

# TECHNICAL MEMORANDUM

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**To:** Nevada Environmental Response Trust

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**Cc:** Dan Pastor, Tetra Tech, Inc.

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**From:** April Hussey

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**Date:** February 28, 2018

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**Subject:** Operation and Maintenance Summary – January 2018  
Weir Dewatering Treatment Plant  
Nevada Environmental Response Trust; Henderson, Nevada

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The Southern Nevada Water Authority (SNWA) is completing two weir construction projects in the Las Vegas Wash, the Sunrise Mountain Weir and Historic Lateral Weir. SNWA has hired a construction company, Las Vegas Paving (LVP) to perform weir construction activities. This includes constructing diversion channels to divert the Las Vegas Wash and perform construction dewatering activities. The Nevada Environmental Response Trust (NERT or Trust) has been ordered by the Nevada Division of Environmental Protection (NDEP) to treat the groundwater from the construction dewatering activities to remove perchlorate before discharging the treated water to the Las Vegas Wash.

To manage and treat groundwater from the construction activities, Tetra Tech, Inc. (Tetra Tech) designed and constructed two pump stations and a central water treatment plant (CWTP), collectively referred to as the SNWA Weir Dewatering Treatment Plant (Treatment Plant). The Treatment Plant will operate on a temporary basis, and operations will cease once groundwater dewatering associated with the SNWA weir construction projects is complete.

At the direction of NERT, Tetra Tech has prepared this summary of the operation and maintenance (O&M) activities performed during January 2018 for the Treatment Plant. The system was operated and maintained in accordance with the *NERT – SNWA Weir Dewatering Water Treatment Plant Operation and Maintenance Manual*.

## SUMMARY OF O&M ACTIVITIES

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Startup of the Treatment Plant was achieved on January 2, 2018 and the Treatment Plant received water from weir construction dewatering activities at both the Sunrise Mountain and Historic Lateral Weirs during the month of January 2018. The Treatment Plant began receiving water from the Historic Lateral Weir construction site via the Historic Lateral Pump Station (HLPS) on January 2, 2018. Construction at the Sunrise Mountain Weir began delivering water to the Sunrise Mountain Pump Station (SMPS) on January 8, 2018. On January 9, 2018, a large rain event caused high flows in the Las Vegas Wash and disrupted LVP's construction operations at both the Sunrise Mountain and Historic Lateral Weirs. As a result, LVP suspended dewatering activities for approximately 6 days. Flow to the SMPS resumed on January 15, 2018, and flow resumed to the HLPS on January 17, 2018.

## OPERATIONS

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Operations in January 2018 were characterized by intervals of high influent total suspended solids (TSS) concentrations as a result of LVP excavating dewatering trenches and pits. The duration of the high solids load was extended due the large rain event that impacted LVP's construction activities and required additional excavation to restore the diversion channels and dewatering trenches following the rain event. Concentrations of TSS in the water flowing into the Treatment Plant were observed to be as high as 3-4% solids as measured through a combination of field measurements and analysis by a certified laboratory. The TSS concentration in an influent sample from the HLPS was 3.87% as analyzed by Silver State Analytical Laboratories. Treatment Plant National Pollutant Discharge Elimination System (NPDES) water quality samples and influent flowrate monitoring confirmed the operations were in compliance with permit limits during the January reporting period.

### Flow Rates

Flow rates for January 2018 are summarized in Table 1. This includes a summary of the flow rate into HLPS, into SMPS, and out of the Treatment Plant. Flow data collected during the project startup period of January 2<sup>nd</sup> (first full plant operations with groundwater) through January 17<sup>th</sup> was subject to increased variability as adjustments to equipment were made and facility operation and procedures were being refined.

### Historic Lateral Pump Station

Flow rates into HLPS are variable based upon the number of dewatering pumps being used by LVP at the Historic Lateral Weir construction site. Each dewatering pump delivers approximately 800 gpm to the HLPS.

### Sunrise Mountain Pump Station

Flow rates into the SMPS were fairly consistent once the dewatering operation at that weir construction site was put into operation.

### Influent Parameters

Influent water quality parameters are measured daily for the water coming into each pump station. Influent water quality parameters measured include:

- Perchlorate
- Chlorate
- Total Dissolved Solids (TDS)
- Sulfate
- Nitrate

Perchlorate, chlorate, and TDS are analyzed at a certified laboratory (Test America) in accordance with the Operations and Maintenance Agreement, executed December 31, 2017. Sulfate and Nitrate are also analyzed to

capture a complete evaluation of these influent parameters. Currently, sulfate is analyzed at a certified laboratory until in-house laboratory methods are finalized. In addition, nitrate is analyzed at a certified laboratory except for samples collected on Saturdays, which are analyzed in-house due to the 48-hour hold time. In-house laboratory procedures follow EPA method 300.1 for nitrate. To confirm in-house procedures, 21 samples were split and analyzed for nitrate both in-house and by Test America. The average relative percent differences between the in-house and Test America results for the 21 samples was within 6%, which is within the 30% specified in the approved NERT project Quality Assurance Project Plan. Both sulfate and nitrate may be analyzed exclusively at the in-house lab in the future following confirmation of in-house laboratory procedures.

The range and average of perchlorate concentrations observed during into each pump station during the month were:

- HLPS: 72 to 230 µg/L, average: 157 µg/L
- SMPS: 1,140 to 2,700 µg/L, average: 1,873 µg/L

Table 2 contains the summary data from the daily influent parameter measurements.

## Perchlorate Mass Removal Estimates

Daily perchlorate mass removal estimates were calculated from the recorded total influent flow to the SMPS and HLPS and daily measurements of perchlorate (analyzed at Test America by Method 314.0). The mass removed was calculated based on an effluent perchlorate concentration of zero (0) µg/L. The estimated mass of perchlorate removed from each pump station for the period of January 18 to January 31:

- HLPS: 20 pounds
- SMPS: 367 pounds
- Total: 387 pounds

Mass removal estimates were not calculated prior to January 18<sup>th</sup>, due to data accuracy considerations associated with system start-up and shakedown as noted above. A graph showing the estimated removal of perchlorate is presented in Figure 1.

## Suspended Solids Removal and Management

The Treatment Plant was designed to remove the majority of suspended solids from the influent waters via hydrocyclones and multimedia filters (MMF). High TSS waste from the hydrocyclones are stored in the 20,000 gallon cyclone waste tank. High TSS waste from the MMF is generated during the MMF backwash process and is stored in two 20,000 gallon backwash waste tanks. The system is designed to slowly blend in backwash waste and cyclone waste water into the treated effluent stream in small quantities to maintain the National Pollutant Discharge Elimination System (NPDES) permit discharge limits for perchlorate (18 µg/L) and TSS (135 mg/L).

To address the significant solids loading in the waters produced from weir construction, additional surge and storage capacity was mobilized to the site. This included 16 additional 20,000 gallon tanks, placed in individual secondary containment outside the main containment area, as well as pumps, hoses, and tank connections to facilitate the movement of waste water between the Treatment Plant and these tanks. Tanker trucks were also mobilized to haul excess solids to the landfill in accordance with the Treatment Plant design plan for managing excess high TSS waste. In the month of January, 104 tanker truckloads of solids slurry were sent to the landfill, or 478,000 gallons tanker capacity.

## MAINTENANCE

Maintenance performed at the Treatment Plant during January 2018 included both routine maintenance activities and non-routine maintenance activities as described in the following sections.

## Routine Maintenance

Routine maintenance activities included the following:

- Generators supplying power to the SMPS, HLPS, and CWTP require service approximately every 250 hours of generator run time. Generators were serviced prior to the start of operations, and then during operations as follows:
  - XQ500 – Unit 14, service conducted on January 13, 2018 and January 25, 2018
  - XQ350 – Unit 17 service conducted on January 20, 2018
- Wye strainer was flushed periodically to clear solids accumulation
- Cyclone underflow lines were flushed periodically to clear solids accumulation
- Pump oil changed on Pumps 1A, 1B, 1C, 5A, 7A, and 7B

## Non-Routine Maintenance

Non-routine maintenance was performed during January 2018 to improve Treatment Plant operation, including:

- Removed bottom caps on valve actuators to the Ion Exchange vessels 1A, 2A, 1C, and 2C and drained accumulated water on January 18, 2018.
- Adjusted tank level sensor housings to improve performance on January 20, 2018.
- Replaced Ion Exchange 1A pressure control disc on January 23, 2018.
- Tighten bolts on Ion Exchange 1C expansion joint to address seepage within secondary containment on January 30, 2018.
- Tighten flange bolts on MMF1A 18" to 8" reducer on January 30, 2018.

## O&M Costs

At the direction of the Trust, Tetra Tech has summarized cost data for the reporting period. The following table summarizes project charges in accordance with the Operations and Maintenance Agreement, executed December 31, 2017. This section only captures project charges consistent with the O&M agreement or agreed upon charges for items supplied by/through Tetra Tech and billed to the Trust.

**Table 1: O&M Cost Summary**

| Item               | Payment Details   | Unit                          | Cost Invoiced During Reporting Period | Total Costs – Project Inception to Date |
|--------------------|---|-------------------------------|---------------------------------------|---|
| Monthly Base Cost  | Lump sum payable to Tetra Tech  | \$297,500 /month              | \$297,500                             | \$297,500                               |
| Ion Exchange Resin | Lump sum direct pay from Trust to Evoqua for turn key resin delivery, replacement, transportation and disposal services | \$135,755 /vessel plus NV tax | \$0 (no vessels changed in January)   | \$0                                     |

| Item                           | Payment Details  | Unit  | Cost Invoiced During Reporting Period                          | Total Costs – Project Inception to Date |
|--------------------------------|--|---|--|---|
| Tankage                        | Actual usage charges direct pay from Trust to Baker Corp and Rain for Rent | Baker Corp: \$20,074 /month plus variable maintenance fees as necessary<br><br>Rain for Rent: As used   | \$0 <sup>1</sup><br><br>\$0 (January to be billed in February) | \$0                                     |
| Generator Rental / Maintenance | Actual usage charges direct pay from Trust to Cashman                      | \$625 every 250 run hours per XQ350 Generator<br><br>\$1250 every 250 run hours per XQ500 plus Backup generator rental costs as required to support maintenance | \$0 <sup>2</sup>   | \$0                                     |
| Generator Fuel                 | Actual usage charges direct pay from Trust to Cashman                      | \$3.65 /gal delivered plus NV tax   | \$0 (January to be billed in February)                         | \$0                                     |
| Solids Disposal                | Lump sum payable to Tetra Tech for off-site transportation and disposal    | \$4,150 /3,000 gallon tanker<br><br>\$6,917 /5,000 gallon tanker  | \$661,261  | \$661,261                               |
| <b>TOTAL</b>                   |  |   | <b>\$958,761</b>   | <b>\$958,761</b>                        |

No other items were supplied by/through Tetra Tech and billed to the Trust during this reporting period.

<sup>1</sup> The Trust pre-paid a sum during Treatment Plant Construction for project tankage to obtain a discount on long-term equipment cost. As of January 1, 2018, the remaining credit balance is \$189,459.85. Additional payment by the Trust will not be required until this prepayment credit is exhausted.

<sup>2</sup> The Trust pre-paid a sum during Treatment Plant Construction for generator rental/maintenance to obtain a discount on long-term equipment cost. As of January 1, 2018, the remaining credit balance is \$336,598.70. Additional payment by the Trust will not be required until this prepayment credit is exhausted.

## CERTIFIED ENVIRONMENTAL MANAGER 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 Weir Dewatering Treatment Plant Operation and Maintenance Summary for January 2018.



Feb 28, 2018

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

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Date

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

## Tables

**Weir Dewatering Treatment Plant  
Monthly Flow Summary  
January 2018  
Table 1**

| Date      | Time  | Influent                              |                            |                                       |                            |                                       |                            | Effluent <sup>3</sup>                 |                            |
|-----------|-------|---------------------------------------|----------------------------|---------------------------------------|----------------------------|---------------------------------------|----------------------------|---------------------------------------|----------------------------|
|           |       | HLPS                                  |                            | SMPS                                  |                            | Combined Feed <sup>1</sup>            |                            | Average <sup>2</sup><br>(FIT8060) gpm | Total (FIT8060)<br>Gallons |
|           |       | Average <sup>2</sup><br>(FIT3010) gpm | Total (FIT3010)<br>Gallons | Average <sup>2</sup><br>(FIT2010) gpm | Total (FIT2010)<br>Gallons | Average <sup>2</sup><br>(FIT4010) gpm | Total (FIT4010)<br>Gallons |                                       |                            |
| 1/1/2018  | 23:59 | N/A*                                  | N/A*                       | N/A*                                  | N/A*                       | N/A*                                  | N/A*                       | N/A*                                  | N/A*                       |
| 1/2/2018  | 23:59 | NA                                    | 178,800*                   | N/A*                                  | N/A*                       | NA                                    | 178,800*                   | NA                                    | NR                         |
| 1/3/2018  | 23:59 | NA                                    | 1,338,900*                 | N/A*                                  | N/A*                       | NA                                    | 1,338,900*                 | NA                                    | 1,541,000*                 |
| 1/4/2018  | 23:59 | NA                                    | 2,190,000*                 | N/A*                                  | N/A*                       | NA                                    | 2,190,000*                 | NA                                    | 2,471,000*                 |
| 1/5/2018  | 23:55 | NA                                    | 2,290,000*                 | N/A*                                  | N/A*                       | NA                                    | 2,290,000*                 | NA                                    | 3,050,000*                 |
| 1/6/2018  | 23:50 | NA                                    | 2,400,000*                 | N/A*                                  | N/A*                       | NA                                    | 2,400,000*                 | NA                                    | 3,167,000*                 |
| 1/7/2018  | 23:55 | NA                                    | 1,660,000*                 | N/A*                                  | N/A*                       | NA                                    | 1,660,000*                 | NA                                    | 2,275,000*                 |
| 1/8/2018  | 23:55 | NA                                    | 2,288,000*                 | NA                                    | 448,000*                   | NA                                    | 2,621,000*                 | NA                                    | 3,391,000*                 |
| 1/9/2018  | 23:55 | NA                                    | 693,000*                   | NA                                    | 400,000*                   | NA                                    | 1,096,000*                 | NA                                    | 1,539,000*                 |
| 1/10/2018 | 23:59 | N/A*                                  | N/A*                       | N/A*                                  | N/A*                       | N/A*                                  | N/A*                       | NA                                    | 158,000*                   |
| 1/11/2018 | 23:59 | N/A*                                  | N/A*                       | N/A*                                  | N/A*                       | N/A*                                  | N/A*                       | NA                                    | 304,000*                   |
| 1/12/2018 | 23:59 | N/A*                                  | N/A*                       | N/A*                                  | N/A*                       | N/A*                                  | N/A*                       | NA                                    | 97,000*                    |
| 1/13/2018 | 23:59 | N/A*                                  | N/A*                       | N/A*                                  | N/A*                       | N/A*                                  | N/A*                       | N/A*                                  | N/A*                       |
| 1/14/2018 | 23:59 | N/A*                                  | N/A*                       | N/A*                                  | N/A*                       | N/A*                                  | N/A*                       | N/A*                                  | N/A*                       |
| 1/15/2018 | 23:59 | N/A*                                  | N/A*                       | NA                                    | 269,300*                   | NA                                    | 269,300*                   | NA                                    | NR                         |
| 1/16/2018 | 23:59 | N/A*                                  | N/A*                       | NA                                    | 1,036,800*                 | NA                                    | 875,100*                   | NA                                    | 1,130,000*                 |
| 1/17/2018 | 23:50 | NA                                    | 287,500*                   | NA                                    | 578,900*                   | NA                                    | 1,011,600*                 | NA                                    | 1,126,000*                 |
| 1/18/2018 | 23:50 | 342                                   | 492,000                    | 1,070                                 | 1,541,000                  | 1,357                                 | 1,954,000                  | 1,421                                 | 2,046,000                  |
| 1/19/2018 | 23:55 | 448                                   | 645,700                    | 1,011                                 | 1,455,800                  | 1,487                                 | 2,140,700                  | 1,614                                 | 2,324,000                  |
| 1/20/2018 | 23:59 | 410                                   | 590,000                    | 996                                   | 1,434,000                  | 1,444                                 | 2,080,000                  | 1,595                                 | 2,296,100                  |
| 1/21/2018 | 23:59 | 410                                   | 590,400                    | 996                                   | 1,433,800                  | 1,394                                 | 2,007,900                  | 1,563                                 | 2,250,200                  |
| 1/22/2018 | 23:59 | 302                                   | 434,600                    | 995                                   | 1,433,100                  | 1,309                                 | 1,885,300                  | 1,478                                 | 2,127,600                  |
| 1/23/2018 | 23:59 | 289                                   | 415,700                    | 1,106                                 | 1,592,700                  | 1,414                                 | 2,036,500                  | 1,521                                 | 2,190,700                  |
| 1/24/2018 | 23:59 | 326                                   | 468,900                    | 1,475                                 | 2,124,600                  | 1,827                                 | 2,630,900                  | 1,944                                 | 2,799,500                  |
| 1/25/2018 | 23:59 | 539                                   | 776,500                    | 1,702                                 | 2,451,000                  | 2,226                                 | 3,205,300                  | 2,413                                 | 3,475,400                  |
| 1/26/2018 | 23:59 | 853                                   | 1,228,900                  | 1,705                                 | 2,454,800                  | 2,563                                 | 3,691,400                  | 2,762                                 | 3,977,700                  |
| 1/27/2018 | 23:59 | 1,045                                 | 1,504,500                  | 1,706                                 | 2,456,100                  | 2,737                                 | 3,940,700                  | 2,934                                 | 4,224,600                  |
| 1/28/2018 | 23:59 | 1,035                                 | 1,491,000                  | 1,705                                 | 2,455,700                  | 2,744                                 | 3,951,900                  | 2,960                                 | 4,262,200                  |
| 1/29/2018 | 23:59 | 1,120                                 | 1,613,000                  | 1,692                                 | 2,437,000                  | 2,817                                 | 4,056,000                  | 3,071                                 | 4,422,000                  |
| 1/30/2018 | 23:59 | 1,139                                 | 1,640,000                  | 1,643                                 | 2,366,000                  | 2,776                                 | 3,998,000                  | 3,081                                 | 4,437,000                  |
| 1/31/2018 | 23:59 | 1,174                                 | 1,690,000                  | 1,625                                 | 2,340,000                  | 2,785                                 | 4,010,000                  | 3,049                                 | 4,390,000                  |

Notes:

HLPS = Historic Lateral Pump Station.

SMPS = Sunrise Mountain Pump Station.

NR = Data block not recorded in SCADA data history.

\* = Total flow is qualified as potentially less accurate during startup & shakedown period while equipment operations and processes are refined.

NA = Average flows unavailable during startup & shakedown period while equipment operations and processes are refined.

N/A\* = No flow received or processed.

FIT numbers presented in column headers correlate with Flow Instrument Transmitter tag numbers for particular flow meters.

Effluent flows recorded between 1/10/2018 and 1/14/2018 generated from municipal water pumped into influent and effluent tanks to clean system during period of no flow received.

Combined flow totals recorded between 1/3/2018 and 1/10/2018 inclusive of pump testing flows

1 - The combined feed is measured by flow indicator FIT4010. This is not equal to the sum of flows from HLPS (FIT3010) and SMPS (FIT2010) due to fluctuating volumes in influent storage tanks.

2 - Average calculated by dividing total gallons by 1,440 (minutes per 24 hours).

3 - Effluent flow meter data is higher than the combined influent flows due to inherent flowmeter variability and is compounded by batch processing operations. Air drawn into piping (as designed for vacuum breaks) at the end of each pumping batch has been observed to result in transient, short duration high flow readings that are not representative of actual flows.



**Weir Dewatering Treatment Plant  
Influent Parameter Summary  
January 2018  
Table 2**

| Location            | Collection Date            | Lab Sample ID | Parameter: | Perchlorate | Chlorate | Total Dissolved Solids | Nitrate as NO3 | Sulfate | Comment |      |  |  |
|---------------------|----------------------------|---------------|------------|-------------|----------|------------------------|----------------|---------|---------|------|--|--|
|                     |                            |               | Units:     | ug/L        | ug/L     | mg/L                   | mg/L           | mg/L    |         |      |  |  |
|                     |                            |               | Result     | LO          | Result   | LO                     | Result         | LO      | Result  | LO   |  |  |
| HLPS Influent       | 1/2/2018                   | 440-199481-1  | 72         | F1          | 100      | U                      | 1600           |         | 44      |      | 530  |  |
|                     | 1/3/2018                   | 440-199547-1  | 90         |             | 13       | J                      | 1400           |         | 43      |      | 490  |  |
|                     | 1/4/2018                   | 440-199666-1  | 150        |             | 51       |                        | 1600           |         | 44      |      | 490  |  |
|                     | 1/5/2018                   | 440-199774-1  | 170        |             | 65       |                        | 1500           |         | 43      |      | 520  |  |
|                     | 1/6/2018                   | 440-199852-1  | 180        |             | 86       |                        | 1500           |         | 49      |      | 500  | Nitrate analyzed at Silver State Laboratory due to 48 hour hold time (Saturday collection) |
|                     | 1/7/2018                   | 440-199852-2  | 160        |             | 82       |                        | 1500           |         | 44      |      | 510  |  |
|                     | 1/8/2018                   | 440-199852-3  | 170        |             | 120      |                        | 1500           |         | 49      |      | 500  |  |
|                     | 1/9/2018                   | 440-200103-2  | 210        |             | 140      |                        | 1500           |         | 44      |      | 520  |  |
|                     | No flow 1/10 - 1/17        |               |            |             |          |                        |                |         |         |      |  |  |
|                     | 1/18/2018                  | 440-201447-1  | 112        | B           | 26.0     |                        | 1710           |         | 38.4    |      | 646  |  |
|                     | 1/19/2018                  | 440-201556-1  | 106        |             | 29.0     |                        | 1580           |         | 39.6    |      | 580  |  |
|                     | 1/20/2018                  | 440-201635-1  | 139        |             | 47.8     |                        | 1600           |         | 43      |      | 590  | Nitrate analyzed at Silver State Laboratory due to 48 hour hold time (Saturday collection) |
|                     | 1/21/2018                  | 440-201636-1  | 136        |             | 67.4     | J                      | 1610           |         | 36.0    |      | 627  |  |
|                     | 1/22/2018                  | 440-201634-1  | 150        |             | 76.3     | J                      | 1590           |         | 36.3    |      | 597  |  |
|                     | 1/23/2018                  | 440-201742-1  | 161        | B           | 76.7     |                        | 1730           |         | 36.6    |      | 664  |  |
|                     | 1/24/2018                  | 440-201933-1  | 122        |             | 70.7     | J                      | 1800           |         | 35.9    |      | 783  |  |
|                     | 1/25/2018                  | 440-201935-1  | 180        |             | 119      |                        | 1590           |         | 37.3    |      | 609  |  |
|                     | 1/26/2018                  | 440-202065-1  | 176        |             | 119      |                        | 1610           |         | 38.5    |      | 595  |  |
|                     | 1/27/2018                  | 440-202149-1  | 157        |             | 66.1     |                        | 1530           |         | 39.46   |      | 590  | Nitrate analyzed by In-House Laboratory (field-filtered nitrate result 38.74 mg/L)         |
|                     | 1/28/2018                  | 440-202145-1  | 173        |             | 85.7     |                        | 1530           |         | 38.1    |      | 571  |  |
| 1/29/2018           | 440-202152-1               | 192           |            | 33.3        |          | 1530                   |                | 39.3    |         | 553  |  |  |
| 1/30/2018           | 440-202246-1/ 440-202297-3 | 212           |            | 138         |          | 1550                   |                | 38.7    |         | 585  | Chlorate from lab sample ID 440-202297-3   |  |
| 1/31/2018           | 440-202297-1               | 230           |            | 113         |          | 1560                   |                | 39.7    |         | 572  |  |  |
| No flow 1/2 - 1/7   |                            |               |            |             |          |                        |                |         |         |      |  |  |
| 1/8/2018            | 440-200103-1               | 2700          |            | 300         |          | 3900                   |                | 17      |         | 1800 |  |  |
| 1/9/2018            | 440-200103-3               | 2500          |            | 270         |          | 3400                   |                | 22      |         | 1600 |  |  |
| No flow 1/10 - 1/14 |                            |               |            |             |          |                        |                |         |         |      |  |  |
| 1/15/2018           | 440-201179-1               | 2670          |            | 310         |          | 3500                   |                | 18      |         | 1600 |  |  |
| 1/16/2018           | 440-201177-1               | 2540          |            | 220         |          | 3400                   |                | 18      |         | 1400 |  |  |
| 1/17/2018           | 440-201412-1               | 2330          |            | 273         |          | 3500                   |                | 20.6    |         | 1510 |  |  |
| 1/18/2018           | 440-201413-1               | 2220          |            | 284         |          | 3560                   |                | 21.4    |         | 1550 |  |  |
| 1/19/2018           | 440-201556-2               | 2060          |            | 191         |          | 3160                   |                | 23.0    |         | 1410 |  |  |
| 1/20/2018           | 440-201635-2               | 1900          |            | 165         |          | 3190                   |                | 25      |         | 1420 | Nitrate analyzed at Silver State Laboratory due to 48 hour hold time (Saturday collection) |  |
| 1/21/2018           | 440-201636-2               | 1850          |            | 291         |          | 3200                   |                | 23.0    |         | 1430 |  |  |
| 1/22/2018           | 440-201634-2               | 1910          |            | 179         |          | 3180                   |                | 30.5    |         | 1400 |  |  |
| 1/23/2018           | 440-201742-2               | 1800          | B          | 195         |          | 3320                   |                | 27.5    |         | 1390 |  |  |
| 1/24/2018           | 440-201844-1               | 1720          |            | 241         |          | 3140                   |                | 28.3    |         | 1430 |  |  |
| 1/25/2018           | 440-201935-2               | 1500          |            | 187         |          | 3410                   |                | 24.8    |         | 1490 |  |  |
| 1/26/2018           | 440-202065-2               | 1470          |            | 176         |          | 3600                   |                | 27.7    |         | 1380 |  |  |
| 1/27/2018           | 440-202149-2               | 1300          |            | 199         |          | 2990                   |                | 28.19   |         | 1400 | Nitrate analyzed by In-House Laboratory (field-filtered nitrate result 28.41 mg/L)         |  |
| 1/28/2018           | 440-202145-2               | 1310          |            | 177         |          | 2940                   |                | 27.9    |         | 1450 |  |  |
| 1/29/2018           | 440-202152-2               | 1360          |            | 193         |          | 3030                   |                | 28.0    |         | 1350 |  |  |
| 1/30/2018           | 440-202246-2/ 440-202297-4 | 1140          |            | 174         |          | 3030                   |                | 30.0    |         | 1290 | Chlorate from lab sample ID 440-202297-4   |  |
| 1/31/2018           | 440-202297-2               | 1340          |            | 191         |          | 2980                   |                | 31.1    |         | 1320 |  |  |

- Notes:
- ug/L micrograms per liter (parts per billion)
  - mg/L milligrams per liter (parts per million)
  - U Parameter analyzed for but not detected above the reporting limit shown.
  - J Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.
  - B Compound was found in the blank and sample.
  - F1 Matrix Spike and/or Matrix Spike Duplicate Recovery is outside acceptance limits.
  - HLPS Historic Lateral Pump Station
  - SMPS Sunrise Mountain Pump Station

HLPS offline due to rain event 1/9/18 - 1/17/18.  
SMPS brought online 1/8/18 and offline 1/9/18 - 1/15/17 due to rain event.  
Nitrate data presented as NO<sub>3</sub> consistent with terms of O&M agreement.

## Figures

Figure 1  
Estimated Perchlorate Mass Removed January 18-31, 2018

