

# TECHNICAL MEMORANDUM

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**To:** Nevada Environmental Response Trust

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**Cc:** Nevada Division of Environmental Protection  
United States Environmental Protection Agency

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**From:** Dana Grady

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**Date:** November 22, 2024

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**Subject:** Las Vegas Wash ZVI-Enhanced Bioremediation Treatability Study Monthly Progress Report

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At the direction of the Nevada Environmental Response Trust (NERT or Trust), Tetra Tech, Inc. (Tetra Tech) has prepared this memorandum to summarize Tetra Tech's progress during October 2024 toward successfully implementing the Las Vegas Wash Zero-Valent Iron (ZVI)-Enhanced Bioremediation Treatability Study.

## Task Progress Update: October 2024

### Task M18 – Las Vegas Wash ZVI-Enhanced Bioremediation Treatability Study

- Current Status –

The Las Vegas Wash ZVI-Enhanced Bioremediation Treatability Study is being conducted to evaluate the effectiveness of ZVI-enhanced bioremediation of perchlorate-contaminated groundwater that has migrated downgradient of the NERT site toward the Las Vegas Wash. The general treatability study layout, including locations of the continuous and discontinuous ZVI walls and associated injection well and monitoring well network, is presented on **Figures 1, 2a, and 2b**. Well construction details are provided in **Table 1**. The construction phase of the treatability study was completed on April 24, 2023 and the performance monitoring phase is ongoing.

- Performance Monitoring – The performance monitoring program included a pre-construction, baseline groundwater sampling event completed in October 2022 prior to installation of the continuous and discontinuous ZVI walls and performance monitoring network. Following construction of the ZVI walls, installation of the performance monitoring network, and injection of biological inoculum and nutrient solution (completed in February through April 2023), the post-construction performance monitoring program began in May 2023 and is ongoing. The original 16-month performance monitoring program outlined in the NDEP-approved Work Plan Addendum, which was scheduled to end in August 2024, was extended through May 2025 as presented in the NDEP-approved Treatability/Pilot Study Modification No. 10. The performance monitoring program includes monthly synoptic gauging events to evaluate hydrologic changes over time and groundwater sampling events approximately one month after completion of the

construction phase and quarterly thereafter for a total of 24 months. To date, the following has been completed:

- Seventeen monthly synoptic gauging events, with the most recent on October 14 through October 16, 2024.
- Six groundwater performance monitoring events have been completed, with the Month 1 event completed in May 2023, followed by quarterly events in August 2023, November/December 2023, February 2024, May 2024, and September 2024. The most recent sixth quarterly performance monitoring event was conducted from September 5 through September 19, 2024, which is approximately 17 months after completion of the construction phase.

Available draft groundwater analytical results from the baseline sampling event and subsequent monitoring events performed in May 2023, August 2023, November/December 2023, February 2024, and May 2024 were presented in previous monthly progress reports. Results from the September 2024 sampling event will be summarized in a future monthly progress report once all laboratory data have been received.

- Monthly Synoptic Monitoring – Monthly synoptic monitoring is being performed to evaluate any changes in horizontal and vertical gradients, assess for potential groundwater mounding upgradient of the ZVI reactive zone, assess hydraulic effects of seasonal precipitation, and evaluate potential non-uniform flow. Results of the October 2024 monthly synoptic monitoring event do not indicate any significant changes to groundwater elevations in monitoring wells located upgradient, within, and/or downgradient of ZVI reactive zones.
- **Schedule and Progress Updates**
  - City of Henderson issued a new Revocable Permit for Occupancy on October 1, 2024 which enables NERT to continue the performance monitoring program in accordance with Modification No. 10 activities.
  - Groundwater levels will continue to be measured on a monthly basis for the duration of the treatability study.
  - Groundwater samples will continue to be collected on a quarterly basis to generate time-series data to evaluate the treatment effectiveness of the ZVI installations with respect to the design performance criteria. The next quarterly groundwater sampling event is planned for December 2 through December 13, 2024.
- **Health and Safety**
  - There were no health and safety incidents related to Task M18 during October 2024.

## CERTIFICATION

### Las Vegas Wash ZVI-Enhanced Bioremediation Treatability 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, President, 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:** 11/22/24

## CERTIFICATION

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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:** Prepared Las Vegas Wash ZVI-Enhanced Bioremediation Treatability Study Monthly Progress Report.



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**Christopher Hayes, CEM**  
Environmental Engineer  
Tetra Tech, Inc.

November 22, 2024

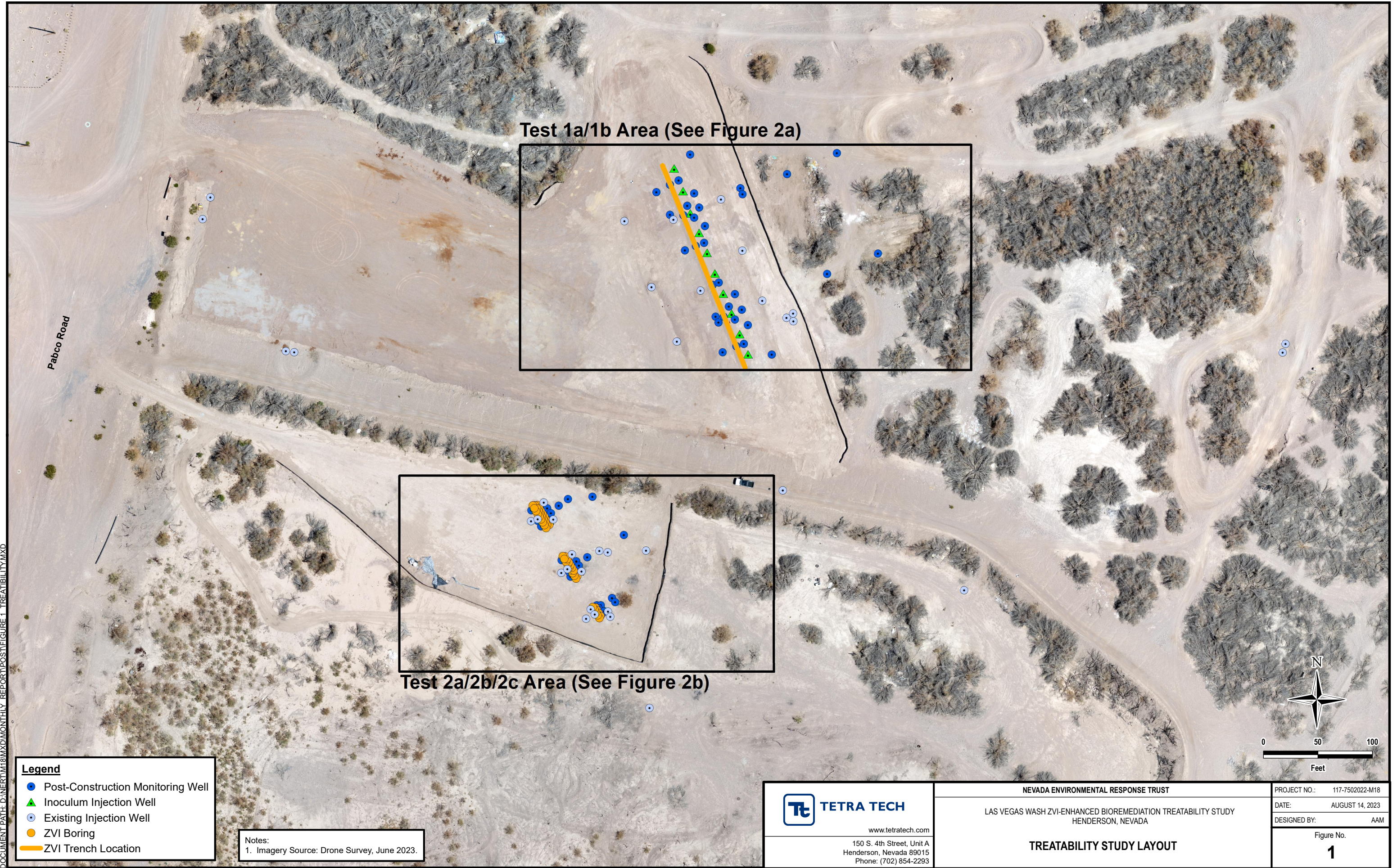
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Date

Nevada CEM Certificate Number: EM2499  
Nevada CEM Expiration Date: December 15, 2024

## Figures





DOCUMENT PATH: D:\NERT\18\MONTHLY REPORT\POST\FIGURE 1\_TREATABILITY.MXD

Legend	
	Post-Construction Monitoring Well
	Inoculum Injection Well
	Existing Injection Well
	ZVI Boring
	ZVI Trench Location

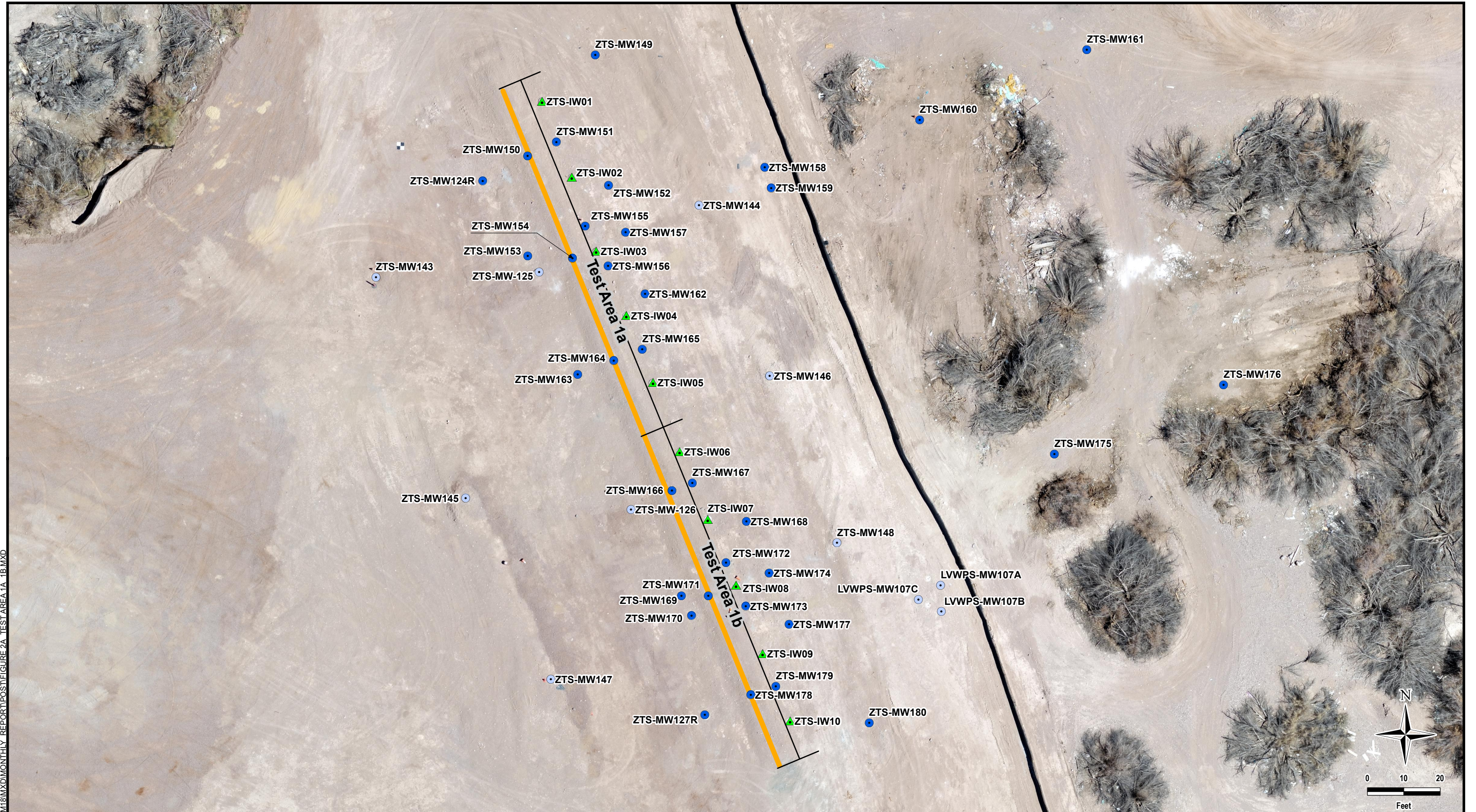
Notes:  
 1. Imagery Source: Drone Survey, June 2023.

**TETRA TECH**  
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 Henderson, Nevada 89015  
 Phone: (702) 854-2293

NEVADA ENVIRONMENTAL RESPONSE TRUST  
 LAS VEGAS WASH ZVI-ENHANCED BIOREMEDIATION TREATABILITY STUDY  
 HENDERSON, NEVADA  
**TREATABILITY STUDY LAYOUT**

PROJECT NO.:	117-7502022-M18
DATE:	AUGUST 14, 2023
DESIGNED BY:	AAM
Figure No.	<b>1</b>





DOCUMENT PATH: D:\NERT\18\MXD\MONTHLY REPORT\POST\FIGURE 2A TEST AREA 1A 1B.MXD

**Legend**

- Post-Construction Monitoring Well
- ▲ Inoculum Injection Well
- Existing Monitoring Well
- ZVI Trench Location

Notes:  
1. Imagery Source: Drone Survey, June 2023.

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LAS VEGAS WASH ZVI-ENHANCED BIOREMEDIATION TREATABILITY STUDY  
HENDERSON, NEVADA

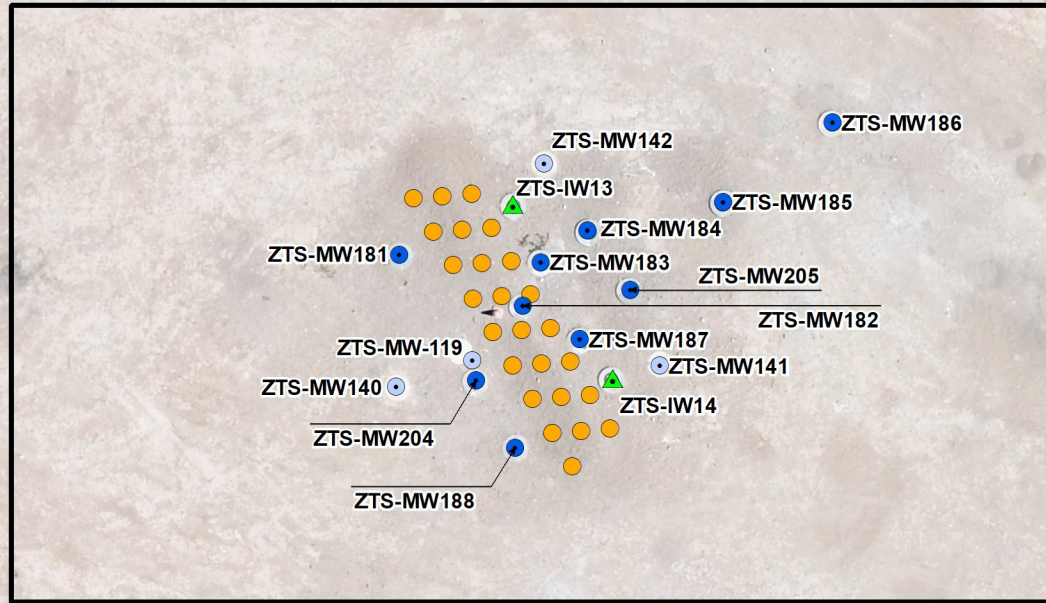
**TEST AREA 1a/1b LAYOUT**

PROJECT NO.: 117-7502022-M18  
DATE: AUGUST 14, 2023  
DESIGNED BY: AAM

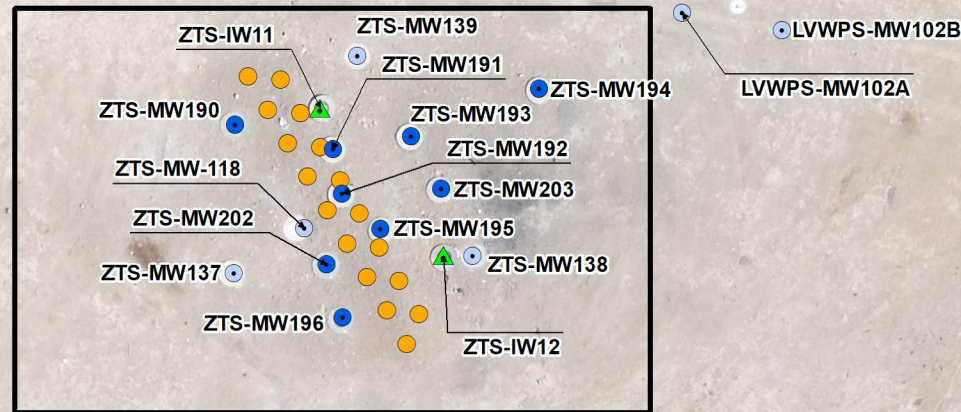
Figure No.  
**2a**



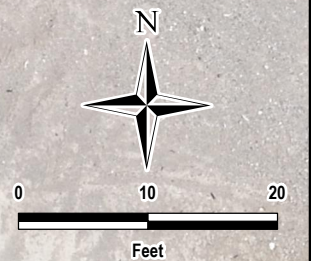
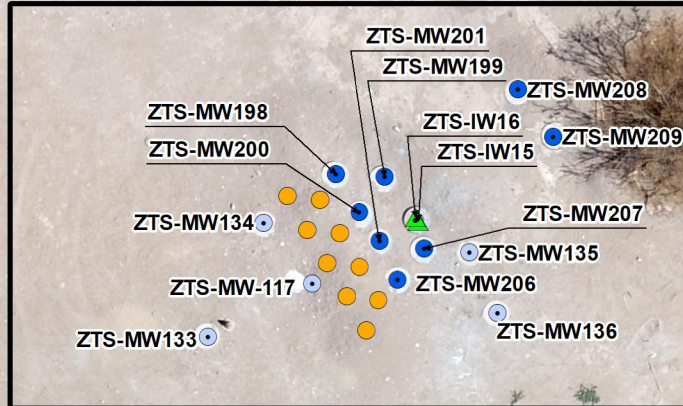
Test 2c Area (Borings ZTS-BH01 through ZTS-BH25)



Test 2a Area (Borings ZTS-BH26 through ZTS-BH42)



Test 2b Area (Borings ZTS-BH43 through ZTS-BH51)



**Legend**

- Post-Construction Monitoring Well
- ▲ Inoculum Injection Well
- ZVI Boring
- Existing Monitoring Well

Notes:  
1. Imagery Source: Drone Survey, June 2023.



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NEVADA ENVIRONMENTAL RESPONSE TRUST

LAS VEGAS WASH ZVI-ENHANCED BIOREMEDIATION TREATABILITY STUDY  
HENDERSON, NEVADA

TEST AREA 2a/2b/2c LAYOUT

PROJECT NO.: 117-7502022-M18  
DATE: AUGUST 14, 2023  
DESIGNED BY: AAM

Figure No.  
**2b**



# Tables



**Table 1**  
**Well Construction Details**  
 Las Vegas Wash ZVI-Enhanced Bioremediation Treatability Study

Well ID	Screened Lithology	Northing	Easting	Ground Surface Elevation	Top of Casing Elevation	Depth to Water <sup>1</sup>	Groundwater Elevation	Casing Material	Slot Size	Filter Pack Gradation	Nominal Borehole Diameter	Borehole Total Depth	Well Diameter	Nominal Screen Length	Well Total Depth	Bottom of Screen	Top of Screen
				feet amsl	feet amsl	ft bTOC	amsl		inches		inches	feet bgs	inches	feet	feet bgs	feet bgs	feet bgs
<b>Test Area 1A</b>																	
ZTS-MW124R	Alluvium	26732932.91	833021.97	1545.35	1545.24	16.94	1528.30	Schedule 40 PVC	0.020	#3	8	35.0	4	10.0	34.5	34.0	24.5
ZTS-MW125	UMCf	26732907.80	833037.00	1546.94	1546.51	17.84	1528.67	Schedule 40 PVC	0.010	#2/16	8	75	4	10	50.5	50	40
ZTS-MW143	Alluvium	26732906.40	832992.60	1545.04	1544.90	16.13	1528.77	Schedule 40 PVC	0.020	#3	6	35	2	10	33.5	33	23
ZTS-MW144	Alluvium	26732926.25	833081.32	1544.47	1544.52	16.85	1527.67	Schedule 40 PVC	0.020	#3	6	40	2	10	34.5	34	24
ZTS-MW149	Alluvium	26732967.42	833052.83	1544.31	1544.20	16.38	1527.82	Schedule 40 PVC	0.020	#3	6	35.0	2	10.0	33.5	33.0	23.3
ZTS-MW150	Alluvium	26732939.76	833034.23	1546.83	1546.74	18.70	1528.04	Schedule 40 PVC	0.020	#3	6	45.0	2	10.0	34.5	34.0	24.3
ZTS-MW151	Alluvium	26732943.59	833042.18	1545.72	1545.62	17.75	1527.87	Schedule 40 PVC	0.020	#3	6	37.5	2	10.0	34.5	34.0	24.3
ZTS-MW152	Alluvium	26732931.70	833056.48	1545.63	1545.50	17.81	1527.69	Schedule 40 PVC	0.020	#3	6	35.0	2	10.0	33.5	33.0	23.3
ZTS-MW153	Alluvium	26732912.34	833034.31	1545.73	1545.61	17.38	1528.23	Schedule 40 PVC	0.020	#3	6	40.0	2	10.0	34.5	34.0	24.3
ZTS-MW154	Alluvium	26732911.74	833046.57	1546.73	1546.62	18.72	1527.90	Schedule 40 PVC	0.020	#3	6	42.5	2	10.0	32.5	32.0	22.3
ZTS-MW155	Alluvium	26732920.46	833050.08	1545.97	1545.89	18.18	1527.71	Schedule 40 PVC	0.020	#3	6	40.0	2	15.0	35.5	35.0	20.3
ZTS-MW156	UMCf	26732909.63	833056.38	1546.34	1546.30	18.52	1527.78	Schedule 40 PVC	0.010	#2/16	6	55.0	2	10.0	54.0	53.5	43.8
ZTS-MW157	Alluvium	26732918.81	833061.15	1545.95	1545.87	18.21	1527.66	Schedule 40 PVC	0.020	#3	6	35.0	2	10.0	33.5	33.0	23.3
ZTS-MW158	Alluvium	26732936.67	833099.40	1544.15	1544.09	16.70	1527.39	Schedule 40 PVC	0.020	#3	6	35.0	2	10.0	33.5	33.0	23.3
ZTS-MW159	UMCf	26732930.97	833101.22	1544.36	1544.08	16.83	1527.25	Schedule 40 PVC	0.010	#2/16	6	50.0	48	10.0	49.0	48.5	38.8
ZTS-MW160	Alluvium	26732949.66	833141.96	1544.42	1544.11	16.86	1527.25	Schedule 40 PVC	0.020	#3	6	40.0	2	10.0	33.5	33.0	23.3
ZTS-MW161	Alluvium	26732968.87	833187.88	1544.23	1543.99	17.03	1526.96	Schedule 40 PVC	0.020	#3	6	45.0	2	10.0	34.5	34.0	24.3
ZTS-MW162	Alluvium	26732901.90	833066.48	1545.76	1545.61	17.94	1527.67	Schedule 40 PVC	0.020	#3	6	40.0	2	10.0	33.5	33.0	23.3
ZTS-MW163	Alluvium	26732879.80	833048.04	1546.23	1546.18	19.05	1527.13	Schedule 40 PVC	0.020	#3	6	40.0	2	10.0	34.5	34.0	24.3
ZTS-MW164	Alluvium	26732883.65	833057.93	1547.06	1546.96	17.90	1529.06	Schedule 40 PVC	0.020	#3	6	40.0	2	10.0	32.5	32.0	22.3
ZTS-MW165	Alluvium	26732886.70	833065.74	1545.63	1545.50	17.83	1527.67	Schedule 40 PVC	0.020	#3	6	38.0	2	10	32.5	32.0	22.3
<b>Between Test Area 1A and Test Area 1B</b>																	
ZTS-MW145	UMCf	26732845.93	833017.26	1547.43	1547.13	18.20	1528.93	Schedule 40 PVC	0.010	#2/16	8	50	4	10	49.5	49	39
ZTS-MW146	UMCf	26732879.40	833100.75	1548.63	1547.33	19.60	1527.73	Schedule 40 PVC	0.010	#2/16	8	55	4	10	51.5	51	41
<b>Test Area 1B</b>																	
ZTS-MW126	Alluvium	26732842.82	833063.07	1548.61	1548.47	19.35	1529.12	Schedule 40 PVC	0.020	#3	8	40	4	10	30.5	30	20
ZTS-MW127R	Alluvium	26732786.41	833082.92	1548.26	1548.18	19.80	1528.38	Schedule 40 PVC	0.020	#3	8	24.0	4	5.0	23.5	23.0	18.5
ZTS-MW147	Alluvium	26732796.25	833040.66	1547.65	1547.18	18.28	1528.90	Schedule 40 PVC	0.020	#3	6	35	2	10	30.0	29.5	19.5
ZTS-MW148	Alluvium	26732833.56	833119.27	1548.62	1548.41	20.49	1527.92	Schedule 40 PVC	0.020	#3	6	35	2	10	32.5	32.0	22.0
ZTS-MW166	Alluvium	26732847.93	833073.86	1548.22	1548.25	20.30	1527.95	Schedule 40 PVC	0.020	#3	6	38.0	2	10	30.0	29.5	19.8
ZTS-MW167	Alluvium	26732850.05	833079.50	1547.37	1547.33	19.43	1527.90	Schedule 40 PVC	0.020	#3	6	40.0	2	10.0	33.5	33.0	23.3
ZTS-MW168	Alluvium	26732839.48	833094.36	1547.52	1547.63	19.78	1527.85	Schedule 40 PVC	0.020	#3	6	32.0	2	10.0	30.5	30.0	20.3
ZTS-MW169	Alluvium	26732819.11	833076.48	1547.70	1547.57	19.44	1528.13	Schedule 40 PVC	0.020	#3	6	27.5	2	10.0	27.5	27.0	17.1
ZTS-MW170	UMCf	26732813.68	833079.28	1547.58	1547.45	19.32	1528.13	Schedule 40 PVC	0.010	#2/16	6	46.5	2	10.0	41.5	41.0	31.1
ZTS-MW171	Alluvium	26732819.11	833083.89	1548.61	1548.53	20.33	1528.20	Schedule 40 PVC	0.020	#3	6	35.0	2	10.0	29.5	29.0	19.3
ZTS-MW172	Alluvium	26732828.15	833088.77	1547.91	1547.74	19.77	1527.97	Schedule 40 PVC	0.020	#3	6	30.0	2	10.0	27.5	27.0	17.3
ZTS-MW173	UMCf	26732816.29	833094.22	1547.95	1547.78	19.77	1528.01	Schedule 40 PVC	0.010	#2/16	6	46.0	2	10.0	43.5	43.0	33.3
ZTS-MW174	Alluvium	26732825.33	833100.64	1548.30	1548.11	20.20	1527.91	Schedule 40 PVC	0.020	#3	6	31.5	2	10.0	30.0	29.5	19.8
ZTS-MW175	Alluvium	26732857.97	833178.91	1546.18	1546.25	19.24	1527.01	Schedule 40 PVC	0.020	#3	6	61.5	2	10.0	30.0	29.5	19.8
ZTS-MW176	Alluvium	26732876.92	833225.42	1543.90	1543.74	17.04	1526.70	Schedule 40 PVC	0.020	#3	6	32.0	2	10.0	30.0	29.5	19.8
ZTS-MW177	Alluvium	26732811.29	833106.07	1548.22	1548.12	20.17	1527.95	Schedule 40 PVC	0.020	#3	6	31.0	2	10.0	30.5	30.0	20.3
ZTS-MW178	Alluvium	26732791.95	833095.60	1549.21	1549.14	20.91	1528.23	Schedule 40 PVC	0.020	#3	6	34.0	2	10.0	28.0	27.5	17.8
ZTS-MW179	Alluvium	26732794.26	833102.47	1548.62	1548.45	20.23	1528.22	Schedule 40 PVC	0.020	#3	6	27.5	2	5.0	23.5	23.0	18.3
ZTS-MW180	Alluvium	26732784.25	833128.08	1548.42	1548.12	20.21	1527.91	Schedule 40 PVC	0.020	#3	6	25.0	2	5.0	23.0	22.5	17.8
LVWPS-MW107A	Alluvium	26732823.90	833144.18	1548.14	1547.58	19.96	1527.62	Schedule 40 PVC	0.020	#3	8	35.5	4	10	35.0	34.5	24.8
LVWPS-MW107B	UMCf	26732816.68	833144.44	1548.20	1547.82	16.61	1531.21	Schedule 40 PVC	0.010	#2/12	8	67.0	4	20	66.3	65.8	46.0
LVWPS-MW107C	UMCf (Semi-Cons)	26732819.93	833138.10	1548.33	1547.93	5.81	1542.12	Schedule 40 PVC	0.010	#2/12	6	121.0	2	20	120.5	120.0	100.3



**Table 1**  
**Well Construction Details**  
 Las Vegas Wash ZVI-Enhanced Bioremediation Treatability Study

Well ID	Screened Lithology	Northing	Easting	Ground Surface Elevation	Top of Casing Elevation	Depth to Water <sup>1</sup>	Groundwater Elevation	Casing Material	Slot Size	Filter Pack Gradation	Nominal Borehole Diameter	Borehole Total Depth	Well Diameter	Nominal Screen Length	Well Total Depth	Bottom of Screen	Top of Screen
				feet amsl	feet amsl	ft bTOC	amsl		inches		inches	feet bgs	inches	feet	feet bgs	feet bgs	feet bgs
<b>Test Area 2A</b>																	
ZTS-MW118	Alluvium	26732588.00	832939.61	1547.64	1547.41	16.34	1531.07	Schedule 40 PVC	0.020	#3	8	40	4	10	24	23.5	13.5
ZTS-MW137	Alluvium	26732584.41	832934.77	1547.68	1547.44	16.36	1531.08	Schedule 40 PVC	0.020	#3	6	28	2	10	24.5	24	14
ZTS-MW138	Alluvium	26732585.74	832953.21	1547.68	1547.35	16.37	1530.98	Schedule 40 PVC	0.020	#3	6	25	2	10	24.5	24	14
ZTS-MW139	Alluvium	26732601.13	832944.31	1547.36	1547.07	16.17	1530.90	Schedule 40 PVC	0.020	#3	6	30	2	10	23.5	23	13
ZTS-MW190	Alluvium	26732595.87	832934.90	1547.59	1547.32	16.32	1531.00	Schedule 40 PVC	0.020	#3	6	25.0	2	10.0	25.5	24.0	14.3
ZTS-MW191	Alluvium	26732593.97	832942.42	1548.18	1547.93	17.00	1530.93	Schedule 40 PVC	0.020	#3	6	30.0	2	10.0	25.0	24.5	14.8
ZTS-MW192	Alluvium	26732590.54	832943.15	1548.28	1548.11	17.16	1530.95	Schedule 40 PVC	0.020	#3	6	25.0	2	10.0	24.5	24.0	14.3
ZTS-MW193	Alluvium	26732594.97	832948.47	1547.64	1547.48	16.62	1530.86	Schedule 40 PVC	0.020	#3	6	25.0	2	10.0	23.8	23.3	13.6
ZTS-MW194	Alluvium	26732598.62	832958.35	1547.33	1547.38	16.65	1530.73	Schedule 40 PVC	0.020	#3	6	25.0	2	5.0	23.0	22.5	17.8
ZTS-MW195	Alluvium	26732587.81	832946.10	1548.38	1548.14	17.20	1530.94	Schedule 40 PVC	0.020	#3	6	25.0	2	10.0	24.5	24.0	14.3
ZTS-MW196	Alluvium	26732581.00	832943.16	1547.81	1547.34	16.29	1531.05	Schedule 40 PVC	0.020	#3	6	25.0	2	10.0	24.0	23.5	13.8
ZTS-MW197	Alluvium	26732619.07	832992.11	1547.27	1546.99	16.97	1530.02	Schedule 40 PVC	0.020	#3	6	25.0	2	10.0	23.0	22.5	12.8
ZTS-MW202	UMCf	26732585.08	832941.97	1547.83	1547.46	16.48	1530.98	Schedule 40 PVC	0.010	#2/16	6	40.0	2	10.0	39.0	38.5	28.8
ZTS-MW203	UMCf	26732590.95	832950.78	1547.77	1547.71	16.90	1530.81	Schedule 40 PVC	0.010	#2/16	6	45.0	2	10.0	38.5	38.0	28.3
LVWPS-MW102A	UMCf	26732606.35	832965.93	1547.23	1546.82	10.40	1536.42	Schedule 40 PVC	0.010	#2/12	6	67.5	2	20	67.1	66.6	47.0
LVWPS-MW102B	UMCf (Semi-Cons)	26732605.06	832973.68	1547.14	1546.78	4.77	1542.01	Schedule 40 PVC	0.010	#2/12	6	120.0	2	20	97.0	96.5	76.8
<b>Test Area 2B</b>																	
ZTS-MW117	UMCf	26732546.84	832964.21	1547.64	1547.32	14.75	1532.57	Schedule 40 PVC	0.010	#2/16	8	75	4	15	56	55.5	40.5
ZTS-MW133	UMCf	26732542.30	832957.28	1547.79	1547.51	11.11	1536.40	Schedule 40 PVC	0.010	#2/16	6	75	2	15	69.5	69	54
ZTS-MW134	UMCf	26732551.09	832961.57	1547.75	1547.54	16.31	1531.23	Schedule 40 PVC	0.010	#2/16	6	37	2	10	36.5	36	26
ZTS-MW135	UMCf	26732548.80	832977.51	1547.56	1547.42	10.76	1536.66	Schedule 40 PVC	0.010	#2/16	6	76	2	15	69.5	69	54
ZTS-MW136	UMCf	26732544.12	832979.70	1547.67	1547.29	16.01	1531.28	Schedule 40 PVC	0.010	#2/16	6	55	2	20	47.5	47	27
ZTS-MW198	UMCf	26732554.83	832967.16	1547.78	1547.69	16.64	1531.05	Schedule 40 PVC	0.010	#2/16	6	47.5	2	20.0	46.5	46.0	26.1
ZTS-MW199	UMCf	26732554.62	832970.93	1547.18	1546.84	10.53	1536.31	Schedule 40 PVC	0.010	#2/16	6	68.0	2	15.0	65.5	65.0	50.1
ZTS-MW200	UMCf	26732551.89	832968.94	1547.67	1547.57	11.41	1536.16	Schedule 40 PVC	0.010	#2/16	6	68.0	2	15.0	65.5	65.0	50.1
ZTS-MW201	UMCf	26732549.70	832970.52	1547.59	1547.29	16.03	1531.26	Schedule 40 PVC	0.010	#2/16	6	50.0	2	20.0	47.5	47.0	27.1
ZTS-MW206	UMCf	26732546.67	832971.91	1547.58	1547.61	11.34	1536.27	Schedule 40 PVC	0.010	#2/16	6	70.0	2	15.0	65.5	65.0	50.1
ZTS-MW207	UMCf	26732549.09	832973.98	1547.48	1547.43	16.33	1531.10	Schedule 40 PVC	0.010	#2/16	6	48.0	2	20.0	46.5	46.0	26.1
ZTS-MW208	UMCf	26732561.34	832981.27	1547.35	1547.21	16.41	1530.80	Schedule 40 PVC	0.010	#2/16	6	48.0	2	20.0	46.5	46.0	26.1
ZTS-MW209	UMCf	26732557.71	832983.97	1547.62	1547.30	11.00	1536.30	Schedule 40 PVC	0.010	#2/16	6	69.0	2	15.0	66.0	65.5	50.6
<b>Test Area 2C</b>																	
ZTS-MW119	Alluvium	26732634.25	832912.06	1547.46	1547.12	16.38	1530.74	Schedule 40 PVC	0.020	#3	8	37.5	4	10	25.5	25	15
ZTS-MW140	Alluvium	26732631.52	832907.03	1547.30	1546.73	15.94	1530.79	Schedule 40 PVC	0.020	#3	6	30	2	10	26.0	25.5	15.5
ZTS-MW141	Alluvium	26732633.15	832927.38	1547.65	1547.39	16.70	1530.69	Schedule 40 PVC	0.020	#3	6	30	2	10	25.0	24.5	14.5
ZTS-MW142	Alluvium	26732648.69	832918.45	1547.42	1546.81	16.21	1530.60	Schedule 40 PVC	0.020	#3	6	27	2	10	26.5	26	16
ZTS-MW181	Alluvium	26732641.70	832907.27	1547.62	1547.25	16.67	1530.58	Schedule 40 PVC	0.020	#3	6	27.5	2	10.0	27.5	27.0	17.3
ZTS-MW182	Alluvium	26732637.76	832916.80	1548.07	1547.79	17.17	1530.62	Schedule 40 PVC	0.020	#3	6	35.0	2	10.0	27.8	27.3	17.6
ZTS-MW183	Alluvium	26732641.13	832918.19	1547.72	1547.58	17.00	1530.58	Schedule 40 PVC	0.020	#3	6	28.0	2	10.0	27.5	27.0	17.3
ZTS-MW184	Alluvium	26732643.60	832921.80	1547.60	1547.53	17.02	1530.51	Schedule 40 PVC	0.020	#3	6	27.5	2	10.0	26.5	26.0	16.3
ZTS-MW185	Alluvium	26732645.77	832932.26	1547.59	1547.60	17.11	1530.49	Schedule 40 PVC	0.020	#3	6	27.5	2	10.0	25.5	25.0	15.3
ZTS-MW186	Alluvium	26732651.85	832940.71	1547.27	1547.26	16.87	1530.39	Schedule 40 PVC	0.020	#3	6	27.0	2	10.0	25.5	25.0	15.3
ZTS-MW187	Alluvium	26732635.16	832921.20	1547.70	1547.25	16.70	1530.55	Schedule 40 PVC	0.020	#3	6	28.0	2	10.0	25.5	25.0	15.3
ZTS-MW188	Alluvium	26732626.83	832916.22	1547.30	1546.93	16.25	1530.68	Schedule 40 PVC	0.020	#3	6	27.5	2	10.0	27.5	27.0	17.3
ZTS-MW189	Alluvium	26732654.00	832963.19	1547.16	1547.14	16.98	1530.16	Schedule 40 PVC	0.020	#3	6	27.5	2	10.0	23.5	23.0	12.8
ZTS-MW204	UMCf	26732632.00	832913.21	1547.40	1546.87	16.35	1530.52	Schedule 40 PVC	0.010	#2/16	6	42.5	2	10.0	40.5	40.0	30.3
ZTS-MW205	UMCf	26732638.98	832925.09	1547.61	1547.30	17.00	1530.30	Schedule 40 PVC	0.010	#2/16	6	42.5	2	10.0	40.5	40.0	30.3
<b>General Vicinity</b>																	
ZTS-MW116	UMCf	26732461.29	833014.94	1548.45	1547.92	16.31	1531.61	Schedule 40 PVC	0.010	#2/16	6	55	2	15	48.5	48	33
ZTS-MW128	UMCf	26732659.68	833137.95	1555.83	1555.41	26.67	1528.74	Schedule 40 PVC	0.010	#2/16	6	75	2	10	52.5	52	42



**Table 1**  
**Well Construction Details**  
 Las Vegas Wash ZVI-Enhanced Bioremediation Treatability Study

Well ID	Screened Lithology	Northing	Easting	Ground Surface Elevation	Top of Casing Elevation	Depth to Water <sup>1</sup>	Groundwater Elevation	Casing Material	Slot Size	Filter Pack Gradation	Nominal Borehole Diameter	Borehole Total Depth	Well Diameter	Nominal Screen Length	Well Total Depth	Bottom of Screen	Top of Screen
				feet amsl	feet amsl	ft bTOC	amsl		inches		inches	feet bgs	inches	feet	feet bgs	feet bgs	feet bgs
<b>Injection Wells</b>																	
ZTS-IW01	Alluvium	26732954.69	833038.19	1545.73	1545.62	NM	NM	Schedule 40 PVC	0.020	#3	6	40.0	2	15.0	36.0	35.5	20.8
ZTS-IW02	Alluvium	26732933.88	833046.37	1545.63	1545.70	NM	NM	Schedule 40 PVC	0.020	#3	6	37.5	2	15.0	35.5	35.0	20.3
ZTS-IW03	Alluvium	26732913.63	833053.06	1546.39	1546.35	NM	NM	Schedule 40 PVC	0.020	#3	6	40.0	2	15.0	36.0	35.5	20.8
ZTS-IW04	Alluvium	26732895.95	833061.35	1545.81	1545.64	NM	NM	Schedule 40 PVC	0.020	#3	6	38.0	2	15.0	36.0	35.5	20.8
ZTS-IW05	Alluvium	26732877.62	833068.66	1546.34	1546.32	NM	NM	Schedule 40 PVC	0.020	#3	6	37.5	2	15.0	36.0	35.5	20.8
ZTS-IW06	Alluvium	26732858.63	833075.96	1547.14	1546.96	NM	NM	Schedule 40 PVC	0.020	#3	6	35.0	2	15.0	35.0	34.5	19.8
ZTS-IW07	Alluvium	26732840.03	833083.70	1547.73	1547.48	NM	NM	Schedule 40 PVC	0.020	#3	6	30.0	2	5.0	27.5	27.0	22.3
ZTS-IW08	Alluvium	26732822.00	833091.44	1547.88	1547.75	NM	NM	Schedule 40 PVC	0.020	#3	6	31.0	2	5.0	27.5	27.0	22.3
ZTS-IW09	Alluvium	26732803.17	833098.78	1548.14	1548.30	NM	NM	Schedule 40 PVC	0.020	#3	6	27.0	2	5.0	26.5	26.0	21.3
ZTS-IW10	Alluvium	26732784.72	833106.32	1548.63	1548.48	NM	NM	Schedule 40 PVC	0.020	#3	6	25.0	2	5.0	25.0	24.5	19.8
ZTS-IW11	Alluvium	26732597.13	832941.47	1547.80	1547.86	NM	NM	Schedule 40 PVC	0.020	#3	6	25.0	2	5.0	23.5	23.0	18.3
ZTS-IW12	Alluvium	26732585.78	832951.00	1547.51	1547.54	NM	NM	Schedule 40 PVC	0.020	#3	6	26.0	2	5.0	25.0	24.5	19.8
ZTS-IW13	Alluvium	26732645.58	832916.08	1547.54	1547.64	NM	NM	Schedule 40 PVC	0.020	#3	6	30.0	2	10.0	29.5	29.0	19.3
ZTS-IW14	Alluvium	26732632.18	832923.75	1547.50	1547.55	NM	NM	Schedule 40 PVC	0.020	#3	6	30.0	2	10.0	27.3	26.8	17.1
ZTS-IW15	UMCf	26732551.24	832973.58	1547.33	1547.34	NM	NM	Schedule 40 PVC	0.010	#2/16	10	68.0	2	15.0	46.5	46.0	26.3
ZTS-IW16	UMCf	26732551.53	832973.34	1547.37	1547.44	NM	NM	Schedule 40 PVC	0.010	#2/16			2	20.0	67.5	67.0	52.3

Notes  
 amsl - above mean sea level  
 bgs - below ground surface  
 bTOC - below top of casing  
 NM - not measured  
 PVC - polyvinyl chloride  
 UMCf - Upper Muddy Creek formation  
 Semi-Cons - Semi-Consolidated  
 1. Depth to water collected on May 16-17, 2023.