Sparks Parks and Recreation

Master
Effluent Management Plan

September, 2003

AMEC Infrastructure
9450 Double R Boulevard
Reno, NV 89521
Phone: (775) 786-5873
Fax: (775) 786-6138
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- SHADOW MOUNTAIN SPORTS COMPLEX SHELLY PARK
- PAH RAH PARK
- LES HICKS PARK
- WILLOW CREEK PARK
- TRUCKEE MEADOWS FIRE FILL STATION
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SECTION 1 - INTRODUCTION

1.1 INTRODUCTION

The Truckee Meadows Water Reclamation Facility (TMWRF) is currently being operated under NDEP permit number NV0020150 (Appendix B). The permit provides for 40 million gallons per day (MGD) effluent discharge to the Steamboat Creek and subsequently into the Truckee River and to approved sites for land application. The primary effluent disposal method for TMWRF is direct discharge to the Truckee River. This practice does not require an Effluent Management Plan and is an important feature of the effluent reuse program because it provides a necessary disposal option to be used in conjunction with the effluent reuse program.

This Effluent Management Plan provides guidance for the application of effluent on the City of Sparks Parks and Recreation sites that will operate under NDEP permit number NEVXXX (Appendix B). There are also plans to expand to other sites including parks and golf courses in the Spanish Springs Valley.

This plan outlines the requirements for disposal of a portion of the effluent from TMWRF by effluent irrigation on a seasonal basis. During the winter months, disposal will be to the Truckee River in accordance with NV0020150.

Irrigation demands are based on both metered water use data and historical evapotranspiration (ET) data collected at the Sparks Tree Farm located at Baring Boulevard and McCarran Boulevard.
SECTION 2 - DISCHARGE PERMIT AND EFFLUENT GUIDELINES

2.1 DISCHARGE PERMIT

The complete discharge NDEP permit for the City of Sparks Parks and Recreation sites (NEVXXX) is contained in Appendix B. Table 2.1 contains excerpts from the permit indicating important restrictions or compliance requirements. The City of Sparks will be the operator for the sites.

2.2 EFFLUENT GUIDLINES

Table 2.1 - Excerpt From Permit Number NEVXXX

A. Effluent Limitations, Monitoring Requirements and Conditions

1. During the period beginning on the effective date of this permit, and lasting until the permit expires, the permittee is authorized to discharge treated wastewater effluent to the City of Sparks Parks and Recreation Sites.

Samples taken in compliance with the monitoring requirements specified below shall be taken at the TMWRF.

The discharge shall be limited and monitored by the permittee as specified below:

<table>
<thead>
<tr>
<th>Effluent Limitations</th>
<th>Discharge Limitations</th>
<th>Monitoring Requirements</th>
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<tbody>
<tr>
<td></td>
<td>30 Day Average</td>
<td>Daily Max</td>
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<td>Flow</td>
<td>See flow for respective sites</td>
<td>Continuous</td>
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<tr>
<td>Total Nitrogen</td>
<td>Monitor and Report</td>
<td>Once/Year</td>
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<td>Calculate</td>
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In addition to the discharge permit, NPEP has published the WTS - 1A General design criteria for reclaimed water irrigation use. (http://ndep.nv.gov/bwpc/wts1a.pdf). A copy of this is included in Appendix C. The WTS - 1B General design criteria for preparing an effluent management plan. (http://ndep.nv.gov/bwpc/wts1b.pdf) is in Appendix D. The following table is an excerpt from the NDEP guidelines.
Table 2.2 - Landscape Spray and Drip Emitter Irrigation at Highway Islands, Medians, Shoulders, Parks, Playgrounds and Similar Greenbelt Areas (excerpt from the NDEP Guidelines WTS -1B).

Table 2.2

<table>
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<th>Required Buffer Zone (ft.)</th>
<th>Fecal Coliform MPN (c.f.u./100mL)</th>
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<td>Geometric mean in any 30 day period</td>
<td>Single maximum value</td>
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2.3 CROSS CONNECTION CONTROL REQUIREMENTS

A. Certification
1. Per NDEP's WTS - 1A "General Design Criteria for Reclaimed Water Irrigation Use," (Appendix D) prior to approval of the discharge permit the Permittee must submit their EMP to the water purveyor (TMWA) for cross connection control certification.
2. The Permittee must abide by TMWA’s Engineering and Construction Standard 8a “Water and Non-Potable Water Separation,” (Appendix 8a) for all new construction sites.
3. A copy of the final Effluent Management Plan will be sent to TMWA for their files.

B. Testing and Inspection
1. Annual testing and inspection of each site on the discharge permit shall be done to assure that no cross connection had occurred in the interim.
2. Backflow assembly test results will be submitted to TMWA.
3. Testing is not required for sites that do not contain potable water lines.
4. Backflow assembly testing will be performed per procedures defined by AWWA.
5. Site Inspections will be performed per guidelines established by AWWA.

2.4 RECLAIMED WATER RUN-OFF CONTROL PLAN

The purpose of the Run-off control plan is to have in written form the exact procedures the site personnel must follow in order to contain and maintain the

In the case of an emergency the site personnel are to complete the following steps:
1. Shut off the effluent line at the gate valve called out on the site plans in each appendix.
2. Call Brian Bessette at 775-353-7837 and Wayne Seidel at 775-353-2330. (See SECTION 6 – STAFF CONTACTS AND COMMUNICATION PROCEDURES PAGE 18)
3. On the provided Reclaimed Water Run-Off Reporting Sheet located in Section 8, the site personnel are to report the following information:
   A. The time and date of the discharge.
   B. Exact location and estimated amount of discharge.
   C. Flow path and bodies of water that the discharge reached.
   D. The specific cause of the discharge
   E. The preventive and/or corrective actions taken.

4. It is IMPORTANT to remember that any contact with the effluent could be harmful to your health. YOU MUST REMEMBER:

1. Reclaimed wastewater may contain disease-causing organisms and viruses. Skin contact with reclaimed wastewater can result in various skin rashes, and open wounds are especially susceptible to infection. Treat cuts with disinfectant immediately.

2. Workers are to keep their typhoid, hepatitis and tetanus shots current and practice good hygiene. No food or drink should be consumed while working in the reclaimed water irrigation area. Smoking is also prohibited due to the possibility of hand to mouth contamination. Wear boots, gloves, or other protective clothing to minimize direct contact with reclaimed water.

3. Workers should wash thoroughly and, if possible, change from their work clothing before leaving the facility. Wash thoroughly with a disinfectant soap before eating or smoking. Drink only water obtained from the faucets in the control building or brought from home.

4. Workers should make sure that the area is clear of people that may get sprayed before running the irrigation system.

5. Report any problem to your supervisor that you feel could pose a risk.
SECTION 3 - DESCRIPTION OF IRRIGATION SITE

3.1 SITE LOCATION

The irrigation sites are in Sparks and Spanish Springs, Nevada. A complete description of each sites' location is in the "City of Sparks Parks and Recreation Site Information and Effluent Demands for Sites Irrigated Under Permit Conditions" located in Appendix F, and again in each individual appendix for the respective site.

A schematic of the effluent distribution piping to the sites are shown in Figures 3.1 and 3.2.

3.2 EFFLUENT STORAGE

There will be no effluent storage at any of the City of Sparks Parks and Recreation sites.

3.3 BUFFER ZONES

Since 1994, the effluent from TMWRF is of the quality that no buffer zone is required for the effluent application. The geometric mean in any 30 day period was below the 2.2 c.f.u./100mL throughout the summer months of 2001. The monthly geometric mean fecal coliform was never greater than the 2.2 c.f.u./100mL in 2001 (Figure 3.3: 2001 TMWRF Fecal Coliform (Geometric Mean)).

The single maximum value rarely exceeds 23 fecal coliform bacteria. Individual measurements were above the maximum value of 23 c.f.u./100 mL six times in 2001 with the majority of these occurring in the winter months (Figure 3.4: 2001 TMWRF Fecal Coliform (MPN/100mL)). Also enclosed is a copy of the 2001 TMWRF Performance Summary Sheet (Figure 3.5). The TMWRF discharge permit does not require these low coliform values. The plant operator modified the system in order to demonstrate that such a low coliform level could be provided for this project. The intent is to increase chlorine dosage in the contact tank to meet the coliform criteria during the irrigation season. Should additional chlorination be required, the chlorine residual will either be increased in the contact tank or by the construction of a separate injection point at the effluent pump station.

3.4 MONITORING WELLS

The quality of the effluent is such that monitoring wells are not necessary.

3.5 IRRIGATION SYSTEM METHOD OF APPLICATION

Effluent delivered to the City of Sparks Parks and Recreation sites are metered at the meter vaults. Adjustments will be made to the sprinkler heads as required to prevent ponding and runoff. Potable water lines will be identified and adjustments made to assure proper separation. Any exposed effluent distribution appurtenances will be posted and painted purple to clearly indicate that they are effluent fixtures.
Each City of Sparks Parks and Recreation irrigation site has its own grounds keepers and maintenance personnel who make daily inspections of the irrigation equipment and irrigation area. If ponding or a line break should occur they would find it, report it and repair it as needed.

City of Sparks Parks and Recreation operates with Rainbird timers that are connected to the Maxicom system. City of Sparks Parks and Recreation sites have been designed to irrigate at night as to reduce the possible human contact. City of Sparks Parks and Recreation sites have full time grounds personnel so they are able to respond to any emergency within 24 hours.
Figure 3.3: 2001 TMWRF – Geometric Mean of Fecal Coliform

2001 TMWRF Monthly Geometric Mean Fecal Coliform MPN/100 ml

Fecal Coliform cfu/100 ml

January

February

March

April

May

June

July

August

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October

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<td>1</td>
<td>1</td>
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<tr>
<td>31</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>7</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
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</tr>
</tbody>
</table>

Average: 1.118287 | 1.160129 | 1.118287 | 1.175548 | 1.118287 | 1.071731 | 1.24519 | 1.06938 | 1.047294 | 1.045734 | 1.118287 | 1.045734
Figure 3.5: 2001 TMWRF Performance Summary Sheet

Parameter Units: Flow is in MGD (Million Gallons per Day) All other units are in mg/L (milligrams per liter)

<table>
<thead>
<tr>
<th>month</th>
<th>year</th>
<th>eff flow</th>
<th>irrigation</th>
<th>inh inf</th>
<th>inf bod</th>
<th>inh eff</th>
<th>eff bod</th>
<th>inf ss</th>
<th>eff ss</th>
<th>inf tot p</th>
<th>eff tot p</th>
<th>eff tds</th>
<th>eff tot nh3</th>
<th>eff no3 n</th>
<th>eff tot n</th>
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</thead>
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<tr>
<td>January</td>
<td>2001</td>
<td>28.01</td>
<td>0</td>
<td>168</td>
<td>182</td>
<td>4</td>
<td>6</td>
<td>147</td>
<td>5</td>
<td>5.22</td>
<td>0.2</td>
<td>353</td>
<td>0.06</td>
<td>0.6</td>
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<td>February</td>
<td>2001</td>
<td>28.57</td>
<td>0</td>
<td>169</td>
<td>191</td>
<td>4</td>
<td>6</td>
<td>150</td>
<td>6</td>
<td>5.21</td>
<td>0.34</td>
<td>339</td>
<td>0.11</td>
<td>0.13</td>
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<td>March</td>
<td>2001</td>
<td>27.97</td>
<td>0</td>
<td>166</td>
<td>189</td>
<td>4</td>
<td>6</td>
<td>151</td>
<td>4</td>
<td>5.39</td>
<td>0.39</td>
<td>355</td>
<td>0.07</td>
<td>0.07</td>
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<td>April</td>
<td>2001</td>
<td>27.99</td>
<td>0</td>
<td>172</td>
<td>195</td>
<td>3</td>
<td>4</td>
<td>147</td>
<td>4</td>
<td>5.54</td>
<td>0.28</td>
<td>359</td>
<td>13.18</td>
<td>0.05</td>
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<tr>
<td>May</td>
<td>2001</td>
<td>27.49</td>
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<td>150</td>
<td>183</td>
<td>4</td>
<td>6</td>
<td>161</td>
<td>5</td>
<td>5.1</td>
<td>0.38</td>
<td>375</td>
<td>13.53</td>
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<td>June</td>
<td>2001</td>
<td>27.96</td>
<td>2.49</td>
<td>152</td>
<td>174</td>
<td>3</td>
<td>4</td>
<td>144</td>
<td>3</td>
<td>5.1</td>
<td>0.31</td>
<td>372</td>
<td>0.07</td>
<td>0.05</td>
<td>1.85</td>
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<tr>
<td>July</td>
<td>2001</td>
<td>28.01</td>
<td>2.07</td>
<td>156</td>
<td>173</td>
<td>5</td>
<td>6</td>
<td>139</td>
<td>6</td>
<td>4.87</td>
<td>0.36</td>
<td>382</td>
<td>0.28</td>
<td>0.18</td>
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<tr>
<td>August</td>
<td>2001</td>
<td>28.25</td>
<td>2.76</td>
<td>151</td>
<td>172</td>
<td>3</td>
<td>4</td>
<td>146</td>
<td>2</td>
<td>5.1</td>
<td>0.3</td>
<td>384</td>
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<td>0.09</td>
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<td>September</td>
<td>2001</td>
<td>29.46</td>
<td>2.13</td>
<td>144</td>
<td>171</td>
<td>3</td>
<td>3</td>
<td>145</td>
<td>2</td>
<td>4.97</td>
<td>0.27</td>
<td>374</td>
<td>0.02</td>
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<td>October</td>
<td>2001</td>
<td>28.56</td>
<td>0</td>
<td>148</td>
<td>169</td>
<td>2</td>
<td>3</td>
<td>139</td>
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<td>5.05</td>
<td>0.28</td>
<td>364</td>
<td>0.02</td>
<td>0.03</td>
<td>1.53</td>
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<tr>
<td>November</td>
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<td>190</td>
<td>4</td>
<td>5</td>
<td>155</td>
<td>3</td>
<td>5.27</td>
<td>0.5</td>
<td>370</td>
<td>0.1</td>
<td>0.04</td>
<td>1.43</td>
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<tr>
<td>December</td>
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<td>160</td>
<td>178</td>
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<td>376</td>
<td>0.05</td>
<td>0.11</td>
<td>2.08</td>
</tr>
<tr>
<td>Year Avg.</td>
<td>2001</td>
<td>28.24</td>
<td>1.05</td>
<td>159</td>
<td>180</td>
<td>4</td>
<td>5</td>
<td>148</td>
<td>4</td>
<td>5.16</td>
<td>0.33</td>
<td>367</td>
<td>2.33</td>
<td>0.34</td>
<td>3.33</td>
</tr>
</tbody>
</table>

3.6 CLIMATE

The evapotranspiration rate in the area averages 62.66 inches a year. This is supported by the values recorded in the area by NOAA. The average annual precipitation for each year from 1998-2001 was 8.13 inches (NOAA, 2001). During the irrigation season the wind direction is usually from the southwest. Appendix E shows the percent wind velocity and direction.

Table 3.1 - Total Precipitation 1998-2001 Sparks (NOAA, 1998-2001)

<table>
<thead>
<tr>
<th>Month</th>
<th>Precipitation (in.)</th>
<th>Month</th>
<th>Precipitation (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>1.63</td>
<td>1.26</td>
<td>2.32</td>
</tr>
<tr>
<td>February</td>
<td>2.20</td>
<td>1.81</td>
<td>1.28</td>
</tr>
<tr>
<td>March</td>
<td>--</td>
<td>0.24</td>
<td>0.60</td>
</tr>
<tr>
<td>April</td>
<td>0.99</td>
<td>0.55</td>
<td>0.37</td>
</tr>
<tr>
<td>May</td>
<td>1.54</td>
<td>0.22</td>
<td>0.68</td>
</tr>
<tr>
<td>June</td>
<td>1.36</td>
<td>0.08</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3.2 - Average Temperatures 1998-2001 Sparks (NOAA, 1998-2001)

<table>
<thead>
<tr>
<th>Month</th>
<th>Temperature (°F)</th>
<th>Month</th>
<th>Temperature (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>39.3</td>
<td>37.0</td>
<td>38.5</td>
</tr>
<tr>
<td>February</td>
<td>36.9</td>
<td>39.6</td>
<td>41.4</td>
</tr>
<tr>
<td>March</td>
<td>--</td>
<td>43.5</td>
<td>45.5</td>
</tr>
<tr>
<td>April</td>
<td>46.4</td>
<td>46.3</td>
<td>53.0</td>
</tr>
<tr>
<td>May</td>
<td>50.7</td>
<td>56.5</td>
<td>58.0</td>
</tr>
<tr>
<td>June</td>
<td>62.0</td>
<td>64.4</td>
<td>68.4</td>
</tr>
<tr>
<td></td>
<td>Annual</td>
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<td></td>
</tr>
</tbody>
</table>

3.7 SOILS

Soils data are provided in each individual site appendix.
3.8 NUTRIENT UPTAKE

Please see Appendix A for the detailed nitrogen worksheet provided by NDEP. The TMWRF effluent, based on 2001 monitoring data, averaged 3.33 mg/L. Figure 3.6 shows the effluent nitrogen and phosphorous data for 2001. The average value for phosphorous during the year was 0.33 mg/L. This wastewater effluent will be used for application on turf grasses. The areas where spray irrigation will be used will have restricted access and the areas irrigated by drip emitter will not have controlled access.

The nutrients applied to the soil should be balanced with the nutrients removed by the turf grass. Table 3.3 illustrates the nutrients removed by a variety of grasses and Douglas-fir trees. For the parks, the nitrogen supplied by effluent may not satisfy the turf grass nitrogen requirement. Also, most fine grained soils have a high adsorption capability for phosphorous. Phosphorous has not been known to cause adverse effects on crops nor is it known to cause adverse health effects (EPA, 1981). Thus high phosphorous in the soil should not be a problem.

Table 3.3 - Nutrient Uptake Rates (EPA, 1981 & Pettygrove et.al., 1986)

<table>
<thead>
<tr>
<th></th>
<th>Nitrogen (kg/ha·yr)</th>
<th>Phosphorous (kg/ha·yr)</th>
<th>Potassium (kg/ha·yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bentgrass</td>
<td>170</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Coastal Bermudagrass</td>
<td>400-675</td>
<td>35-45</td>
<td>225</td>
</tr>
<tr>
<td>Kentucky bluegrass</td>
<td>200-270</td>
<td>45</td>
<td>200</td>
</tr>
<tr>
<td>Ryegrass</td>
<td>200-800</td>
<td>60-85</td>
<td>270-325</td>
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<tr>
<td>Tall Fescue</td>
<td>150-325</td>
<td>30</td>
<td>300</td>
</tr>
<tr>
<td>Hybrid Poplar</td>
<td>300-400</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Douglas-fir plantation</td>
<td>150-250</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

Note: Multiply by 0.89 to obtain lbs/acre.

The turf grass will easily uptake the nitrogen supplied in the effluent please see Appendix A. As a result, the turf grass will require additional fertilization. Park managers must take into consideration the fertilizer value of the effluent when applying additional fertilizer. A nitrogen uptake of 600 kg/ha·yr (534 lb/acre) was used as a conservative estimate.
Figure 3.6: 2001 TMWRF Average Nitrogen and Phosphorus (mg/L)
SECTION 4 - OPERATION OF EFFLUENT IRRIGATION

4.1 OPERATION

Effluent application to the City of Sparks Parks and Recreation sites will be operated by the City of Sparks Parks and Recreation Department. The Plant Facilities Administrator is the primary responsible party and the City of Sparks Parks and Recreation Department Maintenance and Operations Personnel will be responsible for the day-to-day operation of the irrigation system. The Head Maintenance and Operations Personnel of the City of Sparks Parks and Recreation Department will sign the Discharge Monitoring Report (DMR) for each site using the meter data and TMWRF data supplied by the City of Sparks.

4.2 IRRIGATION VOLUMES AND WATER BALANCE

The irrigation peak day demand for each City of Sparks Parks and Recreation site is outlined in the “City of Sparks Parks and Recreation Site Information and Effluent Demands for Sites Irrigated Under Permit Conditions” located in Appendix F, and again in each individual appendix for the respective sites. The sites generally do not irrigate during the winter months. The sites will irrigate at night to prevent human contact.

4.3 WATER DEMAND

The water demand for each site is stated in the “City of Sparks Parks and Recreation Site Information and Effluent Demands for Sites Irrigated Under Permit Conditions” located in Appendix F, and again in each individual appendix. Also the plant consumptive worksheet provided by NDEP is located in Appendix A.

4.4 DAILY APPLICATION VOLUMES

The “City of Sparks Parks and Recreation Site Information and Effluent Demands for Sites Irrigated Under Permit Conditions,” (located in Appendix F, and again in each individual appendix) outlines the demand the individual sites may experience. This is based on the 2001 NOAA precipitation data and the ET data for the Sparks area.

4.5 AVOIDING PONDING AND/OR RUNOFF

Application rates that allow the transport of nutrients beyond the active root zone will not be allowed. The discharge to the irrigation area is to be checked and recorded each day the irrigation system is operated. The sites’ flow is to be measured at the meter vault. The meter vault locations and details are outlined in each individual appendix.

4.6 EFFLUENT IRRIGATION AREAS

The effluent irrigation areas are outlined in the figures located in each individual appendix for the respective sites.
SECTION 5 - CONVEYANCE FACILITIES AND CONTROLS

5.1 EFFLUENT DELIVERY SYSTEM CRITERIA

The effluent delivery system includes pumping capacity and pipe sizing for the effluent delivery system. Effluent storage will be added in a future project. The pumping facility is designed to deliver the maximum day irrigation demand to the park sites.

5.2 PIPELINE ROUTING

For information on pipeline routing, please refer to Figures 3.1 and 3.2.

The system is designed to deliver effluent to the City of Sparks Parks and Recreation sites as noted in the “City of Sparks Parks and Recreation Site Information and Effluent Demands for Sites Irrigated Under Permit Conditions.” A back pressure sustaining valve, at the meter vault, is set to assure system pressure in the pipeline.

Please see each individual appendix for sites controlled with an anemometer.

Monitoring of flow will be done at the meter and PRV vault locations. The meters are equipped with remote read devices. The City of Sparks will read all service meters periodically and use this information to complete their DMRs.
SECTION 6 - STAFF CONTACTS

Emergency Phone Numbers & Contacts in the Event of a Spill or Discharge:

TMWRF

Randall Gray
Manager of Wastewater Treatment
Truckee Meadows Water Reclamation Facility
P.O. Box 857
Sparks, Nevada 89432-0857
8500 Clean Water Way
Reno, Nevada 89503
(775) 861-4100

NDEP

Leo Drozdoff
Bureau Chief
Water Pollution Control Bureau
Nevada Department of Environmental Protection
333 West Nye Lane
Capitol Complex
Carson City, Nevada 89701
775-687-9416
ldrozdoff@ndep.state.nv.us

SPARKS

Wayne Seidel
Public Works Director
City of Sparks
431 Prater Way
Sparks, Nevada 89431
775-353-2330
wseidel@ci.sparks.nv.us

Brian Bessette
Parks Maintenance Superintendent
Sparks Parks & Recreation Department
98 Richards Way
Sparks, NV 89431
(w) 775-353-7837 (c) 775-691-9481
bbessette@ci.sparks.nv.us

In case of an emergency:
1) The grounds personnel are to contact Brian Bessette immediately.
2) Then refer to the Reclaimed Water Run-Off Control Plan on page 3.
6.2 COMMUNICATIONS PROCEDURES

The communication procedures between all parties involved is as follows:

1. The maintenance personnel are to report to Brian Bessette who is listed in the staff contacts on page 18.
2. Brian Bessette is to contact Wayne Seidel who is listed in the staff contacts on page 18.
3. Wayne Seidel will contact:
   a. Leo Drozdoff the Water Pollution Control Bureau at the Nevada Department of Environmental Protection who is listed under the staff contacts on page 18.
   b. Randall Gray the Truckee Meadows Water Reclamation Facility's Manager who is listed in the staff contacts on page 18.

It is IMPORTANT to remember that any contact with the effluent could be harmful to your health. YOU MUST REMEMBER:

1. Reclaimed wastewater may contain disease-causing organisms and viruses. Skin contact with reclaimed wastewater can result in various skin rashes, and open wounds are especially susceptible to infection. Treat cuts with disinfectant immediately.
2. Workers are to keep their typhoid, hepatitis and tetanus shots current and practice good hygiene. No food or drink should be consumed while working in the reclaimed water irrigation area. Smoking is also prohibited due to the possibility of hand to mouth contamination. Wear boots, gloves, or other protective clothing to minimize direct contact with reclaimed water.
3. Workers should wash thoroughly and, if possible, change from their work clothing before leaving the facility. Wash thoroughly with a disinfectant soap before eating or smoking. Drink only water obtained from the faucets in the control building or brought from home.
4. Workers should make sure that the area is clear of people that may get sprayed before running the irrigation system.
5. Report any problem to your supervisor that you feel could pose a risk.
SECTION 7 - DISCHARGE MONITORING REPORT (DMR)

7.1 DISCHARGE PERMIT

When issued a copy of the discharge permit will be included in Appendix B.

7.2 MONITORING REQUIREMENTS

A. Water Inventory
   1. Total effluent reuse flow (continuous monitoring using totalizer readings)
   2. Balance of loss to evaporation and percolation

B. Nutrient Balance
   1. Calculated annual nutrients applied from effluent (TMWRF)
   2. Other nutrients (N & P) from fertilizer
   3. Estimated nutrients removed by crop harvest
   4. Estimated annual nutrient balance in soil or lost to excess irrigation water

C. Effluent Test
   1. Fecal Coliform (weekly from TMWRF data)
   2. Chlorine Residual (weekly from TMWRF data)
   3. Total Nitrogen (TMWRF) (weekly; annual calculation from TMWRF data)
   4. Metals*
   5. Calcium Sodium adsorption ratio*

* These tests are optional

D. Soils Tests *
   1. pH *
   2. Cation exchange capacity and exchangeable cations *
   3. Electrical conductivity *
   4. Metals *

* These tests are optional

7.3 PROCEDURES

The irrigation practice will follow the procedures contained herein NAC 445A.275 through NAC 445A.278. The effluent will be of the quality to meet the discharge permit. A buffer zone is not required at this level of disinfection.

The spray irrigators will be adjusted to discharge near the ground surface and away from areas of normal and frequent public use and at restricted angles to minimize aerosols. Areas shall be posted notifying the public of effluent reuse and routine times of irrigation will be indicated to the public.

No routine spray irrigation is to take place when the public is allowed or present on the irrigation sites.
7.4 CALCULATIONS

A. Water Inventory

Total Flow: Tabulate the total annual flow from the totalizer data from the monthly flow rate recordings form. This is the net effluent applied.

B. Nitrogen Nutrient Balance

The nitrogen balance was calculated using a formula provided by the Nevada Department of Environmental Protection. The formula is found on Worksheet 2-A from Appendix Two out of the NDEP document WTS-1B. Please see Appendix A.

7.5 PROCEDURES FOR PREVENTING/REDUCING TIME OF PONDING

Prior to effluent application, the occurrence of ponding must be evaluated at each of the individual City of Sparks Parks and Recreation sites. Once the areas where ponding occurs are identified, the irrigation system will be adjusted to reduce the time and instances of ponding.

7.6 OPERATION PROCEDURES

Managing the application of the effluent will control runoff at the irrigation site. The City of Sparks Parks and Recreation Department Staff will be responsible for monitoring effluent reuse water to ensure that no discharges occur to surface waters.

In addition to the discharge limitations and the monitoring requirements outlined in Table 2.1 the permit requires the following (excerpt from NDEPS Permit Number NEVXXX):

1. The irrigation shall not cause objectionable odors from the reuse areas.
2. There shall be no discharge of substances that would cause a violation of water quality standards of the State of Nevada.
3. The spray irrigation shall be conducted in such a manner, which inhibits the treated effluent from drifting or carrying off site.
4. The irrigation areas shall be posted with conspicuous warning signs that state “Reclaimed Water - Do Not Drink”.
5. The irrigation distribution facilities shall be operated in accordance with the Effluent Management Plan which must be approved by the Division.
6. The permittee shall remit an annual review and services fee in accordance with NAC 445A.232.
7. The Discharge Monitoring Reports (DMRs) must be signed by the facilities highest ranking officer. The first DMR submitted under this permit must include the written designation of the officer as the authorized
representative to sign the DMRs. If the officer in responsible charge changes, a new designation letter must be submitted.

8. Irrigation of the City of Sparks Parks and Recreation sites shall be performed in such a manner as to reduce standing water to a minimum. Run-off of effluent is prohibited.

9. The permittee shall provide a copy of a brief, but complete and understandable, document describing the possible hazards and proper hygiene of working with and around treated wastewater to all grounds keepers.

10. Schedule of compliance
   a. The permittee shall achieve compliance with the effluent limitations upon issuance of the permit.
   b. Prior to the effluent application submit an Effluent Management Plan (EMP) for Division Approval. Following the receipt of the Division’s comments, the permittee must submit the final EMP within 14 calendar days.

11. The effluent facilities and irrigation application sites should be checked daily. Effluent is provided by TMWRF.

12. The City of Sparks Parks and Recreation sites generally do not irrigate during the winter months.

13. The day-to-day attention of City of Sparks Parks and Recreation personnel is the primary means of preventing run-off from the site.

7.7 PREVENTION MEASURES AND PROCEDURES

The concentration of pathogens in aerosols is directly related to their concentration in the wastewater. Studies show that in the spray irrigation of wastewater 0.1% to 2.0% of the water is aerosoled. Aerosols are defined as particles ranging from 0.01 to 50 μm in diameter that are suspended in air. In general, pathogens in aerosols remain viable and travel farther with increased wind velocity, increased relative humidity, lower temperature, and darkness (Pettygrove et.al., 1986). Prevention of public exposure will be accomplished by the irrigation schedule and public notification.

7.8 HYGIENE

Listed below are the risks and precautions to be taken while using reclaimed wastewater for irrigation.

1. Reclaimed wastewater may contain disease-causing organisms and viruses. Skin contact with reclaimed wastewater can result in various skin rashes, and open wounds are especially susceptible to infection. Treat cuts with disinfectant immediately.

2. Workers are to keep their typhoid, hepatitis and tetanus shots current and practice good hygiene. No food or drink should be consumed while working in the reclaimed water irrigation area. Smoking is also prohibited due to the possibility of hand to mouth contamination. Wear boots,
gloves, or other protective clothing to minimize direct contact with reclaimed water.

3. Workers should wash thoroughly and, if possible, change from their work clothing before leaving the facility. Wash thoroughly with a disinfectant soap before eating or smoking. Drink only water obtained from the faucets in the control building or brought from home.

4. Workers should make sure that the area is clear of people that may get sprayed before running the irrigation system.

5. Report any problem to your supervisor that you feel could pose a risk.

7.9 DISPOSAL OF EFFLUENT DURING EMERGENCIES

During emergencies the effluent volume from the TMWRF will be discharged into the Steamboat Creek as per NDEP permit number NV0020150.

7.10 PUBLIC NOTIFICATION

The public shall be notified of the effluent reuse per NAC 445A.275.3 by either the existing red and white warning signs stating "Caution Reclaimed Water – Do Not Drink" or by the new purple caution signs in the example below. The signs will be posted on the edges of the site identifying the area as a wastewater control facility.

![Sign Example]

Signs are to be placed at all corners, gates and at 300 foot intervals around the indicated areas. As the existing red and white signs need to be replaced the new purple signs in the above example will replace them. Other suggestions for public notification are:

1. Once per year notice in the local newspaper.
SECTION 8 - COMPLETE SET OF FORMS AND CHARTS FOR REQUIRED INFORMATION
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Quantity or Loading</th>
<th>Quality or Concentration</th>
<th>No. of Exceptions</th>
<th>Frequency of Analysis</th>
<th>Sample Type</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>30-Day Average</td>
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<td>Permit Requirement</td>
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I certify under penalty of law that I have personally examined and am familiar with the information submitted herein; and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. See 18 U.S.C. §1001 and 33 U.S.C. §1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)

Name/Title Principal Executive Officer (Typed or Printed)

Signature of Principal Executive Officer or Authorized Agent

DATE: _______________ Month _______________ Day _______________ Year

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)
GENERAL INSTRUCTIONS FOR COMPLETING THE DISCHARGE MONITORING REPORT *(OMB NO. 2000-0015)*

1. If the Discharge Monitoring Report (DMR) has been partially completed by preprinting, disregard instructions directed at entry or that information already preprinted.

2. Enter "Permittee Name/Mailing Address (and facility name/location, if different)", "Permit Number", and "Discharge Number" where indicated. (A separate form is required for each discharge).

3. Enter dates beginning and ending "Monitoring Period" covered by form where indicated.

4. Enter each "Parameter" as specified in monitoring requirements of permit. (Generally Page 2)

5. Enter "Sample Measurement" data for each parameter under "Quantity" and "Quality" in units specified in permit. "Average" is normally arithmetic average (geometric average for bacterial parameters) of all sample measurements for each parameter obtained during "Monitoring Period"; "Maximum" and "Minimum" are normally extreme high and low measurements obtained during "Monitoring Period". (Note to municipals with secondary treatment requirements; Enter 30-day average of sample measurements under "Average" and enter maximum 7-day average of sample measurements obtained during monitoring period under "Maximum").

6. Enter "Permit Requirement" for each parameter under "Quantity" and "Quality" as specified in permit.

7. Under "No Ex" enter number of sample measurements during monitoring period that exceed maximum (and/or minimum or 7-day average as appropriate) permit requirement for each parameter. If none, enter "0".

8. Enter "Frequency of Analysis" both as "Sample Measurement" (actual frequency of sampling and analysis used during monitoring period) and as "Permit Requirement" specified in permit. (e.g., Enter "Cont", for continuous monitoring, "1/7" for one day per week, "1/30" for one day per month, "1/90" for one day per quarter, etc.).

9. Enter "Sample Type" both as "Sample Measurement" (actual sample type used during monitoring period) and as "Permit Requirement". (e.g., Enter "Grab" for individual sample, "24HC" for 24-hour composite, "Cont" for continuous monitoring, etc.).

10. Where violations of permit requirements are reported, attach a brief explanation to describe cause and corrective actions taken, and reference each violation by date. This is to be submitted with the DMR.
11. If "No Discharge" occurs during monitoring period, write "NO DISCHARGE" across the entire form in place of data entry.

12. Enter "Name/Title of Principal Executive Officer" with "Signature of Principal Executive Officer of Authorized Agent", "Telephone Number", and "Date" at bottom of form.

13. Mail one (1) original signed DMR to the NDEP, one (1) copy to EPA in S.F. (if applicable) and retain one (1) copy for your records. The DMR must be received by the date(s) specified in the permit.

14. More detailed instructions for use of this DMR form may be obtained from the Compliance Coordinator of the Nevada Division of Environmental Protection at (775) 687-4670, Ext. 3152.

**PAPERWORK REDUCTION ACT NOTICE**

Public reporting burden for this collection of information is estimated to vary from a range of 10 hours as an average per response for some minor facilities, to 110 hours as an average per response for some major facilities, with a weighted average for major and minor facilities of 18 hours per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Chief, Information Policy Branch, PM-223, U.S. Environmental Protection Agency, 401 M Street, SW, Washington, DC 20460; and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503.

**LEGAL NOTICE**

This report is required by law (33 U.S.C. 1318; 40 C.F.R. 125.27). Failure to report or failure to report truthfully can result in civil penalties not to exceed $10,000 per day of violation; or in criminal penalties not to exceed $25,000 per day of violation or by imprisonment for not more than one (1) year, or by both.
<table>
<thead>
<tr>
<th>DATE &amp; TIME</th>
<th>METER Q (gpm)</th>
<th>Totalizer Reading</th>
<th>Total Gallons</th>
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</table>
YEARNITROGEN BALANCE

(A) Average N (available from TMWRF) = .................................(mg/L)

Flow

(B) Initial Yearly Totalizer Reading = .................................(Gallons)

(C) Final Yearly Totalizer Reading = .................................(Gallons)

(D) Total Flow for a Year = C-B = .................................(Gallons/Year)

Nitrogen

(E) Effluent N Application less 20% Soil Denitrification = D*A* 8.34*0.80/1,000,000

= .................................(lbs./Acre-Year)

Irrigation Area

(F) Area = ______ Acres

(G) N Application = E/F = .................................(lbs./Acre-Year)

Fertilizer Nitrogen Application

(H) Nitrogen Applied to Parks = .................................(lbs./Year)

(I) N Application = H/F = .................................(lbs./Acre-Year)

Total N Applied

(J) Total N Applied = I+G = .................................(lbs./Acre-Year)

Total N Uptake Available

(K) N uptake for plants = *133.5 lbs./Acre-Year (a conservative value)

*Note: When specific plants are used the uptake rate may be adjusted.
Reclaimed Water Run-Off Reporting Sheet

Date and Time of Discharge: __/__/____ - ___

<table>
<thead>
<tr>
<th>Location of Discharge:</th>
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<tbody>
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<tr>
<th>Estimated Amount of Discharge:</th>
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<tr>
<th>Flow Path of Discharge:</th>
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<tr>
<th>Bodies of Water Discharge Reached:</th>
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<tr>
<th>Cause of Discharge:</th>
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<tr>
<th>Corrective Actions Taken:</th>
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<tr>
<th>Preventative Actions Taken to Prevent Future Discharge:</th>
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</table>
PLANT CONSUMPTIVE USE WORKSHEET

The consumptive use equation for determining the crop's water requirement takes into account precipitation, evapotranspiration, the efficiency of the irrigation system, and the salt tolerance of the plant species. The salt tolerance of the plant species is used to calculate the leaching requirement (Lr) to remove excess salts from the root zone. Excess salts within the soil cause the plant cells to expend more energy adjusting the salt concentration within the plant tissues, and therefore, less energy is available for vigorous plant growth. The hydraulic loading rate and the TDS to ECw conversion equation included below are derived from *Wastewater Engineering: Treatment, Disposal, and Reuse*, (Metcalf and Eddy, 1991), the equation for the leaching requirement is from the *Nevada Irrigation Guide*, (USDA, Soil Conservation Service, 1981).

\[
Lw_{(e)} = \frac{(ET-P)}{[E \times (1-Lr)]} \quad \text{Lr} = \frac{ECw}{[(5 \times E_c)-ECw]}
\]

where:

- \(Lw_{(e)}\) = Allowable Hydraulic Loading Rate Based on Crop Water Needs (in/yr);
- \(ET\) = Evapotranspiration Rate (in/yr);
- \(P\) = Precipitation Rate (in/yr);
- \(Lr\) = Leaching Requirement (% expressed as a fraction);
- \(E\) = Efficiency of Irrigation System (% expressed as a fraction)
  - For example: 75% = 75/100 = 0.75; example efficiencies are included below;
- \(E_c\) = Salinity Tolerance of Plant Crop (mmho/cm or dS/m)\(^{11}\);
- \(ECw\) = Salinity of Applied Effluent (mmho/cm); If TDS is supplied by the laboratory, see conversion below; and
- \(TDS\) = Average Total Dissolved Solids in Applied Effluent (mg/l).

**"ET" - Evapotranspiration**

Evapotranspiration is defined as the "loss of water from the soil both by evaporation and by transpiration from the plants growing thereon" (Webster's Dictionary, 1990). Since different plants transpire at different rates, a crop coefficient (Kc) can be used to modify the potential ET for a particular area. Values for Kc vary depending upon the geographical location of the crop, and the species grown. If a crop coefficient can be determined, when multiplied by the potential ET rate, the result is a more accurate estimate of ET for an irrigation site. The Division recommends that reusers contact local agriculture representatives identified in Appendix Five for further crop-specific and regional information.

**"E" - Irrigation Efficiency**

The irrigation system efficiency is related to how effective the method is in delivering the irrigation water equally to all parts of the crop. Example values for efficiency are\(^{10}\):

<table>
<thead>
<tr>
<th>Sprinkler Irrigation Type</th>
<th>Application Efficiency</th>
<th>Surface Irrigation Type</th>
<th>Application Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid Set</td>
<td></td>
<td>Narrow Graded Border (&lt; 15' wide)</td>
<td>0.65 - 0.85</td>
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<tr>
<td>Portable Hand Move</td>
<td></td>
<td>Wide Graded Border (&lt;100' wide)</td>
<td>0.65 - 0.85</td>
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<tr>
<td>Wheel Roll</td>
<td>0.70 - 0.80</td>
<td>Level Border</td>
<td>0.75 - 0.90</td>
</tr>
<tr>
<td>Center Pivot or Traveling Lateral</td>
<td></td>
<td>Straight or Graded Contour Furrows</td>
<td>0.70 - 0.85</td>
</tr>
<tr>
<td>Traveling Gun</td>
<td></td>
<td>Drip</td>
<td>0.70 - 0.85</td>
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</table>
"Ece" - Salinity Tolerance of Plant Crop
The plant salt tolerance is crop-specific, and can be obtained from the local Extension Service, literature, or other reputable sources. The low end of the range identifies the ECe value which would result in a 0% reduction of crop yield. The upper end of the range identifies the ECe value which could result in a 25% reduction of crop yield\(^4\).

Example ECe's:
- Annual Ryegrass\(^2\) = 3 to 6 mmho/cm or dS/m
- Perennial Ryegrass\(^2,4\) = 5.6 to 8.9 mmho/cm or dS/m
- Bermudagrass\(^2,4\) = 6.9 to 10.8 mmho/cm or dS/m
- Tall Fescue\(^3,4\) = 3.9 to 8.6 mmho/cm or dS/m
- Alfalfa\(^3,4\) = 2.0 to 5.4 mmho/cm or dS/m

"ECw" - Salinity of Applied Effluent
Direct measurement of ECw is typically preferred. However, if the laboratory has supplied the reuser with a concentration of TDS, an approximate conversion\(^4\) is ECw = TDS + 640. This conversion is considered accurate within 10%. The value for ECw or TDS is obtained from the treatment plant supplying the effluent. For site design, an average value can be used. For completion of the required annual balance report, the actual analytical results from Discharge Monitoring Reports should be used.

\(^{1}\) For clarity in this document, the unit for electrical conductivity (EC) is expressed as mmho/cm. However, EC can also be expressed in decisiemens per meter, dS/m.
\(^{2}\) 1 mmho/cm = 1 dS/m
\(^{4}\) Wastewater Engineering: Treatment, Disposal, and Reuse, (Metcalf and Eddy, 1991)
Worksheet 1-A

CONSUMPTIVE USE REQUIREMENT WORKSHEET:
Maximum Loading Rate Based on Plant Water Use Requirements

Page _____ of _____  Crop Type = ____________________

\[ Lw_{(c)} = \frac{\text{(ET-P)}}{[E \times (1-Lr) \times \text{ECw}]} \]

\[ Lr = \frac{\text{ECw}}{[(5 \times \text{ECe}) - \text{ECw}]} \]

\[ \text{ECw} = \text{TDS} + 640 \]

(A) Annual Evapotranspiration (ET, in/yr) = ____________
(Multiply by Crop Coefficient (Kc) if value is known)

(B) Annual Precipitation (P, in/yr) = ____________

(C) (A) - (B) = ____________ (in/yr)

(D) Salinity of Applied Effluent (ECw, mmho/cm) or = (TDS, mg/l) ÷ 640 = ____________
(Indicate which method was used to determine ECw, Direct Measurement or Approximation by Calculation.)

(E) Salinity Tolerance of Plant Crop (ECe, mmho/cm) = ____________

(F) 5 x (E) = ____________ (mmho/cm)

(G) (F) - (D) = ____________ (mmho/cm)

(H) Leaching Requirement (Lr, %, expressed as a fraction) = (D) ÷ (G) = ____________

(I) 1 - (H) = ____________

(J) Efficiency of Irrigation System (E, %, expressed as a fraction) = ____________

(K) (J) x (I) = ____________

(L) (C) ÷ (K) = Lw_{(c)} = ____________ (inches/year)

If the water use rate calculated in ("L") above is the lowest application volume calculated between the annual Consumptive Use Limit (This Worksheet) and the Nitrogen Limit (Worksheet 2-A), then fill out Worksheet 1-B to estimate the planned maximum daily flow for the site.
Worksheet 1-B

CONSUMPTIVE USE REQUIREMENT WORKSHEET:
Maximum Loading Rate Based on Plant Water Use Requirements

Page _____ of _____ Crop Type = ________________

\[ Lw_{(e)} = \frac{(ET-P)}{E \times (1-Lr)} \quad \text{Lr} = \frac{ECw}{((5 \times ECe) - ECw)} \quad \text{ECw} = \text{TDS+640} \]

Monthly values for evapotranspiration are dependent on the crop type and regional area of the site, as well as the crop coefficient if known. Monthly precipitation is also regional. The values for ET and P can be obtained from the local extension service, literature, or other reputable source. Please see the explanation in the “WTS-1B: Appendix One” text for further discussion of crop coefficients.

To calculate the monthly value for \( Lw_{(e)} \), perform the calculation for each month as outlined in Worksheet 1-A, and input the result in the table below. Since this form is crop-specific, a value of zero is acceptable when the crop is not in season; however, use of a zero should be explained.

Million Gals/Mo = \( Lw_{(e)} \) in/mo \( \times \) ________ ac \( \times \) 12 in/ft \( \times \) 43,560 ft\(^2\)/ac \( \times \) 7.481 gals/ft\(^3\) \( \div \) 1,000,000

(Enter and use the number of acres for the crop type being irrigated)

\[ \text{MGD (Million gallons/day) = M Gallons/mo + Days/mo} \]

<table>
<thead>
<tr>
<th>Month</th>
<th>Days/Mo</th>
<th>ET (in/mo)</th>
<th>P (in/mo)</th>
<th>( Lw_{(e)} ) (in/mo)</th>
<th>M Gals/Mo</th>
<th>MGD</th>
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Totals (in/yr): [ ] [ ] [ ]

Note: These values should approximate the annual values calculated in Worksheet 1-A.
WTS-1B: APPENDIX TWO

NITROGEN LOADING LIMIT WORKSHEET

The nitrogen loading equation takes into account precipitation, evapotranspiration, plant nitrogen uptake, nitrogen content of the applied effluent, nitrogen denitrification and volitilization in the soils, and allowable percolate nitrogen concentration. The equation included below is from Wastewater Engineering: Treatment, Disposal, and Reuse, (Metcalf and Eddy, 1991)

\[ L_{w(a)} = \left( \frac{(C_p, mg/l) \times (P-ET, in/yr) + (U, lb/acre-yr) \times (4.4)}{(1-f) \times (C_n, mg/l)} \right) - (C_p, mg/l) \]

where:

- \( L_{w(a)} \) = Allowable Hydraulic Loading Rate Based on Nitrogen Loading rate (in/yr);
- \( C_p \) = Total Nitrogen Concentration in Percolating Water (mg/l);
- \( ET \) = Evapotranspiration Rate (in/yr);
- \( P \) = Precipitation Rate (in/yr);
- \( U \) = Nitrogen Uptake Rate by Crop (lb/acre-yr);
- \( 4.4 \) = Combined Conversion Factor;
- \( C_n \) = Total Nitrogen Concentration in Applied Wastewater (mg/l); and
- \( f \) = Fraction of Applied Total Nitrogen Removed by Denitrification and Volatilization.

"Cp" - Nitrogen in Percolating Water
A conservative value for Total N in the water that percolates past the root zone (Cp) is 7 mg/l, which is the first "red flag" value for Nitrate as N in monitoring well samples. Setting the Cp limit at a constant value aids in obtaining an hydraulic nitrogen loading rate (\( L_{w(a)} \)) which should be protective of groundwater resources. The drinking water standard for Nitrate as N is 10 mg/l, which would be the maximum allowable value for Cp.

"ET" - Evapotranspiration
Evapotranspiration is defined as the "loss of water from the soil both by evaporation and by transpiration from the plants growing thereon" (Webster's Dictionary, 1990). Since different plants transpire at different rates, a crop coefficient (Kc) can be used to modify the potential ET for a particular area. Values for Kc vary depending upon the geographical location of the crop, and the species grown. If a crop coefficient can be determined, when multiplied by the potential ET rate, the result is a more accurate estimate of ET for an irrigation site. The Division recommends that reusers contact local agriculture representatives identified in Appendix Five for further crop-specific and regional information.

"U" - Crop Nitrogen Uptake
Plant nitrogen uptake rates (U) are crop-specific, and can be obtained from the local Extension Service, literature, or other reputable sources. Using the accepted value for U in this equation assumes that the harvested portion of the crop is removed from the site. If plant cuttings are not removed from the area, then the amount of nitrogen removed by uptake should be offset by the amount of nitrogen returned to the soil by decomposing cutting materials. If alfalfa, or another legume, is the site's crop, then similar considerations should be made for atmospheric nitrogen which is fixed into the soil by alfalfa. A discussion with the local agricultural extension service is recommended prior to finalizing a "U" value.
"Cn" - Nitrogen in Applied Wastewater
The total nitrogen in the applied effluent water (Cn) can be obtained from the treatment plant that is supplying the effluent. For site design, an average value can be used. For completion of the required annual balance report, the actual analytical results from Discharge Monitoring Reports shall be used.

"f" - Nitrogen lost to Denitrification and Volatilization
The amount of nitrogen lost to denitrification and volatilization varies depending upon the nitrogen characteristics of the applied wastewater and the microbial activity in the soil. Microbial denitrification, in soils with a sufficient carbon source for the biological activity, may account for as much as 15 to 25 percent of the applied nitrogen during warm, biologically active months. Volatilization of ammonia may be as much as 10 percent, depending upon the ammonia fraction in the total nitrogen applied. (Metcalf & Eddy, 1991) For arid climates, such as Nevada, the value typically used for the "f" term is 0.2.

Nitrogen Addition by Chemical Fertilizers
If the allowable reuse water application volume is limited by plant consumptive use (Worksheet 1-A), nitrogen may need to be added by commercial fertilizer. In the design of a reuse site, and preparation of an EMP, this should be estimated to provide the site operator with a guideline for fertilizer application, in addition to the nitrogen being applied via the treated effluent. The application of fertilizer must then be incorporated into the required annual report to demonstrate that the application of commercial nitrogen and effluent nitrogen did not exceed the plant crop’s uptake rate.

Worksheet 2-C is designed to be used to provide the Division with the required annual report of effluent and fertilizer usage. Reuse permits require that the annual evaluation of the effluent application include, "the total nitrogen in the applied wastewater, nitrogen from fertilizer applications, nitrogen uptake by plant materials, evapotranspiration rate, precipitation rate, and fraction of applied nitrogen removed by denitrification and volatilization." While Worksheet 2-C does not take precipitation and evapotranspiration into account, the permittee should compare each year’s P and ET rates to those that were used during the site design and EMP preparation phases to ensure that the original assumptions remain valid.

Worksheet 2-C can also be utilized as a site management tool to estimate the amount of commercial fertilizer which may be required in an upcoming month. However, use of the worksheet in this manner does not preclude the responsible use of good irrigation and nutrient management practices.
Worksheet 2-A

WATER REQUIREMENT DESIGN WORKSHEET:
Maximum Hydraulic Loading Rate Based On Annual Nitrogen Balance Evaluation

Page _____ of _____ Crop Type = _________________

\[ Lw_{(a)} = \left[ \frac{Cp \times (P-ET)}{[(1-f) \times Cn]} - Cp \right] + (U \times 4.4) \]

(A) Total Nitrogen in Percolating Water (Cp, mg/l) = __________

(B) Annual Precipitation (P, in/yr) = __________

(C) Annual Evapotranspiration (ET, in/yr) = __________

(Multiply by Crop Coefficient (Kc) if value is known)

(D) \( (B) - (C) = \) __________ (in/yr) (Note: In Nevada, P is less than ET; therefore a negative number is correct to use in this worksheet.)

(E) \( (A) \times (D) = \) __________

(F) Crop Nitrogen Uptake (U, lb/ac-yr) = __________

(G) \( (F) \times 4.4 = \) __________

(H) \( (E) + (G) = \) __________

(I) Fraction of Applied Total Nitrogen Lost to Denitrification and Volatilization (f) = _____

(J) \( 1 - (I) = \) __________

(K) Total Nitrogen in Applied Effluent (Cn, mg/l) = __________

(L) \( (J) \times (K) = \) __________

(M) \( (L) - (A) = \) __________

(N) \( (H) + (M) = Lw_{(a)} \) (inches/year) = __________

If the Water Use Rate calculated in (“N”) above is the lowest application volume calculated for the annual Consumptive Use Limit (Worksheet 1-A) or the Nitrogen Limit (This Worksheet), then fill out Worksheet 2-B to estimate the planned maximum daily flow for the site.
Worksheet 2-B

WATER REQUIREMENT DESIGN WORKSHEET:
Maximum Hydraulic Loading Rate Based On Annual Nitrogen Balance Evaluation

Page _____ of _____  Crop Type = __________________

\[ Lw_{(o)} = \frac{[Cp \times (P-ET)] + (U \times 4.4)}{[(1-f) \times Cn] - Cp} \]

Monthly values for evapotranspiration are dependant on the crop type and regional area of the site, as well as the crop coefficient if known. Monthly precipitation is also regional. The values for ET and P can be obtained from the local extension service, literature, or other reputable sources. Please see the explanation in the “WTS-1B: Appendix Two” text for further discussion of crop coefficients.

The monthly value of the crop nitrogen uptake (U) can be calculated according to the equation included on the Table. Please see the discussion in the “WTS-1B: Appendix Two” text regarding “U” values for alfalfa crops or sites that do not remove crop cuttings. If a different distribution of monthly “U” is used, due to circumstances such as germination or dormancy periods, then provide documentation explaining the difference.

To calculate the monthly value for \( Lw_{(o)} \), perform the calculation for each month as outlined in Worksheet 2-A, using the monthly values for “U”, “P”, “ET”, and “Cn”, and input the result in the table below. Since this form is crop-specific, a value of zero is acceptable when the crop is not in season; however, use of a zero should be explained.

Monthly \( U \) (lb/ac-mo) = \( U \) (lb/ac-yr) \times ET(in/mo) - ET (total in/yr)

Million Gallons = \( Lw_{(o)} \) in/mo \times \frac{\# \text{ acres}}{12 \text{ in/ft}} \times 43,560 \text{ ft}^2/\text{ac} \times 7.481 \text{ gallons/ft}^3 \div 1,000,000

Per Month (ea. crop type)

<table>
<thead>
<tr>
<th>MGD (Million gallons/day) = M Gallons/mo ÷ Days/mo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Month</td>
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<td>Dec</td>
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</table>

| Totals: |         |          |            |             |                 |          |                     |

Note: The totals for P, ET and \( Lw_{(o)} \) should approximate the annual values used or calculated in Worksheet 2-A.
**Worksheet 2-C:** Regardless of the limiting hydraulic loading rate that was defined during the design phase, Worksheet 2-C is designed to be used to provide the Division with the required annual report of effluent and fertilizer usage.

\[
\text{Effluent N Applied} = \frac{\text{(lb/ac-mo)}}{\text{MGD Applied}} \times \frac{\text{mg/l}}{\text{Effluent N Conc.}} \times 8.34 \times \frac{\# \text{ days/mo}}{\# \text{ Acres}} \times (1 - "P") \text{ (i.e. 0.2)}
\]

\[
\text{Fertilizer N Applied} = \text{Monthly Fertilizer used (lbs/mo)} \times \% \text{ N in Fertilizer (as a fraction)} \div \text{acres}
\]

**Crop Name and Nitrogen Uptake Requirement =**

\[
\text{(lbs/yr)}
\]

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</tbody>
</table>

**Total**

**The Total N Applied to the crop should be less than the crop's Nitrogen Uptake Requirement. Please see your permit for directions if it is not.**
REFERENCES


Pettygrove, G. Stewart and Asano, Takashi, 1986. Irrigation with Reclaimed Municipal Wastewater.

APPENDIX A - NDEP NITROGEN BALANCE WORKSHEET AND
CONSUMPTIVE USE WORKSHEET FROM APPENDICIES ONE AND
TWO OF THE WTS-1B
Worksheet 1-A

CONSUMPTIVE USE REQUIREMENT WORKSHEET:
Maximum Loading Rate Based on Plant Water Use Requirements

Crop Type = P: [Crop Name]

\[ \text{Lw}_{(c)} = \frac{(\text{ET}-\text{P})}{(\text{ECw})}; \quad \text{Lr} = \frac{\text{ECw}}{(5 \times \text{ECE})-\text{ECw}}; \quad \text{ECw} = \text{TDS}/640 \]

(A) Annual Evapotranspiration (ET, in/yr) = \(92.6\) (in/yr)
(Multiply by Crop Coefficient (Kc) if value is known)

(B) Annual Precipitation (P, in/yr) = \(19.9\) (in/yr)

(C) (A) - (B) = \(62.7\) (in/yr)

(D) Salinity of Applied Effluent (ECw, mmho/cm) or = (TDS, mg/l) \(640 = 5.7\)
(Indicate which method was used to determine ECw, Direct Measurement or Approximation by Calculation.)

(E) Salinity Tolerance of Plant Crop (ECE, mmho/cm) = \(3\)

(F) \(5 \times (E) = \frac{15}{5}\) (mmho/cm)

(G) (F) - (D) = \(4.3\) (mmho/cm)

(H) Leaching Requirement (Lr, %, expressed as a fraction) = (D) + (G) = \(100\)

(I) \(1 - (H) = 96\)

(J) Efficiency of Irrigation System (E, %, expressed as a fraction) = \(70\)

(K) (J) \times (I) = \(67\)

(L) (C) \div (K) = \text{Lw}_{(c)} = \frac{90.5}{9}\) (inches/year)

If the water use rate calculated in ("L") above is the lowest application volume calculated between the annual Consumptive Use Limit (This Worksheet) and the Nitrogen Limit (Worksheet 2-A), then fill out Worksheet 1-B to estimate the planned maximum daily flow for the site.
Worksheet 1-B

CONSUMPTIVE USE REQUIREMENT WORKSHEET:
Maximum Loading Rate Based on Plant Water Use Requirements

Page 1 of 1
Crop Type = Wildgrass @ Wild Creek 2001

\[
\text{Lw}_{(a)} = \frac{(ET-P)}{E \times (1-Lr)} \quad \text{Lr} = \frac{EC_w}{(5 \times EC_e - EC_w)} \quad \text{EC}_w = \text{TDS} + 640
\]

Monthly values for evapotranspiration are dependent on the crop type and regional area of the site, as well as the crop coefficient if known. Monthly precipitation is also regional. The values for ET and P can be obtained from the local extension service, literature, or other reputable source. Please see the explanation in the "WTS-1B: Appendix One" text for further discussion of crop coefficients.

To calculate the monthly value for \(\text{Lw}_{(a)}\), perform the calculation for each month as outlined in Worksheet 1-A, and input the result in the table below. Since this form is crop-specific, a value of zero is acceptable when the crop is not in season; however, use of a zero should be explained.

Million Gals/Mo = \(\text{Lw}_{(a)}\) in/mo \times \left[ \frac{155}{ac} \times 12 \text{ in/ft} \times 43,560 \text{ ft}^2/\text{ac} \times 7.481 \text{ gals/ft}^3 \right] + 1,000,000

(Enter and use the number of acres for the crop type being irrigated)

MGD (Million gallons/day) = M Gallons/mo ÷ Days/mo

<table>
<thead>
<tr>
<th>Month</th>
<th>Days/Mo</th>
<th>ET (in/mo)</th>
<th>P (in/mo)</th>
<th>Lw_{(a)} (in/mo)</th>
<th>M Gals/Mo</th>
<th>MGD</th>
</tr>
</thead>
<tbody>
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<td>1.08</td>
<td>7.24</td>
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<tr>
<td>May</td>
<td>31</td>
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<td>--</td>
<td>15.04</td>
<td>67.4</td>
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<td>Jun</td>
<td>30</td>
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<td>16.4</td>
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<tr>
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<td>15.12</td>
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<tr>
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<td>7.14</td>
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<td>10.63</td>
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<tr>
<td>Oct</td>
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<td>Totals (in/yr):</td>
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<td>1.99</td>
<td>90.27</td>
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</table>

Note: These totals should approximate the annual values calculated in Worksheet 1-A.
Worksheet 2-A

WATER REQUIREMENT DESIGN WORKSHEET:
Maximum Hydraulic Loading Rate Based On Annual Nitrogen Balance Evaluation

Page 1 of 1  Crop Type = *Uncross @ Winn Creek* 2001

\[ L_{w(0)} = \frac{[C_p x (P-ET)] + (U x 4.4)}{[(1-f) x Cn] - C_p} \]

(A) Total Nitrogen in Percolating Water (Cp, mg/l) = -6.4 mg/l

(B) Annual Precipitation (P, in/yr) = 1.99 in/yr

(C) Annual Evapotranspiration (ET, in/yr) = 62.66 in/yr

(Multiply by Crop Coefficient (Ke) if value is known)

(D) \((B) - (C) = 60.67 (in/yr)\) (Note: In Nevada, P is less than ET; therefore a negative number is correct to use in this worksheet.)

(E) \((A) x (D) = 394.16 \)

(F) Crop Nitrogen Uptake (U, lb/ac-yr) = 524 lb/ac-yr (EPA)

(G) \((F) x 4.4 = 2341.6 \)

(H) \((E) + (G) = 6291.2 \)

(I) Fraction of Applied Total Nitrogen Lost to Denitrification and Volatilization (f) = 0.2

(J) \(1 - (I) = 0.8 \)

(K) Total Nitrogen in Applied Effluent (Cn, mg/l) = 33.88 mg/l

(L) \((J) x (K) = 27.1 \)

(M) \((L) - (A) = 91.1 \)

(N) \((H) ÷ (M) = L_{w(0)} \) (inches/year) = 69.1

If the Water Use Rate calculated in ("N") above is the lowest application volume calculated for the annual Consumptive Use Limit (Worksheet 1-A) or the Nitrogen Limit (This Worksheet), then fill out Worksheet 2-B to estimate the planned maximum daily flow for the site.
Worksheet 2-B

WATER REQUIREMENT DESIGN WORKSHEET:
Maximum Hydraulic Loading Rate Based On Annual Nitrogen Balance Evaluation

\[ L_{w_{(n)}} = \frac{C_p \times (P-ET) + (U \times 4.4)}{[(1-f) \times Cn] - C_p} \left[ \left( \frac{4}{1} \right) - 4.87 \right] + 2344.6 \]

Monthly values for evapotranspiration are dependant on the crop type and regional area of the site, as well as the crop coefficient if known. Monthly precipitation is also regional. The values for ET and P can be obtained from the local extension service, literature, or other reputable sources. Please see the explanation in the "WTS-1B: Appendix Two" text for further discussion of crop coefficients.

The monthly value of the crop nitrogen uptake (U) can be calculated according to the equation included on the Table. Please see the discussion in the "WTS-1B: Appendix Two" text regarding "U" values for alfalfa crops or sites that do not remove crop cuttings. If a different distribution of monthly "U" is used, due to circumstances such as germination or dormancy periods, then provide documentation explaining the difference.

To calculate the monthly value for \( L_{w_{(n)}} \), perform the calculation for each month as outlined in Worksheet 2-A, using the monthly values for "U", "P", "ET", and "Cn", and input the result in the table below. Since this form is crop-specific, a value of zero is acceptable when the crop is not in season; however, use of a zero should be explained.

Monthly \( U \) (lb/ac-mo) = \( U \) (lb/ac-yr) \times ET (in/mo) \times ET (total in/yr) = \( \frac{5.34 \times ET/\text{mo}}{62.6} \)

Million Gallons = \( L_{w_{(n)}} \) in/mo \times \( \frac{105}{\text{ea. crop type}} \) # acres \times 12 in/ft \times 43,560 ft/acre \times 7.481 gallons/ft\(^3\) + 1,000,000

Per Month

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<tr>
<th>Month</th>
<th>Days/Mo</th>
<th>P (in/mo)</th>
<th>ET (in/mo)</th>
<th>U (lb/ac-mo)</th>
<th>( L_{w_{(n)}} ) (in/mo)</th>
<th>M Gals/Mo</th>
<th>MGD of Reclm'd Water</th>
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Totals: 1.99 62.66 534.1 68.1

Note: The totals for P, ET, and \( L_{w_{(n)}} \) should approximate the annual values used or calculated in Worksheet 2-A.
APPENDIX B – TMWRF NDEP DISCHARGE PERMIT
CITY OF SPARKS DISCHARGE PERMIT FOR:
DON MELLO SPORTS COMPLEX
SPARKS BOULEVARD AND VAN-METER PARK
SHADOW MOUNTAIN SPORTS COMPLEX
SHELLY PARK
PAH RAH PARK
LES HICKS PARK
WILLOW CREEK PARK
TRUCKEE MEADOWS FIRE FILL STATION
DON MELLO FILL STATION
NEVADA DIVISION OF ENVIRONMENTAL PROTECTION

AUTHORIZATION TO DISCHARGE

In compliance with the provisions of the Clean Water Act as amended, (33 U.S.C. 1251 et. seq; the "Act"), and Chapter 445A of the Nevada Revised Statutes (NRS), the Permittee,

Truckee Meadows Water Reclamation Facility
Cities of Reno and Sparks
P.O. Box 857
Sparks, Nevada 89432

is authorized to discharge from a facility located at:

8500 Clean Water Way
Reno, Nevada 89502
Latitude: 39° 31' 8.7" N.
Longitude: 119° 42' 10" W.
Township 19 N, Range 20 E, Section 11 MDB&M

to receiving waters named:

the Truckee River via Steamboat Creek

in accordance with effluent limitations, monitoring requirements, and other conditions set forth in Parts I, II, and III hereof.

This permit shall become effective on: October 15, 2003.

This permit and the authorization to discharge shall expire at midnight, October 14, 2008.

Signed this 30th day of September, 2003.

Bruce Holmgren
Bureau of Water Pollution Control

THE GREAT SEAL OF THE STATE OF NEVADA
PART I

I.A. EFFLUENT LIMITATIONS, MONITORING, AND CONDITIONS

There shall be no discharge from the facility property except as authorized by this permit; there shall be no discharge or release of pollutants or toxic contaminants from the facility to the ground surface or waters of the State; and there shall be no discharge of substances that would cause a violation of water quality standards of the State of Nevada (State).

I.A.1. Effluent Limitations: During the period beginning on the effective date of this permit and lasting until the permit expires, the Permittee is authorized to discharge from a single pipe located on the northeast side of the discharge structure, Outfall 001, into Steamboat Creek and subsequently the Truckee River. Use of reclaimed water/treated effluent and biosolids from the facility may be authorized by other permits.

a. Samples taken in compliance with the monitoring requirements specified below shall be taken at:
   i. The end of the discharge pipe prior to entering Steamboat Creek;
   ii. The influent headworks weirs;
   iii. The downstream boundary of the zone of mixing, approximately 3,800 feet downstream of Steamboat Creek (This sample location may be relocated due to Part I.A.30.b.); and
   iv. The East McCarran Bridge.

b. The discharge shall be limited and monitored by the Permittee as specified below:

<table>
<thead>
<tr>
<th>PARAMETERS</th>
<th>EFFLUENT DISCHARGE LIMITATIONS</th>
<th>MONITORING REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30-Day Average</td>
<td>Daily Maximum</td>
</tr>
<tr>
<td></td>
<td>mg/L</td>
<td>Kg/day</td>
</tr>
<tr>
<td>Total Suspended Solids (mg/L)</td>
<td>30</td>
<td>3,329/</td>
</tr>
<tr>
<td>Total Dissolved Solids</td>
<td>500</td>
<td>7,339/</td>
</tr>
<tr>
<td>Total Nitrogen Species</td>
<td>227</td>
<td>227</td>
</tr>
<tr>
<td>Nitrate - N (mg/L)</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Ammonia - N (mg/L)</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

CONTINUED ON NEXT PAGE →
<table>
<thead>
<tr>
<th>Parameters</th>
<th>Effluent Discharge Limitations</th>
<th>Monitoring Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30-Day Average</td>
<td>Daily Maximum</td>
</tr>
<tr>
<td>Dissolved Organic Nitrogen -N (mg/L)</td>
<td>Monitor and Report</td>
<td>i</td>
</tr>
<tr>
<td>Total Phosphorus -P</td>
<td>0.40</td>
<td>61&lt;sup&gt;4&lt;/sup&gt;</td>
</tr>
<tr>
<td>Total Phosphates -P (filtered) (mg/L)</td>
<td>Monitor and Report</td>
<td>i</td>
</tr>
<tr>
<td>Dissolved Organic Carbon -C (mg/L)</td>
<td>Monitor and Report</td>
<td>i</td>
</tr>
<tr>
<td>Alkalinity as CaCO&lt;sub&gt;3&lt;/sub&gt; (mg/L)</td>
<td>Monitor and Report</td>
<td>iv</td>
</tr>
<tr>
<td>Hardness as CaCO&lt;sub&gt;3&lt;/sub&gt; (mg/L)</td>
<td>Monitor and Report</td>
<td>iv</td>
</tr>
<tr>
<td>Total Chlorine Residual</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Temperature&lt;sup&gt;o&lt;/sup&gt;C (°C)</td>
<td>Monitor and Report</td>
<td>iv</td>
</tr>
<tr>
<td>Temperature&lt;sup&gt;o&lt;/sup&gt;C (°C)</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Fecal Coliform (MPN/100 ml)</td>
<td>200&lt;sup&gt;7&lt;/sup&gt;</td>
<td>400&lt;sup&gt;8&lt;/sup&gt;</td>
</tr>
<tr>
<td>Escherichia coli (MPN/100 ml)</td>
<td>125&lt;sup&gt;14&lt;/sup&gt;</td>
<td>410</td>
</tr>
<tr>
<td>Dissolved Oxygen</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>pH (standard units)</td>
<td>---</td>
<td>6.5 ≤pH ≤ 8.5&lt;sup&gt;4&lt;/sup&gt;</td>
</tr>
<tr>
<td>Priority Pollutants Full Scan&lt;sup&gt;9&lt;/sup&gt; (mg/L)</td>
<td>Monitor and Report</td>
<td>iii</td>
</tr>
<tr>
<td>Present Priority Pollutants&lt;sup&gt;10&lt;/sup&gt; (mg/L)</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

Notes:

1. These analyses shall be taken from the same composite.
2. These analyses shall be taken from the same composite.
5. The background river water alkalinity, hardness, and temperature shall be monitored at the East McCarran Bridge.
6. The compliance river water temperature shall be monitored at the boundary of the Division approved zone of mixing.
7. The fecal coliform bacterial level may not exceed a geometric mean of 200 MPN per 100 ml.
8. A maximum of 10% of the total fecal coliform samples may exceed 400 MPN per 100 ml during any 30-day period without permit violation.
9. Full Scan Priority Pollutants listed in Attachment A.
10. Only those Priority Pollutants exhibiting influent concentrations in the annual full scan must be monitored on a quarterly basis.
11. Exceedance of any of the NAC 445A.144 standards for toxic materials applicable to designated waters.
12. If the Permittee decides not to pursue the removal of the DON from the WLA, the Permittee may stop monitoring the DON upon written notification to the Division.
15. The concentration of total ammonia shall not exceed the applicable criterion more than once every three years.
16. xx - The currently permitted value.
17. yy - The future permitted value, effective after Division approval of the completion of the treatment plant expansion.

mg/L: Milligrams per liter.
ib/day: Pounds per day.
Kg/day: Kilograms per day.
MGD: Million gallons per day.
-N: As nitrogen.
-P: As phosphorus.
-C: As carbon.
CaCO<sub>3</sub>: Calcium carbonate.
ΔT: Change in temperature.
°C: Degrees Celsius.
DON: Dissolved organic nitrogen.
x: Means multiplication.
MIN: Means the lesser of the two values separated by the comma.
T: Temperature in degrees Celsius.
Biosolids shall be sampled at the discharge of the cake pumps. The biosolids shall be limited and monitored by the Permittee as specified below:

<table>
<thead>
<tr>
<th>CHARACTERISTICS</th>
<th>LIMITATIONS</th>
<th>MONITORING REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pollutant Concentrations</td>
<td>Ceiling Concentrations</td>
</tr>
<tr>
<td>Arsenic (mg/Kg)</td>
<td>41</td>
<td>75</td>
</tr>
<tr>
<td>Cadmium (mg/Kg)</td>
<td>39</td>
<td>85</td>
</tr>
<tr>
<td>Chromium (mg/Kg)</td>
<td>1200</td>
<td>3000</td>
</tr>
<tr>
<td>Copper (mg/Kg)</td>
<td>1500</td>
<td>4300</td>
</tr>
<tr>
<td>Lead (mg/Kg)</td>
<td>300</td>
<td>840</td>
</tr>
<tr>
<td>Mercury (mg/Kg)</td>
<td>17</td>
<td>57</td>
</tr>
<tr>
<td>Molybdenum (mg/Kg)</td>
<td>---</td>
<td>75</td>
</tr>
<tr>
<td>Nickel (mg/Kg)</td>
<td>420</td>
<td>420</td>
</tr>
<tr>
<td>Selenium (mg/Kg)</td>
<td>36</td>
<td>100</td>
</tr>
<tr>
<td>Zinc (mg/Kg)</td>
<td>2800</td>
<td>7500</td>
</tr>
<tr>
<td>Organic Nitrogen (-N) (mg/Kg)</td>
<td>Monitor and Report</td>
<td>1/60 days</td>
</tr>
<tr>
<td>Ammonia (-N) (mg/Kg)</td>
<td>Monitor and Report</td>
<td>1/60 days</td>
</tr>
<tr>
<td>Nitrate (-N) (mg/Kg)</td>
<td>Monitor and Report</td>
<td>1/60 days</td>
</tr>
<tr>
<td>Total Nitrogen (-N) (mg/Kg)</td>
<td>Monitor and Report</td>
<td>1/60 days</td>
</tr>
<tr>
<td>Total Phosphorus (-P) (mg/Kg)</td>
<td>Monitor and Report</td>
<td>1/60 days</td>
</tr>
<tr>
<td>Potassium (-K) (mg/Kg)</td>
<td>Monitor and Report</td>
<td>1/60 days</td>
</tr>
<tr>
<td>Pathogen Reduction</td>
<td>15 days at 35 to 60(^\circ) C</td>
<td>1/60 days</td>
</tr>
<tr>
<td>Vector Attractant Reduction</td>
<td>38% Volatile Solids Reduction</td>
<td>1/60 days</td>
</tr>
</tbody>
</table>

NOTES:
1. A representative sample consists of a dry weight grab sample.
2. Provide brief information from the Operations log as support.

mg/Kg: Milligrams per kilogram, dry-weight basis.
\(-N\): As nitrogen.
\(-P\): As phosphorus.
\(-K\): As potassium.
\(^\circ\)C: Degrees Celsius.

A.2. Treatment Efficiency: In addition to the effluent discharge limits specified, the Permittee shall demonstrate that the 30-day average removal efficiency is not less than 85% for 5-day biochemical oxygen demand, inhibited and uninhibited, and for total suspended solids.

A.3. Waste Load Allocations: The Permittee is authorized to discharge the waste loads listed in Table I.A.3, for Total Nitrogen as N, Total Dissolved Solids and Total Phosphorus as P, to the Truckee River. The Waste Load Allocation (WLA) applies to the loading from Outfall 001. This permit condition constitutes a cooperative agreement among the Permittee, Vista Canyon Group LLC, NV0020893, and the City of Sparks - Sparks Marina Park, NV0022918, (hereinafter Dischargers) to allow discharge flexibility. Each facility has an Individual Waste Load Allocation (IWLA) and there is a Cumulative Waste Load Allocation (\(\Sigma\)WLA) for the three facilities. The individual Discharger shall have first rights to the assigned IWLA. Any remaining allocation may be shared by the three agreeing Dischargers. No Discharger shall be penalized for the WLA violations of the other Dischargers.

Treatment facilities which are used to attain a waste load allocation are not required to be operated when not needed to meet that allocation.

a. The Permittee shall be considered in compliance if either:
   i. The Permittee does not exceed the IWLA listed below or the IWLA in effect due to transfers, or
   ii. The Cumulative Waste Load Allocation (\(\Sigma\)WLA) listed below is not exceeded.
Table I.A.3.

<table>
<thead>
<tr>
<th>Constituent</th>
<th>TMWRF IWLA</th>
<th>Vista Canyon Group IWLA</th>
<th>Sparks Marina Park</th>
<th>ΣWLA</th>
<th>TMDL at Lockwood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Nitrogen –N(^1) (lb/day)</td>
<td>500</td>
<td>16.7</td>
<td>33.3</td>
<td>550</td>
<td>1,000</td>
</tr>
<tr>
<td>Total Phosphorus –P (lb/day)</td>
<td>134</td>
<td>4.75</td>
<td>0</td>
<td>138.75</td>
<td>214</td>
</tr>
<tr>
<td>Total Dissolved Solids(^2) (lb/day)</td>
<td>120,168(^3)</td>
<td>9,730</td>
<td>19,390</td>
<td>149,288</td>
<td>900,528</td>
</tr>
</tbody>
</table>

Notes:

1: 30-day Average Load May 1 through October 31 and Annual Average Load November 1 through April 30.
2: Annual Average Load. The annual average load will be calculated as the average of the 12 monthly average loads. If the average weekly flow in the Truckee River at the USGS gaging station at Farad, 10346000, is less than 150 cfs, the Permittee may substitute that month’s load with a load based on the following calculation in determining the annual average:

\[
\text{Monthly Load} = \text{(monthly average effluent flow, MGD)} \times (350 \text{ mg/L}, \text{ or the actual TDS concentration, mg/L, if lower}) \times (83.45);
\]

3: 30-day average load.

-N: As nitrogen, mg/L: Milligrams per liter.
-lb/day: Pounds per day, cfs: Cubic feet per second.
-P: As phosphorus, TDS: Total dissolved solids.

b. Annual Reallocation of IWLA: On an annual basis, the Permittee may modify the IWLA by transferring or receiving waste load from another discharger in possession of a Truckee River IWLA. This reallocation shall become effective upon submittal of a notification signed by the transferring and the receiving discharger. The annual reallocation shall be submitted with the fourth quarter Discharge Monitoring Report (DMR). The notification of reallocation shall include the 30-day average flow rate for the prior 12-month period; the 30-day average waste load discharged for each allocated parameter for the prior 12-months; and the corresponding average monthly treatment plant removal efficiency for the prior 12-month period in tabular and graphical format. The reallocation of IWLAs shall be considered a minor modification to the permit as long as the ΣWLA is not modified.

c. Temporary Trading of IWLA: The Permittee may temporarily trade IWLA upon submittal of a notification signed by the transferring and the receiving dischargers; describing the amount of IWLA transferred, the length of time the transfer is effective and the basis for the transfer. The basis for the transfer shall include the last monthly flows and waste load discharged for both dischargers. The waste load transfer shall be effective on the date of the submittal to the Division.

Any designated transfer is binding on the dischargers and cannot be revoked without a notification signed by the transferring and the receiving dischargers. The transferred IWLA shall revert back to the original holder of the IWLA at the end of the time specified on the notification. A copy of the latest IWLA agreement and any agreements made during the reporting period shall be submitted with each quarterly report required by I.B.2.

d. Reporting: The Permittee shall submit quarterly reports pursuant to I.B.2, the IWLA and the ΣWLA for total nitrogen as N, total phosphorous as P and total dissolved solids, reported monthly in lb/day. The data for the ΣWLA shall be provided to and obtained from the other dischargers. In the event the Permittee cannot obtain the ΣWLA information in time for submittal with the quarterly DMR, then an explanation shall be included with the report along with a schedule for timely submittal.

e. Re-evaluation: Due to operational changes in the water supply system or implementation of conservation measures that impact the plant influent TDS loadings, the Permittee’s TDS WLA may be re-evaluated and modified to reflect the impacts of these activities on permit compliance.
I.A.4. Stream and River Monitoring:

a. The following stations and parameters shall be monitored on a monthly basis using time-of-travel equations to estimate collection times at each site. Samples shall be collected from the centroid of flow using a vertically integrating sampler.

<table>
<thead>
<tr>
<th>Stations</th>
<th>Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>East McCarran Bridge</td>
<td>Temperature (°C)</td>
</tr>
<tr>
<td>North Truckee Drain</td>
<td>pH (SU)</td>
</tr>
<tr>
<td>Steamboat Creek</td>
<td>Dissolved Oxygen (mg/L)</td>
</tr>
<tr>
<td>Lockwood</td>
<td>Ortho Phosphorus -P (filtered) (mg/L)</td>
</tr>
<tr>
<td>Tracy/Clark</td>
<td>Total Phosphorus -P (filtered) (mg/L)</td>
</tr>
<tr>
<td>Derby Dam</td>
<td>Total Phosphorus -P (unfiltered) (mg/L)</td>
</tr>
<tr>
<td>Painted Rock</td>
<td>Nitrate -N (mg/L)</td>
</tr>
<tr>
<td>Wadsworth</td>
<td>Nitrite -N (mg/L)</td>
</tr>
<tr>
<td>Nixon</td>
<td>Ammonia -N (mg/L)</td>
</tr>
<tr>
<td></td>
<td>Kjeldahl Nitrogen -N (filtered) (mg/L)</td>
</tr>
<tr>
<td></td>
<td>Kjeldahl Nitrogen -N (unfiltered) (mg/L)</td>
</tr>
<tr>
<td></td>
<td>Total Dissolved Solids (mg/L)</td>
</tr>
<tr>
<td></td>
<td>Total Alkalinity (mg/L)</td>
</tr>
<tr>
<td></td>
<td>Electrical Conductivity (µmhos/cm)</td>
</tr>
<tr>
<td></td>
<td>Dissolved Organic Carbon (mg/L)</td>
</tr>
</tbody>
</table>

USGS Truckee River Gaging Stations: Flow (cfs)
- at Farad 10346000 - data to be obtained from USGS
- at East McCarran Bridge 10348200
- at Tracy 10350400
- below Derby Dam 10351600
- near Nixon 10351700

b. Continuous water quality analyzers shall be placed at two locations downstream of the plant (as close to the Tracy and Nixon USGS Gaging Stations, as possible) from April through November for analysis of the parameters listed in Part I.A.4.a. The analyzers shall be removed from operation when flows exceed 500 cubic feet per second at Vista.

c. Benthic macroinvertebrates shall be collected, enumerated and identified to the taxonomic levels specified in Attachment B at East McCarran Bridge, Lockwood, Tracy, and Wadsworth on a quarterly basis. Data shall be reported quarterly in a spreadsheet format and entered in the Ecological Data Application System database. The frequency of benthic macroinvertebrate collection, enumeration, and identification and the taxonomic levels specified in Attachment B may be adjusted as a minor modification.

I.A.5. Water Quality Trading: The Division may modify the permit to include specific water quality trading, or offset, projects based upon review of the results of scientific studies, as a major modification. Water quality trading entails the reduction in a pollutant load through implementation of a water quality management project that is credited towards the Permittee’s waste load allocation (WLA), thereby increasing the Permittee’s allowable discharge load for a specific pollutant. Potential water quality trading opportunities include, but are not limited to, water augmentation, river restoration, septic system conversion, and stormwater management practices. These potential water quality management projects will be evaluated as to their effectiveness through watershed/water quality modeling simulations, field pilot studies and on-going water quality monitoring. Based on the results of the model simulations and pilot projects, the permit may be modified to incorporate the Permittee’s increased WLA(s).

I.A.6. Seasonal Discharge: If the Truckee River Total Maximum Daily Load is modified to authorize the use of seasonal WLAs, the Division will modify the permit, as a minor modification, to incorporate a seasonal discharge or flow-based WLA for TN and/or other constituents, as appropriate.
I.A.7. **Dissolved Organic Nitrogen:** If the Truckee River total nitrogen (TN) Total Maximum Daily Load is revised to exclude all or a portion of the dissolved organic nitrogen from the Permittee's TN waste load allocation, the Division will modify the permit, as a minor modification, to include any such revision.

I.A.8. **Reopener Clause:** This permit may be reopened and modified by the Division to incorporate results of changes made to water quality standards, total maximum daily loads, wasteload allocations, or in response to additional scientific evidence as a minor modification.

I.A.9. **Chlorine Residual and pH Effluent Limitation:** Effluent shall be sampled at the outfall structure prior to mixing with Steamboat Creek.

Where the Permittee monitors chlorine residual and pH of the effluent continuously, the Permittee shall maintain the chlorine residual and pH of such effluent within the range set forth in the applicable effluent limitations guidelines, except excursions from the range are permitted subject to the following limitations:

a. The total time during which the chlorine residual or pH values are outside the required range, values shall not exceed 7 hours and 26 minutes in any calendar month; and

b. No individual excursion from the range of chlorine residual or pH shall exceed 60 minutes.

The Division may allow the Permittee to discontinue monitoring for chlorine upon approval of a submittal which demonstrates that there is no reasonable potential for the chlorine concentrations to be toxic.

I.A.10. **Narrative Standards:** Per Nevada Administrative Code (NAC) 445A.121, discharges shall not cause the following standards to be violated in any surface waters of the State. Waters must be free from:

a. Substances that will settle to form sludge or bottom deposits in amounts sufficient to be unsightly, putrescent, or odorous;

b. Floating debris, oil, grease, scum, and other floating materials in amounts sufficient to be unsightly;

c. Materials in amounts sufficient to produce taste or odor in the water, detectable off-flavor in the flesh of fish, or in amounts sufficient to change the existing color, turbidity, or other conditions in the receiving stream to such a degree as to create a public nuisance;

d. High temperature; biocides; organisms pathogenic to human beings; or toxic, corrosive, or other deleterious substances at levels or combinations sufficient to be toxic to human, animal, plant, or aquatic life;

e. Radioactive materials resulting in accumulations of radioactivity in plants or animals hazardous or harmful to humans or aquatic life;

f. Untreated or uncontrolled wastes or effluents that are reasonably amenable to treatment or control; and

g. Substances or conditions which interfere with the beneficial use of the receiving waters.

Narrative standards are not considered violated when the natural conditions of the receiving water are outside the established limits, including periods of high or low flow. Where effluents are discharged to such waters, the discharges are not considered a contributor to substandard conditions provided maximum treatment in compliance with permit requirements is maintained.

I.A.11. **Odors:** There shall be no objectionable odors from the collection system, treatment facility, or the biosolids treatment and storage area.
I.A.12. Visibility Parameters: There shall be no discharge of floating solids. Discharge of visible foam shall be minimized with no foam, other than trace amounts, reaching the Truckee River.

I.A.13. Facility Specifications: The collection, treatment, and disposal facilities shall be constructed in conformance with plans approved by the Administrator of the Division or of the Environmental Protection Agency (EPA) Region IX (Administrator). The plans must be approved by the Administrator prior to initiating construction activities. All changes to plans that have been approved by the Administrator must be re-approved by the Administrator prior to implementation.

I.A.14. Facility Maintenance: The facility shall be maintained in conformance with the plans approved by the Division, Bureau of Water Pollution Control. The Division must authorize all changes to the approved plans prior to implementation.

I.A.15. Process Operations and Maintenance: The facility shall be operated in accordance with the Operations and Maintenance (O&M) Manual, which must be approved by the Division. The O&M Manual shall be updated whenever there is a change in the operation of the facility.

I.A.16. Operations and Maintenance of Permitted Activities: The facility shall be operated and maintained in compliance with permit provisions and requirements, and in accordance with the approved O&M Manual for management of any waste stream and/or pond systems.

I.A.17. Construction Integrity: Any and all containment structures shall remain free of leaks and defects.

I.A.18. Security: The treatment and disposal facility shall be fenced and posted for hazard notification, with access restricted.

I.A.19. Zone of Passage: The zone of mixing shall allow a zone of passage as defined by NAC 445A.299.

I.A.20. Remediation Activities: All groundwater and/or soil contamination issues shall be addressed in accordance with the requirements of the Division.

I.A.21. Closure Activities: Closure of all inactive process components shall be addressed in accordance with the requirements of the Division.

I.A.22. Presumption of Possession and Compliance: Copies of this permit, any subsequent modifications, and the approved O&M Manual shall be maintained at the permitted facility at all times.

I.A.23. Stormwater Management Plan: All Stormwater Discharges Associated with Industrial Activity, as defined in Code of Federal Regulations (CFR) 122.25(b)(14), that are not otherwise controlled under this permit shall be covered by a separate stormwater permit for those discharges. Stormwater permit coverage must be obtained prior to the occurrence of a stormwater discharge associated with industrial activity.

I.A.24. Solid Waste Management: All solid, toxic, or hazardous waste shall be properly handled and disposed of pursuant to applicable laws and regulations. Any sludge generated during this operation shall be characterized and disposed of in accordance with local, State, and Federal regulations.

I.A.25. Biosolids:

a. The Permittee shall ensure that all biosolids generated at the facility shall be used or disposed of in compliance with the applicable sections of the following regulations whether the Permittee uses or disposes of the biosolids or transfers them to another party for further treatment, use, or disposal. Regulations applicable for the proper treatment, handling, or disposal of biosolids include:

i. 40 CFR 503: for non-hazardous biosolids that are land applied, placed in surface disposal sites (dedicated land disposal sites or monofills), or incinerated;

ii. 40 CFR 258: for biosolids disposed in municipal solid waste landfills as approved by the Administrator and the County;
iii. 40 CFR 257: for all biosolids use and disposal practices not covered under 40 CFR 258 or 503; and

iv. 40 CFR 261: for hazardous biosolids or 40 CFR 761 for biosolids with a polychlorinated biphenyl (PCB) concentration greater than 50 milligrams per kilogram (mg/kg).

b. The Permittee is responsible for informing any person or entity that prepares, applies, or disposes of biosolids of the requirement to comply with the applicable regulations listed in Parts I.A.1. and I.A.25.a.

c. If biosolids are stored at any facility for over two (2) years from the time they are generated, the Permittee shall notify the Division within 30 days and shall ensure compliance with all requirements of surface disposal set forth in 40 CFR 503, Subpart C. Otherwise, the Permittee must submit a written notification to the Division and the EPA providing the information required in 40 CFR 503.20 (b) and demonstrating the need for longer temporary storage.

d. Biosolid treatment, storage, or disposal facilities shall be designed to divert stormwater run-on accommodating conditions representing a 100-year storm event, including engineering controls designed to prevent any erosion which could cause biosolids to discharge (run-off) from the facility.

e. The Permittee shall ensure that transporters of biosolids use all necessary measures to contain biosolid material during transport.

f. Biosolids shall be characterized annually pursuant to 40 CFR 261 to determine if they are hazardous.

g. The Permittee shall comply with the following notification requirements either directly or through contractual arrangements with a biosolids management contractor:

i. If biosolids are shipped to another state or to Indian territories, the Permittee shall send notice of the shipment to the appropriate state permitting authority(ies), the collaborating EPA Regional office, and/or the Indian authority(ies) with jurisdiction over the receiving location; and

ii. For land application of biosolids, the Permittee must notify the Division 180 days prior to shipment to enable the receiving site to obtain a permit.


a. All wastewater treatment plant operators employed to operate the Facility shall be State of Nevada Certified Wastewater Treatment Plant Operators or Operators-in-Training. All Operator Certificates and/or Operator-in-Training Certificates shall be current and active according to the by-laws of the Nevada Water Environment Association and Nevada Wastewater Treatment Plant Operators Certification Control Board.

b. Wastewater Treatment Plant Operators for the Facility shall possess the operator certificates in accordance with the following schedule:

i. The Facility Manager and/or person of responsible authority shall possess a Nevada Grade IV Wastewater Treatment Plant Operator Certificate.

ii. The Facility assistant superintendent of operations shall possess a minimum Nevada Grade IV Wastewater Treatment Plant Operator Certificate.

iii. All Senior Operators and/or persons responsible for shift supervision shall possess a minimum Nevada Grade III Wastewater Treatment Plant Operator Certificate.

iv. All other Wastewater Treatment Plant Operators for the Facility shall be Nevada Certified Wastewater Treatment Plant Operators or Operators-in-Training.
I.A.27. Whole Effluent Testing: Beginning with the effective date of this permit, the Permittee shall conduct monthly acute toxicity tests and quarterly chronic toxicity tests, as described below, on the discharge from Outfall 001.

a. Acute Toxicity Limit: The effluent shall be deemed acutely toxic when there is a statistically significant difference at the 95% percentile confidence interval between the survival of the control test organisms exposed to 0% effluent and the survival of the test organisms exposed to 100% effluent at the following limits:

i. When the survival of test organisms in the undiluted effluent (100%) sample is less than 90 percent in six (6) out of eleven (11) consecutive samples; or

ii. When the survival rate of test organisms in the undiluted effluent (100%) sample is less than 70 percent in any two (2) of eleven (11) consecutive samples.

b. Test Methods:

i. Flow Through and Static Replacement Protocols: The acute flow through or static replacement tests shall be conducted in general accordance with the procedures set out in the latest revision of "Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms," EPA/600/4-90/027F. The Permittee shall conduct an acute 48-hour flow through or static replacement toxicity test using any Daphnid approved by the Division, and an acute 96-hour flow through or static replacement toxicity test using fathead minnows, Pimephales promelas. After each 24-hour interval of the test period, the dilutions shall be replaced with freshly prepared dilutions of the original effluent sample.

1. If more than 10 percent control mortality occurs, the test shall be repeated until satisfactory control survival is achieved.

2. The source of the dilution water shall be reported with the test results. Tests shall be run using four (4) replicate tests, with a minimum of 20 organisms per test chamber when using Daphnid subjects and 10 organisms per test chamber when using fathead minnow, Pimephales promelas, subjects.

ii. Alternative Species and Protocols: The Permittee may undertake an investigation of alternative, site-specific toxicity test species and/or alternative, site-specific toxicity protocols. If alternative, site-specific toxicity test species or protocols are developed as a result of work by the Permittee, such species or protocols may be substituted for those specified in this permit if approved by the Division and EPA under 40 CFR Part 136. Alternative protocols must be compared to EPA protocols to demonstrate appropriateness and reliability.

c. Testing Schedule:

i. Routine Schedule: The Permittee shall conduct an acute toxicity test during the first two weeks of the calendar month.

ii. Accelerated Schedule: Whenever the result of any one test has a survival of less than 70 percent, the Permittee shall increase the frequency of acute toxicity testing to every other week. The accelerated testing shall be based on definitive tests using serial dilutions to determine the 'No Observed Adverse Effects Concentration' (NOAEC).

The concentration range of the dilution series must include or contain the critical dilution defined as the in-stream waste concentration (IWC) determined under low-flow conditions. Where the calculated NOAEC for growth and survival is equal to or greater than the critical dilution in four (4) consecutive accelerated tests, the Permittee may resume a routine test schedule.

d. Follow-Up Responses: Whenever the acute toxicity effluent limitation as defined under either Part I.A.27.a.i or I.A.27.a.ii. is exceeded, and one or more of the tests conducted under Part I.A.27.c.ii. fails, the Permittee shall:
i. Initiate an investigation within 24 hours of the exceeded toxicity limitation to identify the cause(s) of toxicity in general accordance with EPA/600/6-91/003, EPA/600/3-88/035, other EPA guidance documents or manuals and any subsequent revisions, and/or alternative methods if approved by the Division.

1. After the initiation of the investigation phase pursuant to this condition, the Permittee may suspend accelerated testing required by Part I.A.27.c.ii. as long as the routine testing required by Part I.A.27.c.i. resumes.

ii. Conduct an evaluation of findings, when relevant and/or appropriate, in general accordance with EPA/600/R-92/081, other EPA guidance documents or manuals and any subsequent revisions and/or alternative methods, if approved by the Division; and

iii. Notify the Division and EPA and within fifteen (15) days of identifying an exceeded toxicity limitation to provide the following information:

1. Times and dates when the limitation was exceeded;
2. The findings and conclusions of the investigation(s) to identify the cause(s) of toxicity and a plan for continuing the investigation activities if initial data and information is inconclusive;
3. Proposed actions the Permittee has taken or will take to mitigate the impact of the discharge, to correct the noncompliance, and to prevent the recurrence of toxicity; and
4. Where corrective actions have not been completed, an expeditious schedule to implement all corrective actions.

e. Premise of Discharge: The Permittee shall not cause any impairment to any receiving water or the designated beneficial uses of any receiving water, nor cause a violation of any other provision of this permit, the Clean Water Act, and State or local regulation or law.

f. Prerogative to Reopen: This permit may be re-opened, re-evaluated, and modified by the permitting authority to include effluent limits, additional testing, and/or other appropriate actions in response to demonstrated effluent toxicity. This permit may also be re-evaluated and modified by the permitting authority to incorporate alternative permit conditions reflecting revisions related to effluent toxicity under State Water Quality Standards.

1. The Permittee shall submit a study plan within ninety (90) days from the date of issuance of this permit for concurrence by the Division.

ii. The study will include the following:

1. Chronic toxicity testing to be conducted at least once per quarter over a two year period following concurrence of the study plan by the Division.
2. Samples of wastewater shall be taken at the same location as the effluent compliance samples, unless otherwise approved in writing by the Division.
3. If chronic toxicity is identified, using appropriate statistical procedures or other evaluation methods acceptable to the Division, the Permittee may either increase testing frequency to monthly or conduct a toxicity identification evaluation (TIE). If, after two additional months of testing the chronic toxicity has abated, the Permittee may return to quarterly testing. If it has not, the Permittee shall continue.
accelerated testing, conduct a TIE, or submit an alternate proposal to the Division for approval.

4. Chronic toxicity testing shall be conducted in accordance with procedures specified in 40 CFR Part 135.

5. TiEs shall be conducted in accordance with procedures set forth in Toxicity Identification Evaluations: Characterization of Chronically Toxic Effluent, Phase I, EPA/600/6-91/003, USEPA, 1991A; and Toxicity Reduction Evaluation Protocol for Municipal Wastewater Treatment Plants, EPA/600/2-88/062, USEPA, 1989A, as appropriate.

iii. The Permittee shall take appropriate actions to address any pollutant of concern identified through this study.

iv. A report on the study shall be submitted to the Division within ninety (90) days of completion of the testing. The Permittee and the Division will review the information and any subsequent actions taken by the Permittee to assess the results and determine what actions, e.g., additional chronic toxicity testing, are necessary and appropriate.

v. The data collected through this study, and through the chronic toxicity testing and TIE procedures, are for informational purposes only and shall not be used to assess compliance or in an enforcement action against the Permittee.

I.A.28. Pretreatment of Industrial Wastewaters: The Permittee shall implement and enforce a pretreatment program under 40 CFR Part 403, including any subsequent regulatory revisions to Part 403, and shall be responsible and liable for the performance of all Control Authority pretreatment requirements contained in Part 403. Where Part 403 or subsequent revisions place mandatory actions upon the Permittee as Control Authority, but does not specify a schedule for the completion of the actions, the Permittee shall complete the required actions within six (6) months from the issuance date of this permit or the effective date of the Part 403 revisions, whichever comes later.

For violations of pretreatment requirements, the Permittee shall be subject to enforcement actions, penalties, fines, and other remedies required by the EPA or other appropriate parties, as provided in the Act. EPA may initiate enforcement action against a non-domestic user for noncompliance with applicable standards and requirements as provided in the Act and as provided by the Division and EPA in the enforcement agreement.

a. The Permittee will comply with the Pretreatment Program submitted to and approved by the Division and the EPA. This program shall include written agreements with all sewage agencies contributing flows to the treatment facility that clearly affords the Permittee with the legal authority to enforce the pretreatment program. The Permittee shall comply with all parts of the schedule listed below, Pretreatment of Industrial Wastewaters.

b. The Permittee shall enforce the requirements promulgated under 40 CFR Part 307(b) and (c) and 40 CFR Part 402(b) of the Act with timely, appropriate, and effective enforcement actions. The Permittee shall cause all non-domestic users subject to Federal, categorical standards to achieve compliance no later than the date specified in those requirements or, in the case of a new non-domestic user, upon commencement of the discharge.

c. The Permittee shall perform the pretreatment functions as required in Part 403 including, but not limited to:

i. Implementing the necessary legal authorities as provided in Part 403.8(f)(1);

ii. Enforcing the pretreatment requirements under Part 403.5 and 6;

iii. Implementing the programmatic functions as provided in Part 403.8(f)(2); and
iv. Providing the requisite funding and personnel to implement the pretreatment program as provided in Part 403.8(f)(3).

I.A.29. Annual Fee: The Permittee shall remit an annual review and services fee in accordance with NAC 445A.232 starting July 1, 2004 and every year thereafter until the permit is terminated.

I.A.30. Schedule of Compliance: The Permittee shall implement and comply with the provisions of the schedule of compliance after approval by the Administrator; including in said implementation and compliance, any additions or modifications which the Administrator may make in approving the schedule of compliance.

a. The Permittee shall achieve compliance with the effluent limitations upon issuance of the permit.

b. At least one hundred eighty (180) days prior to the projected date of the effluent discharge exceeding a 30-day average flow of 44.0 MGD, the Permittee shall submit to the Division an application for a zone of mixing for a 30-day average flow of 51.2 MGD.

c. Within ninety (90) days of the permit effective date, the Permittee shall submit to the Division a revised O & M Manual.

d. Within ninety (90) days of the completion of the expansion to a capacity of 51.2. MGD, 30-day average flow, the Permittee shall submit to the Division a revised O & M Manual.

e. By February 19, 2007, the Permittee shall submit to the Division a detailed evaluation of the pretreatment program limits to determine if the limits are adequate to achieve the biosolids pollutant concentration limits.

f. The Permittee shall submit reports illustrating compliance or noncompliance with specified compliance dates within 14 days of any respective, scheduled compliance date.

All compliance deliverables shall be sent to the attention of the Compliance Coordinator, Bureau of Water Pollution Control.

I.B. MONITORING AND REPORTING

I.B.1 Monitoring:

a. Representative Samples: Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge.

b. Test Procedures: Monitoring for the analysis of pollutants shall be conducted according to test procedures approved under 40 CFR 136 published pursuant to Section 304(h) of the Act; Solid Waste (SW)-846 methods; or in the case of sludge disposal, methods approved under 40 CFR 503; or other procedures as approved by the Administrator in the permit. Analysis shall be performed by a State of Nevada certified laboratory.

c. Recording the Results: For each measurement or sample taken pursuant to the requirements of this permit, the Permittee shall record the following information:

i. The exact place, date, and time of sampling;

ii. The dates the analyses were performed;

iii. The person(s) who performed the analyses;

iv. The analytical techniques or methods used; and

v. The results of all required analyses.

d. Additional Monitoring by Permittee: If the Permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in any calculation
and/or reported value required in this permit. Such increased frequency shall also be indicated in required reports.

e. Records Retention: All records and information resulting from monitoring activities; the permit application; and reporting required by this permit, including all records of analyses performed, calibration and maintenance of instrumentation, and recordings from continuous monitoring instrumentation shall be retained for a minimum of five (5) years or longer if required by the Administrator. Records of monitoring information required by this permit related to the Permittee's sewage sludge use and/or disposal activities shall be retained for a period of at least 5 years or longer as required by 40 CFR 503.

f. Detection Limits: All laboratory analysis conducted in accordance with this discharge permit must meet the following criteria:

i. All methods used must be specified or approved in either 40 CFR 136, SW-846 or otherwise approved by the Division. All analytical results must be generated by analytical laboratories certified by the Nevada State laboratory certification program; and

ii. Each parameter shall have detection at or below the permit limits or the Reported Detection Level as defined in the analytical method, whichever is lower.

g. Modification of Monitoring Frequency and Sample Type: After considering monitoring data, stream flow, discharge flow, and receiving water conditions, the Administrator may, for just cause, modify the monitoring frequency and/or sample type by issuing an order to the Permittee.

h. Definitions:

i. **Daily maximum**: is the highest measurement made or obtained during the monitoring period.

ii. **30-day average discharge**: means the total discharge during a month divided by the number of samples in the period that the facility was discharging. Where less than daily sampling is required by this permit, the 30-day average discharge shall be determined by the summation of all the measured discharges divided by the number of samples during the period when the measurements were made.

iii. **30-day average concentration**: means the arithmetic mean of measurements made during a month (other than for fecal coliform bacteria). The "30-day average concentration" for fecal coliform bacteria means the geometric mean of measurements made during a month. The geometric mean is the \( n^{th} \) root of the product of \( n \) numbers. Geometric mean calculations where there are non-detect results for fecal coliform shall use a value of one half the detection limit to represent the non-detect results.

iv. **"Discrete" sample**: means any individual sample collected in less than 15 minutes.

v. **"Composite" sample**: (for flow rate measurements) means the arithmetic mean of at least six (6) individual measurements taken at equal time intervals for 24 hours or for the duration of discharge, whichever is shorter.

vi. **"Composite" sample**: (for other than flow rate measurements) means a combination of at least six (6) individual flow-weighted samples obtained at equal time intervals for 24 hours or for the duration of discharge, whichever is shorter. Flow-weighted sample means that the volume of each individual sample shall be proportional to the discharge flow rate at the time of sampling.

vii. **Acute toxicity**: is defined in the whole effluent testing procedures described in Part I.A.11.a.

viii. **Biosolids**: are non-hazardous sewage sludge or domestic septage as defined in 40 CFR 503.9.

ix. **Annual average**: is the average of the 12 monthly averages.
I.B.2. Reporting: Analytical data and monitoring results shall be summarized, tabulated, and/or graphically illustrated for presentation in standardized Discharge Monitoring Reports (DMRs). The Permittee is considered compliant if the reported results are less than established permit limits. If there is no discharge during a reporting period, report this condition as 'no discharge' on the DMR for that period. If applicable, if groundwater wells are dry, report this condition as 'dry' on the DMR for that period. Laboratory reports for quantitative analyses conducted by State of Nevada certified laboratories must accompany all report submittals.

DMRs shall be received by the 28th day of the month following the third month of each quarter (reporting period). Quarterly and annual reporting periods are based on the standard annual cycle, January 1 through December 31. The first report is due on January 28, 2004.

Each report submittal (DMR) must be signed by the highest ranking certified operator or the person directly responsible for operating the facility. The first report submitted under this permit must include the written designation of the certified operator or an eligible facility representative authorized to sign DMRs or other periodic report submittals. If the certified operator or facility representative in responsible charge changes, a new designation letter must be submitted.

a. Quarterly Reports: Quarterly reports shall be submitted for the quarterly periods corresponding to: January 1 through March 31, April 1 through June 30, July 1 through September 30, and October 1 through December 31.

i. DMRs: Each DMR shall include:
   1. Monitoring results for effluent discharge parameters described pursuant to Part I.A. of the permit shall be summarized and tabulated for each three (3) month, quarterly period;
   2. The 30-day removal efficiency for each month of the preceding quarter;
   3. Monitored analyte concentrations in dry sludge; and
   4. An electronic file of all submitted data in a format compatible with Microsoft Office software (version 97 or later).

ii. Pretreatment of Industrial Wastewaters - Quarterly Significant Industrial Users (SIU) Compliance Status Reports: These reports shall be submitted with DMRs by the 28th day of the month following the previous quarter, except the quarterly report covering October 1 through December 31, which may be included in the annual report due by February 28th of each year. SIU compliance status reports shall contain:
   1. The name and address of all SIUs which violated any discharge or reporting requirements during the quarter;
   2. A description of any violations including whether any discharge violations were for categorical standards or local limits;
   3. A description of enforcement or other actions that were taken to remedy the noncompliance; and
   4. The status of active enforcement and other actions taken in response to SIU noncompliance identified in previous reports.

b. Annual Reports:

i. DMRs: The fourth quarter DMR report be prepared as an annual report and shall contain a plot of concentration (y-axis) versus date (x-axis) for each analyzed effluent discharge and biosolid constituent defined or limited in Part I.A. The plot shall include data from the preceding five (5) years or from the effective date of the permit whichever is shorter. Any data point from the current year that is greater than the limits in Part I.A. must be explained by a narrative. In addition, an annual report prepared by the Nevada State certified laboratory providing Whole Effluent Toxicity testing data and services shall also be submitted with the fourth quarter, annual DMR.
ii. **Annual Biosolids Monitoring Report (ABMR):** By February 19<sup>th</sup> of each year, the Permittee must submit an ABMR for the previous calendar year. The report shall contain:

1. All the required biosolids analytical data;
2. The volume of biosolids generated that previous year;
3. Any volume of biosolids accumulated from previous years;
4. The names, mailing and street addresses, and telephone numbers of all facilities which received biosolids for storage, disposal, use, treatment, land application, or any other use or disposal mechanism not mentioned; and
5. An evaluation of the pretreatment program limits determining if the limits are adequate to achieve threshold metals concentrations established in 40 CFR 503.13 Table 3. The evaluation shall include final conclusions and any recommended actions to be taken in the pretreatment program.

If the metals concentrations of the biosolids are at or below the pollutant concentration limits, the Permittee may submit a screening level analysis as the annual evaluation of the pretreatment program limits for a maximum of four of the five years of this permit.

iii. **Pretreatment Annual Report:** By September 23<sup>rd</sup> of each year, the Permittee shall submit a report describing the facility pretreatment activities and operations over the previous year, July 1<sup>st</sup> through June 30<sup>th</sup>. In the event the Permittee is not in compliance with any conditions or requirements of this permit, then the Permittee shall comply with such conditions and requirements. The report shall contain, but is not limited to, the following information:

1. A summary of the analytical results from representative, flow-proportioned, 24-hour composite sampling of the influent and effluent through the Publicly Owned Treatment Works (POTW) for those pollutants that EPA has identified under Section 307(a) of the Act to be known or suspected to be discharged by non-domestic users. This will consist of a full priority pollutant scan, Attachment A, with quarterly samples analyzed only for those pollutants detected in the full scan. The Permittee is not required to sample and analyze for asbestos until EPA specifies an analytical method. Biosolids shall be sampled during the same 24-hour period and analyzed for the same pollutants as the influent and effluent sampling and analysis. The biosolids shall be a discrete sample taken during the time of influent and effluent analysis. Wastewater and biosolids sampling and analysis shall be performed a minimum of once per quarter.

The Permittee shall also provide any influent, effluent or biosolids monitoring data for non-priority pollutants which the Permittee believes may be causing or contributing to interferences, pass through or adversely impacting biosolids quality. Sampling and analysis shall be performed using the techniques prescribed in 40 CFR 136;

2. A discussion of upset, interference, or pass through incidents, if any, at the treatment plant, which the Permittee knows or suspects were caused by non-domestic users of the POTW system. The discussion shall include the reasons why the incidents occurred, the corrective actions taken, and, if known, the name and address of the non-domestic user(s) responsible. The discussion shall also include a review of the applicable pollutant limitations to determine whether any additional limitations or changes to existing requirements may be necessary to prevent pass through, interference, or non-compliance with biosolids disposal requirements;

3. An update of the Permittee's significant industrial users (SIUs), including their names and addresses, and a list of deletions, additions, and SIU name changes keyed to the previously submitted list. The Permittee shall provide a brief explanation for each change. The list shall identify the SIUs subject to federal
categorical standards by specifying which set(s) of standards are applicable to each SIU. The list shall also indicate which SIUs are subject to local limitations;

4. The Permittee shall characterize the compliance status of each SIU by providing a list or table, which includes the following information:

A. Name of the SIU;
B. Category, if subject to federal categorical standards;
C. The type of wastewater treatment or control process in place;
D. The number of samples taken by the POTW during the year;
E. The number of samples taken by the SIU during the year;
F. For an SIU subject to discharge requirements for total toxic organics, whether all required certifications were provided;
G. A list of the standards violated during the year, which also identifies whether the violations were for categorical standards or local limits;
H. Whether the facility is in significant noncompliance (SNC) as defined at 403.12(f)(2)(vii) at any time during the year; and
I. A summary of enforcement or other actions taken during the year to return the SIU to compliance. Describe the type of action, final compliance date, and the amount of fines and penalties collected, if any. Describe any proposed actions for bringing the SIU into compliance;

5. A brief description of any programs the POTW implements to reduce pollutants from non-domestic users that are not classified as SIUs;

6. A brief description of any significant changes in operating the pretreatment program which differ from the previous year including, but not limited to, changes concerning the administrative structure of the program, local limits, monitoring program or monitoring frequencies, legal authority, enforcement policy, funding levels, or staffing levels;

7. A summary of the annual pretreatment budget including the cost of the pretreatment program functions and equipment purchases; and

8. A summary of activities to involve and inform the public of the program including copies of newspaper notices, if any, required under 403.8(f)(2)(vii).

iv. Total Dissolved Solids Report: By February 28th of each year, the Permittee shall submit a report summarizing in a tabular form, the past year of total dissolved solids (TDS) data and specify the annual average TDS load.

v. Annual Work Plan: By February 28th of each year, the Permittee shall submit a Work Plan to the Division, outlining the water quality studies scheduled to be completed during the following year. The Work Plan will include specific work elements, goals, budget and schedule. The Permittee will meet with Division staff to discuss the Work Plan and the progress of the agreed upon studies.

c. Compliance Reports: Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each scheduled date.

d. Other Information: Where the Permittee becomes aware of failure to submit any relevant facts in a permit application or the submittal of incorrect information in a permit application or in any report to the Administrator, the Permittee shall promptly submit such facts or information.

e. Planned Changes: The Permittee shall give notice to the Administrator as soon as possible of any planned alterations or additions to the permitted facility. Notice is required only when the alteration or addition to a permitted facility:

i. May meet one of the criteria for determining whether a facility is a new source (40 CFR 122.29(b));
ii. Could significantly change the nature or increase the quantity of pollutants discharged; or

iii. Results in a significant change to the Permittee's sludge management practice or disposal sites.

f. Anticipated Noncompliance: The Permittee shall give advance notice to the Administrator of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

An original, signed copy of these, and all other reports required herein shall be submitted to the State at the following address:

Division of Environmental Protection
Bureau of Water Pollution Control
ATTN: Compliance Coordinator
333 West Nye Lane
Carson City, Nevada 89706-0851

A signed copy of all DMRs and any other reports shall be submitted to the Regional Administrator at the following address:

U.S. Environmental Protection Agency, Region IX
NPDES/DMR WTR-7
75 Hawthorne Street
San Francisco, California 94105

I.B.3. Signatory Certification Required on Application and Reporting Forms:

a. All applications, reports, or information submitted to the Administrator shall be signed and certified by making the following certification:

"I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

b. All applications, reports, or other information submitted to the Administrator shall be signed by one of the following:

i. A principal executive officer of the corporation (of at least the level of vice president) or his authorized representative who is responsible for the overall operation of the facility from which the discharge described in the application or reporting form originates;

ii. A general partner of the partnership;

iii. The proprietor of the sole proprietorship; or

iv. A principal executive officer, ranking elected official, or other authorized employee of the municipal, state, Federal, or other public facility.

c. If an authorization under Part I.B.3.b. is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Part I.B.3.b. must be submitted to the Administrator prior to or together with any reports, information, or applications to be signed by an authorized representative.
PART II

II.A. MANAGEMENT REQUIREMENTS

II.A.1. Change in Discharge: All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant identified in this permit more frequently than, or at a level in excess of, that authorized shall constitute a violation of the permit.

Any anticipated facility expansions or treatment modifications which will result in new, different, or increased discharges of pollutants must be reported by submission of a new application or, if such changes will not violate the effluent limitations specified in this permit, by notice to the permit-issuing authority of such changes. Any changes to the permitted treatment facility must comply with NAC 445A.283 to 445A.285. Pursuant to NAC 445A.283, the permit may be modified to specify and limit any pollutants not previously limited.

II.A.2. Facilities Operation- Proper Operation and Maintenance: The Permittee shall, at all times, maintain in good working order and operate as efficiently as possible all treatment or control facilities, collection systems, or pump stations installed or used by the Permittee to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operating staff and training, and adequate laboratory and process controls, including appropriate quality assurance/quality control procedures.

II.A.3. Adverse Impact-Duty to Mitigate: The Permittee shall take all reasonable steps to minimize releases to the environment resulting from noncompliance with any effluent limitations specified in this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge. The Permittee shall carry out such measures, as reasonable, to prevent significant adverse impacts on human health or the environment.

II.A.4. Noncompliance, Unauthorized Discharge, Bypassing, and Upset:

a. Any diversion, bypass, spill, overflow, or discharge of treated or untreated wastewater from wastewater treatment or conveyance facilities or process water from industrial or commercial operations under the control of the Permittee is prohibited except as authorized by this permit.

b. In the event the Permittee has knowledge that a diversion, bypass, spill, overflow, or discharge not authorized by this permit is probable, the Permittee shall notify the Administrator immediately.

c. In the event of any diversion, bypass, spill, upset, overflow, or release of treated or untreated discharge other than that which is authorized by the permit, resulting in:
   i. Any unanticipated bypass which exceeds any effluent limitation in the permit;
   ii. Any upset which exceeds any effluent limitation in the permit; and
   iii. Any violation of a limitation for any toxic pollutant or any pollutant identified as the method to control a toxic pollutant.

The Permittee shall notify the Administrator within twenty-four (24) hours of the occurrence. The Permittee shall also notify the Pyramid Lake Paiute Tribe, the U.S. Fish and Wildlife Service, and the Truckee-Carson Irrigation District, within two (2) hours of notifying the Administrator of the occurrence.

d. A written report shall be submitted to the Administrator within five (5) days of diversion, bypass, spill, overflow, upset, or discharge detailing the entire incident including:
   i. Time and date of discharge;
   ii. The type of discharge (e.g. bypass, upset, or violation);
   iii. The effluent limitation, condition, or standard violated;
   iv. Exact location and estimated amount of discharge;
v. Flow path and any bodies of water which the discharge contacts;

vi. The specific cause of the discharge;

vii. The preventive and/or corrective actions taken; and

ix. A comprehensive list of all agencies, organizations, tribes, utilities, or local governments notified and when notification was issued.

e. The Permittee shall report all instances of noncompliance not reported under Part II.A.4.c. at the time DMRs are submitted. The reports shall contain the information listed in Part II.A.4.c.

f. A "bypass" means the intentional diversion of waste streams from any portion of a treatment facility.

i. **Bypass not exceeding limitations**: The Permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded if the bypass is needed to allow essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of Parts II.A.4.a. and II.A.4.b.

ii. **Anticipated bypass**: If the Permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible, at least ten (10) days before the date of bypass.

g. Bypass is prohibited, and the Administrator may take enforcement action against a Permittee for bypass, unless:

i. The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage; and

ii. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment down time. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance.

h. The Administrator may approve an anticipated bypass, after considering its adverse effects, if the Administrator determines that it will meet the three conditions listed in Part II.A.4.g.

i. An "upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

j. A Permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that:

i. An upset occurred and that the Permittee can identify the cause(s) of the upset;

ii. The permitted facility was at the time being properly operated;

iii. The Permittee submitted notice of the upset as required under Part II.A.4.d.ii; and

iv. The Permittee complied with any remedial measures required under Part II.A.3.

k. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of Part II.A.4.i. are met.

l. In selecting the appropriate enforcement option, the Administrator shall consider whether or not the noncompliance was the result of an upset. The burden of proof is on the Permittee to establish that an upset occurred.
II.A.5. Removed Substances: Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollution from such materials from entering any navigable waters.

II.A.6. Safeguards to Electric Power Failure: In order to maintain compliance with the effluent limitations and prohibitions of this permit the Permittee shall either:

a. Provide, at the time of discharge, an alternative power source sufficient to operate wastewater control facilities; or

b. Halt or reduce all discharges upon the reduction, loss, or failure of the primary source of power to wastewater control facilities.

II.B. RESPONSIBILITIES

II.B.1. Right of Entry and Inspection: The Permittee shall allow the Administrator and/or his authorized representatives, upon the presentation of credentials, to:

a. Enter at reasonable times upon the Permittee’s premises where an effluent source is located or in which any records are required to be kept under the terms and conditions of this permit;

b. Have access to and copy any records required to be kept under the terms and conditions of this permit;

c. Inspect, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations required in this permit; and

d. Perform any necessary sampling or monitoring to determine compliance with this permit at any location for any parameter.

II.B.2. Transfer of Ownership or Control: In the event of any change in control or ownership of facilities from which the authorized discharge emanates, the Permittee shall notify the succeeding owner or controller of the existence of this permit, by letter, a copy of which shall be forwarded to the Administrator. The Administrator may require modification or revocation and re-issuance of the permit to change the name of the Permittee and incorporate such other requirements as may be necessary. The Administrator shall approve all transfer of permits.

II.B.3. Availability of Reports: Except for data determined to be confidential under NRS 445A.665, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the office of the Administrator. As required by the Act, effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in NRS 445A.710.

II.B.4. Furnishing False Information and Tampering with Monitoring Devices: Any person who knowingly makes any false statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained by the provisions of NRS 445A.300 to 445A.730, inclusive, or by any permit, rule, regulation, or order issued pursuant thereto, or who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under the provisions of NRS 445A.300 to 445A.730, inclusive, or by any permit, rule, regulation, or order issued pursuant thereto is guilty of a gross misdemeanor and shall be punished by a fine of not more than $10,000 or by imprisonment. This penalty is in addition to any other penalties, civil or criminal, provided pursuant to NRS 445A.300 to 445A.730, inclusive.

II.B.5. Penalty for Violation of Permit Conditions: NRS 445A.675 provides that any person who violates a permit condition is subject to administrative and judicial sanctions as outlined in NRS 445A.690 through 445A.705.

II.B.6. Permit Modification, Suspension, or Revocation:

a. After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including, but not limited to, the following:
i. Violation of any terms or conditions of this permit;
ii. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts;
iii. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge;
iv. A determination that the permitted activity endangers human health or the environment and can only be regulated to acceptable levels by permit modification or termination;
v. There are material and substantial alterations or additions to the permitted facility or activity;
vi. The Administrator has received new information;
vii. The standards or regulations have changed; or
viii. The Administrator has received notification that the permit will be transferred.

b. With the consent of the Permittee and without public notice, the Administrator may make minor modifications in a permit to:

i. Correct typographical errors;
ii. Clarify permit language;
iii. Require more frequent monitoring or reporting;
iv. Change an interim compliance date in a schedule of compliance, provided the new date is not more than 120 days after the date specified in the permit and does not interfere with attainment of the final compliance date;
v. Allow for change in ownership;
vi. Change the construction schedule for a new discharger provided that all equipment is installed and operational prior to discharge;
vii. Delete an outfall when the discharge from that outfall is terminated and does not result in discharge of pollutants from other outfalls except in accordance with permit limits; and
viii. Reallocate the Waste Load Allocation as long as the total loading does not change.

II.B.7. Toxic Pollutants: Notwithstanding Part II.B.6., if a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Act for a toxic pollutant which is present in the discharge and such standard or prohibition is more stringent than any limitation for such pollutant in this permit, this permit shall be revised or modified in accordance with the toxic effluent standard or prohibition and the Permittee so notified.

II.B.8. Liability: Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the Permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable Federal, State, or local laws, regulations, or ordinances.

II.B.9. Property Rights: The issuance of this permit does not convey any property rights, in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property, any invasion of personal rights, or any infringement of Federal, State, or local laws or regulations.

II.B.10. Severability: The provisions of this permit are severable and if any provision of this permit or the application of any provisions of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby.

II.B.11. Duty to Comply: The Permittee shall comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action, permit termination, revocation and re-issuance, modification, or denial of a permit renewal application.

II.B.12. Need to Halt or Reduce Activity Not a Defense: In an enforcement action, the need to halt or reduce permitted activities in order to maintain compliance with the conditions of this permit shall not be a defense for a Permittee.
II.B.13. Duty to Provide Information: The Permittee shall furnish to the Administrator, within a reasonable time, any relevant information which the Administrator may request to determine whether cause exists for modifying, revoking and re-issuing, or terminating this Permit, or to determine compliance with this permit. The Permittee shall also furnish to the Administrator, upon request, copies of records required to be kept by this Permit.

PART III

III.A. Other Requirements

III.A.1. Reapplication: If the Permittee desires to continue to discharge, they shall reapply not later than 180 days before this permit expires on the application forms then in use. POTWs with permits issued under the National Pollutant Discharge Elimination System (NPDES) shall submit the sludge information listed at 40 CFR 501.15(a)(2) with the renewal application. The renewal application shall be accompanied by the fee required by NAC 445A.232.

III.A.2. Holding Pond Conditions: If any wastewater from the Permittee's facility is placed in ponds, such ponds shall be located and constructed so as to:

a. Contain, with no discharge, the once-in-25 year, 24-hour storm at said location;

b. Withstand, without structural damage, the once-in-100 year flood of said location; and

c. Prevent escape of wastewater by leakage other than as authorized by this permit.

III.A.3. Flow Rate Notification: The Permittee shall notify the Administrator, by letter, not later than ninety (90) days after the 30-day average daily influent flow rate first equals or exceeds 85% of the design treatment capacity of the Permittee's facility designated in Part I.A. The notification letter shall include:

a. The 30-day average daily influent flow rate;

b. The maximum 24-hour flow rate during the same 30-day period and the date the maximum flow occurred;

c. An estimate of when the 30-day average influent flow rate will equal or exceed the design treatment capacity of the facility;

d. A status report on the treatment works which will outline, but not be limited to:

i. Past performance;

ii. Remaining capacity of the limiting treatment and disposal units or sites;

iii. Past operational problems and improvements instituted; and

iv. Modifications to the treatment works, which are needed to attain the permitted flow rate due to changing site specific conditions or design criteria; and

e. A schedule of compliance to provide additional treatment capacity before the 30-day average daily influent flow rate equals the present design treatment capacity of the facility.

III.A.4. Publicly Owned Treatment Works: This section applies only to publicly owned treatment works as defined in 40 CFR 122.2.

a. Per [40 CFR 122.42(b), all POTWs must provide adequate notice to the Administrator of:

i. Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to Section 301 or 306 of the Act if it were directly discharging those pollutants; and
ii. Any substantial change in the volume or character of pollutants being introduced into the POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.

b. For the purposes of this paragraph, adequate notice shall include information on:

i. The quality and quantity of effluent introduced into the POTW; and

ii. Any anticipated impact resulting from a change of quantity or quality of effluent to be discharged from the POTW.
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<th>PESTICIDES</th>
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Note: Priority Pollutants to be analyzed using Environmental Protection Agency (EPA) Methods 200 Series, 353.3, 420.2, 624.025, 608, and appropriate combination of these methods. Detection limits shall be at or below one-half the numerical water standards at NAC 445A, 144.
Attachment B

List of Truckee Meadows Water Reclamation Facility Taxonomic Effort
This is a working list defining standard levels of taxonomic effort to be used for laboratory analysis pursuant to Part I.A.4.c.

PHYLUM ARTHROPODA
Class Insecta
  Coleoptera Identify to genus
  Diptera Identify all to genus except in the following cases:
    Canacidae Identify to family
    Chironomidae Identify to subfamily or tribe
    Dolichopodidae Identify to family
    Phoridae Identify to family
    Scathophagidae Identify to family
    Syrphidae Identify to family
  Hemiptera Identify to genus
  Megaloptera Identify to genus
  Odonata Identify to genus
  Lepidoptera Identify to genus
  Ephemeroptera Identify to genus
  Plecoptera Identify to genus
  Trichoptera Identify to genus

Subphylum Chelicerata
Class Arachnida
  Acari Identify to family

Subphylum Crustacea
Class Brachiopoda
  Notostraca Identify to genus
  Cladocera Identify to family
  Class Copepoda Identify to subclass

Class Malacostraca
  Amphipoda Identify to genus
  Decapoda Identify to genus
  Isopoda Identify to genus
  Mysidae Identify to genus

Class Ostracoda
  Ostracoda Identify to family

PHYLUM COELENTERATA
Class Hydrozoa Identify to genus

PHYLUM MOLLUSCA
Class Gastropoda Identify to genus except in the following cases
  Hydrobiidae Identify to family
  Physidae Identify to genus except for Physa/Physella
  Class Bivalvia Identify to genus

PHYLUM NEMATODA Identify to phylum

PHYLUM TARDIGRADA Identify to phylum

PHYLUM PLATYHELMINTHES Identify to family

PHYLUM ANNELEIDA
Class Hirudinea Identify to genus
Class Branchiopoda Identify to genus
Class Oligochaeta Identify to family
Class Polychaeta Identify to genus

PHYLUM NEMERTEA
Class Enopla Identify to genus
APPENDIX C – WTS-1A: GENERAL DESIGN CRITERIA FOR RECLAIMED WATER IRRIGATION USE
WTS-1A: GENERAL DESIGN CRITERIA FOR RECLAIMED WATER IRRIGATION USE

GENERAL NOTES:

The Nevada Division of Environmental Protection (NDEP) must be contacted whenever the use of reclaimed water is planned in order to determine the appropriate discharge permit and assist the applicant in preparing the design submittal to the Division.

Also, the Nevada Division of Water Resources (775) 687-4380 must be notified of the plan to use reclaimed water in order to address requirements for secondary water rights. The Nevada State Health Division (775) 687-4754 should be consulted to ensure the use of reclaimed water is consistent with all water supply protection requirements. Finally, please be aware that the local government and water purveyor may have rules on reclaimed water usage and should be consulted.

GUIDANCE INTRODUCTION:

Pursuant to NAC 445A:275.1(b), the Nevada Division of Environmental Protection (NDEP) must issue a discharge permit for the use of reclaimed water. Prior to issuing this permit, the Division must conduct a complete review of the plans for the reclaimed water use project. The NDEP requires that the plans be prepared and stamped by a qualified Nevada Registered Professional Engineer. This document was created to assist the applicant in preparing and submitting the required plans.

Content of each individual submittal will vary based on the proposed type of reclaimed water use, so not all items listed in this guidance will apply to a given site. This guidance was organized to cover only existing usages of reclaimed water for irrigation in Nevada. Items that the Division deems a requirement are so marked in the document and items that are simply recommendations are so marked.

Information on any guidance referenced in WTS-1A may be gathered by contacting the Division either by phone or the Internet. This document does not replace best professional judgement in reuse system design and site management. The Division reserves the right to require further information as needed.

Past guidance documents for reclaimed water use (WTS-1, WTS-9, and the outline format), are now effectively replaced by this guidance and WTS-1B (General Criteria for Preparing an Effluent Management Plan). This guidance is considered a living document, and revisions may be made in the future as changes in reclaimed water permitting dictate.
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KEYWORDS

AIR GAP: Generally, the safest method of back flow prevention control. For this document, it is defined to be an unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe conveying potable water to the flood level rim of any container with treated effluent. The Uniform Plumbing Code details the requirements for Air Gaps and enforcement is the role of the local water purveyor and/or health department.

BUFFER ZONE:
NAC 445A.076 defines a buffer zone to be the shortest distance between the boundary of the site being irrigated with reclaimed water and either; one, the property line boundary of the site; two, a posted public warning sign, or; three, any point where the property is open to public access, whichever is least.

DMR: Discharge Monitoring Report. A table-formatted report where results from permit analytical requirements are recorded for submittal to the NDEP.

Fecal Coliform:
Bacteria from feces of mammals which is used as an indicator of pathogenic organisms.

Reclaimed Water:
Domestic Wastewater that has been treated to secondary treatment standards and disinfected to levels necessary (per NAC 445a.276, 277, and 278) for the chosen method of reuse. Other terms for this water include Treated Effluent, Reuse Water, and Recycled Water.

SAR: Sodium adsorption Ratio, a ratio determined from the concentration (milliequivalents/liter) of sodium, calcium, and magnesium in water. It is used as an indicator of potential soil problems.

\[
SAR = \frac{Na}{[(Ca + Mg)/2]^{1/2}}
\]

A modification of this ratio, termed the adjusted SAR, considers the changes in calcium solubility in soil water. The procedure for determining this ratio is listed in Wastewater Engineering Treatment, Disposal and Reuse, 1991.

Soil Leaching:
Irrigation practice of applying water to soils in an effort to drive salts beyond the crop root zone. Function of crop salinity tolerance and salt level in irrigation water.

Spray Irrigation:
Spray irrigation is subdivided into solid set (golf courses), move-stop (wheel lines), and constant move (center pivot) systems.

Surface Irrigation:
Surface irrigation is subdivided into flood irrigation and drip irrigation. Additionally, flood irrigation is further subdivided into ridge/furrow systems and graded borders.
SITE CHARACTERIZATION DATA

REQUIREMENTS:

A. Maps for Site(s)

1. General location map for the proposed reclaimed water use area that shows any surrounding water courses, all wells or springs on site and within 250 feet of the site boundary. In addition, show any dwelling units on or within 1000 feet of the site.

2. Topographic site map depicting the boundaries of the reuse site(s). The elevation contour intervals should be at least every five feet. All drainage’s within and around the site shall be presented on this map. Also, seismic zone information should be provided, if applicable and available.

3. A 100-year flood zone map of the site.

B. Ground Water Information

The groundwater flow direction, gradient, depth below ground surface, and static water level elevation shall be presented from published data or sampling data for the proposed reuse site. Additionally, water quality data that has been collected from wells at or near the site shall be submitted.

C. Soils Data

Soils data to be included in the submittal include soil classifications, infiltration rates, and general soil chemistry as it relates to plant growth. Soil maps from the NRCS (Natural Resource Conservation Service) are a typical source for this type of information.

D. Plant Survey

Provide a list of current vegetation growing at the site.

RECOMMENDATIONS:

E. Boring Logs

The recommended average is one boring per two acres, with a minimum of two logs, and a maximum of five logs for the site. The depth investigated should range from land surface to the groundwater table, or to a predetermined level based on NDEP consultation. Logs should be prepared by a qualified professional. The logs should detail, at a minimum, the presence of confining layers, highly pervious stratum, fractured bedrock, and depth to groundwater.

F. Soil Test Pits

Exploratory soil test pit data from surface to a depth of five feet (minimum of two per site). Items to examine include:

1. Soils Texture - NRCS nomenclature
2. Soil Gradation
3. Hardpan, bedrock, or other aquaclodes
4. Gravel lenses, soil mottling
5. Soil Chemistry (pH, EC, Cation Exchange Capacity, ESP, SAR, Boron, Sodium, and Nitrogen).

G. Infiltration Tests

Soil infiltration rates determined from field tests. Pilot scale infiltration basin tests are recommended for determining representative values. The EPA Manual “Land Treatment of Municipal Wastewater” provides the procedure for this test. Appendix Six includes the reference citation for the Manual. Standard percolation tests are also acceptable.

PLANT CHARACTERISTICS

REQUIREMENTS:

A. Plant Information to provide for each plant species:
   
   1. Evapotranspiration Rate (ET);
   2. Annual Nitrogen Uptake (pounds per acre per year);
   3. Salinity tolerance;
   4. Required rooting depth; and
   5. Growing season for the region.

* See Appendix Six for references on determining these requirements

RECOMMENDATIONS:

B. Plant information that is recommended for each plant species:

   1. Harvesting requirements;
   2. Product Demand (economic benefit of crop);
   3. Special nutrient needs, sensitivities;
   4. Trace Inorganic demands, sensitivities; and
   5. Freeze/drought tolerance.

RECLAIMED WATER QUALITY

REQUIREMENTS:

A. Reclaimed Water Quality Data to Provide

   1. BOD and TSS.

   Reuse water must meet secondary treatment standards (NAC 445A.275.2). This is 30 mg/l BOD₃ and 30 mg/l TSS, unless specifically exempt for “treatment equivalent to secondary treatment”. Please consult the Division for anticipated permit limits.

   2. Fecal Coliform or Total Coliform
Limits on Fecal Coliform and Total Coliform levels are based on the method of irrigation and site buffer zones as described in NAC 445A.276-278. (Refer to Appendix Seven and specific guidance sections for more details).

3. Nitrogen Speciation

Nitrogen concentrations and nitrogen forms (Ammonia, nitrate, organic) in the reclaimed water.

RECOMMENDATIONS:

B. Reclaimed Water Quality Data that the Division recommends be evaluated

1. Metals

Examine the concentrations of metals in the reclaimed water that may be present. Certain metals will inhibit plant growth and may also pose a risk to ground water quality if leached.

2. Sodium Adsorption Ratio

Check the SAR or Adjusted SAR of the reclaimed water.

3. Significant Inorganics

Electrical Conductivity, pH, Sodium, Chloride, Boron, Phosphorus, TDS, and other pertinent inorganics as related to plant growth should be evaluated.

DETERMINING THE IRRIGATION BUDGETS

REQUIREMENTS:

A. The NDEP requires that the applicant conduct three distinct irrigation balances for the reuse site during the planning phase. The first two balances, for the plant consumptive use needs and the nitrogen loading limit, are prepared to determine the optimal reclaimed water application rate for the plant(s) per the chosen method of irrigation and yet still be protective of ground water quality. The third evaluation considers the effect of soil permeability at the site, and is used for design purposes to help ensure that the site is appropriate for reclaimed water irrigation, and ponding and run-off will not occur.

Depending upon site-specific factors, such as the reclaimed water nitrogen content and the crop’s nitrogen uptake rate, one of the two balances (nitrogen loading or consumptive use) will govern for groundwater protection. Since these are best design estimates of safe application rates, the Division’s reuse discharge permit instructs the user to prepare annual reports detailing the reasons (crop management goals, changes in turf management, seasonal weather differences, etc.) for exceeding the optimal application rate during any given year.

Example worksheets are included in Appendices One through Three. The first worksheet (1-A, 2-A, and 3-A) in each appendix is a general annual overview sheet and can be used to estimate the optimal reclaimed water application volume to determine the limiting use rate. The second worksheet in each appendix (1-B, 2-B, and 3-B) is a breakdown of monthly reclaimed water application rates and can be used for initial design, irrigation planning, and annual reporting. Use of these worksheets as an ongoing
management tool would allow the applicant to track and compare design and actual usage rates throughout the year.

When preparing the annual balance report, the third worksheet in the nitrogen evaluation section (Worksheet 2-C) incorporates the addition of commercial fertilizer. This promotes additional awareness and provides general guidance to the user on the necessary adjustments in chemical fertilization practices when using reclaimed water containing nitrogen.

If more than one crop type is used at the site, the crop nitrogen uptake rates and salinity tolerances will vary. Therefore, separate worksheets should be completed for each crop area, and the total reclaimed water usage for the site would be the sum of the usage rates for each crop.

**IRRIGATION SYSTEM DESIGN**  
General Design Items for All Systems

**A. Flow Rate Recording**

**Requirement:** Method of flow rate measurement for the site(s). If flow meters are used, the meter placement should be such to allow access for reading and servicing. Plans for reclaimed water screening and/or filtering for accurate recording of flow should be evaluated.

**B. Storm water Run-on and Run-off Controls**

1. **Requirement:** Plans for routing Storm water run-on around, or through, the site shall be provided. Typical run-off controls include conveyance ditches and perimeter berms. The 25-year, 24-hour storm event shall be used in these designs; and

2. **Requirement:** Storage reservoirs must contain, without release, the precipitation that falls within the reservoir boundaries for the 25-year, 24-hour storm event at the site. Also, the reservoir must withstand, without release of reclaimed water (from structural damage of berms, etc.), the run-off generated from the 100-year, 24-hour storm event at the site. If run-on will impact exterior berms, a method of erosion control shall be implemented.

**C. Storage Reservoirs**

1. **Requirement:** WTS-37 “Guidance Document for Design of Wastewater Detention Basins” shall be used as the general guidance for the design of the reservoir (pond). Water balances shall be developed for each systems specific requirements (winter storage, etc.).

   The NDEP will evaluate the risk to ground water at the site in determining reservoir lining criteria (such as liner thickness and permeability).

2. **Recommendation:** For reclaimed water use sites where this reuse system is the sole discharge method for a community’s reclaimed water, a minimum of four days of storage volume should be available in reservoirs for periods when the reuse irrigation system is not operating. Storage time is intended to allow time for system repairs.

3. **Recommendation:** In designing a storage reservoir, special focus should be given to algae control, filtering outtake water, and odor control devices.
D. Notification Signage and Public Access Controls

1. **Requirement:** Reuse areas shall have appropriate notification signs that clearly state that treated effluent is in use, and to avoid body contact with spray. (NAC 445A.275.3). These signs shall be placed along each side of the reuse area at points of public access (such as gates) and at least every 300 feet along a fence line or border, unless otherwise approved by the Division. See Appendix Five for sign examples. Signs should be bi-lingual, English and Spanish (or other applicable language), for areas where workers and the public may not speak English.

2. **Requirement:** All ponds containing effluent must be posted with notification signs stating treated effluent is in storage. Signs should be bi-lingual, English and Spanish (or other applicable language), for areas where workers and the public may not speak English.

3. **Recommendation:** A continuous fence around the area of reuse is recommended in sites requiring a buffer zone and control of public access during reuse. Buffer zone requirements are defined in NAC 445A.276.

4. **Recommendation:** In the case of nighttime irrigation at areas with the potential for public access at night, signs should be illuminated if possible.

E. Subsurface Drainage, if applicable, these are requirements

If the reuse operation requires subsurface drainage, the plans for the drain need to be prepared and submitted to this office. Discharge options for the subsurface drainage will be dependent on its quality and its final disposition. This may require coordination with the reuse permit writer.

F. Reclaimed water disinfection at reuse site; if applicable to meet permit limits, these are requirements

1. Design Drawings of the disinfection system, including system redundancy
2. Design calculations for the dosing, contact time, and other related factors
3. Chemical storage plan
4. Spill containment plan
5. Operation and Maintenance Manual

G. Filtration unit, if applicable to meet permit limits, these are requirements

1. Design Drawings for the filter system, including system redundancy.
2. Design calculations for the filter sizing, pumps, and backwash cycle.
4. Chemical storage plan.
5. Spill containment plan.

H. Weather Station at site, if applicable, these are requirements

1. Location for the weather station shall be depicted on the site map.
2. Description of the operational features of the station, including the station wind speed recorder, precipitation, and ET system.

I. Cross-connection Certification
Requirement: Documentation shall be provided that notification has been made to the local water purveyor and the local health agency of the permittee’s intent to use reclaimed water. This documentation shall describe the plan for complying with cross-connection control requirements of the local water purveyor.

IRRIGATION SYSTEM DESIGN
Spray Irrigation Design Submittal Items

REQUIREMENTS:

A. Buffer Zones

1. Delineating the Zone(s)

Delineate the required buffer zones for the reuse site and how the public will be kept from encroaching into these zones. Buffer zones are a function of the reclaimed water quality and public access controls. NAC 445A.276-277 defines the size of the zone required. The regulation is included in Appendix Seven.

2. Controlling Aerosol Drift

For sites with buffer zone requirements, aerosol drift must be controlled to prevent the carryover of aerosols outside of sites buffer zones (NAC 445A.275.5). In order to assess the risk of public contact with wind blown aerosol, the prevailing wind direction shall be presented on the site plan. A typical method of controlling aerosol drift involves the use of a weather station with an anemometer which is automated to cease irrigation at target wind speeds.

B. Reuse Water Application Plans

Detailed plans of the irrigation system layout on the reuse site shall be provided. Items to depict are: the location of control valves, drain valves, blow-off valves, air-gaps, flow meters, pumps, and other related items. Detail drawings shall be provided for control valves, pumps, air gaps, flow meters, and other related items.

C. Irrigation Pump System(s)

Design plans for the reclaimed water pump station(s) shall be presented. Relevant items include:

1. Alarm Systems, level sensors, redundancy, spill containment, and back-up power;

2. If potable water is used for seal water, the local water purveyor and/or health authority shall be consulted to examine back flow prevention controls; and

3. Permanent wording stating that reclaimed water is being used should be placed on visible sections of the pump station(s) such as name plates, meters, and valves. This wording should be bi-lingual in areas where the workers do not all speak English.
D. Reclaimed Water Run-off Prevention

In the event of a line break from the irrigation system, surface flow must be prevented from discharging off the site. The design for the surface flow containment system must be based on a conservative estimate of the volume of water from a significant system failure. Some acceptable options are containment berms and collection ditches with conveyance to impoundments.

E. Cross connection control and Potable Water Protection

The guidelines for separation between reclaimed water and potable water lines that are required by the governing health department and/or local water purveyor shall be followed. The Division requires that the reuser provide documentation that the governing health authority has approved the plan(s) for cross connection controls and backflow prevention.

RECOMMENDATIONS:

F. American Water Works Association Guidelines

As a guidance, the Division recommends the following from the American Water Works Association with regards to irrigation system installation:

1. Purple color for all piping, risers, valve controllers, and valve box covers. In lieu of this, other approved methods or marking, such as purple marking tape over the entire pipe length, could be used. Permanent wording stating that treated effluent is being used should be stenciled on all valve box covers, reclaimed water pipe, and other ancillaries. NOTE: Other identification plans, provided that they meet the objectives of preventing cross connection, misidentification and misunderstanding of piping systems could be used;

2. Prohibiting hose bibs on the treated effluent system;

3. Quick coupler fittings should be such that interconnection cannot be made between potable and reclaimed water systems;

4. At crossings with potable lines, the applicable rules dictated by the governing health authority must be followed.

RECOMMENDATIONS CONTINUED:

G. Drain Valves

Drain valves should be located at low points on the distribution system to allow reuse water line draining for maintenance and seasonal shut-down of the system. Drain water should be infiltrated on-site.
H. Filter Screens

Filter screens or strainers should be installed on the delivery system to prevent sprinkler clogging from algae or other particulates if it is a problem.

I. Piping Protection

Plastic piping should be protected from sunlight. Openings, such as risers, that may allow rodents to nest should be covered.

IRRIGATION SYSTEM DESIGN
Surface (Flood and Drip) Irrigation Design Submittal Items

REQUIREMENTS:

A. Flood Irrigation Design Items

1. Field Grading.

The reuse field should be leveled to allow for smooth and even distribution of water over the field. The slope of the grade is dependent on the type of flood irrigation. Graded border irrigation should be conducted on relatively flat lands. Ridge and furrow irrigation should be sloped, around 2%-5%.

2. Method of reuse water application.

The design plans for reuse water application to the field should be presented. Some common dosing plans include lined ditches with slide gates, slotted pipe, and ridge and furrow systems. The design should focus on even distribution of effluent over the site. Erosion controls at the discharge locations should be incorporated in the design.

3. Tailwater recovery system design.

Design plans for tailwater containment and return systems should be presented. Sizing of the tailwater system must be based on conservative estimates of the volume of tailwater.

B. Drip Irrigation Design Items

1. System Layout

The design plans for reuse water application to the site should be presented. This includes the layout for the distribution lines, emitter zones, and design application rates. It is critical that the pressure limits for the distribution system not be exceeded.

RECOMMENDATIONS:

2. Clog Prevention
Design plans for screening particulate matter, to prevent clogging the emitters, is recommended by the Division.

GROUNDWATER MONITORING

Generally, at least one well located up gradient of the reuse site and two wells located down gradient of the site are required. If groundwater monitoring is required by the permit, proposed monitoring well locations are to be presented on the required site map. The proposed well sites and construction design must receive approval from NDEP prior to installation.

NDEP’s WTS-4 “Guidance Document for Monitoring Well Siting” shall be used for the well siting and design process. The Nevada Division of Water Resources must be contacted for necessary permits and any additional design requirements.

The purpose of the monitoring wells are to demonstrate that the use of reclaimed water does not cause the degradation (exceedance of State Drinking Water Standards) of existing or potential underground sources of drinking water. They are recommended where there is a potential for pollutants to be carried into waters of the state by any means. (NRS 445A.490.3, NRS 445A.465.3)
WTS-1A: APPENDIX ONE

PLANT CONSUMPTIVE USE WORKSHEET

The consumptive use equation for determining the crop’s water requirement takes into account precipitation, evapotranspiration, the efficiency of the irrigation system, and the salt tolerance of plant species. The salt tolerance of the plant species is used to calculate the leaching requirement (Lr) to remove excess salts from the root zone. Excess salts within the soil cause the plant cells to expend more energy adjusting the salt concentration within the plant tissues, and therefore, less energy is available for vigorous plant growth. The hydraulic loading rate and the TDS to ECw conversion equation included below are derived from Wastewater Engineering: Treatment, Disposal, and Reuse, (Metcalf and Eddy, 1991), the equation for the leaching requirement is from the Nevada Irrigation Guide, (USDA, Soil Conservation Service, 1981).

\[
Lw_{(a)} = \frac{(ET-P)}{[E \times (1-Lr)]} \quad \text{Lr} = \frac{ECw}{[(5 \times ECe)-ECw]}
\]

where:
- \( Lw_{(a)} \) = Allowable Hydraulic Loading Rate Based on Crop Water Needs (in/yr);
- \( ET \) = Evapotranspiration Rate (in/yr);
- \( P \) = Precipitation Rate (in/yr);
- \( Lr \) = Leaching Requirement (% expressed as a fraction);
- \( E \) = Efficiency of Irrigation System (% expressed as a fraction)
  - For example: 75% = 75/100 = 0.75; example efficiencies are included below;
- \( ECe \) = Salinity Tolerance of Plant Crop (mmho/cm or dS/m); \( ECw \) = Salinity of Applied Effluent (mmho/cm); If TDS is supplied by the laboratory, see conversion below; and
- \( TDS \) = Average Total Dissolved Solids in Applied Effluent (mg/l).

“ET” - Evapotranspiration

Evapotranspiration is defined as the “loss of water from the soil both by evaporation and by transpiration from the plants growing thereon” (Webster’s Dictionary, 1990). Since different plants transpire at different rates, a crop coefficient (Kc) can be used to modify the potential ET for a particular area. Values for Kc vary depending upon the geographical location of the crop, and the species grown. If a crop coefficient can be determined, when multiplied by the potential ET rate, the result is a more accurate estimate of ET for an irrigation site. The Division recommends that reusers contact local agriculture representatives identified in Appendix Six for further crop-specific and regional information.

“E” - Irrigation Efficiency

The irrigation system efficiency is related to how effective the method is in delivering the irrigation water equally to all parts of the crop. Example values for efficiency are:

<table>
<thead>
<tr>
<th>Sprinkler Irrigation Type</th>
<th>Application Efficiency</th>
<th>Surface Irrigation Type</th>
<th>Application Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid Set</td>
<td></td>
<td>Narrow Graded Border (&lt;15' wide)</td>
<td>0.65 - 0.85</td>
</tr>
<tr>
<td>Portable Hand Move</td>
<td></td>
<td>Wide Graded Border (&lt;100' wide)</td>
<td>0.65 - 0.85</td>
</tr>
<tr>
<td>Wheel Roll</td>
<td>0.70 - 0.80</td>
<td>Level Border</td>
<td>0.75 - 0.90</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-------------</td>
<td>----------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Center Pivot or Traveling Lateral</td>
<td></td>
<td>Straight or Graded Contour Furrows</td>
<td>0.70 - 0.85</td>
</tr>
<tr>
<td>Traveling Gun</td>
<td></td>
<td>Drip</td>
<td>0.70 - 0.85</td>
</tr>
</tbody>
</table>

"ECe" - Salinity Tolerance of Plant Crop
The plant salt tolerance is crop-specific, and can be obtained from the local Extension Service, literature, or other reputable sources. The low end of the range identifies the ECe value which would result in a 0% reduction of crop yield. The upper end of the range identifies the ECe value which could result in a 25% reduction of crop yield\(^{4}\).

Example ECe's:
- Annual Ryegrass\(^{(2)}\) = 3 to 6 mmho/cm or dS/m
- Perennial Ryegrass\(^{(2,4)}\) = 5.6 to 8.9 mmho/cm or dS/m
- Bermudagrass\(^{(2,4)}\) = 6.9 to 10.8 mmho/cm or dS/m
- Tall Fescue\(^{(2,4)}\) = 3.9 to 8.6 mmho/cm or dS/m
- Alfalfa\(^{(1,4)}\) = 2.0 to 5.4 mmho/cm or dS/m

"ECw" - Salinity of Applied Effluent
Direct measurement of ECw is typically preferred. However, if the laboratory has supplied the reuser with a concentration of TDS, an approximate conversion\(^{(4)}\) is ECw = TDS ÷ 640. This conversion is considered accurate within 10%. The value for ECw or TDS is obtained from the treatment plant supplying the effluent. For site design, an average value can be used. For completion of the required annual balance report, the actual analytical results from Discharge Monitoring Reports should be used.

\(^{(1)}\) For clarity in this document, the unit for electrical conductivity (EC) is expressed as mmho/cm. However, EC can also be expressed in decisiemens per meter, dS/m.
\(^{(4)}\) Wastewater Engineering: Treatment, Disposal, and Reuse, (Metcalf and Eddy, 1991)
Worksheet 1-A

CONSUMPTIVE USE REQUIREMENT WORKSHEET:
Maximum Loading Rate Based on Plant Water Use Requirements
Page _____ of _____  Crop Type = _____________________

\[ Lw_{(c)} = \frac{(ET-P)}{[E \times (1-Lr)]} \; \text{ECw} \quad \text{Lr} = \frac{\text{ECw}}{[(5 \times \text{ECe})-\text{ECw}]} \]

(A) Annual Evapotranspiration (ET, in/yr) = __________
(Multiply by Crop Coefficient (Kc) if value is known)

(B) Annual Precipitation (P, in/yr) = __________

(C) \( (A) - (B) = __________ \) (in/yr)

(D) Salinity of Applied Effluent (ECw, mmho/cm) or \( = \) (TDS, mg/l) \( \div \) 640 = __________
(Indicate which method was used to determine ECw, Direct Measurement or Approximation by Calculation.)

(E) Salinity Tolerance of Plant Crop (ECe, mmho/cm) = __________

(F) \( 5 \times (E) = __________ \) (mmho/cm)

(G) \( (F) - (D) = __________ \) (mmho/cm)

(H) Leaching Requirement (Lr, %, expressed as a fraction) = \( (D) \div (G) = __________ \)

(I) \( 1 - (H) = __________ \)

(J) Efficiency of Irrigation System (E, %, expressed as a fraction) = __________

(K) \( (J) \times (I) = __________ \)

(L) \( (C) \div (K) = Lw_{(c)} = __________ \) (inches/year)

If the Water Use Rate calculated in ("L") above is the lowest application volume calculated for the annual Consumptive Use Limit (This Worksheet), the Nitrogen Limit (Worksheet 2-A) or the Permeability Limit (Worksheet 3-A), then fill out Worksheet 1-B to estimate the planned maximum daily flow for the site.
Worksheet 1-B

CONSUMPTIVE USE REQUIREMENT WORKSHEET:
Maximum Loading Rate Based on Plant Water Use Requirements
Page _____ of _____ Crop Type = _______________

$Lw_{(e)} = \frac{(ET-P)}{[E \times (1-Lr)]}$; $Lr = \frac{ECw}{[(5 \times ECe)-ECw]}$; $ECw = TDS+640$

Monthly values for evapotranspiration are dependent on the crop type and regional area of the site, as well as the crop coefficient if known. Monthly precipitation is also regional. The values for ET and P can be obtained from the local extension service, literature, or other reputable source. Please see the explanation in the “WTS-1A: Appendix One” text for further discussion of crop coefficients.

To calculate the monthly value for $Lw_{(e)}$, perform the calculation for each month as outlined in Worksheet 1-A, and input the result in the table below. Since this form is crop-specific, a value of zero is acceptable when the crop is not in season; however, use of a zero should be explained.

Million Gals/Mo = $Lw_{(e)} \times \frac{\text{ac} \times 12 \text{ in/ft} \times 43,560 \text{ ft}^2/\text{ac} \times 7.481 \text{ gals/ft}^3}{1,000,000}$

(Enter and use the number of acres for the crop type being irrigated)

MGD (Million gallons/day) = M Gallons/mo ÷ Days/mo

<table>
<thead>
<tr>
<th>Month</th>
<th>Days/Mo</th>
<th>ET (in/mo)</th>
<th>P (in/mo)</th>
<th>$Lw_{(e)}$ (in/mo)</th>
<th>M Gals/Mo</th>
<th>MGD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>31</td>
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<td>Feb</td>
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<td>Totals (in/yr):</td>
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</table>

Note: These totals should approximate the annual values calculated in Worksheet 1-A.
WTS-1A: APPENDIX TWO

NITROGEN LOADING LIMIT WORKSHEET

The nitrogen loading equation takes into account precipitation, evapotranspiration, plant nitrogen uptake, nitrogen content of the applied effluent, and allowable percolate nitrogen concentration. The equation included below is from *Wastewater Engineering: Treatment, Disposal, and Reuse*, (Metcalf and Eddy, 1991)

\[
L_{w(n)} = \frac{\left[\left(C_{p}, \text{mg/l}\right) \times (P-\text{ET}, \text{in/yr})\right] + \left[\left(U, \text{lb/acre-yr}\right) \times (4.4)\right]}{\left[(1-f) \times (C_{n}, \text{mg/l})\right] - (C_{p}, \text{mg/l})}
\]

where:

\[L_{w(n)} = \text{Allowable Hydraulic Loading Rate Based on Nitrogen Loading rate (in/yr)};\]
\[C_{p} = \text{Total Nitrogen Concentration in Percolating Water (mg/l)};\]
\[\text{ET} = \text{Evapotranspiration Rate (in/yr)};\]
\[P = \text{Precipitation Rate (in/yr)};\]
\[U = \text{Nitrogen Uptake Rate by Crop (lb/acre-yr)};\]
\[4.4 = \text{Combined Conversion Factor};\]
\[C_{n} = \text{Total Nitrogen Concentration in Applied Wastewater (mg/l)};\] and
\[f = \text{Fraction of Applied Total Nitrogen Removed by Denitrification and Volatilization}.
\]

“Cp” - Nitrogen in Percolating Water
A conservative value for Total N in the water that percolates past the root zone (Cp) is 7 mg/l, which is the first “red flag” value for Nitrate as N in monitoring well samples. Setting the Cp limit at a constant value aids in obtaining an hydraulic nitrogen loading rate (Lw(n)) which should be protective of groundwater resources. The drinking water standard for Nitrate as N is 10 mg/l, which would be the maximum allowable value for Cp.

“ET” - Evapotranspiration
Evapotranspiration is defined as the “loss of water from the soil both by evaporation and by transpiration from the plants growing thereon” (Webster’s Dictionary, 1990). Since different plants transpire at different rates, a crop coefficient (Kc) can be used to modify the potential ET for a particular area. Values for Kc vary depending upon the geographical location of the crop, and the species grown. If a crop coefficient can be determined, when multiplied by the potential ET rate, the result is a more accurate estimate of ET for an irrigation site. The Division recommends that reusers contact local agriculture representatives identified in Appendix Six for further crop-specific and regional information.

“U” - Crop Nitrogen Uptake
Plant nitrogen uptake rates (U) are crop-specific, and can be obtained from the local Extension Service, literature, or other reputable sources. Using the accepted value for U in this equation assumes that the harvested portion of the crop is removed from the site. If plant cuttings are not removed from the area, then the amount of nitrogen removed by uptake should be offset by the amount of nitrogen returned to the soil by decomposing cutting materials. If alfalfa, or another legume, is the site’s crop, then similar considerations should be made for atmospheric nitrogen which is fixed into the soil by alfalfa. A discussion with the local agricultural extension service is recommended prior to finalizing a “U” value.
“Cn” - Nitrogen in Applied Wastewater
The total nitrogen in the applied effluent water (Cn) can be obtained from the treatment plant that is supplying the effluent. For site design, an average value can be used. For completion of the required annual balance report, the actual analytical results from Discharge Monitoring Reports shall be used.

“f” - Nitrogen lost to Denitrification and Volatilization
The amount of nitrogen lost to denitrification and volatilization varies depending upon the nitrogen characteristics of the applied wastewater and the microbial activity in the soil. Microbial denitrification, in soils with a sufficient carbon source for the biological activity, may account for as much as 15 to 25 percent of the applied nitrogen during warm, biologically active months. Volatilization of ammonia may be as much as 10 percent, depending upon the ammonia fraction in the total nitrogen applied. (Metcalf & Eddy, 1991) For arid climates, such as Nevada, the value typically used for the “f” term is 0.2.

Nitrogen Addition by Chemical Fertilizers
If the allowable reuse water application volume is limited by plant consumptive use (Worksheet 1-A), nitrogen may need to be added by commercial fertilizer. In the design of a reuse site, this should be estimated to provide the site operator with a guideline for fertilizer application, in addition to the nitrogen being applied via the treated effluent. The application of fertilizer must then be incorporated into the required annual report to demonstrate that the application of commercial nitrogen and effluent nitrogen did not exceed the plant crop’s uptake rate.

Worksheet 2-C is designed to be used to provide the Division with the required annual report of effluent and fertilizer usage. Worksheet 2-C can also be utilized as a site management tool to estimate the amount of commercial fertilizer which may be required in an upcoming month. However, use of the worksheet in this manner does not preclude the responsible use of good irrigation and nutrient management practices.
Worksheet 2-A

WATER REQUIREMENT DESIGN WORKSHEET:
Maximum Hydraulic Loading Rate Based On Annual Nitrogen Balance Evaluation
Page _____ of _____ Crop Type = __________________

\[ L_{w(n)} = \frac{[C_p \times (P-ET)] + (U \times 4.4)}{[(1-f) \times C_n] - C_p} \]

(A) Total Nitrogen in Percolating Water (Cp, mg/l) = ____________

(B) Annual Precipitation (P, in/yr) = ______________

(C) Annual Evapotranspiration (ET, in/yr) = ______________

(Multiply by Crop Coefficient (Kc) if value is known)

(D) (B) - (C) = ____________ (in/yr)

(E) (A) \times (D) = ______________

(F) Crop Nitrogen Uptake (U, lb/ac-yr) = ______________

(G) (F) \times 4.4 = ______________

(H) (E) + (G) = ______________

(I) Fraction of Applied Total Nitrogen Lost to Denitrification and Volatilization (f) = ______

(J) 1 - (I) = ______________

(K) Total Nitrogen in Applied Effluent (Cn, mg/l) = ______________

(L) (J) \times (K) = ______________

(M) (L) - (A) = ______________

(N) (H) + (M) = L_{w(n)} \text{ (inches/year)} = ______________

If the Water Use Rate calculated in ("N") above is the lowest application volume calculated for the annual Consumptive Use Limit (Worksheet 1-A), the Nitrogen Limit (This Worksheet) or the Permeability Limit (Worksheet 3-A), then fill out Worksheet 2-B to estimate the planned maximum daily flow for the site.
 Worksheet 2-B  

WATER REQUIREMENT DESIGN WORKSHEET:  
Maximum Hydraulic Loading Rate Based On Annual Nitrogen Balance Evaluation  
Page _____ of _____  
Crop Type = ____________________________  

\[ Lw_{(a)} = \frac{(Cp \times (P-ET)) + (U \times 4.4)}{[(1-f) \times Cn] - Cp} \]

Monthly values for evapotranspiration are dependent on the crop type and regional area of the site, as well as the crop coefficient if known. Monthly precipitation is also regional. The values for ET and P can be obtained from the local extension service, literature, or other reputable source. Please see the explanation in the “WTS-1A: Appendix Two” text for further discussion of crop coefficients.

The monthly value of crop nitrogen uptake (U) can be calculated according to the equation included on the Table. Please see the discussion in the “WTS-1A: Appendix Two” text regarding U values for alfalfa crops or sites that do not remove crop cuttings. If a different distribution of monthly “U” is used, due to circumstances such as germination or dormancy periods, then provide documentation explaining the difference.

To calculate the monthly value for \( Lw_{(a)} \), perform the calculation for each month as outlined in Worksheet 2-A, using the monthly values for “U”, “P”, “ET”, and “Cn”, and input the result in the table below. Since this form is crop-specific, a value of zero is acceptable when the crop is not in season; however, use of a zero should be explained.

Monthly U (lb/ac-mo) = U (lb/ac-yr) \times ET(in/mo) \div ET (total in/yr)

Million Gallons = \( Lw_{(a)} \) in/mo \times \frac{# \text{ acres} \times 12 \text{ in/ft} \times 43,560 \text{ ft}^2/\text{ac} \times 7.481 \text{ gallons/ft}^3}{1,000,000}

Per Month   

<table>
<thead>
<tr>
<th>Month</th>
<th>Days/Mo</th>
<th>P (in/mo)</th>
<th>ET (in/mo)</th>
<th>U (lb/ac-mo)</th>
<th>( Lw_{(a)} ) (in/mo)</th>
<th>M Gals/Mo</th>
<th>MGD of Recl'm'd Water</th>
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Note: The totals for P, ET and \( Lw_{(a)} \) should approximate the annual values used or calculated in Worksheet 2-A.
Worksheet 2-C: Regardless of the limiting hydraulic loading rate that was defined during the design phase, Worksheet 2-C is designed to be used to provide the Division with the required annual report of effluent and fertilizer usage.

\[
\text{Effluent N Applied} = \frac{\text{MGD Applied} \times \frac{\text{Effluent N Conc.}}{(\text{mg/l})} \times 8.34 \times \frac{\# \text{ days/mo}}{\# \text{ Acres}} \times (1 - "l") \text{ (i.e. 0.2.)}}{\text{lb/acre-mo}}
\]

\[
\text{Fertilizer N Applied} = \frac{\text{Monthly Fertilizer used (lbs/mo)} \times \% \text{ N in Fertilizer (as a fraction)}}{\text{acres (lb/acre-mo)}}
\]

Crop Name and Nitrogen Uptake Requirement = (lbs/acre-yr)

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Total** =

** The Total N Applied to the crop should be less than the crop’s Nitrogen Uptake Requirement. Please see your permit for directions if it is not.
The equation for the hydraulic limit based on soil permeability takes into account precipitation, evapotranspiration, and the design percolation rate of the soil. The equation below is from *Wastewater Engineering: Treatment, Disposal, and Reuse* (Metcalf and Eddy, 1991).

\[ Lw_{p} = ET - P + Wp \]

where:
- \( Lw_{p} \) = Allowable Hydraulic Loading Rate Based on Permeability (in/yr);
- \( ET \) = Evapotranspiration Rate (in/yr);
- \( P \) = Precipitation Rate (in/yr); and
- \( Wp \) = Design Percolation Rate (in/yr), Based on a Percentage (2%-6%) of the Minimum Soil Profile Permeability.

**"ET" - Evapotranspiration**

Evapotranspiration is defined as the “loss of water from the soil both by evaporation and by transpiration from the plants growing thereon” (Webster's Dictionary, 1990). Since different plants transpire at different rates, a crop coefficient (Kc) can be used to modify the potential ET for a particular area. Values for Kc vary depending upon the geographical location of the crop, and the species grown. If a crop coefficient can be determined, when multiplied by the potential ET rate, the result is a more accurate estimate of ET for an irrigation site. The Division recommends that users contact local agriculture representatives identified in Appendix Six for further crop-specific and regional information.

**"Wp" - Design Percolation Rate**

As noted above, the design percolation rate (Wp) should be reduced to 2% to 6% of the minimum soil permeability. This is a conservative approach, and accounts for variation in soil permeabilities across the site, as well as variations within the soil column.
Worksheet 3-A

MAXIMUM DESIGN HYDRAULIC LOADING RATE:
Based on Annual Permeability Evaluation

Page _____ of _____ Crop Type = _________________

Lw(p) = ET - P + Wp

(A) Annual Evapotranspiration (ET, in/yr) = ____________
    (Multiply by Crop Coefficient (Kc) if value is known)

(B) Annual Precipitation (P, in/yr) = ____________

(C) Design Permeability (inches/hour) = ____________

(D) (C) x _____ hr/day x 365 days/yr = inches/year = ____________
    (Enter and use anticipated average time of irrigation in hours per day, i.e. 10 hrs/day)

(E) % used for Percolation Reduction (typically 2% to 6%, expressed as a fraction) = ____________

(F) Design Percolation Rate (Wp, in/yr) = (D) x (E) = ____________

(G) (A) - (B) + (F) = Lw(p) (inches/year) = ____________

This site evaluation tool is to be used to provide awareness to the site developer that soil permeability may be
a concern at the site and that a plan (soil amendments, application rates, etc.,) may have to be developed to
prevent excessive ponding.

Site location and method of reuse will be the major factors in determining the level of this plan. Contact your
NDEP reviewer for assistance.
Worksheet 3-B

MAXIMUM DESIGN HYDRAULIC LOADING RATE:
Based on Annual Permeability Evaluation
Page ____ of ____ Crop Type = ____________________

$L_{wp} = ET - P + W_p$

Monthly values for evapotranspiration are dependent on the crop type and regional area of the site, as well as the crop coefficient if known. Monthly precipitation is also regional. The values for ET and P can be obtained from the local extension service, literature, or other reputable source. Please see the explanation in the "WTS-1A: Appendix Three" text for further discussion of crop coefficients.

To calculate the monthly value for $L_{wp}$, perform the calculation for each month as outlined in Worksheet 3-A, and input the result in the table below.

\[
\text{Million Gals/Mo} = L_{wp} \text{ in/mo} \times \text{# acres} \div 12 \text{ in/ft} \times 43,560 \text{ ft}^2/\text{ac} \times 7.481 \text{ gals/ft}^3 \div 1,000,000
\]

(ea. crop type)

MDG (Million gallons/day) = M Gallons/mo ÷ Days/mo

<table>
<thead>
<tr>
<th>Month</th>
<th>Days/Mo</th>
<th>ET (in/mo)</th>
<th>P (in/mo)</th>
<th>$L_{wp}$ (in/mo)</th>
<th>M Gals/Mo</th>
<th>MGD</th>
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Note: These totals should approximate the annual values calculated in Worksheet 3-A.
APPENDIX FOUR

WORKER HYGIENE FACT SHEETS

This project area uses reclaimed wastewater for irrigation. This reclaimed wastewater comes from the sewage treatment plant and meets the standards required for this level of reuse. Potential risks of disease transmission from the use of the reclaimed water is low, however, some general guidelines (listed below), should be followed to protect you from becoming ill when working with reclaimed water:

1. Do not drink the reclaimed water or use the reclaimed water for washing.

2. Always wash hands and face with clean water and soap before eating, smoking, or drinking.

3. Wear rubber gloves when working on the irrigation system.

4. Try to keep the irrigation water off your skin and clothes as much as possible.

5. Always treat cuts immediately before continuing with work on the irrigation system.

6. Make sure the area is clear of people that may get sprayed before running the irrigation system.

7. Report any problems to your supervisor that you feel could pose a risk.
APPENDIX SIX

REUSE REFERENCE LISTS

LITERATURE REFERENCE LIST FOR RECLAIMED WATER USE MANAGEMENT


Contact List for Technical and Regulatory Guidance

1. Nevada Division of Environmental Protection, Bureau of Water Pollution Control
   333 West Nye Lane, Carson City, NV, 89706 ....................... (775) 687-4670

2. Nevada Division of Water Resources
   123 West Nye Lane, Carson City, NV 89705 ....................... (775) 687-4380

3. Nevada Division of Health
   505 East King Street, Carson City, NV 89710 ....................... (775) 687-4750

4. Desert Research Institute
   7010 Dandini Boulevard, Reno, NV 89506 ....................... (775) 673-7300

5. National Resource Conservation Service (NRCS)
   1528 U.S. Highway 395, Minden, NV 89410 ....................... (775) 883-2623
   5301 Longley Lane, Building F, Room 201, Reno, NV 89511 ........... (775) 784-5875

6. University of Nevada Cooperative Extension
   2345 Redrock Street, Suite 100, Las Vegas, NV 89146-3160 ........... (702) 222-3130

7. U.S. Agriculture Department
   920 Valley Road, Reno, NV 89512 ............................... (775) 784-6057

8. Center for Urban Water Conservation - UNLV Dept. of Biology
   Las Vegas, Nevada 89137-4004 ................................... (702) 895-3853
APPENDIX SEVEN

NEVADA ADMINISTRATIVE CODE - REUSE REGULATIONS

Use of Treated Effluent for Irrigation

445A.275 General requirements and restrictions.
1. A person shall not use treated effluent for irrigation unless he has:
   (a) Submitted to the division and has received the approval of the division of a plan for the management of
       effluent; and
   (b) Obtained a permit pursuant to NAC 445A.228 to 445A.263, inclusive.

2. A person using treated effluent for irrigation by flooding or sprinklers shall use effluent that has received at
   least secondary treatment. As used in this subsection:
   (a) "Secondary treatment" means that the biological oxidization of the sewage to a point where the sewage has
       a 5-day inhibited biochemical oxygen demand concentration of 30 milligrams per liter or less.
   (b) "Five-day inhibited biochemical oxygen demand" means the amount of dissolved oxygen in milligrams per
       liter required during stabilization of the carbonaceous decomposable organic matter by aerobic bacterial
       action at 20 degrees centigrade for 5 days.

3. Any person using treated effluent for irrigation shall post a notice at the site of irrigation warning the general
   public to avoid contact with the treated effluent.

4. Except as otherwise provided in this subsection, a person shall not use treated effluent to irrigate crops for
   human consumption. A person may use treated effluent for surface irrigation of fruit bearing trees and nut
   bearing trees.

5. A person using treated effluent to irrigate by sprinklers shall conduct the irrigation in a manner which inhibits
   the treated effluent from drifting or carrying outside the buffer zone.

6. A person shall not allow treated effluent used in irrigation to run off the site being irrigated.

(Added to NAC by Environmental Comm'n, eff. 9-13-91)—(Substituted in revision for NAC 445.176)

Revisor's Note.

The regulation of the state environmental commission filed with the secretary of state on September 13, 1991, the source of NAC 445A.275 to 445A.280, inclusive, became effective on that
date and contains the following provisions not included in NAC:

"Notwithstanding the provisions of sections 2 to 3, inclusive, of this regulation, a person who:
1. Is using treated effluent for irrigation on the effective date of this regulation without having obtained a permit pursuant to NAC 445A.228 to 445A.263, inclusive; and
2. Has submitted to the state department of conservation and natural resources a completed application for obtaining a permit pursuant to NAC 445A.228 to 445A.263, inclusive, within 180 days after the effective date of this regulation.

may continue to use treated effluent for irrigation without having obtained a permit until the state department of conservation and natural resources takes action upon the application for a
permit."

445A.276 Spray irrigation: Requirements for bacteriological quality and buffer zone limitations.
1. Treated effluent being used for spray irrigation must meet the following requirement for bacteriological
   quality and buffer zone limitations:

<table>
<thead>
<tr>
<th>Fecal Coliform</th>
<th>c.f.u or mpn/100 ml</th>
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<tbody>
<tr>
<td>Reuse Permitted</td>
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<tr>
<td>A</td>
<td>A(1)</td>
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<tr>
<td>30-day geometric mean</td>
<td>No limit</td>
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<td>Maximum daily number</td>
<td>No limit</td>
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<td>Minimum Buffer Zone (Feet)</td>
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</table>
2. As used in this section:
   
   (a) Category "A" means irrigation with treated effluent of land used for:
   
   (1) Pasture; or
   (2) Other agricultural purposes except growing crops for human consumption, where public access to the site being irrigated is prohibited.

   Treated effluent being used for activities falling within category A must meet the requirements for bacteriological quality and buffer zone limitations identified in subsection 1 as applicable to category A or meet the requirements for bacteriological quality and buffer zone limitations identified in subsection 1 as applicable to category A(1).

   (b) Category "B" means irrigation with treated effluent for land used for:
   
   (1) A golf course, cemetery or greenbelt where public access to the site being irrigated is controlled and human contact with the treated effluent does not occur;
   (2) An impoundment where all activities are prohibited and human contact with the treated effluent does not occur; or
   (3) Any combination of a use listed in paragraph (a) and a use listed in subparagraph (1) or (2) of this paragraph.

   Treated effluent being used for activities falling within category B must meet the requirements for bacteriological quality and buffer zone limitations identified in subsection 1 as applicable to category B.

   (c) Category "C" means irrigation with treated effluent of land used for:
   
   (1) A cemetery, highway median, greenbelt, park, playground or residential or commercial lawn where public access to the site being irrigated is controlled and human contact with the treated effluent cannot reasonably be expected;
   (2) Impoundments where full body contact with the treated effluent cannot reasonably be expected;
   (3) Any other purpose not included in category A or B; or
   (4) Any combination of an activity listed in paragraph (a) or (b) and an activity listed in subparagraph (1), (2) or (3) of this paragraph.

   Treated effluent being used for activities falling within category C must meet the requirements for bacteriological quality and buffer zone limitations identified in subsection 1 as applicable to category C.

   (d) "C.F.U. or MPN/100 ml" means colony forming units or most probable number per 100 milliliters of the treated effluent.

(Added to NAC by Environmental Comm'n, eff. 9-13-91) (Substituted in revision for NAC 445.1765)

445A.277 Exceptions to requirements for buffer zone and control of public access. A buffer zone and control of public access is not required where treated effluent is used for irrigation of land used for a cemetery, golf course, greenbelt, impoundment where full body contact can reasonably be expected, park, playground or commercial or residential lawn, if the treated effluent:

1. Has a total coliform concentration of 2.2, or less, per 100 milliliters of the treated effluent as a 30 day geometric mean; and

2. Has a total coliform concentration of 23, or less, per 100 milliliters of the treated effluent as a maximum daily number.

(Added to NAC by Environmental Comm'n, eff. 9-13-91) (Substituted in revision for NAC 445.177)

445A.278 Drip or surface irrigation of landscape: Minimum level of disinfection. The minimum level of disinfection for drip irrigation of landscape and surface irrigation of landscape with treated effluent in areas where public access is controlled is 200 fecal coliform per 100 milliliters of the treated effluent as a 30 day geometric mean and 400 fecal coliform per 100 milliliters of the treated effluent as a maximum daily number.

(Added to NAC by Environmental Comm'n, eff. 9-13-91) (Substituted in revision for NAC 445.1775)
445A.279 Determining quality of effluent: Storage reservoirs excluded from treatment process. For the purpose of determining the quality of effluent, storage reservoirs do not constitute part of the treatment process.

(Added to NAC by Environmental Comm'n, eff. 9-13-91)--(Substituted in revision for NAC 445.178)

445A.280 Waiver or modification of requirements. The director may waive compliance with or modify any requirement of NAC 445A.275 to 445A.280, inclusive, for a specific project of irrigation upon his determination that because of the size, type or location of the project of irrigation, the waiver or modification is consistent with the policy set forth in NRS 445A.305.

(Added to NAC by Environmental Comm'n, eff. 9-13-91)--(Substituted in revision for NAC 445.1785)
APPENDIX D - NDEP GUIDELINES FOR EFFLUENT REUSE WTS-1B
AND TWMA 8a "WATER AND NON-POTABLE WATER
SEPERATION", TMWA 'S "BACKFLOW PREVENTION AND
CROSS-CONNECTION CONTROL PROGRAM"
GENERAL NOTES:
The Nevada Division of Environmental Protection (NDEP) must be contacted whenever the use of reclaimed water is planned in order to determine the appropriate regulatory oversight requirements. NDEP shall also be available to assist the applicant in preparing the effluent management plan (EMP).

The Nevada Division of Water Resources (775) 687-4380 must be notified of the plan to use reclaimed water in order to address requirements for secondary water rights. Also, the Nevada State Health Division (775) 687-4754 should be consulted to ensure the use of reclaimed water is consistent with water supply protection requirements. Finally, please be aware that the local government and water purveyor may have rules on reclaimed water usage and should be consulted.

GUIDANCE INTRODUCTION:
Pursuant to NAC 445A.275.1(b), NDEP must issue a discharge permit for the use of reclaimed water. As part of this permitting process, NAC 445A.275.1(a) states that an EMP must be submitted and approved prior to the use of reclaimed water. This guidance was prepared to assist the permittee in preparing a satisfactory EMP. Please be aware that the extent of information and content for each individual EMP will vary for the different types of reclaimed water use, so not all portions of this guidance may apply to your particular EMP.

This guidance was organized to cover only existing usages of reclaimed water in Nevada. Items that the Division deems a requirement are so marked in the document and items that are simply recommendations are so marked. Information on any guidance referenced in WTS-1B may be gathered by contacting this Bureau.

Past guidance documents for reclaimed water use (WTS-1, WTS-9, and the outline format), are now effectively replaced by this guidance and WTS 1A (General Design Criteria for Reclaimed Water Irrigation Use). This Guidance is considered a dynamic document, and revisions may be made in the future as changes in reclaimed water usage regulations dictate.

Thanks is given to the Reuse Nevada Committee for their assistance in helping NDEP prepare this guidance.

The EMP is intended for use by the reuser (golf course superintendent, farmer, park maintenance worker, industrial worker, etc.) so it should be written in a user friendly format. The use of illustrative figures, maps, and tables throughout the EMP is highly recommended. The EMP should be bound in a loose leaf binder to facilitate updates. The date of printing for the EMP and all subsequent revisions must be shown on the title page of the EMP.

This document does not replace best professional judgement in reuse system management and NDEP reserves the right to require further information and review additional factors as needed.
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KEYWORDS

AIR GAP:
Generally, the safest method of back flow prevention control. For this document, it is defined to be an unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe conveying potable water to the flood level rim of any container with treated effluent. The Uniform Plumbing Code details the requirements for Air Gaps and enforcement is the role of the local water purveyor and/or health authority.

BUFFER ZONE:
NAC 445A.076 defines a buffer zone to be the shortest distance between the boundary of the site being irrigated with reclaimed water and either; one, the property line boundary of the site; two, a posted public warning sign, or; three, any point where the property is open to public access, whichever is least. NAC 445a.276 lists the various buffer zones for spray irrigation sites based on reclamer water quality and type of site being irrigated.

DMR: Discharge Monitoring Report. A table-formatted report where results from permit sampling and monitoring are recorded for submittal to NDEP.

Fecal coliform:
Bacteria from feces of mammals which is used as an indicator of pathogenic organisms.

RECLAIMED WATER:
Domestic Wastewater that has been treated to secondary treatment standards and disinfected to levels necessary (per NAC 445A.276, 277, and 278) for the chosen method of reuse. Other terms for this water include Treated Effluent, Reuse Water, and Recycled Water.

SAR: Sodium adsorption Ratio, a ratio determined from the concentration (milliequivalents/liter) of sodium, calcium, and magnesium in water. It is used as an indicator of potential soil problems.

\[ \text{SAR} = \frac{\text{Na}}{[(\text{Ca} + \text{Mg})/2]^2} \]

A modification of this ratio, termed the adjusted SAR, considers the changes in calcium solubility in soil water. The procedure for determining this ratio is listed in Wastewater Engineering Treatment, Disposal and Reuse, 1991.

SOIL LEACHING:
Irrigation practice of applying water to soils in an effort to drive salts beyond the crop root zone. The rate is a function of crop salinity tolerance and salt level in irrigation water.

SPRAY IRRIGATION:
For purposes of this guidance, spray irrigation is categorized into three types; solid set (golf courses), move-stop (wheel lines), and constant move (center pivot) systems.

SURFACE IRRIGATION:
Surface irrigation is categorized as either flood irrigation or drip irrigation. Flood irrigation is further subdivided into ridge/furrow systems and graded borders.
GENERAL ITEMS FOR ALL EMP'S

REQUIREMENTS:

A. Overview of Project

A comprehensive overview of the reclaimed water application for the project. Outline the distribution system, application site, application method, and permit responsibilities. Use figures to illustrate the general system layout.

B. Staff Listing

A listing of supervisors and key responsible staff at the reuse site, including a description of their accompanying responsibilities. This list shall include each person's phone number, cell phone number, mailing address, and e-mail address (if available).

C. Discharge Permit

A complete copy of the active ground water discharge permit issued by this Division shall be inserted into the EMP.

D. Reuse Provider - User Agreement (If Applicable)

A copy (if applicable) of the reuse agreement between the reclaimed water supplier and the user/permit holder. This agreement should include an updatable copy of the reclaimed water quality analysis and special restrictions that may be in place on the reuse.

E. Communication Procedure

The communication procedure(s) between all parties involved in the transfer of reclaimed water, storage of reclaimed water, and use of reclaimed water shall be outlined in the EMP.

F. Hygiene

A brief document describing the proper hygiene of working with reclaimed water. This document should be written in English and any other languages deemed appropriate for the site. (Sample documents are provided in Appendix 4)

G. Reclaimed Water Run-Off Control Plan

1. Identification of areas where a release off the site may occur and how it will be detected (daily rounds, pressure readouts, etc.).

2. Steps that will be taken to control the release.

3. Phone numbers for key personnel involved in the release response plan and persons who are responsible for reporting the release to NDEP.

G. Reclaimed Water Run-Off Control Plan (continued)
4. Description of the permit requirements for reporting a release to NDEP. This includes notification by phone, at (775) 687-4670, ext 3143, as soon as the release is identified and controlled (within 24 hours). Also, a written report on the release (discharge) and the methods used to mitigate the release must be submitted to the NDEP within five days. This report shall list:

i. the time and date of the discharge;
ii. exact location and estimated amount of discharge;
iii. flow path and bodies of water which the discharge reached;
iv. the specific cause of the discharge; and
v. the preventive and/or corrective actions taken.

H. Cross Connection and Back Flow Prevention (If applicable)

Summarize the cross connection control plan and back flow prevention plan that has been accepted by the Health Authority and/or water purveyor. Reference all figures that show these controls.

I. Discharge Monitoring Reports (DMR’S)

Outline of the procedure for completing the permit required DMR from field readings and laboratory data sheets. This section shall include a sample DMR to guide the reuser.

**RECLAIMED WATER IRRIGATION - GENERAL ITEMS**

A. Irrigation Plan

Provide a summary of the irrigation plan for the site(s). This summary shall detail the times of irrigation, the application rates, and flow measuring procedures. Critical focus shall be given to preventing run-off of reclaimed water from the site(s) and reducing reclaimed water ponding. For sites using automated or computer controlled irrigation systems, please include a brief description of how the system operates.

Depending upon the site type and physical location, several items that should be addressed in the irrigation plan are:

1. A plan to avoid irrigation during or just after significant precipitation events.
2. A plan to provide sufficient drying time for soils (after irrigation) before allowing animal grazing. It’s recommended that the grazing periods be limited, to the best extent possible, to reduce soil compaction.
3. Plans to harvest crop(s) annually (if applicable).
4. A plan to prevent irrigation on frozen soils or saturated soils.
B. **Site Maps**

A detailed site map for the irrigation site(s). This map shall delineate the surrounding water courses, storm water controls, buffer zones (if applicable), prevailing wind direction, surrounding dwelling units, and any wells within 250 feet of the reuse site boundary.

C. **Irrigation System**

Schematic or scaled map of the reuse site that shows the conveyance system and components for the reclaimed water. This includes details on the location of control valves, drain valves, air gaps, flow meters, pumps, and other key components that the reuser will operate and maintain.

D. **Ponds**

Operation and maintenance plan for the reclaimed water storage ponds (if applicable). Items to address could include water level recording devices and storage volume estimates, algae control, odor control, reclaimed water transfer procedures, free board requirements, berm inspection, weed and rodent maintenance, flow recirculation, notification signage, and mechanical aeration (Note: the generation of aerosols from aeration equipment should be minimized to limit drift).

E. **Treatment Systems**

The operation and maintenance plans for treatment units that are required to meet permit limits are to be included in the EMP. This may include such units as sand filters, disinfection systems, or any chemical treatment systems.

F. **Crop/Turf Management Plan**

It is recommended that management plans addressing maintenance of a healthy crop be summarized in the manual. Items relevant to this pursuit include soil leaching practices, soil amendment applications, soil chemistry monitoring, and other specific procedures for the site’s crop. Please contact the local agricultural agency for guidance.

G. **Storm Water**

Storm water control structure maintenance. This shall include a maintenance program for diversion berms, conveyance ditches, and pump systems (if applicable).

H. **Sampling**

Sampling plans required by the permit must be outlined in the EMP. The proper QA/QC for sample preservation, sample holding times, sample containers, and chain of custody

This includes the procedures for collecting a ground water sample from a monitoring well and reclaimed water samples. A groundwater sampling protocol guidance is available from the Division.
I. **Water Balance**

Completion of a water balance is required by reuse permits. The procedures for completing the water balance summary for the site(s) must be clearly outlined in the EMP. Completed worksheet “1-B” from Appendix One, or a comparable form, should be included to present the design assumptions and to provide guidance for filling out subsequent reporting forms. Blank worksheets should also be included. Sample forms are attached in Appendix One. Information from these worksheets can be used by the permittee in completing the Annual Report which is typically required to be submitted with the fourth quarter DMR.

J. **Nitrogen Balance**

Completion of a nitrogen balance is required by reuse permits. The procedures for computing the total amount of nitrogen applied to the site(s) must be clearly outlined in the EMP. This shall include the mass of nitrogen applied from the reclaimed water and fertilizers. Completed Worksheet “2-B” from Appendix Two, or a comparable form, should be included to present the design assumptions and to provide guidance for filling out subsequent reporting forms (Worksheet “2-C” and DMR forms). Blank worksheets should also be included. Sample forms are attached in Appendix Two. Information from these worksheets can be used by the permittee in completing the Annual Report which is typically required to be submitted with the fourth quarter DMR.

K. **Signage**

Any site using reclaimed water for irrigation shall post a notice warning the general public to avoid contact with the reclaimed water (NAC 445A.275.3). Signage examples are included in Appendix Five for reference. Score cards at golf courses are one option for providing notification to the public that reclaimed water is being used for irrigation.

**ADDITIONAL RECLAIMED WATER IRRIGATION ITEMS FOR:**

**SPRAY IRRIGATION**

A. **Run-Off Containment Berms**

Maintenance plan for containment berms that serve to prevent the surface flow of reclaimed water off the site boundary (NAC 445A.275.6) if there is a significant line break or other failure. These berms are site specific requirements and therefore may not apply to your site.

B. **Freezing Weather Protection**

Depending upon the site location, necessary maintenance items to prevent freezing and damage to the distribution system should be included. Items to address are piping insulation, drains, or valve enclosures.
C. Drinking Water Fountain Protection and Food Serving Areas

Plans to cover drinking water fountains located on the reuse site prior to the start of irrigation shall be included. Additionally, plans to shield areas where food is handled should be presented.

NOTE:

Reclaimed water meeting a 30-day geometric mean total coliform limit of 2.2 mpn (cfu)/100 ml and a daily max of 23 mpn (cfu)/100ml has no buffer zone or public access control restrictions (NAC 445A.277). Please refer to Appendix Six for the regulation.

The following items (D thru F) apply only to Category A, A(1), B, and C waters as listed in NAC 445A.276.

D. Buffer Zone Controls

Describe the required buffer zones for the quality of reclaimed water used (see table on next page). Also, list procedures for maintaining spray irrigation within these zones. The irrigation plan should control the drifting of aerosols beyond the buffer zones (NAC 445A.275.5).

E. Irrigation Scheduling

Irrigation under Category B and C criteria (see regulations) shall be conducted during the nighttime hours and the public shall be restricted from entering the site during the irrigation period.

Treated effluent irrigation for golf courses shall only take place during times after the course is closed and shall cease one hour before the course opens for play in the morning. The irrigation system can be operated briefly during daylight hours when golfers are not present or approaching provided the operator ensures that the public are not exposed to effluent spray or wet grass. Daytime irrigation system operation shall be supervised at the site of irrigation by course personnel at all times.

Specific areas within the site that are first accessed (example: first few holes on golf course) by the public should be irrigated during the initial stages of the watering cycle to allow drying time before the public is permitted to enter.

F. Spray Irrigation with Reclaimed Water Under Category A, A(1), B, and C:

1. Plans to control public access to the irrigation site during times of reclaimed water application are required. Relevant items include fencing, adherence to the required buffer zones, and notification of reclaimed water usage. The quality of reclaimed water will dictate the level of access controls (see Table Below).

2. Plans to control public contact with reclaimed water at the site are required. Relevant items include prevention of ponded water, notification signage, irrigation scheduling (ex. night time irrigation), and notification of reclaimed water usage on scorecards, signage or other related documents available to the public. Quality of reclaimed water will dictate level of contact controls required (see Table Below).
<table>
<thead>
<tr>
<th>Category A</th>
<th>Category A(1)</th>
<th>Category B</th>
<th>Category C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Access is prohibited during irrigation periods. No human contact due to site isolation.</td>
<td>Public Access is prohibited during irrigation periods. No human contact due to site isolation.</td>
<td>Public Access is Controlled. Human contact with reclaimed water does not occur.</td>
<td>Public Access is Controlled. Human contact with reclaimed water cannot reasonably be expected to occur.</td>
</tr>
<tr>
<td>Pasture Lands, other agricultural uses</td>
<td>Pasture Lands, other agricultural uses</td>
<td>Golf courses, green belts, cemetery, and other areas</td>
<td>Areas covered in all categories, plus parks, playgrounds, commercial lawns, and residential lawns.</td>
</tr>
<tr>
<td>800 ft. Buffer Zone</td>
<td>400 ft. Buffer Zone</td>
<td>100 ft. Buffer Zone</td>
<td>0 ft. Buffer Zone</td>
</tr>
<tr>
<td>30 day Fecal Coliform Geometric Mean equal to or less than: no limit,</td>
<td>30 day Fecal Coliform Geometric Mean equal to or less than: 200 mpn (cfu)/100ml. Daily Max: 400 mpn (cfu)/100ml</td>
<td>30 day Fecal Coliform Geometric Mean equal to or less than: 23 mpn (cfu)/100ml. Daily Max: 240 mpn (cfu)/100 ml</td>
<td>30 day Fecal Coliform Geometric Mean equal to or less than: 2.2 mpn (cfu)/100ml. Daily Max: 23 mpn (cfu)/100 ml</td>
</tr>
</tbody>
</table>

**ADDITIONAL RECLAIMED WATER IRRIGATION ITEMS FOR:**

**SURFACE IRRIGATION**

A. **FLOOD IRRIGATION:**

1. **Irrigation Methodology**

   Operational plan(s) for flow distribution. Relevant items to address include promoting even spreading of reclaimed water over the site(s), reducing soil erosion at the distribution points, and operation of the tailwater recovery system operation (if applicable).

2. **Containment Berms and Detention Areas**

   A maintenance plan and inspection schedule for containment berms and detention areas (NAC 445A.275.6) that are in place to prevent the run-off of the reclaimed water from the site(s) is required.

B. **DRIP IRRIGATION**

1. **Irrigation Methodology**

   Operational plan for flow distribution. Relevant items include site inspections (checking for line breaks, etc.) and emitter line maintenance (clogging controls).
CONSTRUCTION USAGE

A. DUST CONTROL

1. Fecal Coliform Levels

The typical minimum fecal coliform limits for this application are 23 mpn (cfu)/100 ml for the 30 day geometric mean and 240 mpn (cfu)/100 ml for a daily maximum. However, each facility's permit will specify the permissible fecal coliform limit.

2. Application Items

Plans for controlling the application rate shall address the prevention of ponded reclaimed water. Also, a plan to control the generation of aerosols and the migration of aerosols from the site(s) should be developed. Methods to prevent the application of reclaimed water near water courses (rivers, streams, and lakes) must be presented.

3. Tank Trucks

Tank trucks and other equipment which hold reclaimed water shall be properly identified with notification signs. Tank trucks that carry reclaimed water shall not be used to carry potable water. It is recommended that the tanks be cleaned and disinfected after the project is complete. Please consult the State or local health authority on rules that may be in place for this criteria.
INDUSTRIAL USAGE

A. COOLING WATER

1. Fecal Coliform Level

   The typical minimum fecal coliform limits for this application are 23 mpn (cfu)/100 ml for a 30
day geometric mean and 240 mpn (cfu)/100 ml for a daily maximum. However, each facility’s
permit will specify the permissible fecal coliform limit.

2. Application Items

   List operational controls to reduce aerosol drift.

   NDEP recommends that facilities institute operational methods for treatment (lime addition, alum,
etc.) to handle scaling, corrosion, fouling, and biological growth throughout the system. This will
help reduce line clogging and other system problems. Also, if algae growth is a concern, chlorine
can be used to control algae growth provided the water is not discharged to a water course. This
should also help reduce the formation of Legionella.

OTHER USES OF RECLAIMED WATER

A. Site specific management plans for the use of reclaimed water will be considered on a case by case
basis with appropriate controls and requirements determined by the NDEP.
The consumptive use equation for determining the crop's water requirement takes into account precipitation, evapotranspiration, the efficiency of the irrigation system, and the salt tolerance of the plant species. The salt tolerance of the plant species is used to calculate the leaching requirement \( (L_r) \) to remove excess salts from the root zone. Excess salts within the soil cause the plant cells to expend more energy adjusting the salt concentration within the plant tissues, and therefore, less energy is available for vigorous plant growth. The hydraulic loading rate and the TDS to ECw conversion equation included below are derived from Wastewater Engineering: Treatment, Disposal, and Reuse (Metcalf and Eddy, 1991), the equation for the leaching requirement is from the Nevada Irrigation Guide (USDA, Soil Conservation Service, 1981).

\[
L_{w(c)} = \frac{(ET-P)}{[E \times (1-L_r)]} \quad \quad L_r = \frac{EC_w}{[(5 \times EC_e) - EC_w]}
\]

where:

- \( L_{w(c)} \) = Allowable Hydraulic Loading Rate Based on Crop Water Needs (in/yr);
- \( ET \) = Evapotranspiration Rate (in/yr);
- \( P \) = Precipitation Rate (in/yr);
- \( L_r \) = Leaching Requirement (%, expressed as a fraction);
- \( E \) = Efficiency of Irrigation System (% expressed as a fraction);
- \( EC_e \) = Salinity Tolerance of Plant Crop (mmho/cm or dS/m)\(^{11}\);
- \( EC_w \) = Salinity of Applied Effluent (mmho/cm); If TDS is supplied by the laboratory, see conversion below; and
- \( TDS \) = Average Total Dissolved Solids in Applied Effluent (mg/l).

"ET" - Evapotranspiration

Evapotranspiration is defined as the "loss of water from the soil both by evaporation and by transpiration from the plants growing thereon" (Webster's Dictionary, 1990). Since different plants transpire at different rates, a crop coefficient \( (K_c) \) can be used to modify the potential ET for a particular area. Values for \( K_c \) vary depending upon the geographical location of the crop, and the species grown. If a crop coefficient can be determined, when multiplied by the potential ET rate, the result is a more accurate estimate of ET for an irrigation site. The Division recommends that reusers contact local agriculture representatives identified in Appendix Five for further crop-specific and regional information.

"E" - Irrigation Efficiency

The irrigation system efficiency is related to how effective the method is in delivering the irrigation water equally to all parts of the crop. Example values for efficiency are\(^{12}\):

<table>
<thead>
<tr>
<th>Sprinkler Irrigation Type</th>
<th>Application Efficiency</th>
<th>Surface Irrigation Type</th>
<th>Application Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid Set</td>
<td></td>
<td>Narrow Graded Border (&lt; 15' wide)</td>
<td>0.65 - 0.85</td>
</tr>
<tr>
<td>Portable Hand Move</td>
<td>0.70 - 0.80</td>
<td>Wide Graded Border (&lt;100' wide)</td>
<td>0.65 - 0.85</td>
</tr>
<tr>
<td>Wheel Roll</td>
<td></td>
<td>Level Border</td>
<td>0.75 - 0.90</td>
</tr>
<tr>
<td>Center Pivot or</td>
<td></td>
<td>Straight or Graded</td>
<td>0.70 - 0.85</td>
</tr>
<tr>
<td>Traveling Lateral</td>
<td></td>
<td>Contour Furrows</td>
<td></td>
</tr>
<tr>
<td>Traveling Gun</td>
<td></td>
<td>Drip</td>
<td>0.70 - 0.85</td>
</tr>
</tbody>
</table>
“Ece” - Salinity Tolerance of Plant Crop
The plant salt tolerance is crop-specific, and can be obtained from the local Extension Service, literature, or other reputable sources. The low end of the range identifies the Ece value which would result in a 0% reduction of crop yield. The upper end of the range identifies the Ece value which could result in a 25% reduction of crop yield\textsuperscript{4}.

Example Ece’s:
\begin{itemize}
  \item Annual Ryegrass\textsuperscript{(2)} = 3 to 6 mmho/cm or dS/m
  \item Perennial Ryegrass\textsuperscript{(2,4)} = 5.6 to 8.9 mmho/cm or dS/m
  \item Bermudagrass\textsuperscript{(2,4)} = 6.9 to 10.8 mmho/cm or dS/m
  \item Tall Fescue\textsuperscript{(2,4)} = 3.9 to 8.6 mmho/cm or dS/m
  \item Alfalfa\textsuperscript{(3,4)} = 2.0 to 5.4 mmho/cm or dS/m
\end{itemize}

“ECw” - Salinity of Applied Effluent
Direct measurement of ECw is typically preferred. However, if the laboratory has supplied the reuser with a concentration of TDS, an approximate conversion\textsuperscript{(4)} is ECw = TDS + 640. This conversion is considered accurate within 10%. The value for ECw or TDS is obtained from the treatment plant supplying the effluent. For site design, an average value can be used. For completion of the required annual balance report, the actual analytical results from Discharge Monitoring Reports should be used.

\textsuperscript{(1)} For clarity in this document, the unit for electrical conductivity (EC) is expressed as mmho/cm. However, EC can also be expressed in decisiemens per meter, dS/m.
\textsuperscript{(2)} 1 mmho/cm = 1 dS/m
\textsuperscript{(4)} \textit{Wastewater Engineering: Treatment, Disposal, and Reuse}, (Metcalf and Eddy, 1991)
Worksheet 1-A
CONSUMPTIVE USE REQUIREMENT WORKSHEET:
Maximum Loading Rate Based on Plant Water Use Requirements

Page _____ of _____              Crop Type = ______________________

\[
Lw_{(c)} = \frac{(ET-P)}{[E \times (1-Lr)]} \quad ; \quad Lr = \frac{ECw}{[(5 \times ECe)-ECw]} \quad ; \quad ECw = TDS+640
\]

(A) \quad \text{Annual Evapotranspiration (ET, in/yr) = ____________}
    \text{Multiply by Crop Coefficient (Kc) if value is known}

(B) \quad \text{Annual Precipitation (P, in/yr) = ____________}

(C) \quad (A) - (B) = ____________ (in/yr)

(D) \quad \text{Salinity of Applied Effluent (ECw, mmho/cm) or } = \frac{(TDS, mg/l)}{640} = ____________
    \text{(Indicate which method was used to determine ECw, Direct Measurement or Approximation by Calculation.)}

(E) \quad \text{Salinity Tolerance of Plant Crop (ECe, mmho/cm) = ____________}

(F) \quad 5 \times (E) = ____________ (mmho/cm)

(G) \quad (F) \div (D) = ____________ (mmho/cm)

(H) \quad \text{Leaching Requirement (Lr, %, expressed as a fraction) } = (D) \div (G) = ____________

(I) \quad 1 - (H) = ____________

(J) \quad \text{Efficiency of Irrigation System (E, %, expressed as a fraction) } = ____________

(K) \quad (J) \times (I) = ____________

(L) \quad (C) \div (K) = Lw_{(c)} = ____________ (inches/year)

If the water use rate calculated in ("L") above is the lowest application volume calculated between the annual
Consumptive Use Limit (This Worksheet) and the Nitrogen Limit (Worksheet 2-A), then fill out Worksheet
1-B to estimate the planned maximum daily flow for the site.
Worksheet 1-B

CONSUMPTIVE USE REQUIREMENT WORKSHEET:
Maximum Loading Rate Based on Plant Water Use Requirements

Page _____ of _____ Crop Type = ____________________

\[ \text{Lw}_{(c)} = \frac{\text{ET}-\text{P}}{\left[\text{E} \times (1-\text{Lr})\right]} ; \quad \text{Lr} = \frac{\text{ECw}}{\left[(5 \times \text{E}_{\text{Ce}}) - \text{ECw}\right]} ; \quad \text{ECw} = \text{TDS}+640 \]

Monthly values for evapotranspiration are dependent on the crop type and regional area of the site, as well as the crop coefficient if known. Monthly precipitation is also regional. The values for ET and P can be obtained from the local extension service, literature, or other reputable source. Please see the explanation in the "WTS-1B: Appendix One" text for further discussion of crop coefficients.

To calculate the monthly value for \( \text{Lw}_{(c)} \), perform the calculation for each month as outlined in Worksheet 1-A, and input the result in the table below. Since this form is crop-specific, a value of zero is acceptable when the crop is not in season; however, use of a zero should be explained.

Million Gals/Mo = \( \text{Lw}_{(c)} \) in/mo \( \times \) ______ ac \( \times \) 12 in/ft \( \times \) 43,560 ft\(^2\)/ac \( \times \) 7.481 gals/ft\(^3\) \( \div \) 1,000,000

(Enter and use the number of acres for the crop type being irrigated)

MDG (Million gallons/day) = M Gallons/mo \( \div \) Days/mo

<table>
<thead>
<tr>
<th>Month</th>
<th>Days/Mo</th>
<th>ET (in/mo)</th>
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Note: These totals should approximate the annual values calculated in Worksheet 1-A.
WTS-1B: APPENDIX TWO

NITROGEN LOADING LIMIT WORKSHEET

The nitrogen loading equation takes into account precipitation, evapotranspiration, plant nitrogen uptake, nitrogen content of the applied effluent, nitrogen denitrification and volitilization in the soils, and allowable percolate nitrogen concentration. The equation included below is from Wastewater Engineering: Treatment, Disposal, and Reuse, (Metcalf and Eddy, 1991)

\[ Lw_{(o)} = \frac{[(Cp, \text{mg/l}) \times (P-ET, \text{in/yr})] + [(U, \text{lb/acre-yr}) \times (4.4)]}{[(1-f) \times (Cn, \text{mg/l})] - (Cp, \text{mg/l})} \]

where:
- \(Lw_{(o)}\) = Allowable Hydraulic Loading Rate Based on Nitrogen Loading rate (in/yr);
- \(Cp\) = Total Nitrogen Concentration in Percolating Water (mg/l);
- \(ET\) = Evapotranspiration Rate (in/yr);
- \(P\) = Precipitation Rate (in/yr);
- \(U\) = Nitrogen Uptake Rate by Crop (lb/acre-yr);
- 4.4 = Combined Conversion Factor;
- \(Cn\) = Total Nitrogen Concentration in Applied Wastewater (mg/l); and
- \(f\) = Fraction of Applied Total Nitrogen Removed by Denitrification and Volatilization.

"Cp" - Nitrogen in Percolating Water
A conservative value for Total N in the water that percolates past the root zone (Cp) is 7 mg/l, which is the first “red flag” value for Nitrate as N in monitoring well samples. Setting the Cp limit at a constant value aids in obtaining an hydraulic nitrogen loading rate (Lw_o) which should be protective of groundwater resources. The drinking water standard for Nitrate as N is 10 mg/l, which would be the maximum allowable value for Cp.

"ET" - Evapotranspiration
Evapotranspiration is defined as the “loss of water from the soil both by evaporation and by transpiration from the plants growing thereon” (Websters Dictionary, 1990). Since different plants transpire at different rates, a crop coefficient (Kc) can be used to modify the potential ET for a particular area. Values for Kc vary depending upon the geographical location of the crop, and the species grown. If a crop coefficient can be determined, when multiplied by the potential ET rate, the result is a more accurate estimate of ET for an irrigation site. The Division recommends that users contact local agriculture representatives identified in Appendix Five for further crop-specific and regional information.

"U" - Crop Nitrogen Uptake
Plant nitrogen uptake rates (U) are crop-specific, and can be obtained from the local Extension Service, literature, or other reputable sources. Using the accepted value for U in this equation assumes that the harvested portion of the crop is removed from the site. If plant cuttings are not removed from the area, then the amount of nitrogen removed by uptake should be offset by the amount of nitrogen returned to the soil by decomposing cutting materials. If alfalfa, or another legume, is the site’s crop, then similar considerations should be made for atmospheric nitrogen which is fixed into the soil by alfalfa. A discussion with the local agricultural extension service is recommended prior to finalizing a “U” value.
"Cn" - Nitrogen in Applied Wastewater
The total nitrogen in the applied effluent water (Cn) can be obtained from the treatment plant that is supplying the effluent. For site design, an average value can be used. For completion of the required annual balance report, the actual analytical results from Discharge Monitoring Reports shall be used.

"P" - Nitrogen lost to Denitrification and Volatilization
The amount of nitrogen lost to denitrification and volatilization varies depending upon the nitrogen characteristics of the applied wastewater and the microbial activity in the soil. Microbial denitrification, in soils with a sufficient carbon source for the biological activity, may account for as much as 15 to 25 percent of the applied nitrogen during warm, biologically active months. Volatilization of ammonia may be as much as 10 percent, depending upon the ammonia fraction in the total nitrogen applied. (Metcalf & Eddy, 1991) For arid climates, such as Nevada, the value typically used for the "P" term is 0.2.

Nitrogen Addition by Chemical Fertilizers
If the allowable reuse water application volume is limited by plant consumptive use (Worksheet 1-A), nitrogen may need to be added by commercial fertilizer. In the design of a reuse site, and preparation of an EMP, this should be estimated to provide the site operator with a guideline for fertilizer application, in addition to the nitrogen being applied via the treated effluent. The application of fertilizer must then be incorporated into the required annual report to demonstrate that the application of commercial nitrogen and effluent nitrogen did not exceed the plant crop's uptake rate.

Worksheet 2-C is designed to be used to provide the Division with the required annual report of effluent and fertilizer usage. Reuse permits require that the annual evaluation of the effluent application include, "the total nitrogen in the applied wastewater, nitrogen from fertilizer applications, nitrogen uptake by plant materials, evapotranspiration rate, precipitation rate, and fraction of applied nitrogen removed by denitrification and volatilization." While Worksheet 2-C does not take precipitation and evapotranspiration into account, the permittee should compare each year's P and ET rates to those that were used during the site design and EMP preparation phases to ensure that the original assumptions remain valid.

Worksheet 2-C can also be utilized as a site management tool to estimate the amount of commercial fertilizer which may be required in an upcoming month. However, use of the worksheet in this manner does not preclude the responsible use of good irrigation and nutrient management practices.
Worksheet 2-A

WATER REQUIREMENT DESIGN WORKSHEET:
Maximum Hydraulic Loading Rate Based On Annual Nitrogen Balance Evaluation

Page ____ of ____  Crop Type = ____________________

\[ Lw_{(n)} = \frac{[Cp \times (P-ET)] + (U \times 4.4)}{[(1-f) \times Cn] - Cp} \]

(A) Total Nitrogen in Percolating Water (Cp, mg/l) = __________

(B) Annual Precipitation (P, in/yr) = __________

(C) Annual Evapotranspiration (ET, in/yr) = __________

(Multiply by Crop Coefficient (Ke) if value is known)

(D) (B) - (C) = __________ (in/yr) (Note: In Nevada, P is less that ET; therefore a negative number is correct to use in this worksheet.)

(E) (A) x (D) = __________

(F) Crop Nitrogen Uptake (U, lb/ac-yr) = __________

(G) (F) x 4.4 = __________

(H) (E) + (G) = __________

(I) Fraction of Applied Total Nitrogen Lost to Denitrification and Volatilization (f) = ______

(J) 1 - (I) = __________

(K) Total Nitrogen in Applied Effluent (Cn, mg/l) = __________

(L) (J) x (K) = __________

(M) (L) - (A) = __________

(N) (H) / (M) = Lw_{(n)} (inches/year) = __________

If the Water Use Rate calculated in ("N") above is the lowest application volume calculated for the annual Consumptive Use Limit (Worksheet 1-A) or the Nitrogen Limit (This Worksheet), then fill out Worksheet 2-B to estimate the planned maximum daily flow for the site.
Worksheet 2-B

WATER REQUIREMENT DESIGN WORKSHEET:
Maximum Hydraulic Loading Rate Based On Annual Nitrogen Balance Evaluation

Page _____ of _______  Crop Type = __________________

\[
Lw_{(n)} = \frac{[Cp \times (P-ET)] + (U \times 4.4)}{[(1-f) \times Cn] - Cp}
\]

Monthly values for evapotranspiration are dependant on the crop type and regional area of the site, as well as the crop coefficient if known. Monthly precipitation is also regional. The values for ET and P can be obtained from the local extension service, literature, or other reputable sources. Please see the explanation in the "WTS-1B: Appendix Two" text for further discussion of crop coefficients.

The monthly value of the crop nitrogen uptake (U) can be calculated according to the equation included on the Table. Please see the discussion in the "WTS-1B: Appendix Two" text regarding "U" values for alfalfa crops or sites that do not remove crop cuttings. If a different distribution of monthly "U" is used, due to circumstances such as germination or dormancy periods, then provide documentation explaining the difference.

To calculate the monthly value for \( Lw_{(n)} \), perform the calculation for each month as outlined in Worksheet 2-A, using the monthly values for "U", "P", "ET", and "Cn", and input the result in the table below. Since this form is crop-specific, a value of zero is acceptable when the crop is not in season; however, use of a zero should be explained.

Monthly U (lb/ac-mo) = U (lb/ac-yr) \times ET(in/mo) \div ET (total in/yr)

Million Gallons = \( Lw_{(n)} \) in/mo \times \# acres \times 12 in/ft \times 43,560 ft\(^2\)/ac \times 7.481 gallons/ft\(^3\) \div 1,000,000

Per Month (ea. crop type)

\[
\text{MGD (Million gallons/day)} = \frac{M \text{ Gallons/mo} \div \text{Days/mo}}{}
\]

<table>
<thead>
<tr>
<th>Month</th>
<th>Days/Mo</th>
<th>P (in/mo)</th>
<th>ET (in/mo)</th>
<th>U (lb/ac-mo)</th>
<th>( Lw_{(n)} ) (in/mo)</th>
<th>M Gals/Mo</th>
<th>MGD of Reclm'd Water</th>
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Note: The totals for P, ET and \( Lw_{(n)} \) should approximate the annual values used or calculated in Worksheet 2-A.
**Worksheet 2-C:** Regardless of the limiting hydraulic loading rate that was defined during the design phase, Worksheet 2-C is designed to be used to provide the Division with the required annual report of effluent and fertilizer usage.

\[
\text{Effluent N Applied} = \frac{(lb/\text{ac-mo})}{\text{MGD Applied}} \times \frac{(mg/l)}{\text{Effluent N Conc.}} \times 8.34 \times \frac{\# \text{days/mo}}{\# \text{Acres}} \times \frac{1}{(1 - "f")} \text{ (i.e. 0.2)}
\]

\[
\text{Fertilizer N Applied} = \text{Monthly Fertilizer used (lbs/mo)} \times \text{% N in Fertilizer (as a fraction)} \div \text{acres (lb/ac-mo)}
\]

**Crop Name and Nitrogen Uptake Requirement =** (lbs/ac-yr)

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**Total** =

**Note:** The Total N Applied to the crop should be less than the crop's Nitrogen Uptake Requirement. Please see your permit for directions if it is not.
APPENDIX THREE

WORKER HYGIENE FACT SHEETS

This project area uses reclaimed wastewater for irrigation. This reclaimed wastewater comes from the sewage treatment plant and meets the standards required for this level of reuse. Potential risks of disease transmission from the use of the reclaimed water is low, however, some general guidelines (listed below), should be followed protect you from becoming ill when working with reclaimed water:

1. Do not drink the reclaimed water or use the reclaimed water for washing.
2. Always wash hands and face with clean water and soap before eating, smoking, or drinking.
3. Wear rubber gloves when working on the irrigation system.
4. Try to keep the irrigation water off your skin and clothes as much as possible.
5. Always treat cuts immediately before continuing with work on the irrigation system.
6. Make sure the area is clear of people that may get sprayed before running the irrigation system.
7. Report any problems to your supervisor that you feel could pose a risk.
APPENDIX FIVE

REUSE REFERENCE LISTS

Literature References For Reclaimed Water Use Management


Contacts for Technical and Regulatory Guidance

1. Nevada Division of Environmental Protection, Bureau of Water Pollution Control
   333 West Nye Lane, Carson City, NV, 89706 .................... (775) 687-4670
2. Nevada Division of Water Resources
   123 West Nye Lane, Carson City, NV 89705 .................... (775) 687-4380
3. Nevada Division of Health
   505 East King Street, Carson City, NV 89710 .................... (775) 687-4750
4. Desert Research Institute
   7010 Dandini Boulevard, Reno, NV 89506 .................... (775) 673-7300
5. Natural Resource Conservation Service (NRCS)
   1528 U.S. Highway 395, Minden, NV 89410 .................... (775) 883-2623
   5301 Longley Lane, Building F, Room 201, Reno, NV 89511 .................... (775) 784-5875
6. University of Nevada Cooperative Extension
   2345 Redrock Street, Suite 100, Las Vegas, NV 89146-3160 .................... (702) 222-3130
7. U.S. Agriculture Department
   920 Valley Road, Reno, NV 89512 .................... (775) 784-6057
8. Center for Urban Water Conservation - UNLV Dept. of Biology
   Las Vegas, Nevada 89157-4004 .................... (702) 895-3853
APPENDIX SIX

NEVADA ADMINISTRATIVE CODE - REUSE REGULATIONS

Use of Treated Effluent for Irrigation

445A.275 General requirements and restrictions.

1. A person shall not use treated effluent for irrigation unless he has:
   (a) Submitted to the division and has received the approval of the division of a plan for the
       management of effluent; and
   (b) Obtained a permit pursuant to NAC 445A.228 to 445A.263, inclusive.

2. A person using treated effluent for irrigation by flooding or sprinklers shall use effluent that has
   received at least secondary treatment. As used in this subsection:
   (a) "Secondary treatment" means that the biological oxidization of the sewage to a point where the
       sewage has a 5-day inhibited biochemical oxygen demand concentration of 30 milligrams per
       liter or less.
   (b) "Five-day inhibited biochemical oxygen demand" means the amount of dissolved oxygen in
       milligrams per liter required during stabilization of the carbonaceous decomposable organic
       matter by aerobic bacterial action at 20 degrees centigrade for 5 days.

3. Any person using treated effluent for irrigation shall post a notice at the site of irrigation warning
   the general public to avoid contact with the treated effluent.

4. Except as otherwise provided in this subsection, a person shall not use treated effluent to irrigate
   crops for human consumption. A person may use treated effluent for surface irrigation of fruit
   bearing trees and nut bearing trees.

5. A person using treated effluent to irrigate by sprinklers shall conduct the irrigation in a manner
   which inhibits the treated effluent from drifting or carrying outside the buffer zone.

6. A person shall not allow treated effluent used in irrigation to run off the site being irrigated.

(Added to NAC by Environmental Comm'n, eff. 9-13-91) --(Substituted in revision for NAC 445.176)

Revisor's Note.

The regulation of the state environmental commission filed with the secretary of state on September 13, 1991, the source of NAC 445A.275 to 445A.280,
inclusive, became effective on that date and contains the following provisions not included in NAC:
"Notwithstanding the provisions of sections 2 to 8, inclusive, of this regulation, a person who:
1. Is using treated effluent for irrigation on the effective date of this regulation without having obtained a permit pursuant to NAC 445A.228 to 445A.263,
   inclusive; and
2. Has submitted to the state department of conservation and natural resources a completed application for obtaining a permit pursuant to NAC 445A.228 to
   445A.263, inclusive, within 180 days after the effective date of this regulation,
may continue to use treated effluent for irrigation without having obtained a permit until the state department of conservation and natural resources takes
action upon the application for a permit."
445A.276 Spray irrigation: Requirements for bacteriological quality and buffer zone limitations.

1. Treated effluent being used for spray irrigation must meet the following requirement for bacteriological quality and buffer zone limitations:

<table>
<thead>
<tr>
<th>Fecal Coliform</th>
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<tr>
<td>c.f.u or mpn/100 ml</td>
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</table>

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<thead>
<tr>
<th>Reuse Permitted</th>
<th>A</th>
<th>A(1)</th>
<th>B</th>
<th>C</th>
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<tr>
<td>30-day geometric mean</td>
<td>No limit</td>
<td>200</td>
<td>23</td>
<td>2.2</td>
</tr>
<tr>
<td>Maximum daily number</td>
<td>No limit</td>
<td>400</td>
<td>240</td>
<td>23</td>
</tr>
<tr>
<td>Minimum Buffer Zone</td>
<td>800</td>
<td>400</td>
<td>100</td>
<td>0</td>
</tr>
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(Feet)

2. As used in this section:
(a) Category "A" means irrigation with treated effluent of land used for:
   (1) Pasture; or
   (2) Other agricultural purposes except growing crops for human consumption, where public access to the site being irrigated is prohibited.

Treated effluent being used for activities falling within category A must meet the requirements for bacteriological quality and buffer zone limitations identified in subsection 1 as applicable to category A or meet the requirements for bacteriological quality and buffer zone limitations identified in subsection 1 as applicable to category A(1).

(b) Category "B" means irrigation with treated effluent for land used for:
   (1) A golf course, cemetery or greenbelt where public access to the site being irrigated is controlled and human contact with the treated effluent does not occur;
   (2) An impoundment where all activities are prohibited and human contact with the treated effluent does not occur; or
   (3) Any combination of a use listed in paragraph (a) and a use listed in subparagraph (1) or (2) of this paragraph.

Treated effluent being used for activities falling within category B must meet the requirements for bacteriological quality and buffer zone limitations identified in subsection 1 as applicable to category B.

(c) Category "C" means irrigation with treated effluent of land used for:
   (1) A cemetery, highway median, greenbelt, park, playground or residential or commercial lawn where public access to the site being irrigated is controlled and human contact with the treated effluent cannot reasonably be expected;
   (2) Impoundments where full body contact with the treated effluent cannot reasonably be expected;
   (3) Any other purpose not included in category A or B; or
   (4) Any combination of an activity listed in paragraph (a) or (b) and an activity listed in subparagraph (1), (2) or (3) of this paragraph.

Treated effluent being used for activities falling within category C must meet the requirements for bacteriological quality and buffer zone limitations identified in subsection 1 as applicable to category C.

(d) "C.f.u. or mpn/100 ml" means colony forming units or most probable number per 100 milliliters of the treated effluent.

(Added to NAC by Environmental Comm'n, eff. 9-13-91) - Substituted in revision for NAC 445.1765)
445A.277 Exceptions to requirements for buffer zone and control of public access. A buffer zone and control of public access is not required where treated effluent is used for irrigation of land used for a cemetery, golf course, greenbelt, impoundment where full body contact can reasonably be expected, park, playground or commercial or residential lawn, if the treated effluent:

1. Has a total coliform concentration of 2.2, or less, per 100 milliliters of the treated effluent as a 30 day geometric mean; and
2. Has a total coliform concentration of 23, or less, per 100 milliliters of the treated effluent as a maximum daily number.

(Added to NAC by Environmental Comm’n, eff. 9-13-91) --(Substituted in revision for NAC 445.177)

445A.278 Drip or surface irrigation of landscape: Minimum level of disinfection. The minimum level of disinfection for drip irrigation of landscape and surface irrigation of landscape with treated effluent in areas where public access is controlled is 200 fecal coliform per 100 milliliters of the treated effluent as a 30 day geometric mean and 400 fecal coliform per 100 milliliters of the treated effluent as a maximum daily number.

(Added to NAC by Environmental Comm’n, eff. 9-13-91) --(Substituted in revision for NAC 445.1775)

445A.279 Determining quality of effluent: Storage reservoirs excluded from treatment process. For the purpose of determining the quality of effluent, storage reservoirs do not constitute part of the treatment process.

(Added to NAC by Environmental Comm’n, eff. 9-13-91) --(Substituted in revision for NAC 445.178)

445A.280 Waiver or modification of requirements. The director may waive compliance with or modify any requirement of NAC 445A.275 to 445A.280, inclusive, for a specific project of irrigation upon his determination that because of the size, type or location of the project of irrigation, the waiver or modification is consistent with the policy set forth in NRS 445A.305.

(Added to NAC by Environmental Comm’n, eff. 9-13-91) --(Substituted in revision for NAC 445.1785)
SECTION 8a
POTABLE AND NON POTABLE WATER SEPARATION

Separation between TMWA’s water distribution system and non potable water supplies shall comply with the separation requirements of section 8, “Water and Sewer Separation” of TMWA’s Construction Standards. To safeguard TMWA’s potable water system from the possibility of cross connection to a non potable water source, the potable water system shall include installation of a backflow prevention device in accordance with this section.

If a property served by TMWA is located immediately adjacent to a property or right of way irrigated with non potable water or within 25 feet of a water supply ditch, the TMWA water supply system shall be protected from an illegal cross connection by one of the following measures:

Preferred Option: Install a testable double check valve assembly, per TMWA Construction Standards, immediately downstream of the TMWA water meter and within the public utility easement. TMWA will own, maintain, and test the double check valve assembly on an annual basis.

Second Option: The TMWA water meter setter shall include an integral non-testable dual angle check valve, and there shall be provided a solid barrier between the TMWA and non potable water supply systems.

A solid barrier is defined as:

a: Any fencing or wall that includes a continuous structural concrete footing

or

b: A continuous four foot wide concrete or asphalt pavement sidewalk

or

c: A 24 inch deep by 12 inch wide continuous concrete slurry filled separation trench.

Thermal Expansion Protection: Please note that a thermal expansion tank is required in any home water supply system that is downstream of a backflow prevention device or check valve. Refer to the requirements of the Uniform Plumbing Code – Section 608.3.
STANDARDS FOR RECLAIMED WATER
IRRIGATION SYSTEM CONSTRUCTION

PRIVATE RECLAIMED WATER IRRIGATION SYSTEMS

1. When deemed necessary by the County, an approved backflow prevention device shall be installed, to the satisfaction of the County, immediately downstream of the meter. All aboveground piping shall be painted purple (Pantone Color #512) and a purple tag, with the wording “WARNING: RECLAIMED WATER - DO NOT DRINK” in English and Spanish, attached to the assembly (T. Christy Enterprises, Valve Identification Tag, ID-STD-P2-RC1P2 or approved equal).

2. All valve box covers for isolation valves, electrical control valves, pressure reducing valves, pressure regulating valves, quick coupler valves, and similar appurtenances shall be purple in color as supplied by the manufacturer and labeled “Reclaimed Water”. A purple tag, with the wording “WARNING: RECLAIMED WATER - DO NOT DRINK”, shall be attached to all valves (see above). All valve box covers will be capable of being bolted closed, bolts will be in place and secured.

3. All quick coupler valves shall have purple, lockable covers, i.e. Rain Bird 44NP or equal.

4. All irrigation controllers shall be labeled inside and outside warning that the system uses reclaimed water (T. Christy Enterprises, Controller Marking Decal, Part Number #4100 or approved equal).

5. All irrigation mains, any line upstream of an electrical control valve shall be purple plastic, or be encased in purple polyethylene bags labeled “CAUTION: RECLAIMED WATER LINE” at intervals no greater than 5 feet. If purple pipe or bags are not available, purple vinyl adhesive tape shall be attached to the pipe, continuously, in a longitudinal direction. The tape shall have the wording “CAUTION: RECLAIMED WATER LINE” at intervals of no more than 5 feet, have a minimum width of 3 inches, and be installed along the top of the pipe.

All laterals downstream of an electric control valve shall be purple plastic or have purple reclaimed warning tape placed on top of the pipe. This does not apply to flexible polyethylene tubing used in drip zones.

6. Purple, 3 inch warning tape, with wording “CAUTION: RECLAIMED WATER LINE BELOW”, shall be installed 12 inches above all irrigation mains.

7. Signage shall be posted, in obvious locations, at the entry to all properties, landscape islands, medians, and other use sites. Maximum spacing for roadway landscaping shall be determined by the Utility Services Division, however, will in no case exceed 500’. Signs shall have the wording “TREATED WASTEWATER EFFLUENT USED FOR IRRIGATION- DO NOT DRINK- AVOID CONTACT”. Minimum sign size shall be 8” X 12”, larger signs will be required at primary access points.

8. Reclaimed waterlines, including irrigation main lines, shall be treated as on-site sewer lines and all applicable separation from on-site waterlines maintained.

9. Direct connections between potable water piping and reclaimed water piping shall not exist under any condition with or without backflow protection per UPC (1997 edition) Section 603.3.4.

10. Hosebibs will not be installed on reclaimed water systems.
STANDARDS FOR RECLAIMED WATER
IRRIGATION SYSTEM CONSTRUCTION

DEDICATED RECLAIMED WATER LINES

1. All construction shall conform to the Standard Specification for Public Works Construction (1996) and Washoe County Standards.

2. All reclaimed water lines constructed out of PVC or polyethylene shall be purple plastic, or be encased in purple polyethylene bags labeled “CAUTION: RECLAIMED WATER LINE” at intervals no greater than 5 feet. If purple pipe or bags are not available, purple vinyl adhesive tape shall be attached to the pipe, continuously, in a longitudinal direction. The tape shall have the wording “CAUTION: RECLAIMED WATER LINE” at intervals of no more than 5 feet, have a minimum width of 6 inches, and be installed along the top of the pipe. Reclaimed water lines constructed out of ductile iron shall be encased in purple polyethylene bags labeled “CAUTION: RECLAIMED WATER LINE” at intervals no greater than 5 feet.

3. Tracer wire shall be placed on top of bedding material prior to pipe installation. At 500 foot intervals, wire shall be extended into separate test stations consisting of risers and valve boxes. A minimum of 18 inches of wire shall be left at the top of the riser and connected with the appropriately sized wire nut. The tracer wire shall be placed under laterals, extended into the meter box and up to the meter cover. Wire shall be #12 AWG, insulated, stranded copper. Prior to acceptance of the reclaimed waterline, the contractor shall perform a continuity test after backfilling the trench to the satisfaction of the Utility Services Division Inspector.

4. Purple warning tape, at least 3 inches in width, with wording “CAUTION: RECLAIMED WATER LINE BELOW”, shall be installed 12 inches above all pipe.

5. All covers for valve boxes, flush valves, pressure reducing stations, air/vac stations, and all other appurtenances requiring vaults or boxes shall be purple in color (Pantone Color #512) and labeled “RECLAIMED WATER” or “R.C.W.”. Purple coloration shall be obtained from the manufacturer or be applied by powder coating or epoxy paint. All appurtenances shall have a purple tag attached with the wording “WARNING: RECLAIMED WATER - DO NOT DRINK” in English and Spanish (T. Christy Enterprises, Valve Identification Tag, ID-STD-P2-RC1P2 or approved equal). A debris cap with purple coloration shall be installed inside of all round valve boxes.

6. All aboveground piping shall be painted purple (Pantone Color #512) and a purple tag, with the wording “WARNING: RECLAIMED WATER - DO NOT DRINK” in English and Spanish, attached to the assembly (T. Christy Enterprises, Valve Identification Tag, ID-STD-P2-RC1P2 or approved equal).

7. All meter box covers shall be purple in color (see above) and a purple tag, with the wording “WARNING: RECLAIMED WATER - DO NOT DRINK” in English and Spanish, attached to the meter (T. Christy Enterprises, Valve Identification Tag, ID-STD-P2-RC1P2 or approved equal).

8. The minimum horizontal separation between parallel reclaimed waterlines and potable waterlines shall be 10 feet. When reclaimed waterlines cross potable waterlines, the reclaimed line shall be installed below the potable line. A minimum of 18 inches vertical separation shall be maintained from the bottom of a potable waterline to the top of a crossing reclaimed waterline. Reclaimed waterline pipe joints shall be kept as far away as possible from crossing potable waterlines.

9. Direct connections between potable water piping and reclaimed water piping shall not exist under any condition with or without backflow protection per UPC (1997 edition) Section 603.3.4.
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SECTION 1  PURPOSE, LEGAL AUTHORITY, RESPONSIBILITY

PURPOSE
The purpose of TMWA’s backflow prevention program is:

1. To protect TMWA’s potable distribution system against the possibility of actual or potential contaminants or pollutants entering TMWA’s potable water system by containing that contamination or pollution within that water customer’s private internal water system.

2. To develop and implement an effective, ongoing, consistent backflow prevention program which will comply with Nevada Administrative Codes (NAC) 445A.67185 through NAC 445A.67255, Public Water Systems.

3. To assist in the education of water customers about health (contamination) and non health (pollution) hazards of water use. This, in turn, will promote the elimination of actual and potential cross connections.

LEGAL AUTHORITY
Under Nevada Administrative Code 445A.67185, Public Water Systems, the water purveyor has the primary responsibility for preventing water from unapproved water supplies, or any other substances, from entering the potable public water system. Per NAC 445A.67185, the water purveyor shall

1. Ensure that there are no unprotected connections between the supplies of water, systems for the pumping, storage and treatment of water, and distribution system of the public water system and any source of pollution or contamination pursuant to which any unsafe water or other degrading material can be discharged or drawn into the public water system as a result of backsiphonage or backpressure.

2. Develop and carry out a program for the control of cross-connections that is approved by the health authority.

RESPONSIBILITY
Clear responsibilities exist in the development, implementation and maintenance of an effective backflow prevention and cross-connection control program. TMWA believes that an effective backflow prevention program includes both service protection and internal protection conscientiously followed by all water customers.

TMWA RESPONSIBILITY
TMWA’s responsibilities as a purveyor of drinking water include the following:

1. Performing water treatment to ensure all drinking water standards set forth at the State and Federal level are met,

2. Ensuring that drinking water standards are maintained within its distribution system through programs such as flushing and water quality testing
3. Developing, implementing and maintaining a backflow prevention program consisting of service protection at the point where customer services connect to the distribution system.
   a. TMWA’s Backflow Prevention Group will review all new service connection requests and all existing service connections to determine when a service connection presents an actual or potential hazard to TMWA’s water distribution system.
   b. For the purposes of providing service protection for new or existing water services, TMWA will designate the required type of backflow prevention to comply with NAC 445A and TMWA’s policy.
   c. TMWA will designate the installation location for backflow prevention installation.
   d. TMWA will provide Backflow Prevention Installation Requirements and Standards to the water customer or his/her representative.
   e. TMWA will require the water customer to install the designated backflow prevention, by and at the customer’s expense, within a length of time determined by TMWA, as a requirement for water service.
   f. TMWA will not authorize water service turn on until backflow prevention has been satisfactorily installed, inspected by a member of the TMWA Backflow Prevention Group and has been tested by a certified tester.
   g. TMWA will terminate an existing water service if, after a reasonable attempt, a satisfactory conclusion to a retrofit of existing services is not achieved. A satisfactory conclusion includes installation which has been inspected and approved by a member of the TMWA Backflow Prevention Group and has been tested by a certified tester.
   h. TMWA will notify water customers of tests due.
   i. TMWA will maintain records and monitor that backflow prevention is properly installed, maintained and tested.
   j. TMWA will periodically reevaluate service connections to assess the degree of hazard posed by the water customer’s premise. This will be done by TMWA Backflow Prevention Group whenever there is a change in the customer at a premise or per a schedule acceptable to TMWA.
   k. TMWA will define enforcement actions for any customers that fail to comply with the Backflow Prevention Program.
   l. TMWA is not responsible for detecting, eliminating or controlling cross connections within a customer’s water system.

**WATER CUSTOMER RESPONSIBILITY**

Customers have very clear responsibilities for backflow prevention and cross-connection control. The following measures ensure the quality of the community’s water supply as well as ensuring water quality within internal plumbing.

1. Water customers claim ownership, or custody, of potable water once it passes the water meter or point of connection to TMWA’s distribution system. Furthermore,
customers have the prime responsibility to maintain their internal water piping to ensure that “used water” shall not reverse back into TMWA’s distribution system.

2. All costs associated with backflow prevention assemblies shall be borne by the water customer.

3. It is the water customer’s responsibility to design the backflow prevention installation to meet all of TMWA’s requirements, and to conform with other applicable codes, such as the Uniform Plumbing Code (UPC), the National Fire Protection Association (NFPA) and all city or building codes.

4. The customer shall design his water system (either a new water service or the retrofit of an existing water service) to accommodate pressure losses attributed to the installation of backflow prevention assemblies. This may include installing pumps or renovating existing private water systems.

5. Upon notification from TMWA, the customer shall install, repair, replace or test the backflow prevention assembly within a length of time determined by TMWA.

6. If the backflow prevention assembly is not installed immediately after the meter or point of connection, the water customer shall provide annually in writing to TMWA a declaration that no connections exist, or will be made, between the meter or point of connection and the backflow prevention assembly.

7. The customer shall make all installations and repairs such that the assembly remains in factory working condition.

8. Customers have a responsibility to design, build and maintain their internal private water system per City Building and UPC codes.

9. The water customer shall have the assembly tested per the requirements in this policy.

10. The customer is responsible for any loss or damage resulting from the installation, repair, maintenance, operation, malfunction or vandalism of a backflow prevention assembly.

11. Customers are responsible to notify TMWA of any possible hazards, pollutants or contaminants which may have entered TMWA’s distribution system from the customer’s internal system.

12. If service protection does not exist or has been installed internal to a customer’s internal system, the customer’s system shall be available at all reasonable times for inspection or testing by TMWA to determine the existence of unprotected cross connections.

13. Customers have the responsibility to notify TMWA Backflow Prevention Group of the intent to use a non potable water on the same premise where TMWA water is being delivered.

14. If a non potable water is being used on the customer premises, the customer’s water system shall be available at reasonable time for a shut down inspection and test by TMWA to determine the existence of cross connections.
REFERENCES TO OTHER SECTIONS OF THIS POLICY

Enforcement Action
SECTION 2 DEFINITIONS

The following terms are relevant to TMWA's backflow prevention and cross-connection control program. Any term not specifically defined in this section shall revert to the meaning as defined by the Nevada Administrative Code (NAC) 445A – Public Water Systems – and subsequent revisions thereof.

AIR GAP SEPARATION: The term air-gap separation means a physical break between the free flowing end of the supply pipe and the overflow rim of a receiving vessel. The air-gap shall be at least double the diameter of the supply pipe measured vertically above the top rim of the vessel, in no case less than one inch. In certain proximity to walls, the air gap shall be three times the diameter of the supply pipe.

APPROVED BACKFLOW PREVENTION ASSEMBLY: The term "approved backflow prevention assembly" means an assembly which has passed laboratory and field evaluation tests performed by the University of Southern California (USC) Foundation for Cross-Connection Control and Hydraulic Research.

APPROVED WATER SUPPLY: Approved water supply in the context of this policy statement means the treated water supplied by TMWA, the water quality of which is regulated by the State Health Division and the District Health Department.

ATMOSPHERIC VACUUM BREAKER (AVB): An atmospheric vacuum breaker means a vacuum breaker that contains an air inlet valve, a check seat and one or more air inlet ports, in which: 1) The flow of water causes the air inlet valve to close the air inlet ports; and 2) When the flow of water stops: (a) the air inlet valve falls and forms a check valve against backspiphonage; and (b) the air inlet ports open to allow air to enter and satisfy the vacuum.

AUXILIARY WATER SUPPLY: The term "auxiliary supply" means any water supply on or available to the premises other than the approved water supply.

AWWA STANDARD: The term "AWWA Standard" means an official standard developed by the American Water Works Association (AWWA).

AWWA TEST: The term "AWWA test" is synonymous with the term "test".

BACKFLOW: The term "backflow" shall mean an undesirable flow condition, caused by a differential in pressure, that causes the flow of water or other liquids, gases, mixtures or substances into the distribution system of a potable supply of water from any source or sources other than an approved water supply source. Backspiphonage is one cause of backflow. Backpressure is the other cause.

BACKFLOW PREVENTION GROUP: The term "backflow prevention group" means the personnel charged with administration of TMWA's backflow prevention program.

CERTIFIED SPECIALIST: The term "certified specialist" shall mean an individual who is certified to perform cross-connection control and backflow prevention surveys.
Certification shall be obtained through the California Nevada Section of the American Water Works Association, or through the USC Foundation for Cross-Connection Control and Hydraulic Research. TMWA maintains a list of certified specialists who are eligible to perform surveys for TMWA water customers. Cross-Connection Control Specialist is synonymous with Certified Specialist.

CERTIFIED TESTER: The term "certified tester" shall mean an individual who is certified by the California-Nevada Section of the American Water Works Association, to perform tests on backflow prevention assemblies. In Washoe County, the District Health Department maintains a current list of certified testers.

COMMUNITY'S DRINKING WATER OR COMMUNITY'S WATER DISTRIBUTION SYSTEM: This term means the potable water in TMWA Water Distribution System.

CONSTRUCTION WATER: The term "construction water" shall mean any water, potable or otherwise, which may be used for any construction activity i.e. dust control and grading purposes, mixing concrete etc. Potable water supplied by TMWA for construction purposes shall be protected with backflow prevention as determined by TMWA's backflow prevention group.

CONTAMINATION: The term "contamination" shall mean a degradation of the quality of water by any foreign substance which creates a hazard to the public health, or which may impair the usefulness or quality of the water.

CROSS-CONNECTION: The term "cross-connection" as used in this program means any unprotected actual or potential connection between a potable water system and any source or system containing water or a substance that is not or cannot be approved as safe, wholesome, and potable. By-pass arrangements, jumper connections, removable sections, swivel or changeover assemblies, or other assemblies through which backflow could occur, shall be considered to be cross-connections.

CUSTOMER'S PRIVATE WATER SYSTEM: The term refers to the water customer's private plumbing system within the customer's premises.

DISTRICT HEALTH DEPARTMENT: This term refers to the Washoe County Health Department.

DOUBLE CHECK VALVE ASSEMBLY (DC): The term "double check valve assembly" or DC" means an assembly of two internally loaded, independently acting check valves, including tightly closing resilient seated shut-off valves on each end of the assembly and 4 properly located resilient seated test cocks.

DOUBLE CHECK DETECTOR ASSEMBLY: This is a Double Check Valve with a smaller sized approved bypass containing a specific water meter and an approved double check valve assembly.
FREEZE PROTECTION: The term “freezer protection” as it pertains to this program means an above or below ground enclosure designed with sufficient insulation and heat to prevent the water in a backflow prevention assembly from freezing. Such enclosure shall also allow ready access for maintenance and testing purposes and provide clearances as defined by TMWA Installation Standards.

HEALTH AGENCY: The term “health agency” as it pertains to this program means the Nevada State Health Division.

HEALTH HAZARD: The term “health hazard” shall mean actual or potential threat of contamination to the approved water supply.

INSTALLATION INSPECTION: The term “installation inspection” as it pertains to this program means an inspection by a member of TMWA’s Backflow Prevention Group of a newly installed backflow prevention assembly providing service protection.

INSTALLATION STANDARDS: The term “installation standards” as it pertains to TMWA’s backflow prevention and cross-connection control program means the Backflow Prevention Installation Requirements and Standards and this policy as developed by TMWA. These standards are consistent with the Nevada Administrative Code and other recognized experts in the backflow prevention field, such as the USC Foundation for Cross-Connection Control and Hydraulic Research.

INTERNAL BACKFLOW PREVENTION OR INTERNAL BACKFLOW PROTECTION: The terms “internal backflow prevention” or “internal backflow protection” refer to backflow prevention used for the purpose of isolation on a piece of equipment or use of water within a water customer’s private plumbing system.

INTERNAL WATER SYSTEM: The term “internal water system” refers to the private piping of water on a water customer’s premises.

LOCAL HEALTH AGENCY: The term “local health agency” means the Washoe County District Health Department.

NON HEALTH HAZARD: The term “non health hazard” shall mean actual or potential threat of pollution to the approved water supply.

NON POTABLE WATER: The term “non potable water” shall mean a water supply which has not been approved for human consumption by the health agency having jurisdiction.

POINT OF CONNECTION (POC): The Point of Connection is synonymous with Service Connection. The P.O.C. is the back of curb for all streets with planter strips. The P.O.C. is the back of sidewalk for streets with sidewalk contiguous with the curb and gutter. Where the P.O.C. is unclear, the location will be designated by a TMWA Backflow Prevention Group member. If a meter exists, that shall be considered the P.O.C.

POLICY: The term “policy” or TMWA “policy” shall refer to the document titled
Backflow Prevention and Cross Connection Control Policy for TMWA and its contents.

POLLUTION: The term “pollution” shall mean a degradation of the quality of water by any foreign substance which would not constitute a health hazard to the public health, but which would adversely and unreasonably affect the aesthetic qualities of water for domestic uses.

PRIVATE WATER SYSTEM: The term refers to the water customer’s private plumbing system within the customer’s premises.

PREMISES: The term “premises” means any and all areas on a water customer’s property which are served or have the potential to be served by TMWA’s potable water system.

RECLAIMED WATER: The term “reclaimed water” means effluent derived from wastewater treatment system, which as a result of treatment, is suitable for uses other than potable use.

REDUCED PRESSURE PRINCIPLE ASSEMBLY (RP): The term “reduced pressure principle assembly” or “RP” means an assembly incorporating two internally loaded, independently operating check valves and an automatically operating differential pressure relief valve located between the two checks, with a resilient seated shut-off valves on each end of the assembly, and equipped with 4 properly located resilient seated test cocks.

REDUCED PRESSURE PRINCIPLE DETECTOR ASSEMBLY: This is a Reduced Pressure Principle assembly with a smaller sized approved bypass containing a specific water meter and an approved reduced pressure principle assembly.

RETROFIT: The term retrofit refers to installation of backflow prevention assemblies, for the purpose of providing service protection, on existing water services.

SERVICE CONNECTION: The term “service connection” refers to the point of connection of a customer’s (or water user’s) piping to TMWA’s main or water meter.

SERVICE PROTECTION: The term “service protection” as it pertains to this program means the installation of backflow prevention on the water service connection, just downstream of the water meter or point of connection, the purpose of which is to protect TMWA’s distribution system from cross-connections or potential cross-connections within the customer’s piping system. A synonym is containment. NAC 445A defines the service connection as the point at which the water purveyor loses its authority and control over water.

TRUCKEY MEADOWS WATER AUTHORITY: TRUCKEY MEADOWS WATER AUTHORITY is synonymous with TMWA.

TEST: The term “test” as it pertains to this program means a functional test of an approved backflow prevention assembly. This test shall be conducted by an AWWA Certified Backflow Prevention Tester, per procedures adopted by AWWA.
THERMAL EXPANSION: The term "thermal expansion" means the increase in water pressure within a customer's water system due to thermal affects. Thermal expansion is a potential problem within a customer's system which has been equipped with a backflow prevention assembly and appropriate measures shall be taken by the customer, i.e. properly designed and sized thermal expansion tanks.

USED WATER: The term "used water" means water which has passed the point of service connection and therefore has left the control of the water purveyor.

UTILITY: The term "utility" means TMWA who is responsible for the operation of the water distribution system.

WATER CUSTOMER: The term "water customer" means any person (or that person's representative) or agency (or that agency's representative) obtaining or using water from TMWA's water potable water supply system.

WATER DISTRIBUTION SYSTEM: Means TMWA's water distribution system.

WATER USER SUPERVISOR: When requested by the water purveyor, the water customer shall appoint a water user supervisor who shall be responsible for conformance with all applicable laws, rules and regulations pertaining to backflow prevention; for the installation, operation and use of all water piping systems, backflow prevention assemblies and water using equipment on the premises; and for the avoidance of unprotected cross connections. The Water User Supervisor will be responsible for the customer's private water system and be responsive to backflow prevention requirements set forth by the water purveyor and NAC 445A.

WATER SUPPLIER: The term "water supplier" means the person who owns or operates the approved water supply system. The water supplier in this program is TMWA.
SECTION 3    GENERAL BACKFLOW PREVENTION REQUIREMENTS

CURRENT INSTALLATION REQUIREMENTS
Backflow prevention assemblies are required by TMWA (on domestic, fire and irrigation water services) to provide service protection for TMWA’s distribution system. This backflow prevention shall be installed per TMWA Backflow Prevention Installation Requirements and Standards and this policy as a condition for new water service or continuation of existing service. Any proposed deviation from these requirements and standards will require approval from a member of TMWA’s Backflow Prevention Group.

Backflow prevention requirements and installation standards may change over time. It is the responsibility of the water customer to ensure the current version of TMWA’s Backflow Prevention Installation Requirements and Standards and this policy is complied with. These requirements refer to both new and existing water services, and for domestic, irrigation and fire services, unless specified otherwise by TMWA Backflow Prevention Group.

Retrofits of existing services may present some special circumstances that will be dealt with on a case by case basis. For additional information on Retrofits of existing services, please refer to those sections of this policy.

Refer to the TMWA Backflow Prevention Installation Requirements and Standards in the Appendix for detailed installation, inspection, testing and design requirements.

DESIGN CONSIDERATIONS
The installation of backflow prevention requires a number of considerations be reviewed prior to installation. Of particular importance in the design of a system incorporating a backflow prevention assembly are provisions:

- for thermal expansion of downstream water or fluids
- for drainage systems to handle full port discharges from the relief valves of reduced pressure principle backflow prevention assemblies
- to prevent freezing of the backflow prevention assembly and the water service
- to prevent submergence of internally or externally installed backflow prevention assemblies

APPROVED ASSEMBLIES
Pursuant to NAC 445A, any backflow prevention assembly installed for service protection on TMWA water services shall be on the current University of Southern California (USC) List of Approved Backflow Prevention Assemblies. TMWA maintains a current USC list of the approved assemblies and will, upon request, provide the most current list to a water customer.
Backflow prevention assemblies are approved by USC as an integral unit beginning with the #1 shut off valve, through the assembly body and through the #2 shut off valve. Any modification, including use of spare parts other than those of the original manufacturer or using a non-USC-approved shut off valve, invalidates the USC approval, and therefore the approval of TMWA as an acceptable assembly.

TYPES AND METHODS OF BACKFLOW PREVENTION
Types and methods of backflow prevention that are acceptable to TMWA for providing service protection include the following:

- Pressure Vacuum Breaker or Spill Prevention Pressure Vacuum Breaker
- Double Check Valve Assembly and Double Check Valve Detector Assembly
- Reduced Pressure Principle Assembly and Reduced Pressure Principle Detector Assembly
- Air Gap

A member of TMWA's Backflow Prevention Group shall specify the required type of protection based on NAC 445A and TMWA's policies, and to be commensurate with the assessed degree of hazard on the customer's premise. In situations that are not covered in NAC 445A, TMWA shall evaluate each situation on a case by case basis and will determine the required type of backflow prevention. The water customer may at his/her discretion choose a higher level of protection than the minimum required by TMWA.

Per NAC 445A.6721, TMWA reserves the right to require more stringent requirements than that set forth in NAC 445A.

DOMESTIC, IRRIGATION
DC, RP or Air Gap, to be determined by TMWA Backflow Prevention Group.

FIRE
- Dry systems also require double check valve assemblies due to the potential of contamination when non potable water is introduced through the fire pumper connection.
- NFPA Class 1, 2 and 3 systems require the installation of an approved double check valve assembly.
- NFPA Class 4, 5 or 6 systems require the installation of an approved reduced pressure principal assembly.
- At its discretion TMWA may require detector check assemblies.

SPECIAL CIRCUMSTANCES
The normal types of backflow prevention required for a water service are listed above. However a retrofit situation or any special circumstances listed below (or not listed) may
cause an exception to the norm.

- Where access to a premise is denied by the water customer to TMWA Backflow Prevention Group, TMWA’s distribution system shall be protected with an Air Gap.
- Where there is one contaminant (health) hazard, TMWA’s distribution system shall be protected with a Reduced Pressure Principle Assembly, to be determined by TMWA Backflow Prevention Group.
- If it is impossible or impractical to make a cross connection survey, TMWA’s distribution system shall be protected with an Air Gap or a Reduced Pressure Principle Assembly, to be determined by TMWA Backflow Prevention Group.

ATMOSPHERIC VACUUM BREAKER (AVB)
The use of atmospheric vacuum breakers for service protection on new service connections is prohibited.

INSPECTIONS
All inspections shall be performed by the Backflow Prevention Group unless otherwise assigned by mutual agreement to another department of TMWA. Any backflow prevention installed for service protection for a new service connection or existing service connection shall be inspected by a TMWA Backflow Prevention Group member as a condition for new water service or continuation of existing service.

If any inspection is not requested, TMWA may require the service trench be excavated and/or the backflow prevention assembly moved to the meter or the point of connection.

BACKFLOW PREVENTION ASSEMBLY TESTS
The water customer shall have each assembly, which was installed for service protection, tested by a certified tester as a condition for new water service or continuation of existing service. Upon conclusion of the test, it is the water customer’s responsibility to submit a copy of this written test report to TMWA. Assembly tests are required:
1. After installation of a new assembly
2. After repair, replacement, relocation of an assembly
3. After a backflow incident
4. Annually; or more frequently as required by TMWA for the purpose of monitoring cross connection hazards; or more frequently for the purpose of reviewing assemblies that repeatedly fail the tests.

Water service will be terminated if tests are not performed as required by TMWA.

Refer to the portion of this section titled Repair and Replacement regarding when a test is not successfully completed.
INITIAL TESTS
Each newly installed backflow prevention assembly, or any backflow prevention assembly which has been repaired, replaced or relocated, shall be tested and the successful test results shall be received by TMWA within seven (7) working days of the water meter turn on or repair of the assembly. If the test is not received in this period the procedure to terminate water service, based on the section Enforcement Action, item 3 of Water Service Termination (Refusal or unapproved delay to test a backflow prevention assembly), will be instituted.

ANNUAL TESTS
TMWA will notify customers by mail when the periodic (usually annual) testing of the assembly providing service protection is required. TMWA may require certain assemblies be tested more frequently and will notify the customer of this requirement. The following communication process will be used:

1. TMWA will notify the water customer of the required backflow prevention test at the beginning of the month in which the test is due. The customer will be given a thirty (30) day time frame to comply and have the test provided to TMWA.

2. A second notice will be sent to the water customer who does not take action on the first notification. The second notice will allow a five (5) work day time frame to comply.

3. The third notice will notify the customer of a Disconnect Notice to be carried out within 48 hours and to remain in effect until the test is completed.

4. A delayed test in the current year will not change the next year's test date to the later date when the test was actually done. For example, a test is due in August 1998, but is not performed until October 1998. The next test will be due in August 1999, not in October 1999.

REPAIR OR REPLACEMENT OF ASSEMBLIES
An assembly may be removed by the customer for repair provided the water is not used until the repair is completed. A retest of the repaired assembly will be required after the repair is complete.

An assembly may be removed by the customer for replacement provided the water is not used until the replacement assembly is installed. All assemblies used as replacements shall be installed per TMWA Backflow Prevention Installation Requirements and Standards and this policy and shall be tested by a certified tester after installation. The manufacturer, serial number, and size of the old assembly shall be noted on the test form and shall be noted as being replaced.

TMWA may notify the customer of required repairs to a backflow prevention assembly or replacement of a backflow prevention assembly. TMWA will notify customers by mail regarding repair or replacement requirements.
REMOVAL OR RELOCATION OF ASSEMBLIES
Approval shall be obtained from TMWA Backflow Prevention Group before a backflow prevention assembly, which was installed for service protection, can be removed or relocated. Relocation, inspections and tests of the relocated assembly shall be completed as noted in the TMWA Backflow Prevention Installation Requirements and Standards and this policy.

INSTALLATION LOCATION
The location of backflow prevention for service protection shall be designated by the TMWA Backflow Prevention Group. The normal installation locations are listed below, however a retrofit situation or any special circumstances listed below (or not listed) may cause an exception to the norm.

TMWA shall require of any water customer with backflow prevention designated as service protection, that is not installed immediately after the meter, or point of connection:
  a. An annual certification stating that no connections or taps have been made between the meter, or point of connection, and the backflow prevention.

SPECIAL CIRCUMSTANCES
The backflow prevention assembly for all water services to a premise shall be installed at the meter or point of connection to TMWA’s main if any of the following apply:

- If an auxiliary water supply or non potable water supply (recycled, ditch, well, surface, etc.) is on the premises.
- If entry to any portion of the premises is not available for inspection by TMWA.
- If any customer cannot or will not allow an on-premises inspection of his private internal water system.
- If all conditions for an internal installation as noted in the TMWA Backflow Prevention Installation Requirements and Standards or this policy are not met, including approval by TMWA Backflow Prevention Group for an internal installation.

DOMESTIC, IRRIGATION
- Domestic Service: immediately downstream of the meter effective 9/1/98.
- Irrigation Service: immediately downstream of the meter.

FIRE SERVICES

FIRE SYSTEM DEFINITIONS
The following definition system is used by TMWA for determining the appropriate installation location for backflow prevention on a private fire protection system for new or existing services. It is not to be confused with the NFPA fire system classification system.
1. Type A System—Single Fire Service follows all of the following characteristics:
   a. A single fire service line (one point of connection to TMWA’s main) serves one fire suppression system in one building with one riser and
   b. The fire suppression system is not directly or indirectly connected to any other fire suppression system and
   c. this is not a looped system and
   d. there are no fire hydrants on this fire service line and
   e. the length (of the fire service line) between the point of service connection on TMWA’s main and the riser and backflow prevention installation location in the building is less than 150 feet and
   f. TMWA Backflow Prevention Group has approved an internal installation and
   g. All requirements for internal installations are met.

2. Type B system—defined as any configuration of fire service not designated as Type A system. Type B systems may include, but are not limited to, the following characteristics:
   a. multiple points of connection to TMWA’s main.
   b. looped systems with one point of connection.
   c. one fire service line provides water suppression to more than one building.
   d. the fire service line is greater than 150 feet from point of connection to the backflow prevention.
   e. fire hydrants are on the fire service line.

LOCATION REQUIREMENTS
The location for the backflow prevention shall be determined by TMWA for each project.

For all backflow prevention assemblies that are required by TMWA for service protection, the preferred location of the backflow prevention assembly shall be immediately inside the property being served. The rationale for this requirement is that TMWA loses control of water quality once water passes into the customer’s system. On the other hand, TMWA is aware that locating the backflow prevention assembly at the fire system riser provides easier accessibility for testing and maintenance purposes, and may provide some freeze protection benefits. For these reasons the following standards shall be used in the location of backflow prevention assemblies:

TYPE A SYSTEMS
Internal installations will be accepted for the fire suppression systems defined by TMWA Backflow Prevention Group as a Type A system. All requirements for internal installation as described in the TMWA Backflow Prevention Installation Requirements and Standards and this policy shall be met. If, in the opinion of TMWA, these requirements for internal installations have not been met, TMWA will require corrections to the installation or may require the backflow prevention assembly be moved to an exterior location just inside the property line.
TYPE B, C & D SYSTEMS
The backflow prevention assembly is required at the point of connection (immediately inside the customer’s property line) for these systems. All requirements for installation as described in the TMWA Backflow Prevention Installation Requirements and Standards and this policy shall be met.

1. DC’s may be installed above ground in a freeze proof enclosure, or in an underground vault properly designed for drainage.
2. RP’s shall be installed above ground in a freeze proof enclosure properly designed for drainage.
3. On request from the water customer, rather than an RP at the property line, TMWA will consider allowing a double check valve assembly at property line accompanied by RP’s inside the facility at the glycol loops. The RP installations shall meet all requirements for an internal installation.
SECTION 4  RETROFIT PROCEDURE FOR EXISTING SERVICE CONNECTIONS

As directed by the District Health Department, TMWA shall review all existing water service connections to assess the degree of hazard within a premise to designate the required backflow prevention. All existing domestic, irrigation and fire service connections will be reviewed. The retrofit program will be carried out:

- through mailings to specific water customers,
- during remodels, tenant improvements, expansions, or construction projects or
- through other methods deemed necessary by TMWA.

REMODELS, TENANT IMPROVEMENTS, OTHER CONSTRUCTION

Retrofits which are initiated in conjunction with a building permit for remodels, tenant improvements, building additions, etc. may not require the detailed survey discussed below. TMWA Backflow Prevention Group will review the construction project and water use and will determine the appropriate type of backflow assembly and location. These retrofits shall be completed during the course of the construction project and are required for continuing water service. Water services that are not required to be upgraded with backflow prevention as a result of this construction will be retrofitted at a later time.

NON CONSTRUCTION RELATED RETROFITS

TMWA will contact other customers for retrofit of their domestic, irrigation and fire water services without the stimulus of a construction project. Upon being contacted by Sierra, a water customer of an existing service connection may have two options (and will be notified of the available options):

1. The water customer shall install the required backflow prevention in conformance with NAC 445A and TMWA policy, and per TMWA Backflow Prevention Installation Requirements and Standards. Backflow prevention, commensurate with the degree of hazard per NAC 445A, shall be installed for service protection if one of more of the following characteristics exist:
   - Premise with complex plumbing arrangements which make it impractical to assess whether cross connection hazards exist,
   - Premise with a repeated history of cross connections being established or reestablished,
   - Premise where cross connections are unavoidable, or not corrected, or where there is a high potential for change in the plumbing system.

2. If the customer wishes to install backflow protection internal to his plumbing system, or if petition is being made with TMWA to lower the level of backflow prevention for service protection, the customer shall contract with a Cross Connection Specialist to perform a detailed survey of the premise. TMWA strongly encourages customers to conduct cross-connection control surveys to provide internal protection.

FILE COPY
a. The survey will list the hazards associated with the water use on the premise and will recommend the proper level of backflow prevention for these hazards for internal protection. The survey will also list backflow prevention requirements for service protection.

b. A copy of the survey will be forwarded by the specialist to TMWA Backflow Prevention Group.

c. TMWA will evaluate this survey; review, approve or change requirements and locations for internal protection; and may make additional requirements for internal protection.

d. Having a survey performed will not eliminate, and may not reduce the service protection requirement designated by NAC 445A or TMWA Policy.

e. The retrofit will be carried out as noted in this section under Retrofit Steps.

RETROFIT STEPS

After it has been determined which step above will be followed, the following is a brief description of the next steps in the retrofit.

1. The type of backflow prevention for service protection and its location will be determined by a member of TMWA's Backflow Prevention Group. The level of protection listed in NAC 445A will be the requirement for service protection. Any water use not listed in this detail will be reviewed on a case by case basis for service protection requirements.

   ▪ If TMWA assess that no hazard exists with the current water use and no service protection is required:
      a. A periodic review will be made of this premise to reevaluate level of hazards
      b. TMWA will document the reasons for not requiring service protection.

2. TMWA recognizes the hardships that may be imposed on a customer through this retrofit program. Therefore, the schedule for implementation of the backflow prevention improvements may be flexible, provided TMWA, after any necessary consultation with the District Health Department, determines there is no immediate risk. TMWA and the customer will jointly agree on a completion date. General timeframes for completion of installation follow:

   a. Where TMWA identifies a contaminant (health) hazard, service protection shall:
      ▪ be completed within 90 days or
      ▪ In accordance with an alternate schedule acceptable to TMWA.

   b. Where TMWA identifies a pollutant (non health) hazard, service protection shall be completed in accordance with a schedule acceptable to TMWA.

2. After the final determination is made, an agreement letter will be made between TMWA and the water customer describing in detail the improvements to be made and a schedule by which the improvements shall be completed.
3. If the retrofit is not completed at the agreed upon time, the water service may be terminated after the notification steps listed in Enforcement Action, Water Service Termination, unless the customer receives an approval from TMWA Backflow Prevention Group for an extension.
SECTION 5  REQUIREMENTS FOR RETROITS

GENERAL BACKFLOW PREVENTION REQUIREMENTS
As a general rule, retrofit installations shall be per the requirements in this policy and the TMWA Backflow Prevention Installation Requirements and Standards. This section shall contain only items which may be exceptions only for retrofits to the installation requirements described in Section 3, General Backflow Prevention Requirements, and to the TMWA Backflow Prevention Installation Requirements and Standards.

If, in the original utility plans for the project, a backflow prevention assembly was called for but not installed, the backflow prevention assembly as called for on the utility plans shall be installed.

APPROVED ASSEMBLIES
Regarding any presently existing backflow prevention assembly which was a USC approved assembly at the time of installation, but is not currently on a USC Approved Assemblies list: As long as the assembly passes the annual AWWA functional test, has been maintained and/or repaired to meet original factory working conditions, and is commensurate with TMWA's assessed degree of hazard, the assembly will be accepted as an approved assembly for service protection. It shall be replaced with an approved assembly at the point when it is either moved or can no longer meet the specifications listed above.

REDUCED LEVEL OF SERVICE PROTECTION
This section is applicable to domestic and fire water services. TMWA recognizes that, on occasion during a retrofit, the installation of the proper backflow prevention assembly may be difficult due to space, drainage constraints or the physical configuration of the water customer's premise. In these situations, at the water customer's request, TMWA may consider, in consultation with the District Health Department, a reduced level of protection. As a requirement for a reduced level of service protection the water customer shall commit in writing to the following:

1. In the event a water customer request a reduced level of service protection, the owner accepts liability for installing the pollutant (non health) hazard level type of assembly to protect against a contaminant (health) hazard.

2. The water customer shall have a Cross Control Connection Specialist perform a detailed cross-connection survey of the premise as noted in the section titled Procedure for Retrofit of Existing Services.

3. The customer shall complete installation of internal protection improvements as outlined in the survey and approved by TMWA to provide a level of protection commensurate with the assessed degree of hazard.

4. TMWA will require the water customer to maintain an aggressive, on going internal backflow prevention program.

5. The backflow prevention for internal protection shall be installed per TMWA
Backflow Prevention Installation Requirements and Standards and this policy, inspected by TMWA Backflow Prevention Group, maintained or repaired to original factory working condition, and tested by a certified tester at an interval to be determined by TMWA.

6. An increased frequency of testing of service protection assemblies as determined by TMWA may be required.

7. For reduced service protection on a domestic service some additional requirements are noted in the Domestic Service, Backflow Prevention Options, noted below.

8. For reduced service protection on a fire system some additional requirements are noted in the Fire Service, Backflow Prevention Options, noted below.

9. Records detailing the internal protection, the repair and maintenance, and tests shall be maintained by the water customer and will be submitted to TMWA on an annual basis.

10. Each year, a written re-certification shall be required of the owner or property manager containing details regarding the following items. After receipt and review of the certification, TMWA’s Backflow Prevention Group shall then determine if the reduced service protection is still adequate. Should the level of service protection not be adequate for the level of hazard, the water customer shall be required to upgrade the service protection backflow prevention assembly to the proper type as a requirement for continued water service. The following will be included in the re-certification:

   - Changes in tenancy,
   - Changes in water use,
   - Plumbing changes
   - Use of non potable water

11. TMWA shall require reasonable access to the premise to conduct an initial cursory survey and periodic re-evaluations to determine if the internal protection is adequate to protect TMWA distribution system.

12. TMWA may also require the customer have additional detailed surveys performed by a Cross Connection Specialist.

**INSTALLATION LOCATION**

**SPECIAL CIRCUMSTANCES**

The backflow prevention assembly for all water services to a premise shall be installed at the meter or point of connection to TMWA’s main if any of the following apply:

- If a water customer’s premises has internal cross connections that cannot be permanently corrected or controlled
- If a water customer’s premises has intricate internal plumbing and piping
- If the water service laterals between the point of connection and the water use cannot be located or defined to the satisfaction of TMWA
- If any conditions listed in the section General Backflow Prevention Requirements,
Installation Location Requirements, Special Considerations apply.

**DOMESTIC SERVICES**
Backflow prevention shall be as close as possible to the meter.

TMWA may consider allowing the backflow prevention assembly to be located internally at the water riser if physical space is limited for an exterior installation, if proof is provided that no lateral taps exist prior to the proposed installation location inside the building, and if all requirements are met for an internal installation including sufficient access to the assembly for testing and maintenance purposes.

**IRRIGATION SERVICES**
Backflow prevention shall be immediately downstream of the meter. Installations shall be per the TMWA Backflow Prevention Installation Requirements and Standards and this policy.

**FIRE SERVICES**
Backflow prevention shall be as close as possible to the service connection. The fire hydrants, number of fire risers and the fire department pumper connection will be a consideration during placement of the backflow prevention assembly.

TMWA may consider allowing the backflow prevention assembly to be located internally at the fire system riser if physical space is limited for an exterior installation, if proof is provided that no lateral taps exist prior to the proposed installation location inside the building, and if all requirements are met for an internal installation including sufficient access to the assembly for testing and maintenance purposes.

**TYPES AND METHODS OF BACKFLOW PREVENTION**

**DOMESTIC BACKFLOW PREVENTION OPTIONS**

1. **DOUBLE CHECK VALVE IN LIEU OF REDUCED PRESSURE PRINCIPLE ASSEMBLY**
   With approval of TMWA, the District Health Department a DC may be used in lieu of an RP. All requirements noted above in the section titled Reduced Level of Service Protection shall be met by the water customer. In addition, the DC requires a minimum of semi-annual testing and a possible higher level of testing as directed by TMWA or the District Health Department. This substitution may be considered for retrofit situations only under the following exclusive conditions:

   a. Where retrofit of an RP induces pressure losses which renders the existing domestic system inoperable and there is not space for installation of a pump. The owner of the domestic system shall submit to TMWA calculations and a detailed flow and pressure report to substantiate this claim. The calculations and report shall be provided by a licensed plumber or engineer.

   b. Where safety or drainage problems exist with the installation of an RP which
cannot be reasonably corrected. The owner of the system shall provide a written report from his contractor or engineer which details the problems or logistics of installing the RP.

IRRIGATION SERVICES
STOP AND WASTE VALVES
NAC 445A.67255 specifically defines stop and waste valves as a potential source of contamination to a distribution system and prohibits their use upstream of a backflow prevention assembly. Any existing irrigation system with a stop and waste valve between the meter (or point of connection) and the backflow prevention assembly shall be changed to meet current TMWA Backflow Prevention Requirements and Standards as a requirement for continued water service.

ATMOSPHERIC VACUUM BREAKERS
TMWA may accept the use of the existing atmospheric vacuum breakers (AVB) as system protection if it can be demonstrated that:

1. the AVB is functioning properly:
   - the air inlet opens when water supply is shut off
   - the air inlet closes when water supply is turned on

2. the AVB is installed correctly including
   - being installed at the proper height and
   - with the proper shut off and drain system

3. no stop and waste valve is installed upstream of the AVB.

At the time that this AVB no longer passes the test it shall be replaced with an assembly approved for service protection.

DOUBLE CHECK VALVE
TMWA may accept the use of the existing double check (DC) as system protection if it can be demonstrated that:

1. the DC passes the periodic functional test
2. the DC is installed correctly including
   - the proper shut off and drain system
3. no stop and waste valve is installed upstream of the DC.

At the time that this DC no longer passes the test it shall be replaced with an assembly approved for service protection.

FIRE SERVICES
REGULATORY REQUIREMENTS AND WATER QUALITY ISSUES
NAC 445A requires that all fire sprinkler systems be equipped with a backflow prevention assembly. The type of backflow prevention assembly is based upon the NFPA Classification of the particular fire sprinkler system and will be designated by a TMWA Backflow Prevention Group member.
TMWA has nearly 2000 fire protection service accounts. Based upon the results of early surveys, many of these fire protection services are not equipped with proper backflow prevention assemblies. Proper backflow prevention assemblies are testable double check valve assemblies (DC), or testable reduced pressure principle assemblies (RP) or air gap.

Based upon the water quality findings of the American Water Works Association Research Foundation (AWWRF), there is no doubt that fire sprinkler systems constitute a contaminant (health) hazard to TMWA’s distribution system and shall be equipped with appropriate backflow prevention assemblies. However, since installation of a backflow prevention assembly will reduce the water pressure and may affect sprinkler performance, care must be exercised when installing backflow prevention, to not jeopardize a critical public safety requirement while providing for a public health concern. That fire sprinkler system must continue to perform hydraulically during a fire event. Therefore, any retrofit shall equally address public health (backflow prevention) and public safety (maintaining reliable fire flow).

Other issues that are a concern in retrofitting existing fire sprinkler systems are inadequate space and, in the case of reduced pressure principle assemblies, no drainage system or an inadequate drainage system necessary to handle full discharge from the relief valve. Another issue encountered in TMWA’s backflow prevention program includes the safety issue of installing a reduced pressure principle assembly near electrical equipment. Safety requirements dictate that a reduced pressure principle assembly be installed away from electrical equipment.

FIRE SYSTEM BACKFLOW PREVENTION OPTIONS
1. NO BACKFLOW PREVENTION ASSEMBLY
   TMWA specifies that all fire services be equipped with backflow prevention assemblies consistent with NAC 445A. Based upon the water quality data presented in the AWWRF study and the potential acute and chronic health effects associated with backflow from fire sprinkler systems, the “no backflow prevention option” is not an option.

2. INSTALLATION OF REQUIRED BACKFLOW PREVENTION
   This shall be per the requirements listed in the section titled General Backflow Prevention Requirements.

3. DELAYED INSTALLATION OF DOUBLE CHECK VALVES
   In situations where the retrofit is extremely difficult due to space limitations or where the backflow prevention assembly adversely affects sprinkler system operation, TMWA will consider a lengthening of the installation schedule under the following conditions:
   a. That the existing system is equipped with at least a non-testable single check valve.
   b. That the owner of the system shall submit a report prepared by a licensed fire system contractor or engineer which adequately describes the space or hydraulic problems and provides the flow and pressure requirements of the Fire Department.
   c. That the owner of the premise consent to a prescribed plan and schedule for
eventual retrofit of the fire sprinkler system with a double check valve assembly and a tank-pump installation if necessary for pressure and flow. Such plan and schedule shall be with the approval of the District Health Department and the jurisdictional fire department.

4. DOUBLE CHECK VALVE IN LIEU OF REDUCED PRESSURE PRINCIPLE ASSEMBLY

With approval of TMWA, the District Health Department, and the jurisdictional Fire Department, a DC may be used in lieu of an RP on certain NFPA Class 4, 5, & 6 fire sprinkler systems. All requirements noted above in the section titled Reduced Level of Service Protection shall be met by the water customer. In addition, the DC requires a minimum of semi-annual testing and a possible higher level of testing as directed by TMWA or the District Health Department. This substitution may be considered for retrofit situations only under the following exclusive conditions:

a. Where retrofit of an RP induces pressure losses which renders the existing fire system inoperable and there is not space for installation of a pump. The owner of the fire system shall submit to TMWA calculations and a detailed flow and pressure report to substantiate this claim. The calculations and report shall be provided by a licensed fire system contractor or engineer. A letter from the Fire Department listing required pressures and flows shall be provided to TMWA.

b. Where safety or drainage problems exist with the installation of an RP which cannot be reasonably corrected. The owner of the system shall provide a written report from his fire system contractor or engineer which details the problems or logistics of installing the RP.
SECTION 6 CONSTRUCTION WATER & FIRE HYDRANT USAGE

CONSTRUCTION WATER DEFINITION
Backflow prevention is required by TMWA on all methods of using potable water for construction. During the course of construction for a particular premise, water may be used for various construction activities. Such activities include water used for dust control, site grading and compaction, on-site mixing of concrete and cement, water used for the pressure testing of pipes, and water used in the cleaning of tools and equipment.

CONSTRUCTION WATER SUPPLY
Several options available for construction water are as follows.

TRUCK FILL SITES
TMWA discourages the use of potable water for construction purposes and encourages the use of non-potable supplies for construction water needs, particularly water used for dust control. To this end, TMWA has worked with the construction community and has developed a mix of potable and non-potable of construction water fill stations strategically located around the community. Each station is equipped with metering and appropriate backflow prevention equipment. TMWA encourages contractors and developers to utilize these stations and arrangements can be made with TMWA for their use.

TEMPORARY CONSTRUCTION WATER METER
If in fact a customer or developer requires construction water specifically at its construction site, then the owner/developer may request a temporary construction water service utilizing potable water from TMWA’s distribution system. Temporary construction water service shall require metering, will be billed at the appropriate rate deemed by TMWA, shall be equipped with appropriate backflow prevention equipment which shall be tested by a Certified Tester, and shall be retired by the customer/developer at the end of the project. TMWA’s backflow prevention group will specify the appropriate level of backflow prevention equipment on a case by case basis.

PERMANENT DOMESTIC OR IRRIGATION WATER METER
Another source of potable construction water is to use the permanent domestic or irrigation water service for that property. The meter box shall be set to subgrade in the final permanent location, the permanent backflow prevention assembly installed (with a hose bib at the downstream end of the backflow prevention assembly), inspected by TMWA Backflow Prevention Group, and tested by a Certified Tester. At the end of the construction project, the only change required is for the developer to remove the hose bib from the end of the backflow prevention assembly and contact the TMWA billing department to change the name on the account. All installation requirements and inspections shall be performed as noted in TMWA Backflow Prevention Installation Requirements and Standards and this policy.
FIRE HYDRANT AND FIRE WATER SERVICE USE
At no time shall a private entity utilize water from a public or private fire hydrant or from a fire sprinkler water service inside a facility for any purpose other than fire fighting. TMWA shall designate the approved water supplies that shall be utilized by private entities (including contractors) for construction, or any, purposes.

Any municipal agency that uses water from a private or public fire hydrant or other water outlet shall:

1. Have written approval from TMWA for use of water from this non-metered supply.
2. Have an approved Air Gap on each vehicle or equipment being filled from the hydrant.

Have the air gap on those vehicles and equipment approved by TMWA Backflow Prevention Group before water fill.
SECTION 7  CERTIFIED BACKFLOW ASSEMBLY TESTERS

TESTER CERTIFICATION
Persons wishing to perform tests on backflow prevention assemblies in Nevada shall have a California Nevada American Water Works Association (AWWA) Backflow Prevention Assembly Tester Certification pursuant to NAC 445A. Certification requires passing a tester class resulting in a certificate from the California Nevada section of the AWWA. Re-certification shall be obtained every three years or per the latest version of the USC Manual of Cross Connection Control.

All testers who perform tests on backflow prevention assemblies which provide service protection for TMWA shall be on the List of CA-NV AWWA Certified Testers. The District Health Department maintains this list. Any individual wishing to be placed on the tester's list should contact the Environmental Engineer, District Health Department. The District Health Department will place a tester on the list if AWWA certification has been obtained and if business licenses have been obtained from Reno, Sparks, and Washoe County. The tester's name will be automatically removed from the list if proof of re-certification has not been provided by the tester to the District Health Department.

TMWA reserves the right to remove any tester from the approved list for TMWA testing due to non-performance reasons or for performing the tests in a method not consistent with TMWA’s requirements.

TESTER RESPONSIBILITIES AND TESTING REQUIREMENTS
1. TMWA requires the tester to attend a yearly seminar presented by TMWA to review TMWA policy and standards. This is a requirement for the tester to remain eligible to perform tests for TMWA water customers. The tester will be notified of the time and place for this review.

2. TMWA’s test form shall be used for backflow prevention assemblies installed for service protection for fire, domestic, and irrigation water services. At the request of the tester, TMWA will provide this form on a diskette. The form on the diskette has no TMWA logo. The tester may insert his own logo.

3. All data on the test form shall be legible and complete, otherwise the form will be returned to the tester for completion.

4. If the water meter number is not provided on the test form, the tester shall obtain a copy of the bill for the specific water service from the customer and attach this to the test form.

5. A successful, operational function test by a tester shall be completed and is due to TMWA within seven (7) days after the assembly is installed and water service is set and/or water service is established. Water service will be terminated after the meter is set if this requirement is not met.

6. Any tester who conducts tests of backflow prevention assemblies which protect fire service connections shall also be a licensed fire system contractor or work under the
direct supervision of a licensed fire system contractor. This directive is per the Health Agency.

7. TMWA Backflow Prevention Group members will perform tests on backflow prevention assemblies throughout the year on a random basis as a quality control measure.

8. TMWA may request the tester perform the test in the presence of a TMWA Backflow Prevention Group member.

9. TMWA may conduct periodic spot checks of a tester's work using the tester's own gage.

10. NAC 445A.67245 requires all test gages to be calibrated at least annually by a qualified firm capable of such calibration. The calibration certification forms, for any test gage used to test backflow prevention assemblies on TMWA water services, shall be provided to TMWA Backflow Prevention Group annually.

11. Both backflow prevention assemblies on a Detector Check assembly shall be tested. Designate the test for the bypass assembly as such on the test form. Read the bypass meter and record it on the test form.

12. Place in the comment field any items such as and including:
   - an incorrectly installed assembly (per TMWA Installation Standards)
   - an assembly which has been modified from the original factory configuration such as having a #1 shut off valve without a test cock or one in which a shut off valve has been detached from the body of the backflow assembly.
   - an installation which has a stop and waste valve between the meter and the assembly
   - an installation which has a water outlet, tap, tee, etc. upstream of the backflow prevention assembly
   - use of a test cock for water supply
   - a fire service which has a tap for non fire services upstream or downstream of the backflow prevention assembly

13. Test criteria for a passing test for an RP:
   - Minimum 2.0 PSID on relief valve opening
   - Minimum 1.0 PSID on check valve 1
   - Minimum 3.0 PSID buffer between relief valve opening and check valve 1
   - Both shut off valves shall not leak

14. Test criteria for a passing test for a DC:
   - Minimum 1.0 PSID on check valve 1 and check valve 2
   - Both shut off valves shall not leak

15. Test criteria for a passing test for a PVB:
   - The air inlet shall open at a minimum 1.0 PSID
   - Minimum 1.0 PSID on check valve 1
   - Both shut off valves shall not leak
SECTION 8 CROSS-CONNECTION CONTROL SPECIALISTS

SPECIALIST CERTIFICATION

Any person who wishes to conduct Cross Connection Surveys for TMWA water customers shall be a Cross Connection Control Specialist. This certification shall be obtained through either the specialist class presented by the California-Nevada section of AWWA or the USC Foundation for Cross-Connection Control and Hydraulic Research.

TMWA maintains its own list of Cross Connection Control Specialists. Specialists wishing to perform work for TMWA water users shall submit a copy of their certificate, along with copies of business licenses for Reno, Sparks and Washoe County, to TMWA Backflow Prevention Group.

TMWA requires the Cross Connection Control Specialist to attend a yearly seminar presented by TMWA to review TMWA policy and standards. This is a requirement for the specialist to remain eligible to perform surveys for TMWA water customers. The specialist will be notified of the time and place for this review.

TMWA reserves the right to remove any specialist from the list should he/she fail to perform the survey as required by TMWA.

SURVEY REQUIREMENTS

Surveys conducted for TMWA water users shall be complete, well written and concise. Surveys shall include the following minimum information:

1. A clear and complete description of the water service connections at the premises being surveyed including:
   - customer water account number
   - types of services and meter numbers
   - service address
   - owner name and address
   - a copy of TMWA's service map (may be obtained at TMWA)
   - If the water meter number is not provided on the survey, the specialist shall obtain a copy of the bill for the water services from the customer and attach this to the survey.

2. A recommendation for type of backflow prevention for service protection that is consistent with requirements of NAC 445A. Describe potential external and internal installation locations. Describe locations and sizes of drains, and locations of electric panels and/or electric equipment. Describe any logistical problems, such as space problems, meters in driveways, lack of drains, high water tables, water run off problems, etc.

3. A detailed review of the on-site water use and the health or pollutant level hazards associated with such use. List backflow prevention that exists on internal plumbing
hazards. Provide a copy of the last test if the assemblies have been tested.

4. A physical description of the facility and premises including a map showing pertinent data such as buildings and where water services are located in relation to buildings and parking lots, location of the service connection and description of the area immediately around and downstream of the service connection, etc.

5. Note any special factors such as:
   - Auxiliary approved potable water supplies on the premises.
   - Non potable auxiliary water supplies being used (seasonal or year round) on, adjacent to, or close to the premises: recycled, reclaimed, well, ditch, surface water.
   - Actual or possible unauthorized water taps or usage upstream of any backflow prevention assembly for service protection.
   - Existing backflow prevention assemblies, their purpose, general condition, size, manufacturer, model, serial number and any test history.
   - Relationships to other properties relating to services or private mains.

6. Surveys that address internal protection should also include the following:
   - A detailed description of internal plumbing, including existing or potential cross-connections.
   - A recommendation for “internal protection” consistent with industry codes and references including but not limited to: the Uniform Plumbing Code, city building codes, NAC 445A, 'Orange Book', etc.
SECTION 9 ENFORCEMENT ACTION

GENERAL
If, in the opinion of TMWA, and after consultation with the District Health Department, it is found that a customer is not meeting its responsibilities relative to service protection backflow prevention, TMWA may implement enforcement actions. Enforcement may include:
1. Denying or terminating water service to a customer’s premises.
2. Requiring the water customer to install backflow prevention, for service protection, commensurate with the degree of hazard on the premise.
3. TMWA may install backflow prevention, for the purpose of service protection, commensurate with the degree of hazard on the premise.

BASIS FOR WATER SERVICE TERMINATION
When TMWA encounters a water use that represents a clear and immediate hazard to the potable water supply that cannot be immediately abated, TMWA will notify the District Health Department and will institute a procedure for discontinuing the water service. Conditions or water uses that create a basis for water service termination shall include, but are not limited to, the following:
1. Direct or indirect cross-connection between TMWA’s water system and a sewer line.
2. Unprotected direct or indirect connection between the public water system and an unapproved auxiliary water system.
3. Refusal to install a required backflow prevention assembly. Unapproved delays by the water customer to install backflow prevention assemblies shall constitute such a refusal.
4. Refusal or unapproved delay to test a backflow prevention assembly.
5. Refusal or unapproved delay to repair a faulty backflow prevention assembly.
6. Refusal or unapproved delay to replace a faulty backflow prevention assembly.
7. Unprotected direct or indirect connection between the public water system and a system or equipment containing contaminants.
8. If a backflow prevention assembly has been removed, bypassed or disabled without prior approval from TMWA Backflow Prevention Group.
9. If a cross connection exists that is not controlled commensurate to the degree of hazard as assessed by TMWA Backflow Prevention Group.

TERMINATION PROCEDURE
For condition 1 or 2, the District Health Department will notify TMWA to terminate water service to a customer’s premise immediately if the hazard to the potable water supply cannot be immediately abated.

For all other conditions, the District Health Department will notify TMWA to terminate
service to a customer's premise after two written notices described in steps 1 and 2 below have been sent to the water customer specifying the corrective action needed and the time period in which it shall be completed. If the corrective action is not taken by the water customer within the specified time period, then water service may be terminated per the following steps:

1. TMWA shall notify the water customer of the requirements related to backflow prevention (installation, maintenance, relocation, testing, etc.). The customer shall be given ten (10) working days to comply and have inspections completed by TMWA Backflow Prevention Group.

2. TMWA shall send a second notice to the water customer who does not take action on the first notification. The second notice shall allow five (5) working days to comply.

3. TMWA shall send a third notice to the customer which will be a Disconnect Notice to be carried out within 48 hours.

4. TMWA will terminate water supply and lock service valve. The water service will remain inactive until all violations have been corrected, inspected and approved by TMWA and the District Health Department.
SECTION 10 PROCEDURE FOR A BACKFLOW OR CROSS CONNECTION INCIDENT

GENERAL
Whenever backflow occurs (either from backpressure or backsiphonage) the potential exists for contamination of TMWA's distribution system. Backflow incidents may be confined on site to a particular premise or may be more widespread in the event of sudden pressure loss in TMWA's distribution system. The following procedures will be used for responding to either type of backflow incident.

BACKFLOW EVENT CONFINED TO A PARTICULAR PREMISE OR PROPERTY
This type of backflow event may be communicated to the District Health Department or TMWA. The following will be the procedure followed by TMWA for an event isolated to a single property.

1. TMWA Backflow Prevention Group or water production staff will notify the District Health Department of the event and the nature of the event. Based upon the particular circumstances and with consultation with the District Health Department, TMWA may immediately implement one or more of the following actions: water quality testing, flushing of services and mains, boil water order to customers or areas of the system affected by the event. Water service may be terminated to the premise suspected of being the source of the backflow until correction actions are completed.

2. The owner of the premise allowing (or suspected of allowing) the backflow to occur will be required to install or repair and test backflow prevention equipment on the water service. Backflow prevention measures will be specified by TMWA's backflow prevention group. Such backflow prevention equipment will be installed and tested before service is restored.

3. TMWA will require the owner of the premise to complete a detailed cross-connection control survey of the premise by a certified backflow prevention and cross-connection control specialist. TMWA and the District Health Department will determine the scope of the survey and will utilize the survey to determine additional internal backflow prevention measures required of the affected premise.

BACKFLOW EVENT CAUSED BY A SYSTEM LOSS OF PRESSURE
1. TMWA will determine the extent of the incident and notify the District Health Department as soon as possible. After consultation with the District Health Department, a boil water order may be issued by TMWA to the media identifying the area affected by the event and those customers which should immediately boil their domestic water.

2. TMWA will isolate the area affected by the backflow event and will notify the jurisdictional fire department of curtailment of fire protection service to the affected area. TMWA will continue to communicate with affected customers through use of
3. Immediately after isolating the area affected by the backflow event, TMWA will initiate corrective action to restore service. This will include system repairs, flushing of mains and services and water quality sampling and monitoring.

4. After service is restored (mains and services are fully pressurized and flushed), the boil water order will be lifted upon receiving satisfactory results from water quality testing.
SECTION 11 NON POTABLE WATER USAGE & AUXILIARY WATER

Non potable water includes water from ditches, surface water, unapproved wells, reclaimed water, recycled water, gray water or any non approved water supply.

Any premise on which both TMWA water supply and a non potable water supply exist will be subject to an annual shut down test.

TYPE OF BACKFLOW PREVENTION REQUIRED

- An RP (Reduced Pressure Principle Assembly) backflow prevention assembly is required at the TMWA meter or point of connection on a water service which enters a property in which a non potable water supply is used and in which there are no cross connections between the non potable plumbing and the potable plumbing.

- An Air Gap backflow prevention method is required at the TMWA meter or point of connection for any plumbing system which will have a direct or indirect cross connection between both TMWA water and a non potable water supply.

- For a potable water service which enters a RESIDENTIAL property which is adjacent to a property where non potable water is used for irrigation: SEE SECTION 8A OF TMWA’S ENGINEERING AND CONSTRUCTION STANDARDS FOR SEPARATION AND BACKFLOW REQUIREMENTS.

DECLARATION OF USE OF RECLAIMED OR NON POTABLE WATER

The potential reclaimed water customer will provide to the Backflow Prevention Group a copy of the application for reclaimed water usage within a week after the application has been made.

The potential non potable water customer will provide to the Backflow Prevention Group a written declaration of the intent to use non potable water on the premise where TMWA will supply potable water.

Failure to declare intentions to use reclaimed or non potable water may result in additional expenses to the customer due to TMWA’s backflow prevention requirements for potable versus non potable water use.

TEMPORARY POTABLE WATER SUPPLY

TMWA may provide temporary potable water to a system designed to distribute non potable water. The following are requirements for this service to be provided:

1. The water service shall be a separate tap on TMWA’s distribution system.
2. The timeframe for the service to be retired shall be provided to TMWA in writing.
3. Backflow prevention shall be through an Air Gap on this temporary water service.
4. When non potable water service is connected to the non potable water system, the TMWA temporary water service shall be retired at the main. A bond shall be provided to TMWA for 150% of the amount estimated to retire the service. The additional 50% shall be considered a security deposit to ensure TMWA's potable service is retired.

5. TMWA will require the water customer to designate a water user supervisor for this premise.

SHUT DOWN TESTS
1. All tests shall be attended by TMWA as purveyor of the potable water.
2. The following requirements shall be followed for a shut down test:
3. Shut down tests of the on site potable and non potable systems shall be performed annually.
4. The customer shall bear all costs of the test. This test is in addition to the periodic (usually annual) functional test of the backflow prevention assemblies on the premises.
5. Performance and coordination of the shut down test shall be the responsibility of the end user of non-potable water supply. End user shall coordinate such tests with TMWA as potable water purveyor, the non potable water purveyor, the water customer's water user supervisor, and the District Health Department.
6. The shut down test director will be TMWA, the District Health Department or the Non Potable water Purveyor.

QUALIFICATIONS FOR WATER USER SUPERVISOR
The Water User Supervisor of a premise shall possess one of the following certifications:

1. USC Cross Connection Control Specialist
2. CA-NV AWWA Cross Connection Control Specialist

QUALIFICATIONS FOR DIRECTOR OF SHUT DOWN TEST
The director of a shut down test shall possess all the following certifications:
1. USC Cross Connection Control Specialist or CA-NV AWWA Cross Connection Control Specialist
2. Currently, AWWA is developing a curriculum and certification related to reclaimed water and/or non potable water. The director should obtain and maintain the certification once that certification has been defined.

WATER SERVICE TERMINATION
If any cross connections are detected between the potable water supply and the non potable water during the shut down test, potable water service will be terminated to the facility immediately and remain off until the cross connection problem is located and removed to the satisfaction of TMWA.
AUXILIARY APPROVED WATER SUPPLY
If TMWA supplies water to a premises with an auxiliary approved water supply, backflow prevention shall be required at the point of connection. TMWA Backflow Prevention Group will specify the required type and location of backflow prevention assemblies for all TMWA water supply.

WELL ABANDONMENT
When a well is abandoned, the owner shall submit to TMWA Backflow Prevention Group a certified copy of the well plugging report prepared by the licensed driller in accordance with NAC 534.420. This report shall be recorded by the District Health Department.

REFERENCES TO OTHER SECTIONS OF THIS POLICY
Enforcement Action
APPENDIX A    DENTAL FACILITY POLICY

PURPOSE
The purpose of this policy statement is to define backflow prevention requirements for
domestic service protection for dental facilities. This policy statement has been
developed based upon a review of current regulations and an in-depth balanced review
of other sources of information.

REGULATORY REQUIREMENTS
The installation of backflow prevention assemblies is required on service lines
whenever the possibility exists that any source of pollution or contamination could be
drawn into the public water system as a result of a backflow incident.

Nevada Administrative Code 445A, clearly defines the responsibility of water purveyors
with regard to backflow prevention and cross-connection control. Per NAC
445A.67185, purveyors shall:

1. Ensure that there are no unprotected connections between the supplies of water,
systems for the pumping, storage and treatment of water, and distribution system of
the public water system and any source of pollution or contamination pursuant to
which any unsafe water or other degrading material can be discharged or drawn into
the public water system as a result of backsiphonage or backpressure.

2. Develop and carry out a program for the control of cross-connections that is
approved by the health authority

Pursuant to the requirements of NAC 445A and direction of the District Health
Department, TMWA has implemented a comprehensive backflow prevention program.
The program includes detailed backflow prevention reviews of all new customers and all
existing commercial customers.

BACKFLOW PREVENTION REQUIREMENTS FOR DOMESTIC SERVICES

NEW SERVICES
NAC 445A specifies that the backflow prevention assembly to provide service
protection for "A dental clinic shall consist of a reduced pressure principle assembly."
This RP shall be installed immediately after the water meter and prior to any water uses
or connections.

EXISTING SERVICES
Backflow prevention shall be installed immediately after the water meter and prior to
any water uses or connections.

For retrofit purposes on existing services: TMWA may consider a reduction in service
protection from an RP to a DC if all the following conditions are met:
• if the water customer uses contained water systems with no direct or indirect connection to potable water supply,
• if the water customers agree to meet all requirements listed in Requirements for Retrofit, Reduced Level of Service Protection.

DISCUSSION
The required installation of backflow prevention assemblies often becomes a heated and controversial issue with many water customers. Customers may object to the installation of testable backflow prevention assemblies due to costs, their own interpretation of what constitutes a cross-connection or health hazard, or a sense that they are already over burdened with too many regulations. The issue of health agencies and water utilities requiring backflow protection on the water services to dental offices is no different. This discussion will summarize the various points of view and TMWA’s rationale when it comes to backflow prevention and cross-connection control for dental facilities.

Many in the dental industry believe that requiring backflow prevention devices in dental offices utilizing testable backflow prevention assemblies to be unjustified. They may also object based upon their perception that a non-testable check valve built into various water using equipment is sufficient to prevent backflow. The American Dental Society (from an April 1996 policy statement) also sets forth the following reasons:

1. The Centers for Disease Control and Prevention have not identified any evidence of a public health risk due to this theoretical phenomenon.
2. Bloodborne viruses cannot reproduce outside their living host and therefore, unlike bacteria and fungi, cannot multiply in water.
3. Most dental offices do not use cuspidors, and cuspidors currently manufactured include an air gap.
4. Dental instruments with cross-connections to water systems are neither designed nor intended to ever be immersed in patient fluids.
5. The amount of fluid that could theoretically be aspirated is miniscule, and would be quickly diluted in the public water supply.
6. If water flow is disrupted for any reason, such as in the event of backsiphonage, the dental worker would automatically discontinue use of the instrument and attempt to resolve the problem.
7. Current trends within the dental profession are towards dental units with contained water systems (not connected to the public water system).
8. Cost benefit analyses demonstrate that the expected returns from these safety requirements are negligible when weighed against the cost.

From a water purveyor’s perspective, TMWA’s response to the above discussion points is as follows:
• Regarding point 1: Backflow is a common phenomenon. Every day in the U.S. water utilities experience backflow events due to broken water mains, pump failures, and from backpressure from cross-connections to non-potable customer sources.
• Regarding points 2, 3 and 4: Water purveyors are concerned about all actual and potential sources of pollution and contamination on the customers side of the water meter. Relative to dental offices, there is concern pertaining to the use of toxic chemicals in film developing operations and microbiological contamination from the use of the following devices: autoclaves, steam lines, grinding units, in-line filtering systems, water flushed cuspidors, water/air syringes, water cooled handpieces, and vacuum pumps. Water purveyors are concerned about all sources of microbial contamination, not just bloodborne pathogens. This concern is evident in the dental industry as well. In December 1995, the ADA’s Board of Directors adopted a standard of 200 colony forming units as the maximum microbe load in water emitted from air/water syringes, handpieces and similar equipment in dental facilities.

• Regarding points 2, 3 and 4: Another source of potential contamination from dental offices include potential microorganisms from biofilm buildup in the very small diameter lines used in dental equipment. From the March 1997 Clinical Research Associates Newsletter, colony forming units increase exponentially in dental equipment. The following numbers were cited: @ the dental chair junction box 10,000 cfu/ml; @ the dental chair control center 400,000 cfu/ml; @ the sterile handpiece 100,000 cfu/ml; @ the non-sterile air/water syringe 200,000 cfu/ml. These numbers are alarming from a water purveyor’s perspective when the allowable number in drinking water is 500 cfu/ml (from the Total Coliform Rule under the Safe Drinking Water Act).

• Regarding point 5: From the water purveyor’s perspective, the use of the community’s water supply to “dilute” even minuscule amounts of backflow is unacceptable. The “solution by dilution” argument can not be accepted if one considers immune compromised customers may be severely affected by a very small amount of contaminated water.

• Regarding point 6: It is not prudent for water purveyors to assume that dental personnel will recognize a backflow event and will curtail usage of water using dental equipment.

• Regarding point 7: Some dentists are now using contained water systems. This option may eliminate the need for internal backflow prevention devices on equipment that formerly utilized the public water supply. However, it would not eliminate the need for service protection backflow prevention assemblies if other water using equipment such as vacuum pumps, x-ray machines, autoclaves, etc. are still connected to the public water supply.

• Regarding point 8: Cost/Benefit analysis is not the sole criteria when establishing health and safety regulations, particularly drinking water regulations. Health risk to all segments of the population must be considered as well.

**SUMMARY**

Due to the public health concerns cited above and regulatory requirements, TMWA requires service protection as defined in this section for dental offices.

TMWA strongly encourages dental clinics to implement proactive internal cross-connection control programs.
APPENDIX B  SERVICE CONNECTIONS TO MULTI-UNIT COMMERCIAL BUILDINGS

PURPOSE
The purpose of this policy statement is to define backflow prevention requirements for domestic service protection for multi unit complexes that are water customers of TMWA. This policy statement has been developed based upon a review of current regulations.

BACKGROUND
TMWA has many customers whose premises consists of large buildings serving multiple tenants with one water service. These include, but are not limited to, multi-tenant office buildings, warehouses, and strip malls. Although in many instances an individual tenant's domestic water use may not constitute a pollutant or contaminant level hazard, when the number of units are considered along with a potential wide variety of uses, the risk associated with cross-connections from non-potable sources increases significantly. This risk is further exacerbated by the transient nature of tenancy and changing water use which is difficult, if not impossible, to monitor by the water supplier.

The inherent cross-connection risks and changing water use hazards associated with buildings serving multiple tenants are recognized by NAC 445A, Public Water System Regulations: to the degree that for any building where the business activity and water use cannot be reasonably identified, service protection is required in the form of a reduced pressure principle assembly (RP). In addition, many of the business activities commonly found in multi-unit facilities have been identified in the regulations as requiring a contaminant (health) level of service protection.

Therefore, the multi-tenant facility presents a contaminant (health) degree of hazard to the community's (TMWA's) water supply. For these regulatory reasons and for the risks cited above to TMWA's distribution system, the following are reasonable backflow prevention requirements for the domestic services serving such facilities.

BACKFLOW PREVENTION REQUIREMENTS FOR DOMESTIC SERVICES

NEW SERVICES
An approved reduced pressure principle backflow prevention assembly (RP) shall be required on all new services.

EXISTING SERVICES
For existing service connections, the following criteria will apply:

1. If, in the original utility plans for the project, a backflow prevention assembly was called for but not installed, the backflow prevention assembly as called for on the
utility plans shall be installed.

2. If a multi-unit facility is undergoing an expansion, remodel, or tenant improvement of a unit, then an RP shall be required on the domestic service as close as possible to the meter and before the first lateral take-off.

3. If a cursory survey by TMWA, or a detailed survey by a Cross Control Specialist, on a multi-unit facility indicates a contaminant or pollutant hazard, then an RP shall be required on the domestic service as close as possible to the meter and before the first lateral take-off, rather than on the individual water line to that tenant.

4. If a survey conducted on a multi-unit facility indicates no contamination or pollution-level hazard, then no backflow prevention assembly for service protection would be required immediately. Each year, a written re-certification shall be required of the owner or property manager. After receipt and review of the certification, TMWA’s Backflow Prevention Group shall then determine if service protection is required. The following will be included in the re-certification:
   - Changes in tenancy
   - Changes in water use
   - Plumbing changes
   - Use of non potable water
APPENDIX C  RESIDENTIAL FIRE SPRINKLER SYSTEMS

BACKGROUND
Local fire department jurisdictions may require the installation of fire sprinkler systems for certain single family homes. Single family homes that are far removed from a hydrant, a fire station, or because of their size or nature, may require the installation of such a system.

Based on discussions with the District Health Department and the Reno and Sparks Fire Departments, the owner or developer of a single family residence requiring a fire sprinkler system may elect:
• to install a non-testable single check valve or
• to install a backflow prevention assembly (double check valve assembly or a reduced pressure backflow prevention assembly).

Installation requirements for both are described below.

SINGLE CHECK INSTALLATION REQUIREMENTS
1. Chemical additives or antifreeze shall not be in the system.
2. All piping shall be approved for potable water service.
3. The end of the fire main shall be plumbed into a water closet, to have water flow due to water usage.
4. A single check valve shall be installed at the fire riser. The valve shall be a Grinnell Number 3300 or equal.
5. Dead end branches in the fire suppression system shall be as short as possible and not to exceed 40 feet.
6. On-site storage is not allowed for fire suppression.

BACKFLOW PREVENTION ASSEMBLY REQUIREMENTS
1. The backflow prevention assembly shall meet all requirements for installation noted in the TMWA Backflow Prevention Installation Requirements and Standards and this policy.
2. The type of assembly and location will be designated by TMWA Backflow Prevention Group.
3. The installation shall be inspected by TMWA Backflow Prevention Group.
4. The backflow prevention assembly shall be tested on installation and annually thereafter.
5. The backflow prevention assembly shall be maintained in factory working condition.
REFERENCES TO OTHER SECTIONS OF THIS POLICY

Attached at Appendix D is a letter from the District Health Department reiterating the above requirements.
APPENDIX E  UNIFORM PLUMBING CODE: INTERNAL BACKFLOW PREVENTION REQUIREMENTS

Refer to Chapter 6 of the UPC, Water Supply and Distribution, for internal backflow prevention requirements, for the adopted version specific to the city or jurisdiction in question.

Backflow prevention and cross connection requirements are detailed in sections 602 through 603.
APPENDIX F  NAC 445A EXCERPT

NEVADA ADMINISTRATIVE CODE

Containing All Permanent Regulations of State Agencies
Adopted under chapter 233B of NRS
Classified, Arranged, Revised, Indexed and Published
(Pursuant to NRS 233B.062 to 233B.065 inclusive)
by the
LEGISLATIVE COUNSEL
STATE OF NEVADA

Please direct any questions or suggestions pertaining to NAC to:
Legislative Counsel Bureau
Capitol Complex
Carson City, Nevada 89701-4747
(702) 687-6830


CHAPTER 445A
WATER CONTROLS
PUBLIC WATER SYSTEMS

Design, Construction, Operation and Maintenance

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NAC 445A.6553 "Air gap" defined. "Air gap" means a physical separation between a point of free-flowing discharge from a pipe that supplies liquid to an open or nonpressurized vessel and the overflow rim of that vessel which is:
1. At least twice the effective diameter of that pipe or, if the pipe is affected by side walls, at least three times the effective diameter of that pipe; and
2. In no case less than 1 inch.
(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.65535 "Air release valve" defined. "Air release valve" means a valve that is placed at a high point of a pipeline for the automatic release of air to prevent air binding and the buildup of pressure.
(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.65555 "Approved backflow testing laboratory" defined. "Approved backflow testing laboratory" means:
1. The Foundation for Cross-Connection Control and Hydraulic Research of the University of Southern California; or
2. Any other person or entity who the health authority determines;
   (a) Is competent and possesses the necessary facilities to investigate and evaluate assemblies for the prevention of backflow;
   (b) Adheres to the procedures for testing and certification set forth in the American Water Works Association Standards; and
   (c) Is independent of any manufacturers of assemblies for the prevention of backflow.
(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.65575 "Atmospheric vacuum breaker" defined. "Atmospheric vacuum breaker" means a vacuum breaker that contains an air inlet valve, a check seat and one or more air inlet ports, in which:
1. The flow of water causes the air inlet valve to close the air inlet ports; and
2. When the flow of water stops:
   (a) The air inlet valve falls and forms a check valve against backsiphonage; and
   (b) The air inlet ports open to allow air to enter and satisfy the vacuum.
(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.65585 "Auxiliary supply of water" defined. "Auxiliary supply of water" means a supply of water or system for the supply of water which is available to the premises of a customer of a public water system, other than the supply or system of the public water system established to provide water to the premises, including another public water system or any natural source of water.
(Added to NAC by Bd. of Health, eff. 2-20-97)
NAC 445A.65605 "Backflow" defined. "Backflow" means a hydraulic condition in which a relative difference in pressures causes a nonpotable liquid, gas or other substance to flow into a potable water system.
(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.6561 "Backpressure" defined. "Backpressure" means an elevation in the downstream pressure of a piping system above the supply pressure which:
1. Is caused by pumping, air pressure, steam or the elevation of piping; and
2. Could cause a reversal in the normal direction of flow at a particular point.
(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.65615 "Backsiphonage" defined. "Backsiphonage" means a backflow that results when a reduction in the pressure of a water system causes a subatmospheric pressure to exist at a particular site in the water system.
(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.6569 "Certified backflow prevention assembly tester" defined. "Certified backflow prevention assembly tester" means a person who is certified by the California/Nevada section of the American Water Works Association to test assemblies for the prevention of backflow.
(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.65695 "Check valve" defined. "Check valve" means a valve designed to open in the direction of normal flow and close with the reversal of normal flow.
(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.65725 "Class 1 fire sprinkler system" defined. "Class 1 fire sprinkler system" means a fire sprinkler system that:
1. Has a direct connection to a water main and no physical connection to any source of pollution or contamination;
2. Uses no pumps, tanks or reservoirs; and
3. Uses no antifreeze or other additives of any kind.
(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.6573 "Class 2 fire sprinkler system" defined. "Class 2 fire sprinkler system" means a fire sprinkler system that:
1. Has a direct connection to a water main and no physical connection to any source of pollution or contamination;
2. Has a booster pump installed at the connection to the water main;
3. Uses no tanks or reservoirs; and
4. Uses no antifreeze or other additives of any kind.
(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.65735 "Class 3 fire sprinkler system" defined. "Class 3 fire sprinkler system" means a fire sprinkler system that:
1. Has a direct connection to a water main;
2. Uses no antifreeze or other additives of any kind; and
3. Uses one or more of the following:
   (a) An elevated tank for the storage of water.
(b) A pump that takes suction from a tank or covered reservoir located above ground.
(c) A pressure tank.
(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.6574 "Class 4 fire sprinkler system" defined. "Class 4 fire sprinkler system" means a fire sprinkler system that:
1. Has a direct connection to a water main;
2. Has available an auxiliary supply of water which is located on the premises or within 1,700 feet of a pumping connection for the system; and
3. Uses no antifreeze or other additives of any kind.
(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.65745 "Class 5 fire sprinkler system" defined. "Class 5 fire sprinkler system" means a fire sprinkler system that has a direct connection to a water main and:
1. An interconnection with an auxiliary supply of water, including, without limitation:
   (a) A prohibited water well;
   (b) A water system used for industrial purposes; or
   (c) A pump that takes suction from a river, pond or reservoir; or
2. Uses antifreeze or another additive.
(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.6575 "Class 6 fire sprinkler system" defined. "Class 6 fire sprinkler system" means a fire sprinkler system that:
1. Is combined with a water system used for industrial purposes; and
2. Has a direct connection to a water main and no physical connection to any other supplies of water, except that the system may have gravity storage or a pump that takes suction from a tank.
(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.65795 "Contamination" defined. "Contamination" means an impairment of water quality by chemical substances or biological organisms which the health authority determines to be sufficient to create a risk or threat to the public health.
(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.6581 "Cross-connection" defined. "Cross-connection" means an unprotected connection or structural arrangement, whether actual or potential, between a public water system and any other source or system, through which it is possible to introduce into any part of the public water system any used water, industrial fluid, gas or substance other than the potable water intended to supply the system. The term includes any bypass arrangements, jumper connections, removable sections, swivel or change-over devices or other temporary or permanent devices through which or because of which backflow can occur.
(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.65855 "Double check detector check assembly" defined. "Double check detector check assembly" means an assembly composed of a line-sized double check valve assembly and a bypass that contains a water meter and another double check valve assembly.
(Added to NAC by Bd. of Health, eff. 2-20-97)
NAC 445A.6586 "Double check valve assembly" defined. "Double check valve assembly" means an assembly that:
1. Is composed of two independently acting, approved check valves;
2. Has tightly closing, resilient seated shutoff valves attached at each end;
3. Is fitted with properly located, resilient seated test cocks; and
4. Has been tested and approved, in accordance with American Water Works Association Standard C510, by an approved backflow testing laboratory.
(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.65945 "Fire sprinkler system" defined. "Fire sprinkler system" means a system of piping which is connected to a public water system and has sprinklers that automatically discharge water over the area of a fire.
(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.66055 "Health authority" defined. "Health authority" means the officers and agents of the district board of health of the health district in which the area of service of a public water system is located or, if none, the officers and agents of the health division.
(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.6623 "Pollution" defined. "Pollution" means an alteration of the chemical, physical, biological or radiological integrity of water that:
1. Impairs the quality of the water to such an extent that the impairment adversely and unreasonably affects those aesthetic qualities which would have made the water desirable for domestic use; and
2. Does not impair the quality of the water to such an extent that the health authority determines that the impairment creates a risk or threat to the public health.
(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.6625 "Pressure vacuum breaker" defined. "Pressure vacuum breaker" means a vacuum breaker that:
1. Contains an independently operating, internally loaded approved check valve and an independently operating, loaded air inlet valve located on the discharge side of the approved check valve; and
2. Is equipped with properly located, resilient seated test cocks and tightly closing, resilient seated shutoff valves which are attached at each end of the assembly.
(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.6631 "Reduced pressure detector assembly" defined. "Reduced pressure detector assembly" means an assembly designed to protect against pollution and contamination which is composed of a line-sized, reduced pressure principle assembly and a bypass that contains a water meter and another reduced pressure principle assembly.
(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.66315 "Reduced pressure principle assembly" defined. "Reduced pressure principle assembly" means an assembly that:
1. Contains:
(a) Two independently acting approved check valves; and
(b) A hydraulically operating, mechanically independent pressure relief valve that is located between the approved check valves and below the upstream check valve;
2. Has properly located, resilient, seated test cocks and tightly closing, resilient, seated shutoff valves at each end of the assembly;
3. Is designed to protect against pollution and contamination under conditions of backsiphonage or backpressure; and
4. Has been tested and approved, in accordance with American Water Works Association Standard C511, by an approved backflow testing laboratory.
(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.66375 "Service connection" defined. "Service connection" means:
1. The point of connection between a public water system and the water system used by a customer of the public water system, at which the public water system loses its authority and control over the water;
2. If a meter is installed at a connection between a public water system and the water system used by a customer of the public water system, the downstream end of the meter; or
3. At a park for mobile homes or recreational vehicles, the riser for water service.
(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.6643 "Stop and waste valve" defined. "Stop and waste valve" means a valve installed in a meter box or valve box that allows a supply of water to a service line to be shut off and subsequently allows water from pipelines in the building or other property where the water is used to drain into the meter box or valve box.
(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.6648 "Supplier of water" defined. "Supplier of water" means a person or other entity, including a governmental entity, which owns or operates a public water system.
(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.67185 Cross-connections and backflow: General requirements. A supplier of water shall:
1. Ensure that there are no unprotected connections between the supplies of water, systems for the pumping, storage and treatment of water, and distribution system of the public water system and any source of pollution or contamination pursuant to which any unsafe water or other degrading material can be discharged or drawn into the public water system as a result of backsiphonage or backpressure.
2. Develop and carry out a program for the control of cross-connections that is approved by the health authority. Except for a program that has been approved by a health authority before February 20, 1997, a program for the control of cross-connections must:
   (a) Be submitted to the health authority for its approval no later than:
      (1) January 1, 1999; or
      (2) Eighteen months after the public water system begins operation, whichever is later.
   (b) Include:
      (1) A schedule for implementation.
(2) A plan for inspecting the properties served by the public water system to determine the potential risk of cross-connection and backflow.

(3) A plan for testing and tracking all primary assemblies for the prevention of backflow which are intended to protect the public water system upstream from a service connection. The plan must provide for the annual testing of those assemblies and for the retention of records from that testing.

(4) A list of the particular assemblies for the prevention of backflow which may be used in the public water system or on service connections to the public water system.

(5) A list of the measures the supplier of water will take to enforce the program if any customers of the system fail to comply with the program.

(c) Ensure compliance with NAC 445A.67185 to 445A.67255, inclusive.

(d) Except as otherwise provided in NAC 445A.67185 to 445A.67255, inclusive, comply with the provisions of:

(1) The Uniform Plumbing Code;

(2) Recommended Practice for Backflow Prevention and Cross-Connection Control; and


If there is any conflict between any of the provisions described in this paragraph, the most stringent of those provisions prevails.

(Added to NAC by Bd. of Health, eff. 2-20-97)


1. Each service connection must have an assembly for the prevention of backflow, of a type that is commensurate with the degree of hazard that exists on the property of the customer of a public water system. Except as otherwise provided in NAC 445A.67185 to 445A.67255, inclusive, the assembly may consist of any one of the following, as listed in the order of least to most protection:

(a) A double check valve assembly.

(b) A reduced pressure principle assembly.

(c) An air gap.

2. A reduced pressure principle assembly may be substituted for a double check valve assembly, and an air gap may be substituted for a reduced pressure principle assembly.

3. With the approval of the supplier of water:

(a) A double check detector check assembly may be substituted for a double check valve assembly; and

(b) A reduced pressure detector assembly may be substituted for a reduced pressure principle assembly.

4. A double check valve assembly or double check detector check assembly may be used only for protection against pollution.

5. A reduced pressure principle assembly or reduced pressure detector assembly may be used for protection against pollution or contamination, but a reduced pressure principle assembly must not be used for protection against sewage or reclaimed wastewater.

6. An assembly for the prevention of backflow must not be composed solely of a single check valve.
NAC 445A.67195 Cross-connections and backflow: Minimum types of protection for particular service connections. Except as otherwise provided in NAC 445A.67185 to 445A.67255, inclusive, or authorized by the health authority, the minimum type of protection from cross-connection required for a service connection to:

1. A public building or any building:
   (a) That contains a hotel, motel, casino, condominium or town house, or any apartments;
   (b) Used for commercial purposes where a specific business activity has not been identified; or
   (c) In which one or more sewage pumps or sewage ejectors have been installed, consists of a reduced pressure principle assembly.

2. A building that:
   (a) Has multiple stories and booster pumps or elevated tanks to distribute potable water; or
   (b) Exceeds 40 feet in height, as measured from the service connection to the highest water outlet, consists of a double check valve assembly.

3. A class 1, class 2 or class 3 fire sprinkler system consists of a double check valve assembly.

4. A class 4, class 5 or class 6 fire sprinkler system consists of a reduced pressure principle assembly.

5. A hydronic heating system that contains any chemical additives consists of a reduced pressure principle assembly.

6. A baptismal font of a church consists of a reduced pressure principle assembly.

7. A facility for bottling beverages consists of a reduced pressure principle assembly.

8. A brewery consists of a reduced pressure principle assembly.

9. A cannery, facility for the processing of food, packing house or rendering facility consists of a reduced pressure principle assembly.

10. A facility for cold storage consists of a reduced pressure principle assembly.

11. A dairy processing facility consists of a reduced pressure principle assembly.

12. A restaurant or other facility in which food is served consists of a reduced pressure principle assembly.

13. A dental clinic consists of a reduced pressure principle assembly.

14. A hospital, medical building or clinic consists of a reduced pressure principle assembly.

15. A convalescent home or nursing home consists of a reduced pressure principle assembly.

16. A sanitarium consists of a reduced pressure principle assembly.

17. A morgue, mortuary or facility for conducting autopsies consists of a reduced pressure principle assembly.

18. A laboratory, including, without limitation, a laboratory of a teaching institution or another biological or analytical facility, consists of a reduced pressure principle assembly.

19. A facility of a school, college or university consists of a reduced pressure principle assembly.

20. A facility for the production of motion pictures consists of a reduced pressure principle assembly.
21. A facility for the publishing or printing of a newspaper consists of a reduced pressure principle assembly.
22. A veterinary clinic, pet shop or facility for grooming pets consists of a reduced pressure principle assembly.
23. A laundry or dry cleaning facility consists of a reduced pressure principle assembly.
24. A dyeing facility consists of a reduced pressure principle assembly.
25. A facility for mechanical, chemical or electrochemical plating consists of a reduced pressure principle assembly.
26. Any portable spraying or cleaning equipment consists of an air gap.
27. A pool or spa consists of a reduced pressure principle assembly.
28. A park for mobile homes or recreational vehicles consists of a reduced pressure principle assembly.
29. A facility located on a waterfront, including, without limitation, a fishery, fish hatchery, dock or marina, consists of a reduced pressure principle assembly.
30. A facility for the production of power consists of a reduced pressure principle assembly.
31. A facility for the production, storage or transmission of oil or gas consists of a reduced pressure principle assembly.
32. A facility that handles, processes or stores radioactive materials or substances consists of a reduced pressure principle assembly.
33. A facility for processing sand or gravel consists of a reduced pressure principle assembly.
34. A system for storm drainage, the collection of sewage or the distribution of reclaimed wastewater consists of an air gap.
35. A facility in which:
   (a) Water is used to manufacture, store, compound or process chemicals for industrial purposes;
   (b) Chemicals are added to water used in the compounding or processing of products;
   (c) Chemicals are added to the supply of water; or
   (d) The supply of water is used for the transmission or distribution of chemicals, consists of a reduced pressure principle assembly.
36. A facility for the manufacture of aircraft or missiles consists of a reduced pressure principle assembly.
37. A facility for the manufacture, repair or washing of motor vehicles consists of a reduced pressure principle assembly.
38. A facility for the manufacturing or processing of film consists of a reduced pressure principle assembly.
39. A facility for the manufacturing of ice consists of a reduced pressure principle assembly.
40. A facility for the manufacturing, processing or cleaning of metal consists of a reduced pressure principle assembly.
41. A facility for the manufacturing of natural or synthetic rubber consists of a reduced pressure principle assembly.
42. A facility for the manufacturing of paper or paper products consists of a reduced pressure principle assembly.
43. Any other facility for manufacturing, processing or fabricating consists of a reduced pressure principle assembly.

(Added to NAC by Bd. of Health, eff. 2-20-97)
NAC 445A.67205 Cross-connections and backflow: Minimum types of protection for service connection to auxiliary supply of water or irrigation system. Except as otherwise provided in NAC 445A.67185 to 445A.67255, inclusive, the minimum type of protection required for a service connection to:

1. An auxiliary supply of water must consist of a double check valve assembly or reduced pressure principle assembly, as determined by the supplier of water and approved by the health authority.

2. An irrigation system, including a system for irrigating median strips, must consist of:
   (a) A pressure vacuum breaker or double check valve assembly, as determined by the supplier of water and approved by the health authority, or
   (b) Except as otherwise authorized by the health authority, if facilities have been installed for pumping, injecting or applying fertilizers, pesticides or other hazardous systems, a reduced pressure principle assembly.

(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.6721 Cross-connections and backflow: Minimum types of protection for other service connections; resolution of conflicting requirements; imposition of more stringent requirements.

1. The health authority shall determine, on a case-by-case basis, the minimum type of protection from cross-connection required for any type of service connection which is not specified in NAC 445A.67185 to 445A.67255, inclusive.

2. If there is any conflict between any of the provisions of NAC 445A.67185 to 445A.67255, inclusive, regarding the type of protection from cross-connection required for a particular type of service connection, the most stringent of those provisions prevails.

3. The health authority or supplier of water may impose requirements regarding the installation and use of assemblies for the prevention of backflow which are more stringent than the provisions of NAC 445A.67185 to 445A.67255, inclusive.

(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.67215 Cross-connections and backflow: Service connection to fire sprinkler system.

1. A supplier of water shall ensure that:
   (a) An appropriate assembly for the prevention of backflow is installed at each service connection between the public water system and a fire sprinkler system; and
   (b) The assembly is:
       (1) Tested upon installation; and
       (2) Maintained and tested, and the results of those tests logged, annually.

   The testing required by this subsection must be conducted by a certified backflow prevention assembly tester.

2. An assembly for the prevention of backflow installed on a service connection between a public water system and a fire sprinkler system must:
   (a) Be of such a type and installed in such a manner that the assembly:
       (1) Protects the public water system; and
       (2) Does not interfere with the capability of the fire sprinkler system, as engineered, to protect the safety of persons in the public or private facility in which the fire sprinkler system is located; and
   (b) Prevent any pollution or contamination of drinking water, by any nonpotable water contained in the fire sprinkler system, which may be caused by any backpressure or
backsiphonage that may occur during normal or abnormal operation of the fire sprinkler system or the public water system.

3. The supplier of water shall determine the type of assembly required on a particular service connection between the public water system and a fire sprinkler system based upon the degree of risk posed by the fire sprinkler system to the supply of potable water, considering the chemical and biological contents of the fire sprinkler system, the materials used to construct the fire sprinkler system and the possibility that backflow will occur.

4. Any reduced pressure principle assembly or reduced pressure detector assembly used on a service connection between a public water system and a fire sprinkler system must not have any holes drilled in the check valve clappers.

(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.6722 Cross-connections and backflow: Design of fire sprinkler system. The designer of a fire sprinkler system shall ensure that, based upon the placement of any reduced pressure principle assembly or reduced pressure detector assembly:
1. An antifreeze loop or the total line of the fire sprinkler system is able to accommodate the thermal expansion of any antifreeze; or
2. If necessary, an expansion tank is provided to accommodate the thermal expansion of any antifreeze.

(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.67225 Cross-connections and backflow: Conditions to provision of service to certain fire sprinkler systems. If any backflow involving a fire sprinkler system threatens a public water system, the supplier of water shall require, as a condition to the provision of service to the fire sprinkler system:
1. The installation of an assembly for the prevention of backflow in accordance with the requirements of NAC 445A.67215.
2. An analysis to determine how the assembly will affect the pressure and rate of flow of water available to the fire sprinkler system.
3. The modification of the fire sprinkler system, and the riser and water service lateral for the fire sprinkler system, in such a manner as necessary to ensure adequate fire flow.

(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.6723 Cross-connections and backflow: Installation of air gap. Except as otherwise authorized by the health authority, if an air gap is installed on a service connection:
1. The air gap must be located as closely as practicable to the service connection, on the opposite side of the service connection from the public water system.
2. All piping from the service connection to the receiving tank must be above grade and visible.
3. There must be no type of outlet, tee, tap, take-off or connection to or from the service line between the service connection and the air gap.
4. Expansion tanks or pressure relief valves must be provided as appropriate for the potential threat of water hammer and thermal expansion.

(Added to NAC by Bd. of Health, eff. 2-20-97)
NAC 445A.67235 Cross-connections and backflow: Installation of reduced pressure principle assembly. Except as otherwise authorized by the health authority, if a reduced pressure principle assembly is installed on a service connection:
1. The reduced pressure principle assembly must be installed:
   (a) In a horizontal and level position, except that the reduced pressure principle assembly may be installed in a vertical position if the assembly has been:
      (1) Specifically designed for operation in that position; and
      (2) Tested and certified to be suitable for operation in that position by an approved backflow testing laboratory.
   (b) As closely as practicable to the service connection, on the opposite side of the service connection from the public water system.
   (c) Above ground and, to the extent possible, not less than 12 inches nor more than 36 inches above the finished grade, as measured from the bottom of the assembly.
   (d) At a site with adequate drainage, or with drain piping, for any fluid that is discharged when the assembly is activated.
   (e) In such a manner that no part of the assembly will be submerged during normal conditions of operation and weather.
   (f) In such a manner as to be readily accessible for maintenance and testing.
2. The reduced pressure principle assembly must not be installed below grade, in any subsurface vault, or in any vault, chamber or pit where there is any potential that the relief valve could become submerged.
3. The reduced pressure principle assembly must have a free-flowing drain with an air gap.
4. There must be no type of outlet, tee, tap, take-off or connection to or from the service line between the service connection and the reduced pressure principle assembly.
5. Expansion tanks or pressure relief valves must be provided as appropriate for the potential threat of water hammer and thermal expansion.
6. The reduced pressure principle assembly may be installed indoors if the installation complies with subsections 1 to 5, inclusive, and has a clearance of:
   (a) At least 12 inches on top;
   (b) At least 24 inches on the side with test cocks; and
   (c) At least 12 inches on the other sides.
(Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.6724 Cross-connections and backflow: Installation of double check valve assembly. Except as otherwise authorized by the health authority, if a double check valve assembly is installed on a service connection:
1. The double check valve assembly must be installed:
   (a) In a horizontal and level position, except that the double check valve assembly may be installed in a vertical position if the assembly has been:
      (1) Specifically designed for operation in that position; and
      (2) Tested and certified to be suitable for operation in that position by an approved backflow testing laboratory.
   (b) As closely as practicable to the service connection, on the opposite side of the service connection from the public water system.
   (c) Above ground and, to the extent possible, not less than 12 inches nor more than 36 inches above the finished grade, as measured from the bottom of the assembly.
   (d) In such a manner as to be readily accessible for maintenance and testing.
2. There must be no type of outlet, tee, tap, take-off or connection to or from the service line between the service connection and the double check valve assembly.
3. Expansion tanks or pressure relief valves must be provided as appropriate for the potential threat of water hammer and thermal expansion.
4. The double check valve assembly may, if above-grade installation is impracticable and the health authority approves of the installation, be installed in a below-grade vault in such a manner that:
   (a) The top of the double check valve assembly is not more than 8 inches below grade.
   (b) There is:
       (1) At least 12 inches of clearance between the bottom of the vault and the bottom of the double check valve assembly;
       (2) At least 24 inches of clearance between the side of the vault and the side of the double check valve assembly with test cocks; and
       (3) At least 12 inches of clearance between the side of the vault and the other sides of the double check valve assembly.
   (c) To the extent warranted by climatic conditions, the double check valve assembly is protected from freezing.
   (d) The vault has adequate drainage to prevent the accumulation of water, which drains to daylight, to free-draining soil or to a sufficient amount of gravel placed under the vault to provide for free drainage and prevent the accumulation of water under the vault. A vault that does not have an integrated bottom must be placed on a layer of gravel which is not less than 3 inches deep.
   (e) The vault is protected from vandalism.
   (f) The vault is not located in an area subject to vehicular traffic.
5. The double check valve assembly may be installed indoors if:
   (a) The installation complies with subsections 1 to 4, inclusive; and
   (b) The double check valve assembly has a clearance of:
       (1) At least 12 inches on top;
       (2) At least 24 inches on the side with test cocks; and
       (3) At least 12 inches on the other sides.
   (Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.67245 Cross-connections and backflow: Duties of certified backflow prevention assembly tester. A certified backflow prevention assembly tester shall:
1. Perform his field testing of assemblies for the prevention of backflow in accordance with the provisions of the Manual of Cross-Connection Control.
2. Use, for the testing of reduced pressure principle assemblies, double check valve assemblies and pressure vacuum breakers, a differential pressure gauge that has:
   (a) A differential range of at least zero to 15 psi; and
   (b) Graduations of not more than 0.2 psi.
3. Ensure that his testing equipment:
   (a) Is calibrated to the manufacturers' specifications not less than annually; and
   (b) Has all necessary hoses and fittings.
   (Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.6725 Cross-connections and backflow: Use of vacuum breakers.
1. An atmospheric vacuum breaker or pressure vacuum breaker may be used only for protection against pollution or contamination under conditions of backsiphonage.
2. If an atmospheric vacuum breaker is used:
(a) The vacuum breaker must be installed not less than 6 vertical inches above the highest point of the downstream piping.
(b) Any associated shutoff valve must be installed upstream from the vacuum breaker.
(c) The vacuum breaker must not be subjected to operating pressure for more than 12 hours in any 24-hour period.
(d) Flow from the protected fixture must be to the atmosphere.

3. If a pressure vacuum breaker is used, the vacuum breaker:
   (a) Must be installed:
       (1) Upstream from the terminal shutoff valve; and
       (2) Not less than 12 vertical inches above the highest point of the downstream outlet, valve or piping.
   (b) Must not be installed at a location where backpressure will occur.
   (Added to NAC by Bd. of Health, eff. 2-20-97)

NAC 445A.67255 Cross-connections and backflow: Restrictions on use of certain valves and piping assemblies.
1. A stop and waste valve must not be used on a service line.
2. If a valve or piping assembly, including a frost-free riser, has an opening that is subject to flooding, the valve or piping assembly must not be used on a service line unless:
   (a) The valve or piping assembly is adequately protected by an assembly for the prevention of backflow; and
   (b) If the piping assembly is a frost-free riser, the riser is equipped with appropriate valves and a connection for the introduction of compressed air, pursuant to which water may be purged and the system prepared for winter.
   (Added to NAC by Bd. of Health, eff. 2-20-97)
APPENDIX G   TMWA BACKFLOW PREVENTION INSTALLATION REQUIREMENTS AND STANDARDS DOCUMENT

Installation Requirements and Standards are available from the TMWA Backflow Prevention Group on request.
APPENDIX E - WIND DIRECTION DATA
### Wind- Average Wind Speed- (MPH)

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http://lwf.ncdc.noaa.gov/oa/climate/online/ccc/avgwind.html

*Downloaded Friday, 13-Dec-2002 13:36:42 EST*

*Last Updated Wednesday, 24-Apr-2002 10:55:20 EDT by ncdc.webmaster@noaa.gov*

Please see the [NCDC Contact Page](http://lwf.ncdc.noaa.gov/oa/climate/online/ccc/avgwind.html) if you have questions or comments.

### Wind- Maximum Speed- (MPH)

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http://lwf.ncdc.noaa.gov/oa/climate/online/ccc/maxwind.html

*Downloaded Friday, 13-Dec-2002 13:41:26 EST*

*Last Updated Wednesday, 24-Apr-2002 10:55:21 EDT by ncdc.webmaster@noaa.gov*

Please see the [NCDC Contact Page](http://lwf.ncdc.noaa.gov/oa/climate/online/ccc/maxwind.html) if you have questions or comments.
APPENDIX F - “CITY OF SPARKS PARKS AND RECREATION SITE
INFORMATION AND EFFLUENT DEMANDS FOR SITES IRRIGATED
UNDER PERMIT CONDITIONS”
<table>
<thead>
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<th>Impacted Demolition (Acre)</th>
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<th>Total (Acres)</th>
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</tbody>
</table>
Don Mello Sports Complex

1.1 SITE LOCATION

The estimated irrigation demand for the Don Mello Sports Complex is 800 gpm, and the estimated total annual demand is 56 acre-feet. Irrigation demands are based on metered water use data and historical evapotranspiration (ET) data collected at the Sparks Tree Farm located at Baring Boulevard and McCarren Boulevard. Site irrigation will occur during an 8-hour night period. The site location is detailed in Figure G 1.

<table>
<thead>
<tr>
<th>Site Information:</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Property</td>
<td>Physical Address</td>
</tr>
<tr>
<td>Don Mello Sports</td>
<td>255 Sparks Blvd</td>
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<tr>
<td>Complex</td>
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</table>

1.2 SITE DESCRIPTION

The Don Mello Sports Complex is located in the northwest corner of Sparks Boulevard and Lincoln Way. To the west of Don Mello Sports Complex is vacant land; to the north is an apartment complex; to the east is Sparks Boulevard; and to the south is Lincoln Way. The topography of Don Mello Sports Complex is shown in Figure G 1. Don Mello Sports Complex has slopes ranging from approximately 0% to 2%. Below is an entire section for the soil characteristics, which are also outlined in Figure G 2. Don Mello Sports Complex is identified in the Flood Insurance Rate Map as Zone AE (special flood hazard areas inundated by 100-year flood; base flood elevations determined). The effluent irrigation area is detailed in Figure G 3.

<table>
<thead>
<tr>
<th>Effluent Demands:</th>
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<tbody>
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<td>Complex</td>
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</table>

At the Don Mello Sports Complex, there is an anemometer to monitor the wind speed. Control contacts are provided to shut off irrigation valves when the wind speed exceeds 20 miles per hour for 5 minutes. Irrigation valves are allowed to open if the wind speed remains below 20 mph for 30 minutes.
1.3 SOILS

The Soil Conservation Service describes the geology of the southern Washoe County area as follows (SCS, 1983). Figure G 2 shows the soil characteristics.

452 - Voltaire loam, strongly saline. This very deep, poorly drained and very poorly drained soil is on alluvial fans and flood plains. It formed in alluvium derived dominantly from mixed rock sources. Typically, the surface layer is black loam about 18 inches thick. The underlying material to a depth of 60 inches is stratified, dark grayish brown silty clay loam through loamy sand. Included in this unit are Fettic soils on slightly higher terraces, Jubilee Variant soils near shallow stream channels, and Truckee soils on slightly higher parts of the flood plains. The unit is about 5 percent Fettic soils, 5 percent Jubilee Variant soils, and 5 percent Truckee soils.

Permeability of this Voltaire soil is slow. Available water capacity is high. Effective rooting depth is 60 inches for water-tolerant plants but is limited to depths of 0 to 18 inches for water-sensitive plants. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. A seasonal high water table is at a depth of 0 to 18 inches in late winter and spring. This soil is subject to flooding during storms of prolonged high intensity. Channeling and deposition are common along streambanks. The soil is strongly affected by sodium salt.

The present vegetation in most areas is mainly black greasewood and saltgrass.

456 - Voltaire clay loam, gravelly substratum. This very deep, poorly drained soil is on flood plains. Drainage has been altered. This soil is formed in alluvium derived from mixed rock. Typically, the surface layer is dark gray clay loam about 9 inches thick. The upper part of the underlying material to a depth of 36 inches is gray, mottled, stratified clay to silt loam. Below a depth of 36 inches is stratified very gravelly coarse sand through sandy clay loam. Included in this unit are Fettic soils on low terraces, Jubilee Variant soils on alluvial fans, and Truckee soils on slightly higher parts of the flood plains and fans. The unit is about 5 percent Fettic soils, 5 percent Jubilee Variant soils, and 5 percent Truckee soils.

Permeability of this Voltaire soil is slow. Available water capacity is high. Effective rooting depth is 60 inches for water-tolerant plants. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight. A seasonal high water table if at a depth of 40 to 72 inches in late winter and spring. This soil is subject to flooding during storms of prolonged high intensity. Channeling and deposition are common along stream banks. Some areas are slightly affected by salts and alkali.

The soils listed above are the natural soil in the area. During the construction of the sports complex, there was disruption of this soil and possibly the importation of other
material. Because of this, it is difficult to predict the conditions of the soil that may influence ponding, runoff and infiltration.

1.4 PROCEDURES

The park irrigation control system will control the time and duration of park irrigation. This system controls a set of valves independent of the master valve at the service connection. In case of an emergency the system should be shut down at the gate valve that connects the system to the main water supply. This gate valve has been called out in the site plans and in the detail sheet(s) for the meter/PRV vault.

In the event of a power failure, the Don Mello Sports Complex solenoid controlled PRV automatically closes. This shuts off effluent delivery to the irrigation system regardless of the irrigation controller. Also, in the event of a valve failure, there are manual valves that will be closed. Figures G 1, G 4 and G 5 show the location of the meter vault and valves.
1. METER
2. BACK PRESSURE SUSTAINING, PRESSURE REDUCING (WITH ORIFICE PLATE), SOLENOID CONTROL VALVE.
3. SAND TRAP, JENSEN PRECAST JR-750EE-TP OR EQUAL "W/ 24" MANHOLE COVERS.
4. EFFLUENT SUMP PUMP, MCMASTER-CARR #1342X43 OR EQUAL.
5. 2" SWING CHECK VALVE.
6. 3/4" CORPORATION STOP.
7. BORE HOLE THROUGH GRADE RING, CROUT PVC EFFLUENT PUMP OUTPUT Pipe IN PLACE.
8. 2" FLEX HOSE.
9. 2" THREADED UNION.
10. STAINLESS STEEL HOIST CHAIN, FIX UPPER END IN GRADE RING WITH STAINLESS STEEL BOLT AND EPOXY.
11. CARD READER SYSTEM, SEE SPECIFICATIONS.
12. FLOOR DRAIN WITH HEAVY-DUTY REMOVABLE CAST IRON GRATE, MADE 1204 OR EQUAL.
13. 3/4" BALL VALVE.
14. PRESSURE GAUGE, 0-200 PSI, LIQUID FILLED.
15. 3/4" ELBOW
16. 6" FLANGED COUPLING ADAPTER W/AN HyOR STUDS
17. 4" NO-HUB CAST IRON SOIL PIPE - TYP.
APPENDIX H - LES HICKS PARK
Les Hicks Park

1.1 SITE LOCATION

The estimated irrigation demand for Les Hicks Park is 90 gpm, and the estimated total annual demand is 4 acre-feet. Irrigation demands are based on metered water use data and historical evapotranspiration (ET) data collected at the Sparks Tree Farm located at Baring Boulevard and McCarran Boulevard. Site irrigation will occur during an 8-hour night period.

Site Information:

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<tr>
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<th>Latitude/Longitude</th>
<th>Township/Range/Section</th>
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</tr>
</tbody>
</table>

1.2 SITE DESCRIPTION

Les Hicks Park is located in the southwest corner of Sparks Boulevard and Vintage Hills Parkway. To the north of Les Hicks Park is Vintage Hills Parkway, to the east is the North Truckee Drain and Sparks Boulevard. To the south are houses and to the west is Orange Hill Parkway. The topography of Les Hicks Park is shown in Figure H 1. Les Hicks Park has slopes ranging from approximately 0% to 2%. Below is an entire section for the soil characteristics, which are also outlined in Figure H 2. Les Hicks Park is identified in the Flood Insurance Rate Map as Zone X (areas of 500-year flood, areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile, and areas protected by levees from 100-year flood) and Zone AE (special flood hazard areas inundated by 100-year flood; base flood elevations determined). The effluent irrigation area is detailed in Figure H 3.

Effluent Demands:

<table>
<thead>
<tr>
<th>Property</th>
<th>Total Area (Acre)</th>
<th>Irrigated Area (Acre)</th>
<th>Acre-Feet per Year</th>
<th>Nighttime Demand (gpm)</th>
<th>Daytime Demand (gpm)</th>
<th>Total (gpm)</th>
<th>Average (mgd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Les Hicks Park</td>
<td>1.1</td>
<td>1.0</td>
<td>4</td>
<td>90</td>
<td>0</td>
<td>90</td>
<td>0.04</td>
</tr>
</tbody>
</table>
1.3 SOILS

The Soil Conservation Service describes the geology of the southern Washoe County area as follows (SCS, 1983). Figure H 2 shows the soil characteristics.

403 - Jubilee Variant loam, slightly saline. This very deep, poorly drained soil is on flood plains and alluvial fans. It formed in alluvium derived dominantly from granitic rocks. Typically, the surface layer is very dark brown loam about 14 inches thick. The underlying material to a depth of 60 inches is stratified sandy loam through loamy coarse sand that is mottled and gleyed. Included in this soil are Voltaire soils on low terrace remnants and Sagouspe soils near shallow channels. The unit is about 8 percent Voltaire soils and 7 percent Sagouspe soils.

Permeability of this Jubilee Variant soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches for water-tolerant plants, but is limited to depth between 18 and 36 inches for water-sensitive plants. Runoff is slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 18 to 36 inches in winter and spring. The soil is subject to flash flooding during storms of unusually high intensity. Channeling and deposition are common along stream banks. The soil is slightly affected by sodium salts.

The present vegetation in most areas is mainly grass. Applications of irrigation should be adjusted to the available water capacity and the water intake rate.

The soil listed above is the natural soil in the area. During the construction of the park, there was disruption of this soil and possibly the importation of other material. Because of this, it is difficult to predict the conditions of the soil that may influence ponding, runoff and infiltration.

1.4 PROCEDURES

The park irrigation control system will control the time and duration of park irrigation. This system controls a set of valves independent of the master valve at the service connection. In case of an emergency the system should be shut down at the gate valve that connects the system to the main water supply. This gate valve has been called out in the site plans and in the detail sheet(s) for the meter/PRV vault.

Les Hicks Park does not have electricity in its vault. As long as TMWRF pumps are operating the site will still be able to irrigate. However, power failure to the irrigation system controllers will dictate the parks’ ability to irrigate. Figures H 1 and H 4 show the location and details of the meter vault and valves.
PREVAILING WIND DIRECTION

FLOW CONTROL STATION, METER VAULT AND SYSTEM SHUT OFF GATE VALVE RESIDENTIAL PROPERTY.

NOTE: CONTOUR INTERVAL 1'

SPARKS EFFLUENT PIPELINE
LES HICKS PARK
TOPOGRAPHIC MAP

SCALE: 1" = 100'
DRAWN BY: DTC
DATE: 12/31/02
JOB NO.: 2000-047

Infrastructure, Inc.
9050 DOUBLE "B" BLVD.
RENO, NEVADA 89521
PHONE (775) 786-5473 FAX (775) 786-8136

FIGURE H.1
LEGEND

JUBILEE VARIANT LOAM
(SLIGHTLY SALINE)

SPARKS EFFLUENT PIPELINE
LES HICKS PARK
SOIL CHARACTERISTICS

SCALE: 1" = 100'
DRAWN BY: DTC
DATE: 12/31/02
JOB NO.: 2000-047

FIGURE H.2

Infrastructure, Inc.
9450 DOUBLE 5TH BLVD
RENO, NEVADA  89503
PHONE (775) 788-5873  FAX (775) 786-8138
Pah Rah Park

1.1 SITE LOCATION

The estimated irrigation demand for Pah Rah Park is 700 gpm, and the estimated total annual demand is 44 acre-feet. Irrigation demands are based on metered water use data and historical evapotranspiration (ET) data collected at the Sparks Tree Farm located at Baring Boulevard and McCarran Boulevard. Site irrigation will occur during an 8-hour night period.

<table>
<thead>
<tr>
<th>Property</th>
<th>Physical Address</th>
<th>Latitude/Longitude</th>
<th>Township/Range/Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pah Rah Park</td>
<td>1730 Shadow Lane</td>
<td>39°33'50&quot;N 119°42'20&quot;W</td>
<td>S35.T20N.R20E</td>
</tr>
</tbody>
</table>

1.2 SITE DESCRIPTION

Pah Rah Park is located to the northeast of Shadow Lane, and the southwest of Vista Blvd. Jerry Whitehead School is located to the west. To the south of Pah Rah are houses. The topography of Pah Rah Park is shown in Figure I 1. Pah Rah Park has slopes ranging from approximately 0% to 2%. Below is an entire section for the soil characteristics, which are also outlined in Figure I 2. Pah Rah Park is identified in the Flood Insurance Rate Map as Zone X (areas determined to be outside the 500-year flood plain). The effluent irrigation area is detailed in Figure I 3.

<table>
<thead>
<tr>
<th>Property</th>
<th>Total Area (Acre)</th>
<th>Irrigated Area (Acre)</th>
<th>Acre-Feet per Year</th>
<th>Nighttime Demand (gpm)</th>
<th>Daytime Demand (gpm)</th>
<th>Total (gpm)</th>
<th>Average (mgd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pah Rah Park</td>
<td>12.5</td>
<td>11.3</td>
<td>44</td>
<td>700</td>
<td>0</td>
<td>700</td>
<td>1.01</td>
</tr>
</tbody>
</table>

1.3 SOILS

The Soil Conservation Service describes the geology of the southern Washoe County area as follows (SCS, 1983). Figure I 2 shows the soil characteristics.

445 - Jubilee sandy loam, drained. This very deep soil is on alluvial fans and flood plains. The drainage has been altered. The soil formed in alluvium derived from
mixed rock sources. Typically, the surface layer us dark gray sandy loam about 22 inches thick. The underlying material to a depth of 60 inches is dark grayish brown, stratified, mottled loamy coarse sand and fine sandy loam. Included in this unit are Voltaire soils in swales, Truckee soils on lower flood plains, and Vamp soils on low terrace remnants. The unit is about 5 percent Voltaire soils and, 5 percent Truckee soils, and 5 percent Vamp soils.

Permeability of this Jubilee soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight. A seasonal high water table is at a depth of 48 to 72 inches in winter and early spring. The soil is subject to flooding during storms of prolonged high intensity. Channeling and deposition are common along stream banks.

The present vegetation is mainly sedges, clovers, juncus, and grasses. Irrigation water must be carefully applied to avoid raising the water table.

The soils listed above are the natural soil in the area. During the construction of the park, there was disruption of this soil and possibly the importation of other material. Because of this, it is difficult to predict the conditions of the soil that may influence ponding, runoff and infiltration.

1.4 PROCEDURES

The park irrigation control system will control the time and duration of park irrigation. This system controls a set of valves independent of the master valve at the service connection. In case of an emergency the system should be shut down at the gate valve that connects the system to the main water supply. This gate valve has been called out in the site plans and in the detail sheet(s) for the meter/PRV vault.

Pah Rah Park does not have electricity in its vault. As long as TMWRF pumps are operating the site will still be able to irrigate. However, power failure to the irrigation system controllers will dictate the parks' ability to irrigate. Figures 1 to and I 4 show the location and details of the meter vault and valves.
Shadow Mountain Sports Complex

1.1 SITE LOCATION

The estimated irrigation demand for the Shadow Mountain Sports Complex is 1400 gpm, and the estimated total annual demand is 77 acre-feet. Irrigation demands are based on metered water use data and historical evapotranspiration (ET) data collected at the Sparks Tree Farm located at Baring Boulevard and McCarran Boulevard. Site irrigation will occur during an 8-hour night period.

Site Information:

<table>
<thead>
<tr>
<th>Property</th>
<th>Physical Address</th>
<th>Latitude/Longitude</th>
<th>Township/Range/Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shadow Mountain Sports Complex</td>
<td>1300 O'Callaghan Dr</td>
<td>39°33'50&quot;N 119°42'50&quot;W</td>
<td>S34.T20N.R20E</td>
</tr>
</tbody>
</table>

1.2 SITE DESCRIPTION

Shadow Mountain Sports Complex is located in the southeast corner of Sparks Boulevard and Shadow Lane. To the north is Shadow Lane and to the west is Sparks Boulevard. To the east is open space; and to the south is Reed High School. The topography of Shadow Mountain Sports Complex is shown in Figure J 1. Shadow Mountain Sports Complex has slopes ranging from approximately 0% to 30%, depending on the type of soil. Below is an entire section for the soil characteristics, which are also outlined in Figure J 2. Shadow Mountain Sports Complex is identified in the Flood Insurance Map as Zone X (areas of 500-year flood, areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile, and areas protected by levees from 100-year flood). The effluent irrigation area is detailed in Figure J 3.

Effluent Demands:

<table>
<thead>
<tr>
<th>Property</th>
<th>Total Area (Acre)</th>
<th>Irrigated Area (Acre)</th>
<th>Acre-Feet per Year</th>
<th>Nighttime Demand (gpm)</th>
<th>Daytime Demand (gpm)</th>
<th>Total (gpm)</th>
<th>Average (mgd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shadow Mountain Sports Complex</td>
<td>21.8</td>
<td>19.6</td>
<td>77</td>
<td>1400</td>
<td>0</td>
<td>1400</td>
<td>.067</td>
</tr>
</tbody>
</table>
The Soil Conservation Service describes the geology of the southern Washoe County area as follows (SCS, 1983). Figure J 2 shows the soil characteristics.

310 - **Risley-Rock outcrop complex, 8 to 15 percent slopes.** This map unit is on uplands. This unit is 75 percent Risley very stony loam, 8 to 15 percent slopes, and 15 percent Rock outcrop. The Risley soils is on side slopes of uplands, and the Rock outcrop is on ridges and peaks. Included in this unit are Old Camp soils near Rock outcrop, Mizel soils on rounded ridges and hilltops, Indiana soils on concave slopes at higher elevations, and Xman soils on slightly convex south and west facing slopes. The unit is about 3 percent Old Camp soils, 3 percent Mizel soils, 3 percent Indiana soils, and 1 percent Xman soils. The Risley soil is moderately deep and well drained. It formed in residuum dominantly of altered, weathered andesite. Typically, 3 to 10 percent of the surface is covered with stones. The surface layer is light gray very stony loam about 4 inches thick. The subsoil is brown clay about 20 inches thick. Weathered, altered andesite ranges from 20 to 30 inches.

Permeability of the Risley soils is slow. Available water capacity is low. Effective rooting depth is 20 to 30 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The present vegetation in most areas of this soil is mainly big sagebrush and bottlebrush squirreltail. A small amount of juniper is dispersed throughout.

311 - **Risley-Rock outcrop complex, 15 to 30 percent slopes.** This map unit is on uplands. This unit is 65 percent Risley very stony loam, 15 to 30 percent slopes, and 25 percent Rock outcrop. The Risley soil is on side slopes of uplands, and Rock outcrop is on ridges and peaks. Included in this unit are Old Camp soils near Rock outcrop, Mizel soils on rounded ridges and hilltops, Indiana soils on concave slopes at higher elevations, and Xman soils on slightly convex south and west facing slopes. This unit is about 3 percent Old Camp soils, 3 percent Mizel soils, 2 percent Indiana soils and 2 percent Xman soils. The Risley soil is moderately deep and well drained. It formed in residuum dominantly of altered, weathered andesite. Typically, 3 to 10 percent of the surface is covered with stones. The surface layer is light gray very stony loam about 3 inches thick. The subsoil is brown clay about 20 inches thick. Weathered, altered andesite is at a depth of 23 inches. Depth to weathered altered andesite ranges from 20 to 30 inches.

Permeability of the Risley soil is slow. Available water capacity is low. Effective rooting depth is 20 to 30 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to high. The hazard of soil blowing is slight.
The present vegetation in most areas is mainly big sagebrush and bottlebrush squirreltail. A small amount of juniper is dispersed throughout.

403 - Jubilee Variant loam, slightly saline. This very deep, poorly drained soil is on flood plains and alluvial fans. It formed in alluvium derived dominantly from granitic rocks. Typically, the surface layer is very dark brown loam about 14 inches thick. The underlying material to a depth of 60 inches is stratified sandy loam through loamy coarse sand that is mottled and gleyed. Included in this unit are Voltaire soils on low terrace remnants and Sagouspe soils near shallow channels. The unit is about 8 percent Voltaire soils and 7 percent Sagouspe soils.

Permeability of this Jubilee Variant soils is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches for water-tolerant plants but is limited to depths between 18 and 36 inches for water-sensitive plants. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight. A seasonal high water table is at a depth of 18 to 36 inches in winter and spring. The soil is subject to flash flooding during storms of unusually high intensity. Channeling and deposition are common along streambanks. The soil is slightly affected by sodium salts.

The present vegetation in most areas is mainly grass. Applications of irrigation water should be adjusted to the available water capacity and the water intake rate:

445 - Jubilee sandy loam, drained. This very deep soil is on alluvial fans and flood plains. The drainage has been altered. The soil formed in alluvium derived from mixed rock sources. Typically, the surface layer is dark gray sandy loam about 22 inches thick. The underlying material to a depth of 60 inches is dark grayish brown, stratified, mottled loamy coarse sand and fine sandy loam. Included in this unit are Voltaire soils in swales, Truckee soils on lower flood plains, and Vamp soils on low terrace remnants. The unit is about 5 percent Voltaire soils, 5 percent Truckee soils, and 5 percent Vamp soils.

Permeability of this Jubilee soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight. A seasonal high water table is at a depth of 48 to 72 inches and winter and early spring. This soil is subject to flooding during storms of unusually high intensity. Channeling and deposition are common along streambanks.

The present vegetation is mainly sedges, clovers, juncus, and grasses.

The soils listed above are the natural soil in the area. During the construction of the park, there was disruption of this soil and possibly the importation of other material. Because of this, it is difficult to predict the conditions of the soil that may influence ponding, runoff and infiltration.
The irrigation system is controlled by an anemometer. The anemometer is set to shut the irrigation system pumps off once a wind velocity of 20 mph is maintained for 5 minutes. This will control the application of effluent.

1.4 PROCEDURE

The park irrigation control system will control the time and duration of park irrigation. This system controls a set of valves independent of the master valve at the service connection. In case of an emergency the system should be shut down at the gate valve that connects the system to the main water supply. This gate valve has been called out in the site plans and in the detail sheet(s) for the meter/PRV vault.

At the Shadow Mountain Sports Complex there is an anemometer to monitor the wind speed. Control contacts are provided to shut off irrigation valves when the wind speed exceeds 20 miles per hour for 5 minutes. Irrigation valves are allowed to open if the wind speed remains below 20 mph for 30 minutes.

In the event of a power failure, the Shadow Mountain Sports Complex PRV valve automatically closes. This shuts off effluent delivery to the irrigation system. Also, in the event of a valve failure, there are manual valves that will be closed. Figures J 1 and J 4 show the locations and details of the meter vault and valves.
Shelly Park

1.1 SITE LOCATION

The estimated irrigation demand for Shelly Park is 250 gpm, and the estimated total annual demand is 20 acre-feet. Irrigation demands are based on metered water use data and historical evapotranspiration (ET) data collected at the Sparks Tree Farm located at Baring Boulevard and McCarran Boulevard. Site irrigation will occur during an 8-hour night period.

Site Information:

<table>
<thead>
<tr>
<th>Property</th>
<th>Physical Address</th>
<th>Latitude/Longitude</th>
<th>Township/Range/Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shelly Park</td>
<td>3000 North Truckee Ln</td>
<td>39°33'18&quot;N 119°44'04&quot;W</td>
<td>S33 T20N R20E</td>
</tr>
</tbody>
</table>

1.2 SITE DESCRIPTION

Shelly Park is located in the southwest corner of Baring Boulevard and Truckee Drive. McCarran Blvd surrounds Shelly Park to the west, Baring Boulevard to the northwest, and Truckee Drive is to the northeast. The topography of Shelly Park is shown in Figure K 1. Shelly Park has slopes ranging from approximately 0% to 2%. Below is an entire section for the soil characteristics, which are also outlined in Figure K 2. Shelly Park is identified in the Flood Insurance Rate Map as Zone X (areas determined to be outside the 500-year flood plain). The effluent irrigation area is detailed in Figure K 3.

Effluent Demands:

<table>
<thead>
<tr>
<th>Property</th>
<th>Total Area (Acre)</th>
<th>Irrigated Area (Acre)</th>
<th>Acre-Feet per Year</th>
<th>Nighttime Demand (gpm)</th>
<th>Daytime Demand (gpm)</th>
<th>Total (gpm)</th>
<th>Average (mgd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shelly Park</td>
<td>5.6</td>
<td>5.0</td>
<td>20</td>
<td>250</td>
<td>0</td>
<td>250</td>
<td>0.12</td>
</tr>
</tbody>
</table>

1.3 SOILS

The Soil Conservation Service describes the geology of the southern Washoe County area as follows (SCS, 1983). Figure K 2 shows the soil characteristics.

470 - Dalzell loamy fine sand. This moderately deep, somewhat poorly drained soil is on low lake terraces. It formed in alluvium derived dominantly from mixed rock sources. Typically, the surface layer is light brownish gray loamy fine sand about
14 inches thick. The subsoil is pale brown sandy clay loam about 18 inches thick. The upper 4 inches of the substratum is a strongly silica-cemented hardpan. The lower part to a depth of 60 inches is stratified loamy sand, gravelly coarse sand, and sandy loam. Depth to the strongly silica-cemented hardpan ranges from 20 to 40 inches. Included in this unit are Godecke soils on remnant lake terraces, Incy soils on sand dunes, Surprise soils on toe slopes of alluvial fans, and Playas. This unit is about 5 percent Godecke soils, 5 percent Incy soils, 3 percent Surprise soils, and 2 percent Playas.

Permeability of this Dalzell soil is moderately slow. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. A seasonal high water table is at a depth of 40 to 60 inches in late winter and spring. The soil

The present vegetation in most areas is mainly big sagebrush, black greasewood, and saltgrass. The production of forage is limited by salinity and alkalinity.

600 - **Idlewild clay loam, drained.** This very deep, somewhat poorly drained soil is on alluvial fans and terraces. The drainage has been altered. This soil formed in alluvium derived from mixed rock sources. Typically, the surface layer is very dark grayish brown clay loam about 13 inches thick. The subsoil is olive brown silty clay and silty clay loam about 23 inches thick. The substratum is olive brown stratified sandy clay loam and silty clay loam about 26 inches thick. Included in this unit are Fleischmann soils on slightly higher terrace remnants, Orr soils on alluvial fan skirts, and Truckee soils on lower flood plains and in swales. The unit is about 5 percent Fleischmann soils, 5 percent Orr soils, and 5 percent Truckee soils.

Permeability of this Idlewild soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

601 - **Idlewild sandy loam, drained.** This very deep soil is on alluvial fans and terraces. The drainage has been altered. This soil formed in alluvium derived from mixed rock sources. Typically, the surface layer is very dark grayish brown sandy loam about 13 inches thick. The subsoil is olive brown silty clay about 23 inches thick. The substratum is olive brown, stratified sandy clay loam and silty clay loam about 26 inches thick. Included in this unit are Fleischmann soils on slightly higher terrace remnants, Orr soils on alluvial fan skirts, and Truckee soils on flood plains and in swales. The unit is about 5 percent Fleischmann soils, 5 percent Orr soils, and 5 percent Truckee soils.

Permeability of this Idlewild soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight.
The soils listed above are the natural soil in the area. During the construction of the park, there was disruption of this soil and possibly the importation of other material. Because of this, it is difficult to predict the conditions of the soil that may influence ponding, runoff and infiltration.

1.4 PROCEDURES

The park irrigation control system will control the time and duration of park irrigation. This system controls a set of valves independent of the master valve at the service connection. In case of an emergency the system should be shut down at the gate valve that connects the system to the main water supply. This gate valve has been called out in the site plans and in the detail sheet(s) for the meter/PRV vault.

Shelly Park does not have electricity in its vault. As long as TMWRF pumps are operating the site will still be able to irrigate. However, power failure to the irrigation system controllers will dictate the parks' ability to irrigate. Figures K 1 and K 4 show the location and details of the meter vault and valves.
Sparks Boulevard Park

1.1 SITE LOCATION

The estimated irrigation demand for the Sparks Boulevard Park is 76 gpm, and the estimated total annual demand is 8 acre-feet. Irrigation demands are based on metered water use data and historical evapotranspiration (ET) data collected at the Sparks Tree Farm located at Baring Boulevard and McCarran Boulevard. Site irrigation will occur during an 8-hour night period.

Site Information:

<table>
<thead>
<tr>
<th>Property</th>
<th>Physical Address</th>
<th>Latitude/Longitude</th>
<th>Township/Range/Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sparks Boulevard Park</td>
<td>3200 Sparks Blvd</td>
<td>39°33'0&quot;N 119°43'0&quot;W</td>
<td>S34.T20N.R20E</td>
</tr>
</tbody>
</table>

1.2 SITE DESCRIPTION

Sparks Boulevard Park is located in the median of Sparks Boulevard. The topography of Sparks Boulevard Park (South Part) is shown in Figure L 1, and Sparks Boulevard Park (North Part) is shown in Figure L 2. Sparks Boulevard has slopes ranging from approximately 0% to 2%. Below is an entire section for the soil characteristics, which are also outlined in Figure L 2. Sparks Boulevard Park is identified in the Flood Insurance Rate Map as Zone A (special flood hazard areas inundated by 100-year flood; no base flood elevations determined). The effluent irrigation area of Sparks Boulevard Park (South Part) is shown in Figure L 5 and Sparks Boulevard Park (North Part) is shown in Figure L 6.

Effluent Demands:

<table>
<thead>
<tr>
<th>Property</th>
<th>Total Area (Acre)</th>
<th>Irrigated Area (Acre)</th>
<th>Acre-Feet per Year</th>
<th>Nighttime Demand (gpm)</th>
<th>Daytime Demand (gpm)</th>
<th>Total (gpm)</th>
<th>Average (mgd)</th>
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<tr>
<td>Sparks Boulevard Park</td>
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<td>8</td>
<td>76</td>
<td>0</td>
<td>76</td>
<td>0.04</td>
</tr>
</tbody>
</table>
1.3 SOILS

The Soil Conservation Service describes the geology of the southern Washoe County area as follows (SCS, 1983). The soil characteristics of Sparks Boulevard Park (South Part) are shown in Figure L 3 and Sparks Boulevard Park (North Part) is shown in Figure L 4.

400 - **Jubilee Variant loamy sand, strongly saline.** This very deep, poorly drained soil is on flood plains and alluvial fans. It formed an alluvium dominantly of granitic rock. Typically, the surface layer is very dark brown loamy sand about 14 inches thick. The underlying material to a depth of 60 inches is stratified sandy loam through loamy coarse sand. Included in this map unit are Voltaire soils on low terrace remnants and Sagouspe soils near shallow channels. The unit is 8 percent Voltaire and 7 percent Sagouspe soils.

Permeability of this Jubilee Variant soils is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches for water-tolerant plants but is limited to 18 to 36 inches for water-sensitive plants. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. A seasonal high water table is at a depth of 18 to 36 inches in winter and spring. The soil is subject to flash flooding during storms of unusually high intensity. Channeling and deposition are common along streambanks. This soil is moderately to strongly affected by sodium salts.

The present vegetation in most areas is mainly grass.

403 - **Jubilee Variant loam, slightly saline.** This very deep, poorly drained soil is on flood plains and alluvial fans. It formed in alluvium derived dominantly from granitic rocks. Typically, the surface layer is very dark brown loam about 14 inches thick. The underlying material to a depth of 60 inches is stratified sandy loam through loamy coarse sand that is mottled and gleyed. Included in this unit are Voltaire soils on low terrace remnants and Sagouspe soils near shallow channels. The unit is about 8 percent Voltaire soils and 7 percent Sagouspe soils.

Permeability of this Jubilee Variant soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches for water-tolerant plants, but is limited to depths between 18 to 36 inches for water-sensitive plants. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight. A seasonal high water table is at a depth of 18 to 36 inches in winter and spring. The soil is subject to flash flooding during storms of unusually high intensity. Channeling and deposition are common along streambanks. The soil is slightly affected by sodium salts.

The present vegetation in most areas is mainly grass. Applications of irrigation water should be adjusted to the available water capacity and the water intake rate.
445 - **Jubilee sandy loam, drained.** This very deep soil is on alluvial fans and flood plains. The drainage has been altered. The soil formed in alluvium derived from mixed rock sources. Typically, the surface layer is very dark brown loamy sand about 12 inches thick. Below this is a buried surface layer of mottled very dark gray and olive fine sandy loam about 18 inches thick. The underlying material to a depth of 60 inches is olive gray, stratified sandy loam through coarse sand. Included in this are Ophir soils on lower lying flood plains and Jubilee Variant soils on the lower parts of the unit. The unit is about 8 percent Ophir soils and 7 percent Jubilee Variant soils.

Permeability of this Jubilee soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches for water-tolerant plants but is limited to 18 to 30 inches for water-sensitive plants. Runoff is very slow, and the hazard of soil blowing is moderate. A seasonal high water table is a depth of 20 to 30 inches in winter and spring. This soil is subject to flash flooding during storms of unusually high intensity. Channeling and deposition are common along streambanks.

The present vegetation in most areas is mainly grasses, sedges, clovers, and juncus.

456 - **Voltaire clay loam, gravelly substratum.** This very deep, poorly drained soil is on flood plains. Drainage has been altered. This soil is formed in alluvium derived from mixed rock. Typically, the surface layer is dark gray clay loam about 9 inches thick. The upper part of the underlying material to a depth of 36 inches is gray, mottled, stratified clay to silt loam. Below a depth of 36 inches is stratified very gravelly coarse sand through sandy clay loam. Included in this unit are Fettic soils on low terraces, Jubilee Variant soils on alluvial fans, and Truckee soils on slightly higher parts of the flood plains and fans. The unit is about 5 percent Fettic soils, 5 percent Jubilee Variant soils, and 5 percent Truckee soils.

Permeability of this Voltaire soil is slow. Available water capacity is high. Effective rooting depth is 60 inches for water-tolerant plants. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight. A seasonal high water table if at a depth of 40 to 72 inches in late winter and spring. This soil is subject to flooding during storms of prolonged high intensity. Channeling and deposition are common along streambanks. Some areas are slightly affected by salts and alkali.

600 - **Idlewild clay loam, drained.** This very deep, somewhat poorly drained soil is on alluvial fans and terraces. The drainage has been altered. The soils formed in alluvium derived from mixed rock sources. Typically, the surface layer is very dark grayish brown clay loam about 13 inches thick. The subsoil is olive brown silty clay and silty clay loam about 23 inches thick. The substratum is olive brown stratified sandy clay loam and silty clay loam about 26 inches thick.
Included in this unit are Fleischmann soils on slightly higher terrace remnants, Orr soils on alluvial fan skirts, and Truckee soil on lower flood plains and in swales. The unit is about 5 percent Fleischmann soils, 5 percent Orr soils, and 5 percent Truckee soils.

Permeability of this Idlewild soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

601 - Idlewide sandy loam, drained. This very deep soil is on alluvial fans and terraces. The drainage has been altered. This soil formed in alluvium derived from mixed rock sources. Typically, the surface layer is very dark grayish brown sandy loam about 13 inches thick. The subsoil is olive brown silty clay about 23 inches thick. The substratum is olive brown, stratified sandy clay loam and silty clay loam 26 inches thick. Included in this are Fleischmann soils on slightly higher terrace remnants, Orr soils on alluvial fan skirts, and Truckee soils on flood plains and in swales. The unit is about 5 percent Fleischmann soils, 5 percent Orr soils, and 5 percent Truckee soils.

Permeability of this Idlewild soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of erosion is slight.

The soils listed above are the natural soil in the area. During the construction of the parks, there was disruption of this soil and possibly the importation of other material. Because of this, it is difficult to predict the conditions of the soil that may influence ponding, runoff and infiltration.

1.4 PROCEDURES

The park irrigation control system will control the time and duration of park irrigation. This system controls a set of valves independent of the master valve at the service connection. In case of an emergency the system should be shut down at the gate valve that connects the system to the main water supply. This gate valve has been called out in the site plans and in the detail sheet(s) for the meter/PRV vault.

Sparks Boulevard does not have electricity in its vault. As long as TMWRF pumps are operating the site will still be able to irrigate. However, power failure to the irrigation system controllers will dictate the parks’ ability to irrigate. Figures L 7 and L8 show the location of the meter vault and valves.
Van-Meter Park

1.1 SITE LOCATION

The estimated irrigation demand for the Sparks/Van Meter Park is 66 gpm, and the estimated total annual demand is 7 acre-feet. Irrigation demands are based on metered water use data and historical evapotranspiration (ET) data collected at the Sparks Tree Farm located at Baring Boulevard and McCarran Boulevard. Site irrigation will occur during an 8-hour night period.

Site Information:

<table>
<thead>
<tr>
<th>Property</th>
<th>Physical Address</th>
<th>Latitude/Longitude</th>
<th>Township/Range/Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Van-Meter Park</td>
<td>3200 Sparks Blvd</td>
<td>39°33'0&quot;N 119°43'0&quot;W</td>
<td>S34.T20N.R20E</td>
</tr>
</tbody>
</table>

1.2 SITE DESCRIPTION

Van-Meter Park is located in the north corner of Fargo Way and O'Callaghan Drive. To the north of Van-Meter Park are houses. The topography of Van-Meter Park is shown in Figure M 1. Van-Meter Park has slopes ranging from approximately 0% to 2%. Below is an entire section for the soil characteristics, which are also outlined in Figure M 2. Van-Meter Park is identified in the Flood Insurance Rate Map as Zone A (special flood hazard areas inundated by 100-year flood; no base flood elevations determined). The effluent irrigation area is detailed in Figure M 3.

Effluent Demands:

<table>
<thead>
<tr>
<th>Property</th>
<th>Total Area (Acre)</th>
<th>Irrigated Area (Acre)</th>
<th>Acre-Feet per Year</th>
<th>Nighttime Demand (gpm)</th>
<th>Daytime Demand (gpm)</th>
<th>Total (gpm)</th>
<th>Average (mgd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Van-Meter Park</td>
<td>2.0</td>
<td>1.8</td>
<td>7</td>
<td>66</td>
<td>0</td>
<td>66</td>
<td>0.03</td>
</tr>
</tbody>
</table>

1.3 SOILS

The Soil Conservation Service describes the geology of the southern Washoe County area as follows (SCS, 1983). Figure M 2 shows the soil characteristics.

400 - Jubilee Variant loamy sand, strongly saline. This very deep, poorly drained soil is on flood plains and alluvial fans. It formed an alluvium dominantly of
granitic rock. Typically, the surface layer is very dark brown loamy sand about 14 inches thick. The underlying material to a depth of 60 inches is stratified sandy loam through loamy coarse sand. Included in this map unit are Voltaire soils on low terrace remnants and Sagouspe soils near shallow channels. The unit is 8 percent Voltaire and 7 percent Sagouspe soils.

Permeability of this Jubilee Variant soils is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches for water-tolerant plants but is limited to 18 to 36 inches for water-sensitive plants. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. A seasonal high water table is at a depth of 18 to 36 inches in winter and spring. The soil is subject to flash flooding during storms of unusually high intensity. Channeling and deposition are common along streambanks. This soil is moderately to strongly affected by sodium salts.

The present vegetation in most areas is mainly grass.

403 - Jubilee Variant loam, slightly saline. This very deep, poorly drained soil is on flood plains and alluvial fans. It formed in alluvium derived dominantly from granitic rocks. Typically, the surface layer is very dark brown loam about 14 inches thick. The underlying material to a depth of 60 inches is stratified sandy loam through loamy coarse sand that is mottled and gleyed. Included in this unit are Voltaire soils on low terrace remnants and Sagouspe soils near shallow channels. The unit is about 8 percent Voltaire soils and 7 percent Sagouspe soils.

Permeability of this Jubilee Variant soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches for water-tolerant plants, but is limited to depths between 18 to 36 inches for water-sensitive plants. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight. A seasonal high water table is at a depth of 18 to 36 inches in winter and spring. The soil is subject to flash flooding during storms of unusually high intensity. Channeling and deposition are common along streambanks. The soil is slightly affected by sodium salts.

The present vegetation in most areas is mainly grass. Applications of irrigation water should be adjusted to the available water capacity and the water intake rate.

445 - Jubilee sandy loam, drained. This very deep soil is on alluvial fans and flood plains. The drainage has been altered. The soil formed in alluvium derived from mixed rock sources. Typically, the surface layer is very dark brown loamy sand about 12 inches thick. Below this is a buried surface layer of mottled very dark gray and olive fine sandy loam about 18 inches thick. The underlying material to a depth of 60 inches is olive gray, stratified sandy loam through coarse sand. Included in this are Ophir soils on lower lying flood plains and Jubilee Variant soils on the lower parts of the unit. The unit is about 8 percent Ophir soils and 7 percent Jubilee Variant soils.
Permeability of this Jubilee soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches for water-tolerant plants but is limited to 18 to 30 inches for water-sensitive plants. Runoff is very slow, and the hazard of soil blowing is moderate. A seasonal high water table is a depth of 20 to 30 inches in winter and spring. This soil is subject to flash flooding during storms of unusually high intensity. Channeling and deposition are common along streambanks.

The present vegetation in most areas is mainly grasses, sedges, clovers, and juncus.

Voltaire clay loam, gravelly substratum. This very deep, poorly drained soil is on flood plains. Drainage has been altered. This soil is formed in alluvium derived from mixed rock. Typically, the surface layer is dark gray clay loam about 9 inches thick. The upper part of the underlying material to a depth of 36 inches is gray, mottled, stratified clay to silt loam. Below a depth of 36 inches is stratified very gravelly coarse sand through sandy clay loam. Included in this unit are Fettic soils on low terraces, Jubilee Variant soils on alluvial fans, and Truckee soils on slightly higher parts of the flood plains and fans. The unit is about 5 percent Fettic soils, 5 percent Jubilee Variant soils, and 5 percent Truckee soils.

Permeability of this Voltaire soil is slow. Available water capacity is high. Effective rooting depth is 60 inches for water-tolerant plants. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight. A seasonal high water table if at a depth of 40 to 72 inches in late winter and spring. This soil is subject to flooding during storms of prolonged high intensity. Channeling and deposition are common along streambanks. Some areas are slightly affected by salts and alkali.

Idlewild clay loam, drained. This very deep, somewhat poorly drained soil is on alluvial fans and terraces. The drainage has been altered. The soils formed in alluvium derived from mixed rock sources. Typically, the surface layer is very dark grayish brown clay loam about 13 inches thick. The subsoil is olive brown silty clay and silty clay loam about 23 inches thick. The substratum is olive brown stratified sandy clay loam and silty clay loam about 26 inches thick. Included in this unit are Fleischmann soils on slightly higher terrace remnants, Orr soils on alluvial fan skirts, and Truckee soil on lower flood plains and in swales. The unit is about 5 percent Fleischmann soils, 5 percent Orr soils, and 5 percent Truckee soils.

Permeability of this Idlewild soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight.
Idlewild sandy loam, drained. This very deep soil is on alluvial fans and terraces. The drainage has been altered. This soil formed in alluvium derived from mixed rock sources. Typically, the surface layer is very dark grayish brown sandy loam about 13 inches thick. The subsoil is olive brown silty clay about 23 inches thick. The substratum is olive brown, stratified sandy clay loam and silty clay loam 26 inches thick. Included in this are Fleischmann soils on slightly higher terrace remnants, Orr soils on alluvial fan skirts, and Truckee soils on flood plains and in swales. The unit is about 5 percent Fleischmann soils, 5 percent Orr soils, and 5 percent Truckee soils.

Permeability of this Idlewild soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard or erosion is slight.

The soils listed above are the natural soil in the area. During the construction of the parks, there was disruption of this soil and possibly the importation of other material. Because of this, it is difficult to predict the conditions of the soil that may influence ponding, runoff and infiltration.

1.4 PROCEDURES

The park irrigation control system will control the time and duration of park irrigation. This system controls a set of valves independent of the master valve at the service connection. In case of an emergency the system should be shut down at the gate valve that connects the system to the main water supply. This gate valve has been called out in the site plans and in the detail sheet(s) for the meter/PRV vault.

Van-Meter Park does not have electricity in its vault. As long as TMWRF pumps are operating the site will still be able to irrigate. However, power failure to the irrigation system controllers will dictate the parks’ ability to irrigate. Figures M 4 and M 5 show the location and details of the meter vault and valves.
VAN METER & SPARKS PARK
METER & FLOW VAULT

SPARKS EFFLUENT PIPELINE
SPARKS BURG, & VAN METER PARKS, METER VAULT & CONNECTION DETAILS

M.5
Infrastructure, Inc.

1. 1" PL PVC WELD, USE BARBES AND CLAMMERS, VALVE, NORMALLY OPEN
2. 1" PL PVC WELD, USE BARBES AND CLAMMERS, VALVE, NORMALLY OPEN
3. 1" PL PVC WELD, USE BARBES AND CLAMMERS, VALVE, NORMALLY OPEN
4. 1" PL PVC WELD, USE BARBES AND CLAMMERS, VALVE, NORMALLY OPEN
5. 1" PL PVC WELD, USE BARBES AND CLAMMERS, VALVE, NORMALLY OPEN
6. 1" PL PVC WELD, USE BARBES AND CLAMMERS, VALVE, NORMALLY OPEN
7. 1" PL PVC WELD, USE BARBES AND CLAMMERS, VALVE, NORMALLY OPEN
8. 1" PL PVC WELD, USE BARBES AND CLAMMERS, VALVE, NORMALLY OPEN
9. 1" PL PVC WELD, USE BARBES AND CLAMMERS, VALVE, NORMALLY OPEN
10. 1" PL PVC WELD, USE BARBES AND CLAMMERS, VALVE, NORMALLY OPEN

CONNECTION TO EXISTING IRRIGATION SYSTEM FOR SPARKS PARK & VAN METER PARK
Willow Creek Park

1.1 SITE LOCATION

The estimated irrigation demand for Willow Creek Park is 150 gpm, and the estimated total annual demand is 15 acre-feet. Irrigation demands are based on metered water use data and historical evapotranspiration (ET) data collected at the Sparks Tree Farm located at Baring Boulevard and McCarran Boulevard. Site irrigation will occur during an 8-hour night period.

Site Information:

<table>
<thead>
<tr>
<th>Property</th>
<th>Physical Address</th>
<th>Latitude/Longitude</th>
<th>Township/Range/Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Willow Creek Park</td>
<td>125 East Prater</td>
<td>39°32'0&quot;N 119°42'50&quot;W</td>
<td>S33.T20N.R20E</td>
</tr>
</tbody>
</table>

1.2 SITE DESCRIPTION

Willow Creek Park is located in the northwest corner of Prater Way and Station Street. To the west and north of Willow Creek Park are houses; Prater Way is to the south. The topography of Willow Creek Park is shown in Figure N 1. Willow Creek Park has slopes ranging from approximately 0% to 2%. Below is a section for the soil characteristics, which are also outlined in Figure N 2. Willow Creek Park is identified in the Flood Insurance Rate Map as Zone X (areas determined to be outside the 500-year flood plain). The effluent irrigation area is detailed in Figure N 3.

Effluent Demands:

<table>
<thead>
<tr>
<th>Property</th>
<th>Total Area (Acre)</th>
<th>Irrigated Area (Acre)</th>
<th>Acre-Feet per Year</th>
<th>Nighttime Demand (gpm)</th>
<th>Daytime Demand (gpm)</th>
<th>Total (gpm)</th>
<th>Average (mgd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Willow Creek Park</td>
<td>4.3</td>
<td>3.9</td>
<td>15</td>
<td>150</td>
<td>0</td>
<td>150</td>
<td>0.07</td>
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1.3 SOILS

The Soil Conservation Service describes the geology of the southern Washoe County area as follows (SCS, 1983). Figure N 2 shows the soil characteristics.

805 - Truckee sandy loam, gravelly substratum. This very deep, somewhat poorly drained soil is on flood plains. Drainage has been altered. This soil formed in
alluvium derived from mixed rock sources. Typically, the surface layer is gray sandy loam about 12 inches thick. The upper 18 inches of the underlying material is gray stratified sandy loam through silty clay loam. The lower part to a depth of 60 inches is pale brown, stratified gravelly sand through very gravelly sandy loam. Depth to gravelly material ranges from 30 to 40 inches. Included in this unit are Rose Creek soils that occur as stringer channels on flood plains, Washoe soils on alluvial fan remnants, and Fettic soils on low terrace remnants. The unit is about 4 percent Rose Creek soils, 5 percent Washoe soils, and 6 percent Fettic soils.

Permeability of the Truckee soil is moderately slow in the upper part of the underlying material and rapid in the lower part. Available water capacity is moderate. Effective rooting depth is 60 inches. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight. The soil is subject to flooding during storms of prolonged high intensity. Channeling and deposition are common along streambeds. The soil is moderately saline and alkali affected.

The soil listed above is the natural soil in the area. During the construction of the park, there was disruption of this soil and possibly the importation of other material. Because of this, it is difficult to predict the conditions of the soil that may influence ponding, runoff and infiltration.

1.4 PROCEDURES

The park irrigation control system will control the time and duration of park irrigation. This system controls a set of valves independent of the master valve at the service connection. In case of an emergency the system should be shut down at the gate valve that connects the system to the main water supply. This gate valve has been called out in the site plans and in the detail sheet(s) for the meter/PRV vault.

Willow Creek Park does not have electricity in its vault. As long as TMWRF pumps are operating the site will still be able to irrigate. However, power failure to the irrigation system controllers will dictate the parks' ability to irrigate. Figures N 1 and N 4 show the location and details of the meter vault and valves.
Truckee Meadow Fire Fill Station

1.1 SITE LOCATION

The estimated irrigation demand for the Truckee Meadow Fire Fill Station is 2000 gpm, and the estimated total annual demand is 84 acre-feet. Irrigation demands are based on metered water use data and historical evapotranspiration (ET) data collected at the Sparks Tree Farm located at Baring Boulevard and McCarran Boulevard. Site irrigation will occur during an 8-hour night period.

Site Information:

<table>
<thead>
<tr>
<th>Property</th>
<th>Physical Address</th>
<th>Latitude/Longitude</th>
<th>Township/Range/Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truckee Meadows Fire</td>
<td>La Posada/Rockwell</td>
<td>39°38'15&quot;N 119°42'40&quot;W</td>
<td>S34.T20N.R20E</td>
</tr>
<tr>
<td>Fill Station</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1.2 SITE DESCRIPTION

The Truckee Meadows Fire Fill Station is located south of La Posada Drive and north of Rockwell Boulevard. To the west of the Truckee Meadows Fire Fill Station is a strip mall. The topography of the Truckee Meadows Fire Fill Station is shown in Figure O 1. The Truckee Meadows Fire Fill Station has slopes ranging from approximately 0% to 4%. Below is an entire section for the soil characteristics, which are also outlined in Figure O 2. Truckee Meadows Fire Fill Station is identified in the Flood Insurance Rate Map as Zone X (areas determined to be outside the 500-year flood plain). The effluent irrigation area is detailed in Figure O 3.

Effluent Demands:

<table>
<thead>
<tr>
<th>Property</th>
<th>Total Area (Acre)</th>
<th>Irrigated Area (Acre)</th>
<th>Acre-Feet per Year</th>
<th>Nighttime Demand (gpm)</th>
<th>Daytime Demand (gpm)</th>
<th>Total (gpm)</th>
<th>Average (mgd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truckee Meadows Fire</td>
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<td>n/a</td>
<td>84</td>
<td>0</td>
<td>2000</td>
<td>2000</td>
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</tbody>
</table>

FILE COPY
1.3 SOILS

The Soil Conservation Service describes the geology of the southern Washoe County area as follows (SCS, 1983). Figure 2 shows the soil characteristics.

1191 - Spasprey sandy loam, 2 to 4 percent slopes. This moderately deep, well drained soil is on lake terraces and alluvial fans. It formed in alluvium derived from mixed rock sources. Typically, the surface layer is grayish brown sandy loam about 2 inches thick. The subsoil is brown clay loam about 10 inches thick. The upper 17 inches of the substratum is light brownish gray sandy loam, the next 17 inches is a pale brown stringly cemented hardpan, and the lower part to a depth of 60 inches is pale brown sandy loam with varying degrees of cementation. Depth to the hardpan ranges from 20 to 30 inches. Included in this unit are Mellor soils on low terraces, Haybourne soils on inset alluvial fans, and Indian Creek soils on higher terrace remnants. The unit is about 5 percent Mellor soils, 5 percent Haybourne soils, and 5 percent Indian Creek soils.

Permeability of this Spasprey soil is moderately slow. Available water capacity is very low. Effective rooting depth is 20 to 30 inches. Runoff is slow, and the hazard of soil blowing is slight.

The present vegetation in most areas is mainly big sagebrush, spiny hopsage, and Douglas rabbitbrush.

1192 - Spasprey sand, 2 to 4 percent slopes. This moderately deep, well drained soil is on lake terraces and alluvial fans. It formed in alluvium derived from mixed rock sources. Typically, the surface layer is grayish brown sand about 6 inches thick. The subsoil is brown clay loam about 8 inches thick. The upper 16 inches of the substratum is light brownish gray sandy loam, the next 17 inches is a pale brown strongly cemented hardpan, and the lower part to a depth of 60 inches is pale brown sandy loam with varying degrees of cementation. Depth to the hardpan ranges from 20 to 30 inches. Included in this unit are Mellor soils on low terraces, Haybourne soils on inset alluvial fans, and Indian Creek soils on higher terrace remnants. The unit is about 5 percent Mellor soils, 5 percent Haybourne soils, and 5 percent Indian Creek soils.

Permeability of this Spasprey soil is moderately slow. Available water capacity is very low. Effective rooting depth is 20 to 30 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

The present vegetation in most areas is mainly big sagebrush, Anderson peachbrush, and cheatgrass.

1200 - Mellor silt loam. This very deep, moderately well drained soil is on lake terraces and alluvial fans. It formed in alluvium derived from mixed rock sources. Typically, the surface layer is pale brown silt loam about 11 inches thick. The subsoil is pale brown silty clay loam about 15 inches thick. The substratum to a
depth of 60 inches is silty clay loam. Included in this unit are Doten soils on lower terraces or in draws; Turria soils which occur on alluvial fans and are subject to frequent flooding; Incy soils on small sand dunes; and Rednik soils on higher elevations near drainageways. The unit is about 5 percent Doten soils, 5 percent Turria soils, 3 percent Incy soils, and 2 percent Rednik soils.

Permeability of this Mellor soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight. The surface layer is moderately affected by salt and alkali, and the subsoil and substratum are strongly affected by salt and alkali.

The present vegetation in most areas is mainly black greasewood and Douglas rabbitbrush.

The soils listed above are the natural soil in the area. During the construction of the fill station, there was disruption of this soil and possibly the importation of other material. Because of this, it is difficult to predict the conditions of the soil that may influence ponding, runoff, and infiltration.

1.4 PROCEDURES

The park irrigation control system will control the time and duration of park irrigation. This system controls a set of valves independent of the master valve at the service connection. In case of an emergency, the system should be shut down at the gate valve that connects the system to the main water supply. This gate valve has been called out in the site plans and in the detail sheet(s) for the meter/PRV vault.

Truckee Meadows Fire Fill Station does not have electricity in its vault. As long as TMWRF pumps are operating the site will still be able to irrigate. However, power failure to the irrigation system controllers will dictate the parks’ ability to irrigate. Figures O 4 and O 5 show the locations and details of the meter vault and valves.
Don Mello Fill Station

1.1 SITE LOCATION

The estimated irrigation demand for the Don Mello Fill Station is 1000 gpm, and the estimated total annual demand is 42 acre-feet. Irrigation demands are based on metered water use data and historical evapotranspiration (ET) data collected at the Sparks Tree Farm located at Baring Boulevard and McCarran Boulevard. Site irrigation will occur during an 8-hour night period.

<table>
<thead>
<tr>
<th>Site Location</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Property</strong></td>
</tr>
<tr>
<td>Don Mello Fill Station</td>
</tr>
</tbody>
</table>

1.2 SITE DESCRIPTION

The Don Mello Fill Station is located in the parking lot of the Don Mello Sports Complex. The following is copied from above: Don Mello Fill Station is located in the northwest corner of Sparks Boulevard and Lincoln Way. To the west of Don Mello Fill Station is vacant land; to the north is an apartment complex; to the east is Sparks Boulevard; and to the south is Lincoln Way. The topography of Don Mello Fill Station is shown in Figure P 1 Don Mello Sports Complex has slopes ranging from approximately 0% to 2%. Below is an entire section for the soil characteristics, which are also outlined in Figure P 2. Don Mello Fill Station is identified in the Flood Insurance Rate Map as Zone AE (special flood hazard areas inundated by 100-year flood; base flood elevations determined). The effluent irrigation area is detailed in Figure P 3.

<table>
<thead>
<tr>
<th>Effluent Demands</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Property</strong></td>
</tr>
<tr>
<td>Don Mello Fill Station</td>
</tr>
</tbody>
</table>

At the Don Mello Fill Station, there is an anemometer to monitor the wind speed. Control contacts are provided to shut off irrigation valves when the wind speed exceeds 20 miles per hour for 5 minutes. Irrigation valves are allowed to open if the wind speed remains below 20 mph for 30 minutes.
1.3 SOILS

The Soil Conservation Service describes the geology of the southern Washoe County area as follows (SCS, 1983). Figure P 2 shows the soil characteristics.

452 - Voltaire loam, strongly saline. This very deep, poorly drained and very poorly drained soil is on alluvial fans and flood plains. It formed in alluvium derived dominantly from mixed rock sources. Typically, the surface layer is black loam about 18 inches thick. The underlying material to a depth of 60 inches is stratified, dark grayish brown silty clay loam through loamy sand. Included in this unit are Fettic soils on slightly higher terraces, Jubilee Variant soils near shallow stream channels, and Truckee soils on slightly higher parts of the flood plains. The unit is about 5 percent Fettic soils, 5 percent Jubilee Variant soils, and 5 percent Truckee soils.

Permeability of this Voltaire soil is slow. Available water capacity is high. Effective rooting depth is 60 inches for water-tolerant plants but is limited to depths of 0 to 18 inches for water-sensitive plants. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. A seasonal high water table is at a depth of 0 to 18 inches in late winter and spring. This soil is subject to flooding during storms of prolonged high intensity. Channeling and deposition are common along streambanks. The soil is strongly affected by sodium salt.

The present vegetation in most areas is mainly black greasewood and saltgrass.

456 - Voltaire clay loam, gravelly substratum. This very deep, poorly drained soil is on flood plains. Drainage has been altered. This soil is formed in alluvium derived from mixed rock. Typically, the surface layer is dark gray clay loam about 9 inches thick. The upper part of the underlying material to a depth of 36 inches is gray, mottled, stratified clay to silt loam. Below a depth of 36 inches is stratified very gravelly coarse sand through sandy clay loam. Included in this unit are Fettic soils on low terraces, Jubilee Variant soils on alluvial fans, and Truckee soils on slightly higher parts of the flood plains and fans. The unit is about 5 percent Fettic soils, 5 percent Jubilee Variant soils, and 5 percent Truckee soils.

Permeability of this Voltaire soil is slow. Available water capacity is high. Effective rooting depth is 60 inches for water-tolerant plants. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight. A seasonal high water table if at a depth of 40 to 72 inches in late winter and spring. This soil is subject to flooding during storms of prolonged high intensity. Channeling and deposition are common along streambanks. Some areas are slightly affected by salts and alkali.
The soils listed above are the natural soil in the area. During the construction of the sports complex, there was disruption of this soil and possibly the importation of other material. Because of this, it is difficult to predict the conditions of the soil that may influence ponding, runoff and infiltration.

1.4 PROCEDURES

The park irrigation control system will control the time and duration of park irrigation. This system controls a set of valves independent of the master valve at the service connection. In case of an emergency the system should be shut down at the gate valve that connects the system to the main water supply. This gate valve has been called out in the site plans and in the detail sheet(s) for the meter/PRV vault.

In the event of a power failure, the Don Mello Fill Station PRV valve automatically closes. This shuts off effluent delivery to the irrigation system. Also, in the event of a valve failure, there are manual valves that will be closed. The locations of the meter vaults and valves are located in Figures P 1, P 4 and P 5.
1. METER
2. BACK PRESSURE SUSTAINING, PRESSURE REDUCING (WITH ORIFICE PLATE), SOLENOID CONTROL VALVE.
3. SAND TRAP, JENSEN PRECAST JP-750EE-TP OR EQUAL W/ 24" MANHOLE COVERS.
4. EFFLUENT SUMP PUMP, MCMASTERS-CARR #1342443 OR EQUAL.
5. 2" SWING CHECK VALVE.
6. 3/4" CORROSION CONTROL STOP.
7. BORE HOLE THROUGH GRAGE, CONCRETE PVC EFFLUENT PUMP OUTLET PIPE IN PLACE.
8. 2" FLEX HOSE.
9. 2" THREADED UNION.
10. STAINLESS STEEL HOIST CHAIN, FIX UPPER END IN GRAGE RING WITH STAINLESS STEEL BOLT AND EPOXY.
11. CARD READER SYSTEM, SEE SPECIFICATIONS.
12. FLOOR DRAIN WITH HEAVY-DUTY REMOVABLE CAST IRON GRATE, MADE 1204 OR EQUAL.
13. 3/4" BALL VALVE.
14. PRESSURE GAUGE, 0-200 PSI, LIQUID FILLED.
15. 3/4" ELBOW
16. 6" FLANGED COUPLING ADAPTER W/ANCHOR STUDS
17. 4" NO-HUB CAST IRON SOIL PIPE - TYP.