.59	0.0	25.69	2.54	5.7	<0.00025	260	260	<4.0	<4.0	4,900	1.7
LVWPS-MW108B	5/15/2018	N	440-211381-2	300	8.30	8.54	0.0	19.52	80.8	11	<0.00025	86	86	<4.0	<4.0	7,600	0.75 J
LVWPS-MW108C	5/15/2018	N	440-211381-1	-105.9	6.05	56.37	0.15	24.65	7.51	2.6	0.037	100	100	<4.0	<4.0	56,000	4.8
LVWPS-MW109	5/17/2018	N	440-211577-3	92.6	6.84	7.44	0.0	24.97	8.2	7.0	0.87	230	230	<4.0	<4.0	5,100	1.5
LVWPS-MW109	5/17/2018	FD	440-211577-4	---	---	---	---	---	---	7.1	0.73	230	230	<4.0	<4.0	5,000	1.5
LVWPS-MW110	5/14/2018	N	440-211274-1	326	4.35	0.008	0.0	23.52	656	0.21	0.00057 J	99	99	<4.0	<4.0	8,300	0.74 J
LVWPS-MW111A	5/17/2018	N	440-211576-1	360	7.02	6.62	0.0	19.91	40	6.9	<0.00025	200	200	<4.0	<4.0	5,100	2.0
LVWPS-MW111B	5/17/2018	N	440-211577-1	78.8	7.39	11.04	0.0	22.79	9.1	2.6	0.00061 J	91	91	<4.0	<4.0	9,100	<0.65
LVWPS-MW112A	5/17/2018	N	440-211576-2	3.69	7.14	6.34	0.0	20.72	230	9.3	<0.00025	200	200	<4.0	<4.0	4,800	1.4
LVWPS-MW112B	5/17/2018	N	440-211577-2	43.6	7.37	39.15	0.05	25.25	70.2	2.2	0.0031	170	170	<4.0	<4.0	39,000	3.7

Notes

ug/L	micrograms per liter	SU	Standard Units
mg/L	milligrams per liter	mS/cm	milliSiemens per c
mV	milliVolts	C	degrees Celsius
FD	Field duplicate	NTU	Nephelometric Tur
N	Normal field sample		
<	The analyte was analyzed for, but was not detected abov the reported sample quantitation limit.		
J-	The result is an estimated quantity, but the result may be		
J+	The result is an estimated quantity, but the result may be		
J	The result is an estimated quantity. The associated nume the approximate concentration of the analyte in the sampl		
UJ	The analyte was analyzed for, but was not detected. The quantitation limit is approximate and may be inaccurate o		

DRAFT

Table 5
Groundwater Analysis Results - Transect 1A Area
Las Vegas Wash Pilot Study

Location	Sample Date	QCType	Lab SampleID	Dissolved Metals by SW6010B												Total Manganese by SW6010B	Dissolved Manganese by SW6010B
				Aluminum	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Manganese
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LVWPS-MW101A	5/16/2018	N	440-211479-3	<0.25	<0.025	<0.0050	2.6	<0.013	550	0.033	<0.025	<0.025	<0.25	<0.019	210	<0.015	<0.075
LVWPS-MW101B	5/16/2018	N	440-211479-4	<0.25	<0.025	<0.0050	2.5	<0.013	530	0.027	<0.025	<0.025	<0.25	<0.019	430	0.056	<0.075
LVWPS-MW102A	5/16/2018	N	440-211479-5	<0.25	<0.025	<0.0050	1.5	<0.013	540	0.017 J	<0.025	<0.025	<0.25	<0.019	460	0.035	<0.075
LVWPS-MW102B	5/16/2018	N	440-211479-6	<1.3	<0.13	<0.025	12	<0.063	530	<0.063	<0.13	<0.13	<1.3	<0.095	6,100	<1.5	<0.38
LVWPS-MW103A	5/18/2018	N	440-211687-2	<0.25	<0.025	<0.0050	3.2	<0.013	510	0.061	<0.025	<0.025	<0.25	<0.019	350	<0.015	<0.075
LVWPS-MW103B	5/18/2018	N	440-211687-3	<1.3	<0.13	<0.025	8.7	<0.063	570	<0.063	<0.13	0.95 J-	<1.3	<0.095	12,000	1.2 J+	0.80
LVWPS-MW104	5/16/2018	N	440-211479-1	<0.25	<0.025	<0.0050	2.8 J+	<0.013	560	0.034	<0.025	<0.025	<0.25	<0.019	200	0.030	<0.075
LVWPS-MW105	5/17/2018	N	440-211577-5	<0.10	0.019 J	<0.0020	1.9	<0.0050	580	0.022	<0.010	<0.010	<0.10	<0.0076	260	0.044	0.030 J
LVWPS-MW106	5/17/2018	N	440-211576-4	<0.25	<0.025	<0.0050	2.3	<0.013	640	0.052	<0.025	<0.025	<0.25	<0.019	250	0.10	<0.075
LVWPS-MW107A	5/15/2018	N	440-211381-4	0.078 J	0.020	<0.0010	3.1	<0.0025	600	0.015	<0.0050	<0.0050	<0.050	<0.0038	280	<0.015	<0.015
LVWPS-MW107B	5/15/2018	N	440-211381-5	0.12	0.024	<0.0010	2.0	<0.0025	250	0.0026 J	<0.0050	<0.0050	0.089 J	<0.0038	380	<0.015	<0.015
LVWPS-MW107C	5/16/2018	N	440-211479-2	<1.3	<0.13	<0.025	12	<0.063	550	<0.063	<0.13	<0.13	<1.3	<0.095	6,600	<1.5	<0.38
LVWPS-MW108A	5/15/2018	N	440-211381-3	0.14	0.025	<0.0010	3.0	<0.0025	350	0.0070	<0.0050	<0.0050	<0.050	<0.0038	180	<0.015	<0.015
LVWPS-MW108B	5/15/2018	N	440-211381-2	0.33	0.022	<0.0010	3.1	<0.0025	570	0.043	<0.0050	<0.0050	0.25	<0.0038	400	0.028	<0.015
LVWPS-MW108C	5/15/2018	N	440-211381-1	<0.50	<0.050	<0.010	13	<0.025	550	<0.025	<0.050	<0.050	<0.50	<0.038	5,300	0.26	0.18 J
LVWPS-MW109	5/17/2018	N	440-211577-3	0.053 J	0.019	<0.0010	2.5	<0.0025	340	<0.0025	<0.0050	<0.0050	<0.050	<0.0038	160	0.020	<0.015
LVWPS-MW109	5/17/2018	FD	440-211577-4	<0.050	0.020	<0.0010	2.7	<0.0025	360	0.0043 J	<0.0050	<0.0050	<0.050	<0.0038	170	0.052	<0.015
LVWPS-MW110	5/14/2018	N	440-211274-1	<0.50	<0.050	<0.010	2.1	<0.025	560	<0.025	<0.050	<0.050	<0.50	<0.038	410	<0.075	<0.15
LVWPS-MW111A	5/17/2018	N	440-211576-1	0.053 J	0.022	<0.0010	2.6	<0.0025	390	0.0066	<0.0050	<0.0050	<0.050	<0.0038	180	0.078	0.061
LVWPS-MW111B	5/17/2018	N	440-211577-1	<0.050	0.015	<0.0010	1.5	<0.0025	420	0.0029 J	<0.0050	<0.0050	<0.050	<0.0038	550	<0.030	<0.015
LVWPS-MW112A	5/17/2018	N	440-211576-2	0.18	0.020	<0.0010	2.4	<0.0025	400	0.0093	<0.0050	<0.0050	0.17	<0.0038	160	0.27	0.19
LVWPS-MW112B	5/17/2018	N	440-211577-2	<0.50	<0.050	<0.010	3.1	<0.025	440	<0.025	<0.050	<0.050	<0.50	<0.038	3,700	0.37	0.31

Notes

ug/L	micrograms per liter	SU	Standard Units
mg/L	milligrams per liter	mS/cm	milliSiemens per c
mV	milliVolts	C	degrees Celsius
FD	Field duplicate	NTU	Nephelometric Tur
N	Normal field sample		

<	The analyte was analyzed for, but was not detected abov the reported sample quantitation limit.
J-	The result is an estimated quantity, but the result may be
J+	The result is an estimated quantity, but the result may be
J	The result is an estimated quantity. The associated nume the approximate concentration of the analyte in the sampl
UJ	The analyte was analyzed for, but was not detected. The quantitation limit is approximate and may be inaccurate o

DRAFT

Table 5
Groundwater Analysis Results - Transect 1A Area
Las Vegas Wash Pilot Study

Location	Sample Date	QCType	Lab SampleID	Dissolved Metals by SW6010B												Dissolved Metals by SW6010B	Dissolved Metals by SW6020			
				Molybdenum	Nickel	Phosphorus	Potassium	Silicon	Silver	Sodium	Strontium	Tin	Titanium	Tungsten	Vanadium	Zinc	Antimony	Arsenic	Selenium	Thallium
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	ug/L	ug/L
LVWPS-MW101A	5/16/2018	N	440-211479-3	0.36	<0.025	<0.50	70	40	<0.025	640	11	<0.25	<0.013	<0.25	<0.025	<0.060	<5.0	48	34	<5.0
LVWPS-MW101B	5/16/2018	N	440-211479-4	0.45	<0.025	<0.50	130	35	<0.025	870	13	<0.25	<0.013	<0.25	0.027 J	<0.060	<5.0	73	59	<5.0
LVWPS-MW102A	5/16/2018	N	440-211479-5	<0.050	<0.025	<0.50	160	34	<0.025	790	13	<0.25	<0.013	<0.25	0.026 J	<0.060	<5.0	74	26	<5.0
LVWPS-MW102B	5/16/2018	N	440-211479-6	<0.25	<0.13	<2.5	5,100	5.5	<0.13	7,800	10	<1.3	<0.063	<1.3	<0.13	<0.30	<5.0	<5.0	18 J	<5.0
LVWPS-MW103A	5/18/2018	N	440-211687-2	<0.050	<0.025	<0.50	600	40	<0.025	810	9.3	<0.25	<0.013	<0.25	<0.025	<0.060	<5.0	35	8.6 J	<5.0
LVWPS-MW103B	5/18/2018	N	440-211687-3	1.4	1.1 J-	<2.5	11,000	5.7	<0.13	14,000	12	<1.3	<0.063	<1.3	<0.13	1.2 J-	5.9 J	17	11 J	<5.0
LVWPS-MW104	5/16/2018	N	440-211479-1	0.25	<0.025	<0.50	56	36	<0.025	670	12	<0.25	<0.013	<0.25	<0.025	<0.060	<5.0	50	28	<5.0
LVWPS-MW105	5/17/2018	N	440-211577-5	0.079	<0.010	<0.20	190	41	<0.010	550	12	<0.10	<0.0050	<0.10	<0.010	<0.024	<0.50	58	17	<0.50
LVWPS-MW106	5/17/2018	N	440-211576-4	0.070 J	<0.025	<0.50	150	36	<0.025	660	14	<0.25	<0.013	<0.25	<0.025	<0.060	<0.50	35	32	<0.50
LVWPS-MW107A	5/15/2018	N	440-211381-4	0.12	<0.0050	<0.10	89	47	<0.0050	710	16	<0.050	<0.0025	<0.050	0.0090 J	<0.012	<2.5	48	13	<2.5
LVWPS-MW107B	5/15/2018	N	440-211381-5	0.056	<0.0050	<0.10	560	28	<0.0050	780	8.5	<0.050	<0.0025	<0.050	<0.0050	<0.012	<2.5	59	9.3 J	<2.5
LVWPS-MW107C	5/16/2018	N	440-211479-2	<0.25	<0.13	<2.5	6,100	5.5	<0.13	9,000	7.8	<1.3	<0.063	<1.3	<0.13	<0.30	<5.0	<5.0	19 J	<5.0
LVWPS-MW108A	5/15/2018	N	440-211381-3	0.23	<0.0050	<0.10	52	41	<0.0050	880	9.4	<0.050	<0.0025	<0.050	0.031	<0.012	<2.5	68	20	<2.5
LVWPS-MW108B	5/15/2018	N	440-211381-2	0.52	<0.0050	<0.10	120	32	<0.0050	980	14	<0.050	0.014	<0.050	<0.0050	<0.012	<2.5	52	77	<2.5
LVWPS-MW108C	5/15/2018	N	440-211381-1	<0.10	<0.050	<1.0	2,600	5.8	<0.050	7,300	12	<0.50	<0.025	<0.50	<0.050	<0.12 UJ	<10	<10	14 J	<10
LVWPS-MW109	5/17/2018	N	440-211577-3	0.24	<0.0050	<0.10	51	34	<0.0050	710	8.3	<0.050	<0.0025	<0.050	0.022	<0.012	<0.50	62	24	<0.50
LVWPS-MW109	5/17/2018	FD	440-211577-4	0.26	<0.0050	<0.10	56	37	<0.0050	770	9.0	<0.050	<0.0025	<0.050	0.024	<0.012	<0.50	63	24	<0.50
LVWPS-MW110	5/14/2018	N	440-211274-1	<0.10	<0.050	<1.0	540	29	<0.050	790	13	<0.50	<0.025	<0.50	<0.050	<0.12	<2.5	3.2 J	3.4 J	<2.5
LVWPS-MW111A	5/17/2018	N	440-211576-1	0.17	<0.0050	<0.10	49	32	<0.0050	710	9.3	<0.050	<0.0025	<0.050	0.012	<0.012	0.66 J	37	27	<0.50
LVWPS-MW111B	5/17/2018	N	440-211577-1	0.11	<0.0050	<0.10	390	29	<0.0050	890	10	<0.050	<0.0025	<0.050	0.016	<0.012	<0.50	76	39	<0.50
LVWPS-MW112A	5/17/2018	N	440-211576-2	0.13	<0.0050	<0.10	53	33	<0.0050	660	9.0	<0.050	0.0059	<0.050	0.012	<0.012	<0.50	36	28	<0.50
LVWPS-MW112B	5/17/2018	N	440-211577-2	0.56	<0.050	<1.0	1,700	22	<0.050	3,100	8.7	<0.50	<0.025	<0.50	<0.050	<0.12	1.7 J	47	2.1	<0.50

Notes

ug/L	micrograms per liter	SU	Standard Units
mg/L	milligrams per liter	mS/cm	milliSiemens per c
mV	milliVolts	C	degrees Celsius
FD	Field duplicate	NTU	Nephelometric Tur
N	Normal field sample		
<	The analyte was analyzed for, but was not detected abov the reported sample quantitation limit.		
J-	The result is an estimated quantity, but the result may be		
J+	The result is an estimated quantity, but the result may be		
J	The result is an estimated quantity. The associated nume the approximate concentration of the analyte in the sampl		
UJ	The analyte was analyzed for, but was not detected. The quantitation limit is approximate and may be inaccurate o		

DRAFT

Table 5
Groundwater Analysis Results - Transect 1A Area
Las Vegas Wash Pilot Study

Location	Sample Date	QCType	Lab SampleID	Volatile Fatty Acids					
				Acetic Acid	Butyric Acid	Formic Acid	Lactic Acid	Propionic Acid	Pyruvic Acid
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LVWPS-MW101A	5/16/2018	N	440-211479-3	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW101B	5/16/2018	N	440-211479-4	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW102A	5/16/2018	N	440-211479-5	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW102B	5/16/2018	N	440-211479-6	<2.9	<2.6	<2.6	<3.1	<3.5	<190
LVWPS-MW103A	5/18/2018	N	440-211687-2	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW103B	5/18/2018	N	440-211687-3	<2.9	<2.6	<2.6	<3.1	<3.5	<190
LVWPS-MW104	5/16/2018	N	440-211479-1	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7 UJ
LVWPS-MW105	5/17/2018	N	440-211577-5	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW106	5/17/2018	N	440-211576-4	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW107A	5/15/2018	N	440-211381-4	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW107B	5/15/2018	N	440-211381-5	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW107C	5/16/2018	N	440-211479-2	<2.9	<2.6	<2.6	<3.1	<3.5	<190
LVWPS-MW108A	5/15/2018	N	440-211381-3	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW108B	5/15/2018	N	440-211381-2	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW108C	5/15/2018	N	440-211381-1	<2.9	<2.6	<2.6	<3.1	<3.5	<190
LVWPS-MW109	5/17/2018	N	440-211577-3	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW109	5/17/2018	FD	440-211577-4	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW110	5/14/2018	N	440-211274-1	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW111A	5/17/2018	N	440-211576-1	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW111B	5/17/2018	N	440-211577-1	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW112A	5/17/2018	N	440-211576-2	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW112B	5/17/2018	N	440-211577-2	<2.9	<2.6	<2.6	<3.1	<3.5	<74

Notes

ug/L	micrograms per liter	SU	Standard Units
mg/L	milligrams per liter	mS/cm	milliSiemens per c
mV	milliVolts	C	degrees Celsius
FD	Field duplicate	NTU	Nephelometric Tur
N	Normal field sample		

<	The analyte was analyzed for, but was not detected abov the reported sample quantitation limit.
J-	The result is an estimated quantity, but the result may be
J+	The result is an estimated quantity, but the result may be
J	The result is an estimated quantity. The associated nume the approximate concentration of the analyte in the sampl
UJ	The analyte was analyzed for, but was not detected. The quantitation limit is approximate and may be inaccurate o

DRAFT

Table 6
Groundwater Analysis of Shelby Tube Samples - Transect 1A Area
Las Vegas Wash Pilot Study

Location	Sample Date	Depth ft bgs	ASTM D854 Specific Gravity	D2216 Moisture Content %	D2937 Density (dry) lbs/ft^3	API RP40 Total Porosity %	ASTM D6913 Sieve Analysis					
							Gravel		Sand			
							% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines
LVWPS-MW102B	4/4/2018	25	2.583	66.5	56.0	65.2	0	0	2	14	12	72
LVWPS-MW102B	4/4/2018	40	2.704	38.1	83.3	50.6	0	0	0	0	3	97
LVWPS-MW102B	4/4/2018	62	2.657	40.3	66.0	60.1	0	1	0	3	6	90
LVWPS-MW109	4/16/2018	25	2.607	22.6	117	28.0	4	10	7	13	27	39
LVWPS-MW109	4/17/2018	57	2.691	45.2	77.3	53.9	0	12	9	14	9	56
LVWPS-MW109	4/17/2018	71	2.597	59.0	61.8	61.8	0	22	13	15	28	22
LVWPS-MW110	4/5/2018	30	2.606	47.5	63.2	61.1	0	0	0	6	14	80
LVWPS-MW110	4/5/2018	50	2.695	41.8	75.9	54.8	0	0	0	4	3	93
LVWPS-MW110	4/5/2018	60	2.722	42.8	79.8	52.9	0	1	2	4	2	91

Notes

ft	feet
bgs	below ground surface
%	percent
lbs/ft^3	pounds per cubic foot

DRAFT

Table 7
Transect 1B Area Monitoring Wells
Las Vegas Wash Bioremediation Pilot Study

Monitoring Well/Borehole ID	Northing	Easting	Ground Surface Elevation	Top of Casing Elevation	Depth to Water[1]	Well Diameter	Borehole Diameter	Borehole Total Depth	Well Total Depth	Bottom of Screen	Top of Screen	Screen Length	Slot Size
			feet amsl	feet amsl	feet bTOC	inches	inches	feet bgs	feet bgs	feet bgs	feet bgs	feet	inches
LVWPS-MW201A	26734867.372	837018.940	1523.10	1522.82	18.65	4	8	49.5	48.5	47.8	28.2	20	0.020
LVWPS-MW201B	26734869.473	837026.359	1522.97	1522.81	18.15	2	6	120	80.4	79.8	60.1	20	0.010
LVWPS-MW202	26734960.157	837604.939	1522.44	1522.04	24.80	2	6	120	62.0	61.5	41.8	20	0.020
LVWPS-MW203A	26735133.067	837668.334	1519.38	1518.99	21.40	2	6	56	55.0	54.5	34.8	20	0.020
LVWPS-MW203B	26735134.449	837677.531	1519.31	1519.05	22.23	4	8	96	95.4	94.7	75.1	20	0.010
LVWPS-MW203C	26735127.542	837675.108	1519.62	1519.23	111.15	2	6	121	120.6	120.0	100.3	20	0.010
LVWPS-MW204	26735143.942	838137.440	1520.86	1520.68	26.74	2	6	120	70.6	70.0	50.3	20	0.020
LVWPS-MW205B	26735351.797	838413.617	1517.41	1517.40	25.34	2	6	120	85.1	84.6	64.9	20	0.020
LVWPS-MW205C	26735359.772	838411.474	1517.33	1517.36	25.64	2	6	121	120.6	120.0	100.3	20	0.020
LVWPS-MW206A	26735026.649	838554.302	1528.94	1528.79	35.61	2	6	63	60.1	59.5	39.8	20	0.020
LVWPS-MW206B	26735020.364	838551.744	1528.85	1528.81	36.13	4	8	91	90.2	89.5	69.9	20	0.020
LVWPS-MW206C	26735013.638	838549.640	1529.04	1528.68	36.00	2	6	121	120.6	120.0	100.3	20	0.010
LVWPS-MW207	26735325.360	838761.633	1519.21	1518.96	27.78	2	6	120	88.4	87.8	68.1	20	0.020
LVWPS-MW208A	26735088.710	839198.514	1522.78	1522.63	31.45	4	8	61	60.1	59.5	39.9	20	0.020
LVWPS-MW208B	26735082.390	839200.271	1523.04	1522.84	32.00	2	6	120	85.6	85.0	65.3	20	0.020
LVWPS-MW209	26735476.503	839198.991	1517.32	1516.79	26.96	2	6	120	91.6	91.0	71.3	20	0.020
LVWPS-MW210A	26735671.028	839297.058	1515.15	1514.72	25.95	2	6	56	55.6	55.0	35.3	20	0.020
LVWPS-MW210B	26735673.799	839305.795	1515.09	1514.64	25.52	2	6	91	90.4	89.8	70.1	20	0.020
LVWPS-MW210C	26735676.651	839314.268	1514.97	1514.66	25.42	2	6	121	120.6	120.0	100.3	20	0.020
LVWPS-MW211	26735455.105	839388.413	1516.71	1516.44	26.81	2	6	120	70.2	69.7	50.0	20	0.020
LVWPS-MW212A	26735150.141	839428.278	1519.62	1519.33	28.49	2	6	55	54.6	54.0	34.3	20	0.020
LVWPS-MW212B	26735157.369	839430.869	1519.27	1519.30	28.76	2	6	120	80.1	79.5	59.8	20	0.020
LVWPS-MW213	26735391.700	839564.267	1516.70	1516.70	26.95	2	6	120	60.4	59.8	40.1	20	0.020
LVWPS-MW214	26735776.734	839916.302	1508.80	1508.31	26.82	2	6	120	44.6	44.0	34.4	10	0.020
LVWPS-MW215A	26736013.101	839957.907	1492.39	1492.30	11.58	2	6	35	33.8	33.2	13.5	20	0.020
LVWPS-MW215B	26736016.554	839966.088	1492.47	1492.06	12.31	2	6	46	45.9	45.3	40.7	5	0.010
LVWPS-MW216	26736374.699	841345.384	1480.70	1480.45	7.97	2	6	80	20.6	20.0	10.4	10	0.020

Notes:
amsl - above mean sea level
bTOC - below top of casing
bgs - below ground surface
1. Depth to water measurements collected on June 29, 2018.