TETRA TECH

TECHNICAL MEMORANDUM

To:	Nevada Environmental Response Trust
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Date:	2/14/2017
Subject:	NERT Weir Dewatering Treatment: Key Features of Treatment System – 75% Design for Permitting

1.0 INTRODUCTION

At the direction of the Nevada Environmental Response Trust (NERT or Trust), Tetra Tech, Inc. (Tetra Tech) has prepared this Technical Memorandum to discuss the Key Features of the Weir Dewatering Treatment System. This Technical Memorandum is being provided as a supplement to the original Form 7-2540 submitted on October 4, 2016 and the 75% engineering design package for the treatment system.

1.1 Background

The Southern Nevada Water Authority (SNWA) is planning to construct multiple new weirs on the Las Vegas Wash. The Trust will be ordered to treat groundwater associated with the constuction dewatering operations of the Sunrise Mountain Weir and Historic Lateral Weir. SNWA will hire a weir general contractor (WGC) to construct the new weirs.

The treatment process consists of two pump stations, one Central Water Treatment Plant (CWTP), and associated piping from the pump stations to the CWTP and from the CWTP to the Wash. The Sunrise Mountain Pump Station (SMPS) will be located south of the Sunrise Mountain Weir, adjacent to the CWTP. Both the SMPS and the CWTP will be located on private property directly south of BOR land, managed as Clark County Wetlands Park.The Historic Lateral Pump Station (HLPS) will be located south of the Historic Lateral Weir within Clark County Wetlands Park.

The groundwater generated from the construction activities at the Sunrise Mountain Weir will be transferred by the WGC to four baker-type influent tanks installed at the SMPS. The groundwater generated from the construction activities at the Historic Lateral Weir will be transferred by the WGC to four baker-type influent tanks installed at the HLPS. The combined flow from the two weir construction sites will not exceed 6,900 gpm.

The treatment system will consist of hydrocyclones to remove large sediment particles, multi-media filters to remove residual Total Suspended Solids (TSS) that remains after treatment by the hydro cyclones, and ion exchange to remove perchlorate. The underflow from the hydrocyclones and the backwash from the multi-media

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filters will be stored in separate storage tanks and re-blended with the treated water before discharge to the Wash under a National Pollutant Discharge Elimination System permit issued by the Nevada Division of Environmental Protection. A more detailed description of the process operation and the process control strategy is provided in the *NERT Weir Dewatering Treatment Process Control Narrative*, dated February 14, 2017 and provided with the 75% design package.

1.2 Objective

The objective of this Technical Memorandum is to provide details regarding Key Features of the project that were raised during a meeting with the Bureau of Reclamation (BOR), Nevada Division of Environmental Protection (NDEP), Southern Nevada Water Authority (SNWA), NERT, and Tetra Tech on November 16, 2016.

2.0 KEY FEATURES

Key features of the Weir Dewatering Treatment System Design address the following areas:

- Security at the CWTP and pump stations;
- Contingency planning;
- Secondary containment;
- Equipment redundancy, including spares;
- Power loss;
- Electrical grounding;
- Noise control;
- Operations and maintenance (O&M) procedures;
- Signage;
- Bike trail crossing
- Site restoration; and
- Construction duration

These items are described in more detail in the following sections.

2.1 Security at the Treatment Plant and Pump Stations

Security at the treatment system facilities is an important consideration, specifically at the CWTP and the two pump stations (SMPS and HLPS). Clark County Wetlands Park is unsecured and open to the public. For that reason, the facilities need to be secured as much as practical.

The two pump station sites and the CWTP will be surrounded by barbed-wire fencing with locked gates to prevent access from unauthorized personnel. The gates will have manual locks that can only be opened by authorized personnel, and will remain locked at all times. Lights will be installed at the pump stations and CWTP sites to provide adequately lighted areas for surveillance and to deter unwanted entrants. The pump stations and the CWTP will be staffed 24 hours per day, seven days per week. Existing nightly security patrols of the NERT Groundwater Extraction and Treatment System lift station will be expanded to include the CWTP and the two pump stations.

The 18-inch carbon steel pipeline transferring groundwater from the Historic Lateral Pump Station (HLPS) to the CWTP will be an underground pipe, buried in a shallow trench. Therefore, the pipe will not be accessible to potential vandals, and will also reduce the aesthetic impact in the area. The Sunrise Mountain Pump Station (SMPS) and the CWTP will be located within the same fenced/barbed wired area, therefore, the pipeline transferring groundwater from the SMPS to the CWTP will be above ground,

2.2 Contingency Planning

An issue was raised regarding contingency planning for various upset conditions or scenarios related to the treatment process.

The treatment system will be monitored and controlled using a SCADA (Supervisory Control and Data Acquisition) system. The SCADA system will consist of a control panel at each pump station, the SMPS Control Panel and the HLPS Control Panel for the SMPS and the HLPS, respectively. Both panels will be tied to the Master Control Panel (MCP) that will also control the CWTP. The influent lines from each weir construction site to its respective pump station will have an electrically-actuated control valve that will be controlled by its respective control panel via the MCP.

Four primary scenarios have been identified requiring contingency planning, and each are presented below with an associated response action. It should be noted that the below scenarios are presented in conceptual form and will need to be discussed with the WGC, SNWA and NDEP prior to system startup. All contingency procedures will then be formalized in the facility O&M Manual.

- Flow from the combined weirs exceeds the treatment plant capacity of 6,900 gpm
    - Flowmeters will be installed on the lines coming from each weir construction site to its respective pump station. A third flowmeter on the influent line into the CWTP (which carries the combined flows from the SMPS and the HLPS) will measure the CWTP inflow and send the flow reading to the MCP. In the event the MCP detects a total combined influent flow measured at the inlet to the two pump stations in excess of 6,900 gpm, the appropriate control valve will be throttled until combined flow decreases to 6,900 gpm. The Operator will then immediately contact the WGC. As indicated above, additional response actions will be discussed with the WGC and formalized prior to system startup.
- Mechanical failure of any major unit operation at the SMPS, HLPS and/or the CWTP
    - A mechanical failure of a major component at the CWTP will generate an alarm to the MCP that will close the respective inlet control valves entering the two pump stations and stop the pumps. Furthermore, the MCP will stop the operations at the CWTP. The Operator will then immediately contact the WGC. As indicated above, additional response actions will be discussed with the WGC, SNWA and NDEP and formalized prior to system startup.
    - A mechanical failure of a major component at either pump station will generate an alarm to the MCP that will close the respective inlet control valve entering the pump station with the failure and stop the pumps. Operation of the other pump station and CWTP will continue normally. The Operator will then immediately contact the WGC. As indicated above, additional response actions will be discussed with the WGC, SNWA and NDEP and formalized prior to system startup.
- A major spill at either pump station or the CWTP
    - Each pump station and the CWTP will be equipped with spill detection instrumentation in the sump. Any spill which triggers the spill detection instrumentation at either pump station will generate an alarm to the MCP that will close the respective inlet control valve entering the pump station with the spill and stop the pumps. Operation of the other pump station and CWTP will continue normally. The Operator will then immediately contact the WGC. As indicated above, additional response actions will be discussed with the WGC, SNWA and NDEP and formalized prior to system startup.
    - Any spill which triggers the detection instrumentation at the CWTP will generate an alarm to the MCP that will close the inlet respective control valves entering the two pump stations and stop the pumps. Furthermore, the MCP will stop the operations at the CWTP. The Operator will then

immediately contact the WGC. As indicated above, additional response actions will be discussed with the WGC, SNWA and NDEP and formalized prior to system startup.

- Minor leaks and spills will be handled by the operational staff at the pump stations and the CWTP. Minor leaks/spill may not require closing the control valves, therefore interrupting the flow to the treatment system.

- Combined water from both weir construction sites exceeds the NPDES limit on total suspended solids (TSS) of 135 ppm
  - Online TSS meters will be installed on the lines coming from each weir construction site to its respective pump station. A third online TSS meter in the influent line into the CWTP (combining the flows from the SMPS and the HLPS) will measure the TSS and send it to the MCP. In the event the MCP detects a TSS level in excess of 120 ppm at the inlet streams to each pump station, an alarm will be sound to alert the operator of a potential TSS problem. The control valve corresponding to the stream containing higher TSS will gradually close to 50%, allowing only one half the flow coming from that pump station. The operator will continue to monitor the total TSS in the combined stream entering the pump stations. If the TSS in the combined stream entering the pump stations rises to 135 ppm, which is the NPDES discharge limit, the control valve corresponding to the higher TSS concentration will close completely reducing flow with high TSS concentration entering the treatment system. The Operator will then immediately contact the WGC. As indicated above, additional response actions will be discussed with the WGC, SNWA and NDEP and formalized prior to system startup. It should be noted that additional processes for filtration beyond hydro cyclones to remove large sediment particles and multi-media filters to remove residual TSS that remains after treatment by the hydro cyclones are not included in the system design. The high TSS if not remove could adversely impact the performance of the ion exchange resin, potentially causing exceedance of perchlorate in the discharge stream.

2.3 Secondary Containment

The water generated from the weir dewatering activities will be impacted with some perchlorate, and any spills of untreated water at the CWTP or pump stations will be contained and managed in a controlled manner in order to prevent the migration of the impacted water to surrounding areas.

The two pump stations and the CWTP will be located inside a secondary containment area. These areas will consist of an earthen berm surrounding the site, lined with an HDPE geosynthetic liner. The inside of the bermed area will be graded to direct leaks or spills to a sump installed in a low area where a sump pump will be used to remove the spilled liquids. At the CWTP, spilled liquids will be pumped to the waste storage tanks at the CWTP. At each pump station, the spilled liquids will be pumped to the influent tanks at the pump station. The containment areas are sized to provide a volume of 110% of the largest unit/tank operating within the contained area. Sump pumps will be sized to return the secondary containment volume within 24 hours.

2.4 Equipment Redundancy Including Spares

The treatment system will be operated continuously. Because of this, the pump stations and CWTP must have adequate redundancy so that they can continue running if a piece of equipment or unit process malfunctions or breaks down, requiring repair. Redundancy can be achieved by providing installed spares, shelf (i.e., uninstalled) spares, or repairs kits for equipment.

2.4.1 Pumps

Each pump station will be equipped with three pumps rated for 2,300 gpm for a maximum total flow rate of 6,900 gpm. Based on historic data provided by SNWA from previous weir construction projects on the Las Vegas

Wash, the maximum flow rate that was generated at most of the previous weir construction projects was approximately 2,000 gpm. Despite the low flow indicated by the historic data, each pump station has been designed with three pumps with a total hydraulic capacity of 6,900 gpm. Therefore, based on typical historical operating flowrates, no more than two pumps are expected to run at each pump station at any given time. Also based on the design flow rate of 6,900 gpm, no more than three pumps will be operating at each or both pump stations combined.

In addition, one 2,300-gpm pump will be provided as a shelf spare in the event any one pump in the pump stations breaks down; the shelf spare can be used at either pump station.

At the CWTP, all pumps will be provided with installed spares. Two 30-gpm pumps, one operating and one installed spare, will be used to pump the underflow from the hydro cyclones to the hydro cyclone waste storage tank. Three 150-gpm pumps, two operating and one installed spare, will be used to pump the backwash waste from the backwash waste tanks to the treated water discharge line. Three 1,500-gpm pumps, two operating and one installed spare, will be used to pump rinse and backwash water through the multimedia filters. Four 2,300-gpm treated water pumps, three operating and one installed spare, will be used to discharge treated effluent back to the Wash. A shelf spare will also be provided.

Repair kits will be stocked for pumps where necessary at the CWTP and replaced if used. Pump shelf spares will also be replaced if used. Spares for other equipment are discussed in Section 2.4.4 below.

2.4.2 Level Control at Tanks

Critical units requiring redundancy for level measurement and control include the storage tanks at the pump stations and at the CWTP.

Ultrasonic level sensors are used in the storage tanks at each pump station. An installed spare ultrasonic sensor is also included as a back-up to the main level sensor.

At the CWTP, ultrasonic level sensors with installed spares included as a backup to the main level sensor are also used in the hydro cyclone waste tank, rinse tanks, backwash waste tanks, and the treated water effluent tanks.

2.4.3 Other Process Equipment

The manufacturers for the major process equipment at the CWTP, including the cyclones, multimedia filters, and ion exchange units, provide a one-year warranty, which covers the majority of the required operational life for the system. In addition, process equipment has been designed with redundant units installed in parallel to handle a flow of 5,750 gpm with one unit out of service.

2.4.4 Spares

Spare parts for the pumps have been specified in Section 2.4.1 above. If a shelf spare is utilized, efforts will be made to repair the broken equipment before it is replaced.

For the CWTP major unit operations (cyclones, multimedia filters, and ion exchange units), Tetra Tech has requested equipment suppliers to recommend spare parts list for their equipment during submittal phase of the project and will select and order the appropriate spare parts. The requested spare parts will be available onsite during start up and system operation.

2.5 Power Loss

Because the treatment system will be operated continuously, the pump stations and CWTP must consider back-up power and/or minimize downtime in the event of a power outage.

Existing power is not readily available at either of the pump stations or the CWTP. Therefore, rental generators will provide power to the treatment system. Because the generators are reliable, large in size and are expensive, it is not practical to provide spare generators for each area. However, the generator suppliers will be local and are confident that they can replace a faulty generator in approximately 4 hours in the event of a generator failure.

A generator failure at one of the pump stations will be treated as a mechanical failure upset condition, and operation of the affected pump station will be stopped as described in Section 2.2. The same strategy will be used in the event of a power failure in the CWTP, with the failure being handled as a mechanical failure. Operation of both pump stations and the CWTP will be stopped as described in Section 2.2.

2.6 Electrical Grounding

For the safety of operational personnel and anyone in and around the treatment system, as well as for equipment protection, all electrical equipment for the treatment system must be adequately grounded.

All generators and major electrical equipment will be grounded. Grounding plans have been included in the 75% design package.

2.7 Noise Control

Clark County and City of Henderson noise ordinances were a factor for engineering design to minimize noise as much as practicable, given the surrounding residential and recreational uses in the area.

The sources of noise will be the generators and pumps in both the two pump stations and the CWTP. The generators will be trailer-mounted and enclosed in sound-attenuated International Organization for Standardization (ISO) containers to minimize noise levels to approximately 70 dBA, or below, at the source. The centrifugal pumps at the pump stations will be designed with noise attenuating enclosures if necessary to lower noise levels to approximately 85 dBA, or below, at the source. These are manufacturer's specifications. Tetra Tech is supplementing manufacturer specifications with a site-specific analysis of noise levels anticipated at the source and property lines.

2.8 Operations and Maintenance Procedures

Operations and maintenance of the new treatment system must be adequately addressed before the system is operational. Authorized personnel will be designated to access and operate the treatment system.

An O&M Manual will be prepared prior to the start-up and commissioning of the system. The Manual will need to be submitted to the BWPC for review and comment as part of the Permit requirements. System operators will be trained on the procedures listed in the Manual.

2.9 Signage

There are visitors to the bike trails and other recreational areas close to the proposed HLPS. To protect people traveling in and around these areas, clear and adequate signage indicating construction of the proposed pump station will be displayed. Construction signage and/or flaggers will be placed per City of Henderson requirements along East Russell Road and McCormick Road. Signage and/or flaggers along the entry road to the Park will be placed per Clark County standards when construction activities are anticipated to impact traffic in that area.

2.10 Bike Trail Crossing

Previous to the 75% design, the HLPS was located to the north of the bike trail and would have necessitated crossing the trail with construction and operational equipment. Subsequent to discussions with SNWA, the pump station has been moved to the south of the bike trail. The trail will no longer need to be crossed by construction vehicles or operational vehicles.

2.11 Site Restoration

Construction of the HLPS, pipelines, and discharge outfall will disturb portions of Clark County Wetlands Park for the approximately 200' x 200' HLPS, buried underground pipelines, and a buried discharge pipeline with a permitted outfall at the Wash.

Site disturbance will be limited to the area necessary to support construction and operation of the HLPS and pipelines. Access will maximize use of existing paved and unpaved roads to avoid or minimize cross-country travel. Small trenching equipment will be used for pipeline installation. Any areas designated for protection will be fenced to prevent construction traffic, and measures will be installed and implemented during construction to minimize any erosion and damage to site vegetation and other amenities. Any affected areas will be restored based on guidance from BOR and Clark County Parks & Recreation.

2.12 Construction Duration

The construction schedule for the project is subject to SNWA's timeline, which indicates a need for system readiness as early as September 2017. Tetra Tech will expedite construction to minimize the time necessary for disturbances associated with construction activity. Based upon sequencing the construction, restoration activities will be initiated as soon as practicable.