City of Sparks
Spanish Springs
Master Effluent Management Plan

December 2004
Revised May 2006

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List of Revisions to the Sparks Spanish Springs Master Effluent Management Plan
May 2006

- Cover sheet – Revision date has been added.
- List of revisions – Insert into document.
- Table of Contents page iii – Updated Calle De La Plata – Hawco Business Park titles to include Hawco Office Building I, Hawco Office Building II, Spanish Springs Professional Center, RW Ramsey, Silver State Liquor, Lindell’s Painting, Sierra Design Concrete, and Valley Building Supply. Added Appendix O- Agency Approvals.
- List of Tables page v – Inserted Permit Number NEV2004530.
- Page 1, 2, 3, 4 – Inserted Permit Number NEV2004530 and updated permit information.
- Insert Staff Contact divider before page 18.
- Appendix A – Replace TMWRF NDEP discharge permit NV0020150 with discharge permit NEV2003506. Add Discharge Permit NEV2004530.
- Appendix M – Replace Appendix M in its entirety. Appendix M now includes Calle De La Plata Phase 2, West Calle De La Plata, Hawco Office Building I, Hawco Office Building II, Spanish Springs Professional Center, RW Ramsey, Silver State Liquor, Lindell’s Painting, Sierra Design Concrete, and Valley Building Supply.
- Appendix O- Agency Approvals. Add Appendix O with agency approvals received to date.
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  • RW RAMSEY
  • SILVER STATE LIQUOR
  • LINDELL'S PAINTING
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SECTION 1 - INTRODUCTION

1.1 INTRODUCTION

The effluent used to irrigate the several sites included in this effluent management plan (EMP) is discharged from the Truckee Meadows Water Reclamation Facility (TMWRF). TMWRF, operating under NDEP Permit NEV2003506, is permitted to discharge 40 million gallons per day to Steamboat Creek, the Reno Effluent Pipeline or the Sparks Effluent Pipeline. The Sparks Effluent Pipeline serves all of the reuse sites covered in this EMP.

This Effluent Management Plan provides guidance for the land application of effluent on the City of Sparks Spanish Springs Valley sites, which will operate under NDEP permit number NEV2004530, a copy of which is included in Appendix A.

This plan outlines the requirements for disposal of a portion of the effluent from TMWRF by effluent irrigation at six sites and three construction water truck fill stations in the Spanish Springs Valley. The irrigation sites will operate seasonally while the truck fill station may be operational year-round.
2.1 DISCHARGE PERMIT

The complete NDEP discharge permit for the City of Sparks Spanish Springs Sites (NEV2004530) is contained in Appendix A. Table 2.1 contains excerpts from the permit indicating important restrictions and compliance requirements.

2.2 EFFLUENT GUIDELINES

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 reclaimed water supplied by the Truckee Meadows Water Reclamation Facility to the eight sites listed and two fill stations.

Flow monitoring shall be recorded at the subject meter vaults at each site prior to irrigation or others use. Reclaimed water quality shall be in accordance with the limits set forth in discharge permit NEV2003506 for the Truckee Meadows Water Reclamation Facility. The discharge shall be limited and monitored by the Permittee as specified below:

Table 2.1- Excerpt From Permit Number NEV2004530

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Effluent Discharge Limitations</th>
<th>Monitoring Requirements</th>
</tr>
</thead>
<tbody>
<tr>
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<td>30 Day Average</td>
<td>Daily Max</td>
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<tr>
<td>Total Flow:</td>
<td>0.990 MGD</td>
<td>1.224 MGD</td>
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<tr>
<td>Million Gallons per Month (MGM)</td>
<td>Monitor and Report</td>
<td>Monitor and Report</td>
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<td>Annual Application Volume (AF)</td>
<td>1024.21 Acre-Feet/Year</td>
<td>Cumulative</td>
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<tr>
<td>Fecal Coliform (CFU, MPN)</td>
<td>2.2 CFU (MPN)/100 ml</td>
<td>23 CFU (MPN)/100 ml</td>
</tr>
</tbody>
</table>
In addition to the discharge limitations and the monitoring requirements outlined in Table 2.1 the permit requires the following (excerpt from NDEP Permit Number NEV2004530):

**General**

1. The Permittee shall provide documentation to the Division that notification has been made to the local water purveyor and local health agency of the Permittee’s use of effluent at these facilities. The documentation shall describe the plan for compliance with the cross-connection control requirements of the local water purveyor and health agency. This documentation shall be received prior to effluent re-use as detailed in the schedule of compliance.

2. There shall be no discharge of substances that would cause a violation of water quality standards of the State of Nevada.

3. The permittee shall remit an annual review and services fee in accordance with NAC 445A.232 starting July 1, 2005 and every year thereafter until the permit is terminated.

4. The Discharge Monitoring Reports (DMRs) must be signed by the city of Sparks designated responsible person in charge. 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.

5. The Permittee shall provide a copy of a brief, clearly worded document which describes the possible hazards and proper hygiene of working with and around treated wastewater to all ground keepers and other affected personnel at each site. Copies shall be included in the EMP.

6. Schedule of compliance
   - The permittee shall achieve compliance with the effluent flow monitoring requirements, the approved EMP and other conditions of this permit upon issuance of the permit.
   - Prior to effluent reuse, the Permittee shall submit the cross-connection control documentation for the new sites required by part I.B.10.

**Effluent Irrigation**

7. The effluent irrigation shall not cause objectionable odors on or off the site.

8. The irrigation systems, truck fill stations, and ancillaries shall be constructed and operated in accordance with plans approved by the Division.
9. **Irrigated areas and truck fill stations shall be posted with conspicuous warning signs clearly stating that reclaimed water is utilized and to avoid contact. Ancillary equipment shall be clearly marked to indicate use with effluent.**

10. **Irrigation of the streetscapes, common areas, parks and school areas shall be performed in such a manner as to reduce standing water to a minimum and to prevent run-off.**

11. **Drinking water fountains where present shall be covered during effluent irrigation.**

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](http://ndep.nv.gov/bwpc/wts1a.pdf). A copy of this is included in Appendix B. The WTS - 1B General design criteria for preparing an effluent management plan, [http://ndep.nv.gov/bwpc/wts1b.pdf](http://ndep.nv.gov/bwpc/wts1b.pdf) is in Appendix C.
2.3 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 of fecal coliform was below 2.2 c.f.u./100mL throughout 2003. The single maximum value of fecal coliform bacteria exceeded 23 c.f.u./100ml only once, measuring 300 c.f.u./100mL on December 11, 2003. Refer to Figure 2.1: 2003 TMWRF Monthly Geometric Mean Fecal Coliform (MPN/100ml) and Figure 2.2: 2003 TMWRF Fecal Coliform (MPN/100ml). Also enclosed is a copy of the 2003 TMWRF Performance Summary Sheet (Figure 2.3). The following table is an excerpt from NDEP guidelines.

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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>
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2.4 MONITORING WELLS

Monitoring wells can be required to determine if the irrigation is degrading the groundwater quality down-gradient from the re-use site. Monitoring wells are not required for any of the sites covered by this EMP because of the quality of the effluent being used.
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Geometric Mean: 0.3589 1.1885 1.5993 1.2030 0.7054 1.0473 1.0000 0.2476 0.7302 1.0000 1.0234 0.6934

Mean: 1.0645 1.5571 2.0000 1.3333 1.0000 1.0667 1.0000 1.0323 1.0667 1.0000 1.0333 10.9677

Average: 1.0645 1.3571 2.0000 1.3333 1.0000 1.0667 1.0000 1.0323 1.0667 1.0000 1.0333 10.9677
### Figure 2.3 - 2003 TMWRF Performance Summary Sheet

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

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<td>0.13</td>
<td>0.2</td>
<td>1.74</td>
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</table>
2.5 HYGIENE

One of the major concerns with spray irrigation of wastewater effluent is aerosols containing pathogens. 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 50µm in diameter that are suspended in the 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).

The nighttime irrigation schedule will minimize the risk of public exposure to effluent.

Some of the risks and precautions to be taken while using reclaimed wastewater for irrigation are listed below:

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.
2.6 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 runoff and maintain safety in the event of an emergency.

In the case of an emergency the site personnel are to complete the following steps:

1. Shut off the effluent supply at the gate valve called out on the site plans in each appendix.

2. Call the Maintenance Personnel for the site where the run-off is occurring and Mike Biselli at 353-2271 (See SECTION 4 – STAFF CONTACTS AND COMMUNICATION PROCEDURES ON PAGE 18)

3. The Permittee shall Notify the Division of Environmental Protection within 24 hours of any diversion, bypass, spill, upset, overflow or release of treated or untreated discharge other than that which is authorized by the discharge permit. Using the Reclaimed Water Run-Off Reporting Sheet located in Section 6, 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.

2.7 CROSS CONNECTION CONTROL REQUIREMENTS

A. Certification

1. Per NDEP’s WTS - 1A “General Design Criteria for Reclaimed Water Irrigation Use,” (Appendix B) prior to approval of the discharge permit the Permitee must submit their EMP to the water purveyor (TMWA or Washoe Department of Water Resources) for cross connection control certification.

2. The permitee must abide by TMWA’s or Washoe County Department of Water Resources’ engineering and construction standards found in Appendix D for all new construction sites.

3. A copy of the final Effluent Management Plan will be sent to TMWA and Washoe County Department of Water Resources 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 or Washoe County Department of Water Resources.

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.
2.8 PUBLIC NOTIFICATION

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

![Sign]

Signs are to be placed at all corners, gates and at 300 ft. intervals around the indicated areas. Other suggestions for public notification are:

1. Once per year notice in the local newspaper.
SECTION 3 – RECLAIMED WATER IRRIGATION

3.1 SITE LOCATION

The re-use sites are in the City of Sparks and in unincorporated areas of the Spanish Springs Valley. Refer to Figure 3.1 for an overall vicinity map of the Spanish Springs Reuse sites. Site-specific information is included in Appendices H through N.

3.2 SOILS

Site-specific soil data is included in Appendices H through N for each reuse site.

3.3 IRRIGATION PLAN

An irrigation plan for each reuse site is included in the respective appendix. Each site will adopt a plan that minimizes the likelihood of public contact with the effluent and prevents effluent ponding or runoff.

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. If ponding or line breaks should occur they will be quickly identified and repaired.

3.4 IRRIGATION SYSTEM

Each reuse site has a meter to total all effluent delivered to that site. A pressure reducing-pressure sustaining valve is located immediately upstream of the meter at all sites to protect the irrigation system and maintain system pressure. The pressure-sustaining feature is initially set at approximately 60 psi for all sites and will be adjusted as necessary as new users connect to the main pipeline. Refer to the respective appendices for meter vault location and on-site irrigation system plans.
3.5 IRRIGATION REQUIREMENTS

The expected irrigation requirements for all sites are tabulated in Appendix F and detailed in the respective appendix.

3.6 EFFLUENT STORAGE

No effluent storage will occur at any of the reuse sites covered by this EMP.

3.7 ON-SITE EFFLUENT TREATMENT

No additional effluent treatment will occur at any of the reuse sites covered by this EMP.

3.8 NUTRIENT UPTAKE

Please see Appendix G for the detailed nitrogen worksheet provided by NDEP. The TMWRF effluent, based on 2003 monitoring data, averaged 1.73 mg/L nitrogen. The average value for phosphorous during the year was 0.29 mg/L. Figure 3.2 shows the effluent nitrogen and phosphorous data for 2003.

The nutrients applied to the soil should be balanced with the nutrients removed by the turfgrass. Table 3.1 illustrates the nutrients removed by a variety of grasses. For the reuse sites the nitrogen supplied by effluent may not satisfy the turfgrass nitrogen requirement and 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 3.1 - Nutrient Uptake Rates (EPA, 1981 & Pettygrove et al., 1986)

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

Note: Multiply kg/ha*yr by 0.89 to obtain lbs/acre.
Figure 3.2 - TMWRF 2003 Nitrogen and Phosphorous (mg/l)
3.9 NITROGEN BALANCE

A working nitrogen balance is necessary for the determination of all nitrogen applied to the soil. This is based upon the amount applied during irrigation with effluent and the application of fertilizer. A balance may be developed by totaling the amount of nitrogen from both of these sources and subtracting out the nitrogen used by the grass (uptake). If the plants in the area use more nitrogen than is being supplied from the irrigation water, it may be necessary to add additional nitrogen in the form of fertilizer.

A Yearly Nitrogen Balance Worksheet has been included in Section 6. To complete the form, one must insert the average nitrogen level from TMWRF, the total effluent flow, and the irrigation area. One can then calculate the nitrogen applied to the soil in lbs/acre-year and compare the amount to the nitrogen uptake rate for the type of grass or plant receiving the effluent application.

For the City of Sparks Spanish Springs reuse sites an assumed flow of approximately 333.78 million gallons/year, irrigated area of 403 acres and average effluent nitrogen content of 1.73 mg/l was entered into the balance worksheet. The result is total nitrogen applied from effluent of 9.56 lbs/acre-year. Per Table 3.1, the nutrient uptake for Kentucky bluegrass is 200 Kg/ha-year or 178 lbs/acre-year. The grass will easily uptake the nitrogen and overloading the soil with nitrogen is unlikely. In fact, additional fertilization will be necessary. Re-use site managers must monitor the amount of fertilizer applied to achieve the proper nitrogen balance. Application rates that allow the transport of nutrients beyond the active root zone will not be allowed.

NDEP has a detailed nitrogen worksheet as part of Appendix One of WTS-IB: General Criteria For Preparing An Effluent Management Plan. As a requirement of the discharge permit, the permittee must calculate the Consumptive Use Balance for each month based upon the parameters listed in Appendix One of WTS-IB. Refer to the completed NDEP Consumptive Use Requirement Worksheet and Water Requirement Design Worksheet in Appendix G.
SECTION 4 – STAFF CONTACTS AND COMMUNICATION PROCEDURES

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

TMWRF

**Randall Gray**
TMWRF Manager
Truckee Meadows Water Reclamation Facility
P.O. Box 857
Sparks, Nevada 89432-0857
8500 Clean Water Way
Reno, Nevada 89502
775-861-4102
rgray@ci.sparks.nv.us

NDEP

**Weekday:**
Front Office
(775) 687-9418

Valerie King, Enforcement Branch Supervisor
(775) 687-9427

Diana Silsby, Enforcement Officer
(775) 687-9438

**After Hours**
1-888-331-6337

CITY OF SPARKS

**Shawn Gooch**
Civil Engineer II
City of Sparks
431 Prater Way
Sparks, NV 89432
(775) 353-7824
sgooch@ci.sparks.nv.us

**Mike Biselli**
Maintenance Services Manager
City of Sparks
431 Prater Way
Sparks, NV 89432
(775) 353-2271

**Chris Nicholas**
Maintenance Supervisor
City of Sparks
431 Prater Way
Sparks, NV 89432
(775) 353-2366

*In case of an emergency:*

1) Refer to the Run-Off Control Plan on Page 10.
2) The grounds personnel are to contact Mike Biselli and Chris Nicholas immediately
SECTION 4.2 COMMUNICATIONS PROCEDURES

The communication procedures between all parties involved is as follows:

1. The maintenance personnel are to report to their Maintenance Supervisor who is listed in the staff contacts on page 18.

2. The Maintenance Supervisor will then contact Mike Biselli, the Maintenance Services Manager, who is listed in the staff contacts on page 18.

3. Mike Biselli the Maintenance Services Manager will then contact:
   
   a. The Nevada Department of Environmental Protection contact as 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.
SECTION 5 - DISCHARGE MONITORING REPORT (DMR)

5.1 MONITORING REQUIREMENTS

A. Water Inventory
   1. Total effluent reuse flow (continuous monitoring using totalizer readings)
   2. Annual effluent application volume (ac-ft/year)

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

5.2 REPORTING

The Permittee (City of Sparks) shall submit quarterly Discharge Monitoring Reports (DMR) to NDEP. The City of Sparks is also responsible for the effluent quality as it discharges from TMWRF and will coordinate the dissemination of the required data necessary to complete the DMR. This will include TMWRF fecal coliform data, TMWRF nitrogen data, and recorded effluent flow meter data from the re-use site meter vaults. A DMR form is included in Section 6.

The Permittee shall calculate the Consumptive Use Balance for each month based upon the parameters listed in Appendix One of WTS-1B (Appendix C). The annual application volume limit and monthly maximum limit shall be determined from this balance. The annual application volume limit shall be submitted with the 4th Quarter DMR. If the actual annual application volume or monthly maximum volume exceeds the calculated annual application limit or monthly maximum limit, the Permittee shall prepare a report which includes an evaluation of the application rates in the EMP, an explanation of conditions (overseeding, reseeding, extraordinary weather conditions, etc.) which lead to the exceedance, and any planned changes the Permittee deems necessary. This evaluation shall be submitted with the fourth quarter DMR.
5.3 NITROGEN LOADING CALCULATIONS

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 G.
SECTION 6 - COMPLETE SET OF FORMS AND CHARTS FOR REQUIRED INFORMATION
### National Pollutant Discharge Elimination System (NPDES)
#### Discharge Monitoring Report (DMR)

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<thead>
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<th>Name/Title (Principal Executive Officer)</th>
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<td>COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)</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.)

Signature of Principal Executive Officer or Authorized Agent

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NOTE: Read instructions before completing this form.
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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</tbody>
</table>
YEARNING NITROGEN 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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<table>
<thead>
<tr>
<th>Estimated Amount of Discharge:</th>
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<th>Flow Path of Discharge:</th>
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</table>

<table>
<thead>
<tr>
<th>Bodies of Water Discharge Reached:</th>
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<table>
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<th>Cause of Discharge:</th>
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<th>Corrective Actions Taken:</th>
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</table>

<table>
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<tr>
<th>Preventative Actions Taken to Prevent Future Discharge:</th>
</tr>
</thead>
</table>
WTS-1B: 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 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 EC_w 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).

\[
L_w_{(c)} = \frac{(ET-P)}{(E \times (1-L_r))} \\
L_r = \frac{EC_w}{[(5 \times EC_e) - EC_w]}
\]

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
  For example: 75% = 75/100 = 0.75; example efficiencies are included below;
- \(EC_e\) = 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" (Websters 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:

<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>0.70 - 0.80</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>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>
“Ee” - 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 Ee value which would result in a 0% reduction of crop yield. The upper end of the range identifies the Ee value which could result in a 25% reduction of crop yield\(^{(3)}\).

Example Ee’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
- Bermuda grass\(^{(2,4)}\) = 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.
\(^{(2)}\) 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 = ________________

\[ \text{Lw}_{(c)} = \frac{(\text{ET}-\text{P})}{[\text{E} \times (1-\text{Lr})]} ; \quad \text{Lr} = \frac{\text{EC}_w}{[(5 \times \text{EC}_e)-\text{EC}_w]} ; \quad \text{EC}_w = \text{TDS} \div 640 \]

(A) Annual Evapotranspiration (ET, in/yr) = ___________
(Multiply by Crop Coefficient (Ke) 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) = \text{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 I-B

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

Page ______ of ______ Crop Type = ____________________

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

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 \( Lw_{\text{ct}} \), 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 = \( Lw_{ct} \) in/mo x _ ac = 12 in/ft x 43,560 ft²/ac x 7.481 gals/ft³ ÷ 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_{ct} (in/mo)</th>
<th>M Gals/Mo</th>
<th>MGD</th>
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<td>Totals (in/yr):</td>
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Note: These results 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 volatilization in the soils, and allowable percolate nitrogen concentration. The equation included below is from Wastewater Engineering: Treatment, Disposal, and Reuse, (Metcalf and Eddy, 1991)

\[
Lw_{(w)} = \frac{[(Cp, \text{mg/l}) \times (P-ET, \text{in/yr})] + [(U, \text{lb/acre-yr}) \times (4.4)]}{[(1-f) \times (Cn, \text{mg/l})] - (Cp, \text{mg/l})}
\]

where:
- \(Lw_{(w)}\) = 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_{(w)}) 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 = __________________

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

(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 (I) = __________

(J) 1 - (I) = __________

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

(L) (J) x (K) = __________

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

(N) \( \frac{H}{(M)} = Lw_{(n)} \) (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 = ________________

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

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 sources. Please see the explanation in the "WTS-IB: 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-IB: 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 \( Lw_{\text{in}} \), 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/acre-mo) = \( U \) (lb/acre-yr) \times ET(in/mo) + ET (total in/yr)

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

(Month) (Days/Mo) (P (in/mo)) (ET (in/mo)) (U (lb/acre-mo)) (Lw_{\text{in}}) (in/mo) (M Gals/Mo) (MGD of Recl'md Water)

<table>
<thead>
<tr>
<th>Month</th>
<th>Days/Mo</th>
<th>P (in/mo)</th>
<th>ET (in/mo)</th>
<th>U (lb/acre-mo)</th>
<th>Lw_{\text{in}} (in/mo)</th>
<th>M Gals/Mo</th>
<th>MGD of Recl'md Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
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Totals:        |        |            |            |                |                         |           |                     |

Note: The values for P, ET and Lw_{\text{in}} 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.

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

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

**Crop Name and Nitrogen Uptake Requirement**

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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


FEMA, 1994. Flood insurance Rate Maps, Washoe County.


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

APPENDIX A – TMWRF NDEP DISCHARGE PERMIT

NDEP DISCHARGE PERMIT FOR CITY OF SPARKS SPANISH SPRINGS SITES:

THE VINEYARDS – DISC DRIVE
BARCELONA CROSSING-SPARKS BLVD.
KILEY WEST – SPARKS BLVD
SPANISH SPRINGS REGIONAL SPORTS COMPLEX
THE FOOTHILLS – VISTA BLVD. – PIONEER MEADOWS
CALLE De La PLATA - HAWCO BUSINESS PARK
SHA-NEVA FILL STATION
NEVADA DIVISION OF ENVIRONMENTAL PROTECTION

AUTHORIZATION TO DISCHARGE

In compliance with the provisions 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

Contact Entity: City of Sparks

is authorized to discharge reclaimed water 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 the following reclaimed water utilization sites:

Nevada Agricultural Experiment Station, UNR NEV92012;
Wild Creek Golf Course, RSCVA, NEV95007;
Various sites, Sparks Public Works Department, NEV95005;
D'Andrea Golf Course, D'Andrea Nevada LLC NEV2000509;
Various sites, Washoe County School District
Various sites, Washoe Co. Parks and Recreation To be assigned; and
Truck fill and Landscaping at the Truckee Meadows Water Reclamation Facility;

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 March 27, 2004.

This permit and the authorization to discharge shall expire at midnight, March 26, 2009.

Signed this 17th day of March, 2004.

Bruce Holmgren
Bureau of Water Pollution Control

p:\LNV and nevTMWR\freuse\2003\2003506f.pmt
### Part I

#### I.A. Effluent Limitations, Monitoring, and Conditions

There shall be no discharge from the facility property except as authorized by this permit or by permit NV0020150; 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.

#### 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 provide reclaimed water from the Truckee Meadows Water Reclamation Facility (TMWRF) for permitted beneficial uses.

- Effluent samples and/or measurements taken in compliance with the monitoring requirements specified below shall be collected at:
  - The TMWRF reclaimed water flow meter;
  - The flow meters at the individual reclaimed water reuse sites (for permits with multiple sites: report total reclaimed water supplied for each reuse permit); and
  - The TMWRF reclaimed water sampling port.

Other permitted reclaimed water utilization sites may be added to this permit and the permitted flow to the reuse sites may be increased as minor modifications, provided that the 39.5 million gallons per day maximum flow will not be exceeded.

- The effluent discharge shall be limited and monitored in accordance with the following specifications:

#### Effluent Discharge Limitations Table

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Discharge Limitations</th>
<th>Monitoring Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30-Day Average</td>
<td>Daily Maximum</td>
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<tr>
<td>Flow, Total, MGD</td>
<td>—</td>
<td>39.5</td>
</tr>
<tr>
<td>NEV92012, MGD</td>
<td>5.8&lt;sup&gt;1&lt;/sup&gt;</td>
<td>7.7&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>NEV95005, MGD</td>
<td>9.5&lt;sup&gt;1&lt;/sup&gt;</td>
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<td>NEV95007, MGD</td>
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<td>5.0&lt;sup&gt;1&lt;/sup&gt;</td>
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<tr>
<td>NEV2000509, MGD</td>
<td>0.53&lt;sup&gt;1&lt;/sup&gt;</td>
<td>0.79&lt;sup&gt;1&lt;/sup&gt;</td>
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<tr>
<td>NEV2003513, MGD</td>
<td>1.51&lt;sup&gt;1&lt;/sup&gt;</td>
<td>1.80&lt;sup&gt;1&lt;/sup&gt;</td>
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<td>Washoe Co. P&amp;R, MGD</td>
<td>2.96&lt;sup&gt;1&lt;/sup&gt;</td>
<td>3.53&lt;sup&gt;1&lt;/sup&gt;</td>
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<td>NEV2003506, MGD</td>
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<tr>
<th>Biochemical Oxygen Demand, 5-day, Uninhibited, mg/L</th>
<th>20</th>
<th>30</th>
<th>iii.</th>
<th>3 Times/Week</th>
<th>Composite</th>
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<tr>
<td>Total Suspended Solids, mg/L</td>
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<td>30</td>
<td>iii.</td>
<td>3 Times/Week</td>
<td>Composite</td>
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<tr>
<td>Fecal Coliform, cfu or mpn per 100 mL</td>
<td>2.2</td>
<td>23</td>
<td>iii.</td>
<td>Daily</td>
<td>Discrete</td>
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<td>pH, su</td>
<td>6.5 ≤ pH ≤ 8.5</td>
<td>iii.</td>
<td>Daily</td>
<td>Discrete</td>
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<tr>
<td>Total Nitrogen Species -N, mg/L</td>
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<td>10</td>
<td>iii.</td>
<td>Weekly</td>
<td>Composite</td>
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<tr>
<td>Total Dissolved Solids, mg/L</td>
<td>Monitor and Report</td>
<td>iii.</td>
<td>Weekly</td>
<td>Discrete</td>
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Notes:

1. These values are for guidance purposes only. The reclaimed water user, not the supplier, shall be responsible for limiting the volume of reclaimed water used at the permitted sites. The Permittee may only supply reclaimed water to sites listed in this permit.
2. For reuse permitw with multiple sites, report flows for the permit, not individual sites.
3. If the TMWRF landscape irrigation flow can be estimated, it is not necessary to install a flow meter for quantification. If estimated, the method of estimation must be explained in the TMWRF Effluent Management Plan.

MDG: Million gallons per day.
mg/L: Milligrams per liter.
cfu: Colony forming units.
mpn: Most probable number.
mL: Milliliter.
SU: Standard Units.
-N: As nitrogen.

I.A.3. Odors: There shall be no objectionable odors from the collection system, treatment facility, or distribution system.

I.A.4. Visibility Parameters: There shall be no discharge of floating solids or visible foam in other than trace amounts.


I.A.6. Facility Construction: Collection, treatment, and/or distribution system shall be constructed in conformance with plans approved by the Nevada Division of Environmental Protection (Division). All plans must be approved by the Division prior to the start of construction and must be stamped by a Professional Engineer registered in the State of Nevada. All changes to any plans approved by the Division must be stamped by Professional Engineer registered in the State of Nevada and re-approved by the Division prior to implementation.

I.A.7. Process Operations and Maintenance: The facility shall be operated in accordance with a Division-approved Operations and Maintenance (O&M) Manual and Effluent Management Plan (EMP). The O&M Manual and/or EMP shall be updated whenever there is a change in the operation of the facility.
I.A.8.  Operations and Maintenance of Permitted Activities: The Permittee shall operate the permitted facility in compliance with permit provisions and requirements, and in accordance with the approved O&M Manual and EMP.

I.A.9.  Conveyance System Identification: The reclaimed water conveyance systems shall be clearly labeled or otherwise demarked to the satisfaction of the Division as containing reclaimed water. The Divisions guidance document WTS-1A is recommended to be used as guidance on this requirement.

I.A.10. 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.11. 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 or conditions confirmed by subsequent monitoring data. This permit may also be re-evaluated and modified by the permitting authority to incorporate alternative permit conditions determined to be appropriate based on subsequent monitoring data and/or effluent toxicity information.

I.A.12. 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.13. 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. The Permittee shall implement and/or execute the following scheduled compliance requirements:

a. Upon the effective date of this permit, the Permittee shall achieve compliance with the permit conditions and limitations.

b. Within ninety (90) days of the permit effective date, the Permittee shall submit to the Division for review and approval an Operations and Maintenance Manual for the reclaimed water distribution system.

c. Within ninety (90) days of the permit effective date, the Permittee shall submit to the Division for review and approval an Effluent Management Plan for the TMWRF reclaimed water landscape irrigation.

d. Thirty (30) days prior to increasing the flow of reclaimed water to any of the permitted facilities listed in the Effluent Discharge Limitations table of this permit, Part I.A.1.b., the Permittee shall provide written notification of the proposed flow increase to the Division.

e. Thirty (30) days prior to providing reclaimed water to any facility not listed in the Effluent Discharge Limitations table of this permit, Part I.A.1.b., the Permittee shall provide written notification of the proposed new user of TMWRF reclaimed water:

All schedule of compliance submittals and evidence of compliance documents shall be submitted to the Bureau Compliance Coordinator.

There are no special conditions.
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 Code of Federal Regulations (CFR) 136 published pursuant to Section 304(h) of the Clean Water Act, Solid Waste (SW)-846 methods, or other procedures as approved by the Division. 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 by 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; 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.

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

   i. The most sensitive analytical method specified or approved in either 40 CFR 136 or SW-846 shall be used, which is required and/or approved under the Nevada State laboratory certification program; and
   ii. Each parameter shall have detection below the limit of detection or the method detection limit 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, discharge frequency, and receiving water conditions, the Division and/or 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 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 \( \frac{1}{2} \) the detection limit to represent the
non-detect results.

If fewer than four measurements are made during a month, the compliance or
noncompliance with the 30 day average concentration limitation shall not be
determined.

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

v. "Composite" sample: (for measurements other than flow-rate) means a
combination of no fewer than 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.

I.B.2. Reporting

a. Discharge Monitoring Reports: Analytical data and monitoring results shall be
summarized and/or tabulated for presentation in standardized Discharge Monitoring
Reports (DMRs). Laboratory reports for quantitative analyses conducted by State of
Nevada certified laboratories must accompany DMR submittals.

b. Schedule: DMRs shall be received by the 28\textsuperscript{th} 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 April 28, 2004. If no discharge occurs during the reporting period, report "no
discharge" on the submitted DMR.

c. Certification: DMRs must be signed by the highest ranking certified operator that is
responsible for the facility. The first DMR submitted under this permit must include the
written designation of the authorized representative elected to sign DMRs. The
designated representative responsible for facility operations must sign each subsequent
DMR submitted to the Division. If the authorized representative changes, a new
designation letter must be submitted.

d. Submittals:

i. Quarterly Reporting: Monitoring results for the effluent discharge described in
Part I.A.1. shall be summarized and tabulated for each quarter. The Permittee is
considered in compliance if the reported results are less than the established
permit limit. Any data submitted that exceeds the limits of Part I.A.1 must be
explained by a narrative. The Permittee shall also submit reported data in
electronic format compatible with Microsoft Office software (version 97 or later).

ii. Annual Report: The fourth quarter report shall contain a plot of concentration (y-
axis) versus date (x-axis) for fecal coliform and flow, cumulative and to each
permitted user. The plot shall include data from the preceding five years or the
lifetime of the permit, whichever is shorter. A narrative must explain any data
point from the current year that exceeds the limits in Part I.A.1.
iv. Compliance Report: Reports of compliance or noncompliance with, or any progress reports pertaining to, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.

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

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

A. Could significantly change the nature or increase the quantity of pollutants discharged.

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.

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

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

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 Division 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, or other public facility.
c. Changes to Authorization: If an authorization under Part I.B.3. 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. 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.263, 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 control facilities, collection and distribution systems, or pump stations installed or used by the Permittee to achieve compliance with the terms and conditions of this permit.

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, spill, overflow, or discharge of treated wastewater from conveyance facilities under the control of the Permittee is prohibited except as authorized by this permit. Release of reclaimed water that remains on the treatment plant site need not be reported, however, measures shall be taken to prevent public contact with the release. In the event the Permittee has knowledge that a diversion, spill, overflow, or discharge not authorized by this permit is probable, the Permittee shall immediately notify the Division at 775-687-9368, or 775-687-5300, after business hours.

b. The Permittee shall notify the Administrator within twenty-four (24) hours of any diversion, spill, upset, overflow, or release of treated discharge other than that which is authorized by the permit. The following shall be included as information which must be reported within 24 hours:

i. Any upset which exceeds any effluent limitation in the permit; and

ii. Any violation of a limitation for any toxic pollutant or any pollutant identified as the method to control a toxic pollutant.

c. A written report shall be submitted to the Division within five (5) days of diversion, bypass, spill, overflow, upset, or discharge detailing the entire incident including:

i. Time and date of discharge;

ii. Exact location and estimated amount of discharge;

iii. Flow path and any bodies of water which the discharge contacts;
iv. The specific cause of the discharge; and
v. The preventive and/or corrective actions taken.

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

e. 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.

f. 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 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.e.; and
iv. The Permittee complied with any remedial measures required under II.A.3.

g. 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.

h. 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.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 the wastewater control facilities; or

b. Halt or reduce all discharges upon the reduction, loss, or failure of the primary source of power to the 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 Division 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: 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:

a. Violation of any terms or conditions of this permit;

b. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts;

c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge;

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, rights, or rights of access or easement; 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. Need to Halt or Reduce Activity Not a Defense: 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 in an enforcement action.

II.B.12. 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 reissuing, 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, he shall reapply not later than 180 days before this permit expires on the application forms then in use. The renewal application shall be accompanied by the fee required by NAC 445A.232.
DISCHARGE PERMIT TO BE INSERTED HERE
Nevada Division of Environmental Protection

AUTHORIZATION TO DISCHARGE

In compliance with Chapter 445A of the Nevada Revised Statutes,

City of Sparks
431 Prater Way
Sparks, Nevada 89431

is authorized to discharge tertiary treated denitrified disinfected effluent for reuse at:

- Vineyards Truck Fill Station and Common Areas Irrigation, Winery Dr. and Sparks Blvd., Sparks NV 89434; Longitude: 119°43'13"W, Latitude: 39°35'17"N, Section 22, T.20N, R.20E, and
- Disc Drive Truck Fill Station, Sparks Blvd. and Disc Dr, Sparks, NV 89434. Longitude: 119°43'26"W.; Latitude: 39°35'05"N. Section 27, T.20N, R.20E.
- Barcelona Crossing at 5200 Sparks Blvd., Sparks, NV 89434; Longitude: 119°43'26"W., Latitude: 39°35'52"N., Section 22, T.20N., R.20E.
- Kiley West - Sparks Blvd Streetscape and Common Area, Sparks Blvd., Sparks, NV 89434; Longitude: 119°43'43"W., Latitude: 39°35'34"N., Section 22, T.20N., R.20E.
- Spanish Springs Regional Sports Complex, Spanish Springs, Sparks, Nevada 89434; Longitude: 119°40'20"W., Latitude: 39°36'33"N., Section 18, T.20N., R.21E.
- The Foothills - Vista Blvd. streetscapes, 7300 Vista Blvd., Sparks, Nevada 89434; Longitude: 119°40'22″W., Latitude: 39°38'17"N., Sections 6 & 7, T.20N., R.21E.
- Pioneer Meadows streetscape, two mini parks, commercial landscape and a school, Vista Blvd., Sparks, Nevada 89434; Longitude: 119°42'12″W., Latitude: 39°27'22"N., Section 11, T.20N., R.20E.
- Calle de La Plata streetscapes on Calle de La Plata between Eagle Canyon Road and Pyramid Highway (SR445), Sparks, Nevada 89434; Longitude: 119°40'28"W., Latitude: 39°40'28"N., Sections 22 & 23, T.21N., R.20E.
- HAWCO Business Park landscape irrigation and pressure testing effluent distribution piping, 9732 SR 445, Sparks, Nevada 89434; Longitude: 119°42'50"W., Latitude: 39°32'00"N., Section 10, T.19N., R.20E.
- Sha Nevada Truck Fill Station, 1102 Calle de La Plata, Sparks, Nevada 89434; Longitude: 119°42'31″W., Latitude: 39°41'12"N., Section 23, T.21N., R.20E.

to receiving waters named

Groundwaters of the State via effluent percolation

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

This permit shall become effective on April 12, 2005.

This permit and the authorization to discharge shall expire at midnight, April 12, 2010.

Signed this Day of April, 2005.

[Signature]

Icy C. Mulligan, ES MS
Bureau of Water Pollution Control

A:SPARKSPK4.PMT
PART I

Introduction: The City of Sparks Department of Public Works proposes to supply and manage the use of treated effluent for irrigation of streetscapes and common area/parks and other approved uses at the subject properties listed above under the terms and conditions of this permit and the approved Effluent Management Plan. The sites are all located in the Spanish Springs area of northern Sparks, where treated effluent will be used for irrigation via spray and drip irrigation, or for construction water/dust control from two truck fill stations. Annual reclaimed water usage for the properties and fill stations is estimated to be a maximum of approximately 1024.21 acre-feet/year. Most irrigation is seasonal.

Reclaimed water is supplied by the Truckee Meadows Water Reclamation Facility (NEV2003506, formerly NV0020150). This facility (TMWRF) provides reclaimed water that meets Category B quality (NAC 445A.276) and is denitrified (below 10 mg/l N).

I.A. EFFLUENT LIMITATIONS, MONITORING REQUIREMENTS AND CONDITIONS

I.A.1. During the period beginning on the effective date of this permit, and lasting until the permit expires, the Permittee is authorized to discharge reclaimed water supplied by the Truckee Meadows Water Reclamation Facility to the eight sites listed and two fill stations.

I.A.2. Flow monitoring shall be recorded at the subject meter vaults at each site prior to irrigation or other use. Reclaimed water quality shall be in accordance with the limits set forth in NEV2003506 for the Truckee Meadows Water Reclamation Facility. The discharge shall be limited and monitored by the Permittee as specified below:

<table>
<thead>
<tr>
<th>TABLE I.1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PARAMETERS</strong></td>
</tr>
<tr>
<td>30-Day Average</td>
</tr>
<tr>
<td><strong>Total Flow:</strong></td>
</tr>
<tr>
<td>Million Gallons per Month(^2) (MGM)</td>
</tr>
<tr>
<td>Annual Application Volume(^3) (AF)</td>
</tr>
<tr>
<td>Fecal Coliform(^1) (CFU, MPN)</td>
</tr>
</tbody>
</table>

CFU = Colony Forming Units; MPN = Most Probable Number; ml = Milliliter; MGD = Million Gallons per Day

Footnotes:

1. Sample results to be obtained from NEV2003506
2. Monthly maximum based upon highest usage month determined from consumptive use balance + 10 % allowance and in accordance with the Effluent Management Plan.
3. Submit with 4th Quarter Report DMR.

I.B. EFFLUENT MANAGEMENT
I.B.1. The irrigation storage, distribution and ancillary facilities shall be operated in accordance with the Master Effluent Management Plan (EMP) which must be approved by this Division prior to the use of treated effluent. The EMP shall contain the site specific information required to comply with this permit. It is recommended that the Permittee utilize "WTS-1B: General Criteria for Preparing an Effluent Management Plan" (NDEP 2000) as a guidance to prepare the EMP.

I.B.2. The Permittee shall provide a copy of a brief, clearly worded document which describes the possible hazards and proper hygiene of working with and around treated wastewater to all grounds keepers and other affected personnel at each site. Copies shall be included in the EMP.

I.B.3. The Permittee shall calculate the Consumptive Use Balance for each month for each site, based upon the parameters listed in Appendix One of WTS-1B. The evaluation of the rates shall be included in the EMP. The annual application volume limit and monthly maximum limit shall be determined from this balance.

If the actual annual application volume or monthly maximum volume exceeds the calculated annual application limit or monthly maximum limit, the Permittee shall prepare a report which includes an evaluation of the application rates in the EMP, an explanation of conditions (overseeding, reseeding, extraordinary weather conditions, etc.) which lead to the exceedance, and any planned changes the Permittee deems necessary. This evaluation shall be submitted with the fourth quarter DMRs.

I.B.4. The EMP shall detail the procedures for collecting monitoring samples (if applicable) required by this permit.

I.B.5. The effluent irrigation or use shall not cause objectionable odors on or off the sites.

I.B.6. The irrigation systems, truck fill stations and ancillaries shall be constructed and operated in accordance with plans approved by the Division. All plans must be approved by the Division prior to the start of construction. All changes to the approved plans must be approved by the Division.

I.B.7. Irrigated areas and truck fill stations shall be posted with conspicuous warning signs clearly stating that reclaimed water is utilized and to avoid contact. Ancillary equipment (including water trucks) used for effluent shall be clearly marked to indicate use with effluent.

I.B.8. Drinking water fountains where present shall be covered during effluent irrigation.

I.B.9. Irrigation of the streetscapes, common areas, parks and school areas shall be performed in such a manner as to reduce standing water to a minimum and to prevent run-off.

I.B.10. The Permittee shall provide documentation to the Division that notification has been made to the local water purveyor and local health agency of the Permittee's use of effluent at these facilities. The documentation shall describe the plan for compliance with the cross-connection control requirements of the local water purveyor and health agency. This documentation shall be received prior to effluent reuse as detailed in the schedule of compliance.

I.B.11. All terms and conditions stated herein shall not superecede the requirements of the Nevada Division of Water Resources.

I.C. GENERAL CONDITIONS

I.C.1. There shall be no discharge of substances that would cause a violation of water quality standards of the State of Nevada.
I.C.2. The Permittee shall remit an annual review and services fee in accordance with NAC 445A.232 starting July 1, 2005 and every year thereafter until the permit is terminated.

I.C.3. The Discharge Monitoring Reports (DMRs) must be signed by the City of Sparks designated person in responsible charge. The first DMR submitted under this permit must include the written designation of the officer (required by Part III A.2) as the authorized representative to sign the DMRs. If the officer in responsible charge changes, a new designation letter must be submitted.

I.D. SCHEDULE OF COMPLIANCE

I.D.1 The Permittee shall implement and comply with the provisions of the following 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 flow monitoring requirements, the approved EMP and other conditions of this permit upon issuance of the permit.

b. Prior to effluent reuse, the Permittee shall submit the cross-connection control documentation for the new sites required by part I.B.10.

I.E. MONITORING AND REPORTING

I.E.1. Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. Analysis shall be performed by a State of Nevada certified laboratory. Results from this lab must accompany the Discharge Monitoring Report.

I.E.2. Reporting

a. Annual Report - The fourth quarter report shall contain a plot of the date (x-axis) versus concentration (y-axis) for Flows and Fecal Coliform. The plot shall include data from the preceding five years, if available. Any data point from the current year that is greater than the limits in Part I.A. must be explained by a narrative.

b. The Fourth Quarter Report shall demonstrate that the facility has maintained compliance with the annual application volume. If the annual application volume exceeds the limit listed in Table I.1, an evaluation shall be submitted with the fourth quarter report in accordance with the requirements listed in permit condition I.B.3.

c. The Fourth Quarter Report shall contain all data required to be collected annually.
Part I.E.2.

d. Quarterly Report - Monitoring results obtained during the previous three (3) months shall be summarized for each month and reported quarterly on a Discharge Monitoring Report (DMR) Form received in this office no later than the 28th day of the month following the end of each quarter. The first report is due on (July 28, 2005). 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 - Diana Silsby
333 West Nye Lane
Carson City, Nevada 89706-0851

If the monthly maximum volume exceeds the limit listed in Table I.1, an evaluation shall be submitted with the fourth quarter report in accordance with the requirements listed in permit condition I.B.3.

I.E.3. Definitions

a. The "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.

b. The "daily maximum" is the highest measurement during the monitoring period.

c. The "30-day average concentration", other than for fecal coliform bacteria, means the arithmetic mean of measurements made during a month. 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 one-half the detection limit as the value for the non-detect results.

d. A "discrete" sample means any individual sample collected in less than 15 minutes.

e. For flow-rate measurements a "composite" sample means the arithmetic mean of no fewer than six individual measurements taken at equal time intervals for 24 hours, or for the duration of discharge, whichever is shorter.

For other than flow-rate a "composite" sample means a combination of no fewer than six 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.
I.E.4. Test Procedures

Test procedures for the analysis of pollutants shall conform to regulations (40 CFR, Part 136) published pursuant to Section 304(h) of the Act, under which such procedures may be required unless other procedures are approved by the Division.

I.E.5. Recording the Results

For each measurement or sample taken pursuant to the requirements of this permit, the Permittee shall record and maintain at the facility, the following information:

a. the exact place, date, and time of sampling;
b. the dates the analyses were performed;
c. the person(s) who performed the analyses;
d. the analytical techniques or methods used; and
e. the results of all required analyses.

I.E.6. 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 the calculation and reporting of the values required in the Discharge Monitoring Report Form. Such increased frequency shall also be indicated.

I.E.7. Records Retention

All records and information resulting from the monitoring activities 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 three (3) years, or longer if required by the Administrator.

I.E.8. Modification of Monitoring Frequency and Sample Type

After considering monitoring data, stream flow, discharge flow and receiving water conditions, the Division, may for just cause, modify the monitoring frequency and/or sample type by issuing an order to the Permittee.

I.E.9. All laboratory analysis conducted in accordance with this discharge permit must have detection at or below the permit limits.

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
Part II.A.1. Continued

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 Nevada Administrative Code NAC 445A.283 to 445A.285. Pursuant to NAC 445A.263, the permit may be modified to specify and limit any pollutants not previously limited.

II.A.2. Facilities Operation

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.

II.A.3. Adverse Impact

The Permittee shall take all reasonable steps to minimize any adverse impact to receiving waters 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.

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, conveyance facilities, or holding ponds under the control of the Permittee is prohibited except as authorized by this permit. 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 Division immediately.

b. The Permittee shall notify the Division within twenty-four (24) hours of any diversion, bypass, spill, upset, overflow, or release of treated or untreated discharge other than that which is authorized by the permit. 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:

(1) time and date of discharge;
(2) exact location and estimated amount of discharge;
(3) flow path and any bodies of water which the discharge reached;
(4) the specific cause of the discharge; and
(5) the preventive and/or corrective actions taken.

c. The following shall be included as information which must be reported within 24 hours: any unanticipated bypass which exceeds any effluent limitation in the permit; any upset which exceeds any effluent limitation in the permit; and violation of a limitation for any toxic pollutant or any pollutant identified as the method to control a toxic pollutant.

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

E. An "upset" means an incident in which there is unintentional and temporary noncompliance with the 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.

F. In selecting the appropriate enforcement option, the Division shall consider whether or not the noncompliance was the result of an upset.

G. The burden of proof is on the Permittee to establish that an upset occurred.

In order to establish that an upset occurred, the Permittee must provide, in addition to the information required under paragraph II.A.4.b. above, properly signed contemporaneous logs or other documentary evidence that:

1. The facility was at the time being properly operated as required in paragraph II.A.2. above; and

2. All reasonable steps were taken to minimize adverse impacts as required by paragraph II.A.3. above.

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.B. RESPONSIBILITIES

II.B.1. Right of Entry

The Permittee shall allow the Administrator and/or his authorized representatives, upon the presentation of credentials:

A. to enter 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; and

B. at reasonable times, to have access to and copy any records required to be kept under the terms and conditions of this permit; to inspect any monitoring equipment or monitoring method required in this permit; and to perform any necessary sampling to determine compliance with this permit or to sample any discharge.
Part II.B.

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. ALL transfer of permits shall be approved by the Division.

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 Division. 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

Nevada Revised Statutes 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

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:

a. violation of any terms or conditions of this permit;
b. obtaining this permit by misrepresentation or failure to disclose fully all relevant facts;
or
c. a change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

II.B.7. Toxic Pollutants

Notwithstanding Part II.B.6. above, 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 or any invasion of personal rights, nor 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.

PART III

III.A. OTHER REQUIREMENTS

III.A.1. Reapplication

If the Permittee desires to continue to discharge, he shall reapply not later than 180 days before this permit expires on the application forms then in use. The Permittee shall submit the reapplication fee required by NAC 445A.232 with the application.

III.A.2. Signatures required on application and reporting forms.

   a. Application and reporting forms submitted to the department must 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/her 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, or other public facility.

   b. Each application must contain a certification by the person signing the application that he is familiar with the information provided, that to the best of his knowledge and belief the information is complete and accurate and that he has the authority to sign and execute the application.
Part III.A.2.

c. Changes to Authorization. If an authorization under paragraph b. of this section 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 paragraph b. of this section must be submitted to the Division prior to or together with any reports, information, or applications to be signed by an authorized representative.

III.A.3. Holding Pond Conditions

If any effluent is placed in ponds, such ponds shall be located, operated and constructed so as to:

a. contain with no discharge the once-in-a-twenty-five year 24 hour storm at said location;

b. withstand the once-in-one-hundred year flood of said location without physical damages to berms and other pond structures;

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

d. maintain freeboard at a minimum of 2 feet, unless otherwise approved by the Division.
APPENDIX B - NDEP 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 judgment 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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WORKER HYGIENE FACT SHEETS ............................................................. Appendix Four
NOTIFICATION SIGN EXAMPLES ............................................................... Appendix Five
REUSE REFERENCE LIST .............................................................................. Appendix Six
NEVADA ADMINISTRATIVE CODE - REUSE REGULATIONS .................. Appendix Seven
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.

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 aquicludes
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

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 outake 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.

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)
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 \((L_r)\) 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 EC\(_w\) 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).

\[
L_{w(c)} = \frac{(ET-P)}{[E \times (1-L_r)]} \quad L_r = \frac{EC_w}{[(5 \times EC_w)-EC_w]}
\]

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)
For example: 75% = 75/100 = 0.75; example efficiencies are included below;
\(EC_e\) = Salinity Tolerance of Plant Crop (mmho/cm or dS/m\(^{(1)}\));
\(EC_w\) = 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” (Websters 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 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:\(^{(4)}\):

<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 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>

"EC_e" - 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 EC_e value which would result in a 0% reduction of crop yield. The upper end of the range identifies the EC_e value which could result in a 25% reduction of crop yield:\(^{(4)}\):

Example EC_e'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\(^{(3,4)}\) = 2.0 to 5.4 mmho/cm or dS/m

"EC_w" - Salinity of Applied Effluent
Direct measurement of EC_w is typically preferred. However, if the laboratory has supplied the reuser with a concentration of TDS, an approximate conversion\(^{(4)}\) is EC_w ≈ TDS ÷ 640. This conversion is considered accurate within 10%. The value for EC_w 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)
CONSUMPTIVE USE REQUIREMENT WORKSHEET:
Maximum Loading Rate Based on Plant Water Use Requirements

Page _____ of _____  Crop Type = _____________________

\[ Lw_{(c)} = \frac{(ET-P)}{E \times (1-Lr)}; \quad Lr = \frac{ECw}{(5 \times ECe) - ECw}; \quad ECw \approx TDS \times 640 \]

(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 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 = _________________

\[ Lw_{(c)} = \frac{(ET-P)}{[E \times (1-Lr)]} \]
\[ Lr = \frac{ECw}{[(5 \times E_Ce)-ECw]} \]
\[ ECw \approx TDS \div 640 \]

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 \( Lw_{(c)} \), 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 = \( Lw_{(c)} \) in/mo x _______ ac ÷ 12 in/ft x 43,560 ft²/ac x 7.481 gals/ft³ ÷ 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_{(c)} ) (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 1-A.
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)

\[
Lw_{(n)} = \frac{[(C_p, mg/l) \times (P - ET, in/yr)] + [(U, lb/acre-yr) \times (4.4)]]}{[(1-f) \times (Cn, mg/l)] - (C_p, mg/l)}
\]

where:
- \(Lw_{(n)}\) = 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;
- \(Cn\) = 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(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 (Ke) can be used to modify the potential ET for a particular area. Values for Ke 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.

"I" - 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 "I" 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 = ____________________

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

(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) 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(m) (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 = ________________

\[ \text{Lw}_{(a)} = \frac{(C_p \times (P-ET)) + (U \times 4.4)}{((1-f) \times C_n) - C_p} \]

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 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 \( \text{Lw}_{(a)} \), perform the calculation for each month as outlined in Worksheet 2-A, using the monthly values for “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 \text{ET(in/mo)} \div \text{ET (total in/yr)}

Million Gallons = \( \text{Lw}_{(a)} \) 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} \text{ Per Month}

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

<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_{(a)} (in/mo)</th>
<th>M Gals/Mo</th>
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</table>

Note: The totals for P, ET and \( \text{Lw}_{(a)} \) 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.

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

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 = 
\[
\text{(lbs/ac-yr)}
\]

<table>
<thead>
<tr>
<th>Month</th>
<th>Days/Mo</th>
<th>Million Gallons</th>
<th>MGD of Irrigation</th>
<th>Effluent N</th>
<th>Effluent N</th>
<th>Fertilizer N</th>
<th>Total N Applied</th>
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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.
WTS-IA: APPENDIX THREE

PERMEABILITY LIMIT WORKSHEET

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).

\[ L_{wp} = ET - P + Wp \]

where:
- \( L_{wp} \) = 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 reusers 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 = ______________________

\[ L_{w_{(p)}} = ET - P + Wp \]

(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) \( (C) \times \text{____ hr/day} \times 365 \text{ days/yr} = \text{inches/year} = \text{_______} \)

(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) = \((D) \times (E) = \text{_______} \)

(G) \( (A) - (B) + (F) = L_{w_{(p)}} \) (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 = ______________________

\[ L_{w_{(p)}} = ET - P + W_p \]

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 source. Please see the explanation in the “WTS-1A: Appendix Three” text for further discussion of crop coefficients.

To calculate the monthly value for \( L_{w_{(p)}} \), perform the calculation for each month as outlined in Worksheet 3-A, and input the result in the table below.

\[ \text{Million Gals/Mo} = L_{w_{(p)}} \text{ in}/\text{mo} \times \text{______ # acres} \div 12 \text{ in}/\text{ft} \times 43,560 \text{ ft}^2/\text{ac} \times 7.481 \text{ gals}/\text{ft}^3 \div 1,000,000 \\
\text{(ca. crop type)} \]

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

<table>
<thead>
<tr>
<th>Month</th>
<th>Days/Mo</th>
<th>ET (in/mo)</th>
<th>P (in/mo)</th>
<th>( L_{w_{(p)}} ) (in/mo)</th>
<th>M Gals/Mo</th>
<th>MGD</th>
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| Totals (in/yr): | Note: These totals should approximate the annual values calculated in Worksheet 3-A |

|               |                     |
|               |                     |
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

NOTIFICATION SIGN EXAMPLES

To Support Conservation
We Use Reclaimed Water
Do Not Drink!

IRRIGATION SIGN
Figure 4.3

Conserving for the future...
We irrigate with reclaimed water.

IRRIGATION SIGN
Figure 4.5

WE IRRIGATE WITH RECLAIMED WATER
DO NOT DRINK

IRRIGATION SIGN
Figure 4.4
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 89157-4004 ...........................................(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 oxidation 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 Com'n, eff. 9-13-91)--(Substituted in revision for NAC 445.176)

Revisor's Note.
The regulations 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."
A.276 Spray irrigation: Requirements for bacteriological quality and buffer zone limitations.

Treated effluent being used for spray irrigation must meet the following requirements for bacteriological quality and buffer zone limitations:

<table>
<thead>
<tr>
<th>Fecal Coliform</th>
<th>A</th>
<th>A(1)</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
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<td>R Reuse Permitted</td>
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<td>B</td>
<td>C</td>
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<td>400</td>
<td>240</td>
<td>23</td>
</tr>
<tr>
<td>Minimum Buffer Zone (Feet)</td>
<td>800</td>
<td>400</td>
<td>100</td>
<td>0</td>
</tr>
</tbody>
</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.

*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)
A.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 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 C - NDEP WTS-1B: GENERAL CRITERIA FOR PREPARING AN
EFFLUENT MANAGEMENT PLAN
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 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), 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 reclaimed 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.

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

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. 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.

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NOTE:

Reclaimed water meeting a 30-day geometric mean total coliform limit of 2.2 mfp (cfu)/100 ml and a daily max of 23 mfp (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.

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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>
</tbody>
</table>

<table>
<thead>
<tr>
<th>800 ft. Buffer Zone</th>
<th>400 ft. Buffer Zone</th>
<th>100 ft. Buffer Zone</th>
<th>0 ft. Buffer Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 day Fecal Coliform Geometric Mean equal to or less than: 200 mpu (cfu)/100ml. Daily Max: 400 mpu (cfu)/100ml</td>
<td>30 day Fecal Coliform Geometric Mean equal to or less than: 200 mpu (cfu)/100ml. Daily Max: 240 mpu (cfu)/100ml</td>
<td>30 day Fecal Coliform Geometric Mean equal to or less than: 2.2 mpu (cfu)/100ml. Daily Max: 23 mpu (cfu)/100ml</td>
<td></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.
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).

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

where:

- \(Lw_{(c)}\) = 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)
- \(ECe\) = Salinity Tolerance of Plant Crop (mnh/m or dS/m)
- \(ECw\) = Salinity of Applied Effluent (mnh/m); 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 users 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:

<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 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 2.5% reduction of crop yield.(2)

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(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(3) 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.

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(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.

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 = _______________________

\[ L_{w(c)} = \frac{(E_{T-P})}{[E \times (1-L_r)]}; \quad L_r = \frac{ECw}{[(5 \times ECe) - ECw]} \]

\[ ECw = TDS + 640 \]

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

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

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

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

(D) Salinity of Applied Effluent (ECw, mmho/cm) or \(= \frac{(TDS, \text{mg/l})}{640} \) = __________

(Indicate which method was used to determine ECw, Direct Measurement or Approximation by Calculation)

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

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

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

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

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

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

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

(L) \((C) \div (K) = L_{w(c)} = \) __________ (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

Crop Type = 

\[
Lw_{(c)} = \frac{(ET-P)}{[E \times (1-Lr)]}; \quad Lr = \frac{1}{Cw}; \quad ECw = TDS-640
\]

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-1B: Appendix One" text for further discussion of crop coefficients.

To calculate the monthly value for \(Lw_{(c)}\), 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.

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

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

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

<table>
<thead>
<tr>
<th>Month</th>
<th>Days/Mo</th>
<th>ET (in/mo)</th>
<th>P (in/mo)</th>
<th>(Lw_{(c)}) (in/mo)</th>
<th>M Gals/Mo</th>
<th>MGD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
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<td>31</td>
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</tbody>
</table>

Totals (in/yr): 

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 volatilization in the soils, and allowable percolate nitrogen concentration. The equation included below is from Wastewater Engineering: Treatment, Disposal, and Reuse, (Metcalf and Eddy, 1991)

\[ Lw_{(o)} = \frac{[(C_p, \text{mg/l}) \times (P-ET, \text{in/yr})] + [(U, \text{lb/acre-yr}) \times 4.4]}{[(1-f) \times (Cn, \text{mg/l})]} - (Cp, \text{mg/l}) \]

where:
- \( Lw_{(o)} \) = Allowable Hydraulic Loading Rate Based on Nitrogen Loading rate (in/yr);
- \( C_p \) = 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;
- \( Cn \) = 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 (Ke) can be used to modify the potential ET for a particular area. Values for Ke 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 = ________________

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

(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) (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 (I) = ____________

(J) 1- (I) = ____________

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

(L) (J) x (K) = ____________

(M) (L) - (A) = ____________

(N) (H) / (M) = L_{w_{(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 = __________________

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

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 \( L_{W_{(o)}} \), 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) \div ET (total in/yr)

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

<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>( L_{W_{(o)}} ) (in/mo)</th>
<th>M Gals/Mo</th>
<th>MGD of Recl'md Water</th>
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</table>

Note: The totals for P, ET and \( L_{W_{(o)}} \) 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.

\[
\text{Effluent N Applied} = \frac{\text{MGD Applied}}{\text{Effluent N Conc.}} \times 8.34 \times \frac{\# \text{ days/mo}}{\# \text{ Acres} \times (1 - f)} \times \text{Acres}
\]

\[
\text{Fertilizer N Applied} = \frac{\text{Monthly Fertilizer used (lugs/mo)} \times \% \text{ N in Fertilizer (as a fraction)}}{\text{Acres}}
\]

<table>
<thead>
<tr>
<th>Crop Name and Nitrogen Uptake Requirement =</th>
<th>(lbs/ac-vr)</th>
</tr>
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<tbody>
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<td>Dec</td>
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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.**
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 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 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 oxidation 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 centegrade 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>Reuse Permitted</th>
<th>Fecal Coliform</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>c.f.u or mpp/100 ml</td>
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<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>30-day geometric mean</td>
<td>No limit</td>
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<tr>
<td>Maximum daily number</td>
<td>No limit</td>
</tr>
<tr>
<td>Minimum Buffer Zone (Feet)</td>
<td>800</td>
</tr>
</tbody>
</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) Impoundment 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 mpp/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 445.177)

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 - TMWA 8a "RESIDENTIAL POTABLE AND NON-POTABLE WATER SEPARATION", TMWA'S "BACKFLOW PREVENTION AND CROSS-CONNECTION CONTROL PROGRAM" AND WASHOE COUNTY STANDARDS FOR RECLAIMED WATER
SECTION 8a
RESIDENTIAL 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 & Design Standards, the requirements of this section, and the requirements of NAC445A.

Common or landscaped areas that are adjacent to a dwelling may not be irrigated from a non-potable source. If a property served by TMWA is located immediately adjacent to a property or right of way irrigated with non potable water or located within 10 feet of a non-potable source, the TMWA water supply system shall be protected from a direct or indirect cross connection through the following measures:

All new single family residential services will include the installation of a single angle check valve integral to the meter setter.

In addition, where a parcel’s back or side property line is adjacent to a property served with non-potable water, a solid barrier or delineating concrete mow strip (6”W x 6”D), shall be provided between the property served with potable water by TMWA and the property to be irrigated with non-potable water. Non-potable water facilities (piping, spray heads, drip emitters, etc), shall not be installed on the potable water side of the barrier or delineating mow strip. Pressurized non-potable irrigation piping, (upstream of irrigation control valves), shall not be installed within 10-feet of back or side property lines.

A solid barrier is defined as:

a: Any solid face wood, stone, or brick fencing or wall with a minimum height of 3-feet, separating the property served by TMWA and the property irrigated with non-potable water

or

b: A continuous four foot wide concrete or asphalt pavement sidewalk.

For front of property parkways, a sidewalk shall serve as the solid barrier. Pressurized non potable water mains can be installed within the grass area between the sidewalk and curb. Non potable water facilities (piping, spray heads, drip emitters, etc), shall not be installed on the house side of the side walk and spray heads or emitters shall not be allowed to over spray or discharge onto the house side of the side walk.

TMWA reserves the right to require more stringent backflow protection requirements for uncommon or non-standard installations.

**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.

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BACKFLOW PREVENTION AND CROSS-CONNECTION CONTROL PROGRAM

FOR

TRUCKEE MEADOWS WATER AUTHORITY

Amended MARCH 2003

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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 backsiphonage; 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. Backsiphonage 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.

DISTRIBUTION SYSTEM: The term shall mean the potable TMWA Water Distribution System.

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 "freeze 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.

TRUCKEE MEADOWS WATER AUTHORITY: TRUCKEE MEADOWS WATER AUTHORITY is synonymous with TMWA.

TEST: The term "test" as it pertains to this program means a functional test of a USC approved backflow prevention assembly. This test shall be conducted by a CA-NV 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.
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 4.45A. 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
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 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
the media.

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 D

HEALTH DEPARTMENT MEMO: RESIDENTIAL FIRE SPRINKLER REQUIREMENTS

CITY OF RENO
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.
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)
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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)
Installation Requirements and Standards are available from the TMWA Backflow Prevention Group on request.
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. Hose bibs will not be installed on reclaimed water systems.
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.
RENTO TAHOE AIRPORT
WIND ROSE DIAGRAM

SOURCE
NOAA National Climatic Center
Asheville, NC
RENO Carsons International Airport
RENO, NEVADA

OBSERVATIONS
70,360 Observations
1981 - 1989

ALL WEATHER WIND COVERAGE

<table>
<thead>
<tr>
<th></th>
<th>10.5 KNOTS</th>
<th>13 KNOTS</th>
<th>16 KNOTS</th>
<th>21 KNOTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Runway 16-34</td>
<td>89.22%</td>
<td>92.89%</td>
<td>96.17%</td>
<td>99.49%</td>
</tr>
<tr>
<td>Runway 7-25</td>
<td>92.31%</td>
<td>95.01%</td>
<td>97.11%</td>
<td>99.21%</td>
</tr>
<tr>
<td>Combined Coverage</td>
<td>94.02%</td>
<td>95.43%</td>
<td>99.22%</td>
<td>99.98%</td>
</tr>
</tbody>
</table>

21 KNOTS — 18 KNOTS
13 KNOTS — 16 KNOTS
10.5 KNOTS — 13 KNOTS
80 90 100
360 N

0-10 KNOTS
260 270 280
16 KNOTS — 21 KNOTS
13 KNOTS
10.5 KNOTS
## Wind- Average Wind Speed- (MPH)

<table>
<thead>
<tr>
<th>DATA THROUGH 2001</th>
<th>YRS</th>
<th>JAN</th>
<th>FEB</th>
<th>MAR</th>
<th>APR</th>
<th>MAY</th>
<th>JUN</th>
<th>JUL</th>
<th>AUG</th>
<th>SEP</th>
<th>OCT</th>
<th>NOV</th>
<th>DEC</th>
<th>ANN</th>
</tr>
</thead>
<tbody>
<tr>
<td>RENO, NV</td>
<td>59</td>
<td>5.6</td>
<td>6.2</td>
<td>7.8</td>
<td>8.2</td>
<td>8.0</td>
<td>7.7</td>
<td>7.2</td>
<td>6.6</td>
<td>5.8</td>
<td>5.4</td>
<td>5.5</td>
<td>5.3</td>
<td>6.6</td>
</tr>
</tbody>
</table>

http://lwf.ncdc.noaa.gov/oa/climate/online/ccd/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 if you have questions or comments.

## Wind- Maximum Speed- (MPH)

<table>
<thead>
<tr>
<th>DATA THROUGH 2001</th>
<th>YRS</th>
<th>JAN</th>
<th>FEB</th>
<th>MAR</th>
<th>APR</th>
<th>MAY</th>
<th>JUN</th>
<th>JUL</th>
<th>AUG</th>
<th>SEP</th>
<th>OCT</th>
<th>NOV</th>
<th>DEC</th>
<th>ANN</th>
</tr>
</thead>
<tbody>
<tr>
<td>RENO, NV</td>
<td>12</td>
<td>16</td>
<td>45</td>
<td>15</td>
<td>44</td>
<td>21</td>
<td>49</td>
<td>SW</td>
<td>50</td>
<td>17</td>
<td>46</td>
<td>23</td>
<td>37</td>
<td>18</td>
</tr>
</tbody>
</table>

http://lwf.ncdc.noaa.gov/oa/climate/online/ccd/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 if you have questions or comments.
<table>
<thead>
<tr>
<th>Site Number</th>
<th>Property</th>
<th>Total Area (Acre)</th>
<th>Irrigated Area (Acre)</th>
<th>Acre-Feet per Year</th>
<th>Peak Demand (gpm)</th>
<th>Maximum Daily Flow (mgd)</th>
<th>Average Daily Flow (mgd)</th>
<th>Physical Address</th>
<th>Latitude/Longitude</th>
<th>Township/Range/Section</th>
<th>Estimated Date of Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vineyards &amp; Disc Drive Total</td>
<td>138.6</td>
<td>138.6</td>
<td>59.58</td>
<td>2000 (Daytime)</td>
<td>0.091</td>
<td>0.101</td>
<td>See Attached</td>
<td>See Attached</td>
<td>See Attached</td>
<td>Sep-2004 - 2006</td>
</tr>
<tr>
<td>2</td>
<td>Barcelona Crossing - Sparks Blvd.</td>
<td>15.0</td>
<td>0.48</td>
<td>4.89</td>
<td>82.0 (Nighttime)</td>
<td>0.039</td>
<td>0.025</td>
<td>5200 Sparks Blvd.</td>
<td>39°35'52&quot;N 119°43'26&quot;W</td>
<td>S22.T20N.R20E</td>
<td>Oct-04</td>
</tr>
<tr>
<td>3</td>
<td>Kiley West - Sparks Blvd.</td>
<td>44.6</td>
<td>2.3</td>
<td>4.88</td>
<td>100 (Nighttime)</td>
<td>0.048</td>
<td>0.025</td>
<td>Sparks Blvd.</td>
<td>39°35'54&quot;N 119°43'43&quot;W</td>
<td>S22.T20N.R20E</td>
<td>Oct-04</td>
</tr>
<tr>
<td>4</td>
<td>Spanish Springs Sports Complex</td>
<td>448.0</td>
<td>100.8</td>
<td>394.80</td>
<td>400.00</td>
<td>0.192</td>
<td>0.173</td>
<td>Future - south of Vista Blvd.</td>
<td>39°36'33&quot;N 119°40'12&quot;W</td>
<td>S18.T20N.R21E</td>
<td>Mar-06</td>
</tr>
<tr>
<td>7</td>
<td>Sha Neva Total</td>
<td>0.36</td>
<td>0.11</td>
<td>103.31</td>
<td>800 (Daytime)</td>
<td>0.206</td>
<td>0.120</td>
<td>1102 Calle de la Plata</td>
<td>39°41'12&quot;N 119°42'31&quot;W</td>
<td>S23.T21N.R20E</td>
<td>Oct-04</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>2342.6</td>
<td>419.81</td>
<td>1017.41</td>
<td></td>
<td>1.248</td>
<td>0.990</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL AVERAGE DAILY FLOW** 0.990 MGD
APPENDIX G – NDEP CONSUMPTIVE USE REQUIREMENTS WORKSHEET AND WATER REQUIREMENT DESIGN WORKSHEET (WTS-1B)
WTS-1B: 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 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).

\[
L_w(c) = \frac{(ET-P)}{[E \times (1-L_r)]} \quad L_r = \frac{EC_w}{[(5 \times EC_e) - EC_w]}
\]

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)(1);
- \( EC_w \) = 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 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(4):

<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>0.70 - 0.80</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>0.75 - 0.90</td>
<td>Level Border</td>
<td>0.70 - 0.85</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>0.70 - 0.85</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[2,4] = 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[6] 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.
1 mmho/cm = 1 dS/m

Worksheet 1-A

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

Crop Type = **ANNUAL RYEGRASS**

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

(A) Annual Evapotranspiration (ET, in/yr) = \( \frac{(477 \times 0.9)}{3} \approx 42.30'' \)

(Multiply by Crop Coefficient (Kc) if value is known) \( K_c = 0.9 \)

(B) Annual Precipitation (P, in/yr) = 75''

(C) \( A - B = 34.8 \) (in/yr)

(D) Salinity of Applied Effluent (ECw, mmho/cm) or = \( \frac{(\text{TDS, mg/l})}{640} = \frac{0.58}{14.45} = 0.04 \)

(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) \( 5 \times (E) = 15 \) (mmho/cm)

(G) \( \text{(F)} - \text{(D)} = 14.42 \) (mmho/cm)

(H) Leaching Requirement (Lr, %, expressed as a fraction) = \( \frac{0.58}{14.45} = 0.04 \)

(I) \( 1 - \text{(H)} = 0.96 \)

(J) Efficiency of Irrigation System (E, %, expressed as a fraction) = \( \frac{50}{100} \)

(K) \( \text{(J)} \times \text{(I)} = 0.77 \)

(L) \( \text{(C)} \div \text{(K)} = 45.19 \) (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

Lw\(_{(o)}\) = \(\frac{(ET-P)}{[E \times (1-Lr)]}\); \(Lr = \frac{EC_w}{[(5 \times EC_e) - ECw]}\); 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-1B: Appendix One” text for further discussion of crop coefficients.

To calculate the monthly value for Lw\(_{(o)}\), 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\(_{(o)}\) in/mo x ______ ac x 12 in/ft x 43,560 ft\(^2\)/ac x 7.481 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 \div Days/mo

<table>
<thead>
<tr>
<th>Month</th>
<th>Days/Mo</th>
<th>ET (in/mo)</th>
<th>P (in/mo)</th>
<th>Lw(_{(o)}) (in/mo)</th>
<th>M Gals/Mo</th>
<th>MGD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>31</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>Feb</td>
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<td>May</td>
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<td>Jun</td>
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<td>Oct</td>
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<td>Nov</td>
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<td>Dec</td>
<td>31</td>
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</tr>
<tr>
<td>Totals (in/yr):</td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 volatilization in the soils, and allowable percolate nitrogen concentration. The equation included below is from Wastewater Engineering: Treatment, Disposal, and Reuse, (Metcalf and Eddy, 1991)

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

where:
- \(L_{w(o)}\) = Allowable Hydraulic Loading Rate Based on Nitrogen Loading rate (in/yr);
- \(C_p\) = Total Nitrogen Concentration in Percolating Water (mg/l);
- \(P\) = Precipitation Rate (in/yr);
- \(ET\) = Evapotranspiration 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.

"C_p" - Nitrogen in Percolating Water

A conservative value for Total N in the water that percolates past the root zone (C_p) is 7 mg/l, which is the first "red flag" value for Nitrate as N in monitoring well samples. Setting the C_p limit at a constant value aids in obtaining an hydraulic nitrogen loading rate (L_{w(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 C_p.

"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 (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.

"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

Crop Type = Annual Ryegrass

\( \text{Lw}_{(n)} = \frac{[\text{Cp} \times (\text{P-ET})] + (\text{U} \times 4.4)}{[(1-f) \times \text{Cn}] - \text{Cp}} \)

(A) Total Nitrogen in Percolating Water (\( \text{Cp} \), mg/l) = 0.1

(B) Annual Precipitation (P, in/yr) = 7.5

(C) Annual Evapotranspiration (ET, in/yr) = \( \frac{47 \times 0.9}{14} \) = 30
(Multiply by Crop Coefficient (Kc) if value is known) \( K_c = 0.9 \)

(D) (B) - (C) = -34.80 (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) = -3.48

(F) Crop Nitrogen Uptake (U, lb/ac-yr) = 78

(G) \( \text{F} \times 4.4 = 783.2 \)

(H) \( (E) + (G) = 779.7 \)

(I) Fraction of Applied Total Nitrogen Lost to Denitrification and Volatilization (f) = 20%

(J) 1 - (I) = 80%

(K) Total Nitrogen in Applied Effluent (Cn, mg/l) = 1.74

(L) \( (J) \times (K) = 1.39 \)

(M) \( (L) - (A) = 1.29 \)

(N) \( (H) + (M) = \text{Lw}_{(n)} \) (inches/year) = 6.04

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 = ________________

\[ L_{w_{(o)}} = \frac{[C_p \times (P-ET)] + (U \times 4.4)}{[(1-I) \times C_n] - C_p} \]

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 \( L_{w_{(o)}} \), 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) x ET(in/mo) / ET (total in/yr)

Million Gallons = \( L_{w_{(o)}} \) in/mo x _____ # acres x 12 in/ft x 43,560 ft²/ac x 7.481 gallons/ft² ÷ 1,000,000
Per Month (ea. crop type)

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

Note: The totals for P, ET and \( L_{w_{(o)}} \) 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.

Effluent N Applied = \( \frac{(lb/ac-mo) \times MGD \text{ Applied} \times (mg/l) \times 8.34 \times \frac{\# \text{ days/mo}}{\# \text{ Acres}}}{\left(1 - \frac{\text{f}}{\text{i.e. 0.2}}\right)} \)

Fertilizer N Applied = ______ Monthly Fertilizer used (lbs/mo) x ______ % N in Fertilizer (as a fraction) ÷ ______ acres (lb/ac-mo)

Crop Name and Nitrogen Uptake Requirement = ______ (lbs/ac-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 Vineyards – Disc Drive

1.1 SITE LOCATION AND DESCRIPTION

The Vineyards is a 112-acre development consisting of a 9.2-acre commercial development and a 300-unit subdivision located between Sparks Blvd and Vista Blvd., north of Disc Drive in Sparks, Nevada. Refer to Figure H-1. Adjacent developments to the Vineyards include existing residential to the north, Sparks Boulevard to the west, Vista Blvd. to the east, and existing commercial development to the south.

The Disc Drive Extension will extend Disc Drive west from Sparks Blvd. approximately 2700 feet. Table H-1 gives location data for the Vineyards and the Disc Drive extension.

<table>
<thead>
<tr>
<th>Property</th>
<th>Physical Address</th>
<th>Latitude/Longitude</th>
<th>Township/Range/Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Vineyards</td>
<td>Intersection of Disc Drive and Sparks Blvd.</td>
<td>39°35'17&quot;N 119°43'13&quot;W</td>
<td>SE 1/4 Sec 22 T20N R20E</td>
</tr>
<tr>
<td>Disc Dr.</td>
<td>Intersection of Winery Drive and Sparks Blvd.</td>
<td>39°35'05&quot;N 119°43'26&quot;W</td>
<td>NW 1/4 Sec 27 T20N R20E</td>
</tr>
</tbody>
</table>

The Vineyards will utilize a temporary effluent truck fill station during construction as well as effluent irrigation of streetscape, common areas, and detention basins when the project is completed. The mass-grading plan for the Vineyards is shown as Figure H-2.

The Vineyards is located in the Flood Insurance Rate Map 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 Disc Drive extension will require the grading of 26.6 acres of land. This project will utilize a temporary effluent truck fill station during construction. The effluent will be used for dust suppression, bank stabilization and vegetation establishment. Upon completion of the project the fill station will be removed.

The Disc Drive extension plan and profile sheets, showing finished grade, are included as Figures H-3A through H-3C. The location of the temporary fill station is shown on Figure H-3C. All of the proposed project lies in Flood Insurance Rate Map 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.
1.2 SOILS

The Soil Conservation Service soil maps delineate two soil types present in the re-use area. The soil characteristics of the Vineyards and Disc Drive are shown in Figure H-4.

310- **Risley-Rock outcrop complex, 8-15 percent slopes.** This 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 approximately 20 inches thick. Weathered, altered andesite to a depth of 24 inches. Depth to weathered altered andesite ranges from 20 to 30 inches.

Permeability of this soil is slow. Available water capacity is low. Effective rooting depth is 20 – 30 inches. Runoff is medium and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

Present vegetation in most areas is mainly big sagebrush and bottlebrush squirreltail.

631 - **Fleischmann gravely clay loam.** This moderately deep, well-drained soil is on terraces. It formed in alluvium derived from mixed rock sources. Typically, the surface layer is light grayish-brown gravely clay loam about 4 inches thick. The upper 6 inches of the sub-soil is a brown heavy clay loam and the lower 10 inches is yellowish brown clay. The upper 23 inches of the substratum is a hardpan. The lower part to a depth of 60 inches is variable, compact, stratified alluvial material. Depth to the hardpan ranges from 20 – 30 inches.

The permeability of this Fleischmann soil is slow. Available water capacity is low. Effective rooting depth is more than 20 - 30 inches. Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is slight. This soil is subject to shallow flash flooding during storms of unusually high intensity.

Present vegetation is mainly grass.

The soils listed above are the natural soil in the area. During construction 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.

1.3 IRRIGATION PLAN

All irrigation will be done through automatic sprinklers to minimize the possibility of over-irrigating and subsequent ponding or runoff. Sprinkler heads will be placed to prevent ponding and runoff. Spray irrigators will be discharge near the ground surface and away from areas of frequent public use.
Potable water lines will be identified and necessary adjustments made to provide the required separation between effluent and potable water lines. Any component of the irrigation system that is exposed will be posted and painted purple to clearly identify the component as an effluent fixture. All areas of the development shall be posted to notify the public that the landscaping is irrigated with effluent.

1.4 IRRIGATION SYSTEM

The Vineyards effluent irrigation and one of the construction water truck fill stations are served by a common 6-inch diameter service line. Figure H-5 shows the general location of these connections to the City of Sparks effluent line and a schematic diagram of the PRV, meters and fill stations. As shown, the Vineyard's service line will tee after the PRV to serve both the temporary truck fill station and eight irrigation connections. The eight irrigation connections to that 6-inch main will be 3-inch diameter pipe with two-inch meters. The landscape plan for the Vineyards has not been finalized, thus, no detailed plans of the irrigation system are available at this time. Refer to Figures H-6 and H-7 for the proposed alignment of the 6-inch irrigation main and the eight points of connection to that main.

The main pump station at TMWRF and a booster pump station located in Kiley Ranch pressurize the effluent pipeline system. The effluent storage tank in Spanish Springs provides storage to reduce pump operation time. A pressure reducing - pressure sustaining valve is located at each connection to the City of Sparks Effluent pipeline protect the downstream pipe and to maintain system pressure. The Vineyards will not be able to irrigate if the system pressure falls below the PSV setting, initially set at 50 psi.

If electrical power is interrupted to either pump station, effluent may not be available because the storage tank alone may not be sufficient to maintain system pressure above the PSV set point. Any electrical power interruption to the irrigation controllers at the Vineyards will prohibit irrigation.

The irrigation controllers will control the time and duration of 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 effluent supply at the meter vault. The location of the gate valve is shown on the truck fill station vault details for the Vineyards and Disc Dr. fill stations, Figures H-8 and H-9 respectively. The fill station vaults are located near the truck fill station.

1.5 TEMPORARY TRUCK FILL STATIONS

Two temporary truck fill stations will be constructed at the re-use site to supply effluent for use as dust suppression water or for other construction purposes. The fill stations will serve the Vineyards and the Disc Drive extension projects. The fill stations are to be used only during the construction of these projects and will be removed upon completion,
estimated to be in 2007. No other construction projects will be allowed to draw effluent from these temporary fill stations.

The Vineyards truck fill station will be served by 6-inch diameter effluent line while the Disc Drive fill station will be served with a 4-inch diameter connection. Each fill station will have a PRV and effluent meter in a vault at the point of connection. Details of the 6-inch and 4-inch PRV & meter vaults are given as Figures H-8 and H-9, respectively. An isolation gate valve will be located at each meter vault for use when the fill station is not in service or in the event of an emergency. The valve will have a locking cover to prevent unauthorized access. The location of the isolation gate valve is shown on the fill station vault details, Figures H-8 and H-9, and a diagram of the locking cover is shown in Figure H-10.

The City of Sparks Application/Agreement form between the City and users of the fill stations is included in this appendix. The agreement requires the users to acknowledge the requirements of effluent use and the potential hazards of working with effluent. An informational handout is included with the agreement. This information sheet will be given to any worker who may come into contact with the effluent at the fill station or through the irrigation system.

1.6 EFFLUENT DEMAND

The estimated effluent demands for the Vineyards fill station and effluent irrigation, and the Disc Drive fill station are shown in Table H-2 below.

<table>
<thead>
<tr>
<th>Property</th>
<th>Total Area (Acre)</th>
<th>Irrigated Area (Acre)</th>
<th>Acre-Feet per Year</th>
<th>Peak Demand (gpm)</th>
<th>Maximum Daily Flow (MGD)</th>
<th>Average Daily Flow (MGD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vineyards Fill Station</td>
<td>112.0</td>
<td>112.0</td>
<td>24.1</td>
<td>1000 (Daytime)</td>
<td>0.038</td>
<td>0.035</td>
</tr>
<tr>
<td>Disc Drive Fill Station</td>
<td>26.6</td>
<td>26.6</td>
<td>6.2</td>
<td>1000 (Daytime)</td>
<td>0.009</td>
<td>0.009</td>
</tr>
<tr>
<td>Vineyards Irrigation at Build-Out</td>
<td>112</td>
<td>34.65</td>
<td>59.58</td>
<td>189</td>
<td>0.091</td>
<td>0.101</td>
</tr>
<tr>
<td>Vineyards and Disc Drive Total</td>
<td>138.6</td>
<td>138.6(^1)</td>
<td>59.58(^2)</td>
<td>2000(^3)</td>
<td>0.091</td>
<td>0.101</td>
</tr>
</tbody>
</table>

\(^1\)Total disturbed area of Vineyards and Disc Drive receiving dust control is 138.6 acres. Upon build-out, irrigated area will be 34.65 acres.

\(^2\)Maximum acre-ft/year will occur at build-out.

\(^3\)Peak demand during construction – two fill stations operating simultaneously. Upon build-out, peak demand will be reduced to 189 gpm.
1.7 RUNOFF CONTROL PLAN

In the event of an emergency, the effluent irrigation system and truck fill stations should be isolated by closing the gate valves located on either side of the effluent meter vault.

ISOLATION VALVE LOCATIONS

Disc Drive Extension – The effluent meter vault and isolation valves are located immediately west of Sparks Blvd and north of Disc Drive. Refer to Figure H-3C for the location of the vault and valves. Figure H-9 shows the isolation valves with respect to the PR-PSV/Meter vault.

The Vineyards – The effluent meter vault and isolation valves are located on the southern shoulder of Winery Drive approximately 50 feet East of the intersection with Sparks Blvd. Refer to Figure H-6 for the location of the PR-PSV and meter vault. Figure H-8 shows the isolation valves with respect to the PR-PSV/Meter vault.

After isolating the effluent irrigation or truck fill station, follow the notification procedures on page 18 of the Effluent Management Plan.
* REFER TO NOTES PAGE SE-TTF.6.2

Figure H-8

6" EFFLUENT TEMPORARY TRUCK FILL STATION VAULT
750 - 1000 GPM
6" TEMPORARY TRUCK FILL STATION VAULT NOTES:

ALL MATERIALS SHALL BE RATED FOR 200 PSI WORKING PRESSURE MINIMUM UNLESS SPECIFICALLY APPROVED BY THE CITY OF SPARKS.

1. SUPPLY PIPING SHALL BE CLASS 200, C-900 PURPLE PVC OR CLASS 200 DUCTILE IRON PIPE WRAPPED IN PURPLE POLYETHYLENE PIPE ENCASMENT. IF DOWNSTREAM OF A MASTER PRESSURE REDUCING STATION, PIPE CLASS SHALL BE DESIGNED FOR LOCALLY REDUCED PRESSURE.

2. CLA-VAL MODEL 92-01-YBCS-KC PRESSURE REDUCING/PRESSURE SUSTAINING VALVE PER SPECIFICATIONS. SUPPLY AND INSTALL ORIFICE PLATE.

3. FLANGE X PLAIN END DUCTILE IRON PIPE SPOOLED, 200 PSI. WRAP BURIED PIPE IN PURPLE POLYETHYLENE PIPE ENCASMENT.

4. EBAA IRON, SERIES 2100 MEGALANGE, RESTRAINED FLANGE ADAPTER, 200 PSI, OR APPROVED EQUAL. INSTALL FLANGE ADAPTER LEAVING SUFFICIENT GAP FOR FUTURE REMOVAL OF VALVES.

5. (NOT USED)

6. LIQUID FILLED PRESSURE GAUGE, 0-200 psi, 1/4" ISOLATION BALL VALVE.

7. LIQUID FILLED PRESSURE GAUGE, 0-100 psi, 1/4" ISOLATION BALL VALVE AND Sample Tap with 1/4" BALL VALVE.

8. RESTRAINED JOINT, RESILIENT WEDGE GATE VALVE WITH EBAA IRON SERIES 1100 MEGALUG OR EQUAL. PROVIDE RESTRAINED JOINT PIPE OR THRUST BLOCKS FOR 200 PSI WORKING PRESSURE.

9. PRECAST JENSEN UTILITY BOX, MODEL 4686 WITH SUMP KNOCK OUT. DESIGNED FOR "INCIDENTAL" H2O LOADING. INSTALL RISERS AS NECESSARY TO MEET GRADE REQUIREMENTS. INSTALL LADDER AND BILCO LADDER-UP SAFETY POST.

10. JENSEN 487BAT, TORSION ASSISTED COVER – EPOXY COATED PURPLE & LABELED "EFFLUENT" OR "RECLAIMED WATER", DESIGNED FOR "INCIDENTAL" H2O LOADING. NOT SUITABLE FOR FULL TRAFFIC LOCATIONS.

11. MANUAL PIPE DRAIN. 1/4" DIRECT TAP ON BOTTOM OF PIPE, 1/4" X 3" NIPPLE, 1/4" BALL VALVE.

12. ORIFICE PLATE – 4.40" DIAMETER ORIFICE FOR 1000 GPM FLOW ON 6" LINE.

13. FIELD BORE VAULT PENETRATIONS FOR EXISTING OR PROPOSED CONDITIONS. PACK VOID WITH NON-SHRINK GROUT OR INSTALL MODEL "C" LINK-SEAL MODULAR SEAL.

14. PIPE SUPPORT.

15. 6" FLOW METER. REGISTER SHALL INDICATE AND TOTALIZE IN GALLONS. PERMANENT METERS SHALL BE BADGER METERS WITH PIT MOUNT ERT PER SPECIFICATIONS.

16. BADGER BRONZE PLATE STRAINER W/ ANSI 125# FLANGES. INVENSYS (SENSUS) IS APPROVED EQUAL.

17. INSTALL TWO, 4" X 4" X 3/32" FORD METAL PIT INSULATING BLANKETS (FIB) OVER PIPING AND VALVES.

18. FLANGE X (PER PLAN) DUCTILE IRON PIPE. CONNECT TO FILL STATION PIPING PER PLANS. PROVIDE FITTINGS AND ADAPTERS AS NECESSARY.

19. VAULT PIPE TAPS SHALL BE DIRECT TAPS OR BY APPROVED SERVICE SADDLE. SERVICE SADDLES SHALL BE FUSION BONDED EPOXY OR NYLON COATED SADDLE WITH DOUBLE STAINLESS STEEL STRAPS.

20. CONSTRUCT TOP 4" ABOVE FINISHED GRADE IN UNIMPROVED OR LANDSCAPED LOCATIONS. PLACE TOP FLUSH IN HARDSCAPED AREAS. GRADE TO DRAIN AWAY FROM VAULT.

21. T. CHIRSTY ENTERPRISES, VALVE IDENTIFICATION TAG, ID-MAX-P2-RC-006, OR APPROVED EQUAL.

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NOTES: 6" EFFLUENT
TEMPORARY TRUCK FILL
STATION VAULT

DRAWING No. SE-TTF.6.2
* REFER TO NOTES PAGE SE-TTF.4.2

Figure H-9

4" EFFLUENT TEMPORARY TRUCK FILL STATION VAULT
500 GPM TYPICAL FLOW
4" TEMPORARY TRUCK FILL STATION VAULT NOTES:

ALL MATERIALS SHALL BE RATED FOR 200 PSI WORKING PRESSURE MINIMUM UNLESS SPECIFICALLY APPROVED BY THE CITY OF SPARKS.

1. SUPPLY PIPING SHALL BE CLASS 200, C-900 PURPLE PVC OR CLASS 200 DUCTILE IRON PIPE WRAPPED IN PURPLE POLYETHYLENE PIPE ENCASMENT. IF DOWNSTREAM OF A MASTER PRESSURE REDUCING STATION, PIPE CLASS SHALL BE DESIGNED FOR LOCALLY REDUCED PRESSURE.

2. CLA-VAL MODEL 92-01-YBCS-KC PRESSURE REDUCING/PRESSURE SUSTAINING VALVE PER SPECIFICATIONS. SUPPLY AND INSTALL ORIFICE PLATE.

3. FLANGE X FLANGE END DUCTILE IRON PIPE SPOOL, 200 PSI. WRAP BURIED PIPE IN PURPLE POLYETHYLENE PIPE ENCASMENT.

4. EBAA IRON, SERIES 2100 MEGAFANGLE RESTRAINED FLANGE ADAPTER, 200 PSI, OR APPROVED EQUAL. INSTALL FLANGE ADAPTER LEAVING SUFFICIENT GAP FOR FUTURE REMOVAL OF VALVES.

5. (NOT USED)

6. LIQUID FILLED PRESSURE GAUGE, 0-200 psi, 1/4" ISOLATION BALL VALVE.

7. LIQUID FILLED PRESSURE GAUGE, 0-100 psi, 1/4" ISOLATION BALL VALVE AND SAMPLE TAP WITH 1/4" BALL VALVE.

8. RESTRAINED JOINT, RESILIENT WEDGE GATE VALVE WITH EBAA IRON SERIES 1100 MEGAFANGLE OR EQUAL. PROVIDE RESTRAINED JOINT PIPE OR THRUST BLOCKS FOR 200 PSI WORKING PRESSURE.

9. PRECAST JENSEN UTILITY BOX, MODEL 4686 WITH SUMP KNOCK OUT. DESIGNED FOR "INCIDENTAL" H2O LOADING. INSTALL RISERS AS NECESSARY TO MEET GRADE REQUIREMENTS. INSTALL LADDER AND BILCO LADDER-UP SAFETY POST.

10. JENSEN 487BMT, TORSION ASSISTED COVER - EPOXY COATED PURPLE & LABELED "EFFLUENT" OR "RECLAIMED WATER", DESIGNED FOR "INCIDENTAL" H2O LOADING. NOT SUITABLE FOR FULL TRAFFIC LOCATIONS.

11. MANUAL PIPE DRAIN. 1" DIRECT TAP ON BOTTOM OF PIPE, 3/4" X 3" NIPPLE, 1" BALL VALVE.

12. ORIFICE PLATE - 3.00" DIAMETER ORIFICE FOR 500 GPM FLOW ON 4" LINE. (MINIMUM FLOW= 205 GPM; MAXIMUM FLOW= 820 GPM; NOMINAL FLOW= 450 GPM)

13. FIELD BORE VAULT PENETRATIONS FOR EXISTING OR PROPOSED CONDITIONS. PACK VOID WITH NON-SHRINK GROUT OR INSTALL MODEL "C" LINK-SEAL MODULAR SEAL.

14. PIPE SUPPORT.

15. 4" FLOW METER. REGISTER SHALL INDICATE AND TOTALIZE IN GALLONS. PERMANENT METERS SHALL BE BADGER METERS WITH PIT MOUNT ERT PER SPECIFICATIONS.

16. BADGER BRONZE PLATE STRAINER W/ ANSI 125# FLANGES. INVENSYS (SENSUS) IS APPROVED EQUAL.

17. INSTALL TWO, 4" X 4" X 3/32" FORD METAL PIT INSULATING BLANKETS (FIB) OVER PIPING AND VALVES.

18. FLANGE X FLANGE DUCTILE IRON PIPE. CONNECT TO FILL STATION PIPEiping PER PLANS. PROVIDE FITTINGS AND ADAPTERS AS NECESSARY.

19. VAULT PIPE TAPS SHALL BE DIRECT TAPS OR BY APPROVED SERVICE SADDLE. SERVICE SADDLES SHALL BE FUSION BONDED EPOXY OR NYLON COATED SADDLE WITH DOUBLE STAINLESS STEEL STRAPS.

20. CONSTRUCT TOP 4" ABOVE FINISHED GRADE IN UNIMPROVED OR LANDSCAPED LOCATIONS. PLACE TOP FLUSH IN HARDSCAPED AREAS. GRADE TO DRAIN AWAY FROM VAULT.

21. T. CHRISTY ENTERPRISES, VALVE IDENTIFICATION TAG, ID-MAX-P2-RC-006, OR APPROVED EQUAL.

REVISION  CITY OF SPARKS EFFLUENT REUSE SYSTEM DETAILS  DATE: 9/28/05

NOTES: 4" EFFLUENT TEMPORARY TRUCK FILL STATION VAULT - 500 GPM

DRAWING No. SE-TTF.4.2
HINGED METAL COVER

METAL CONDUCTOR PIPE EXTENDED 18" ABOVE GRADE

FINISH GRADE

HASP & PADLOCK

WATER PIPE TO FILL STATION

VALVE

VALVE LOCK DETAIL

Figure H-10
ONSITE
Application/Agreement for
Temporary Use of Treated Wastewater Effluent
For Onsite Construction Use

Application No: __________

PROJECT NAME: ______________________________________________________

PROJECT ADDRESS: ____________________________________________________

TEMPORARY METER LOCATION: _________________________________________

COMPANY (USER) NAME: ______________________________________________

COMPANY REPRESENTATIVE: _____________________________________________

BILLING ADDRESS: _____________________________________________________

CITY: ____________________ STATE: ____________________ ZIP CODE: __________

COMPANY PHONE NUMBER: _____________________________________________

TRUCK CAPACITY: __________ TRUCK ID: __________ LICENSE PLATE: __________

TRUCK CAPACITY: __________ TRUCK ID: __________ LICENSE PLATE: __________

TRUCK CAPACITY: __________ TRUCK ID: __________ LICENSE PLATE: __________

(COS Representative.): ___________________________________________________

AGREEMENT

1. This agreement is applicable to project sites that will use treated effluent for irrigation on a permanent basis and for construction purposes on a temporary basis. An Agreement for Sale of Treated Effluent shall be established with the City of Sparks for this project prior to the establishment of a temporary agreement for construction purposes.

2. A TEMPORARY DISCHARGE PERMIT (NDEP) is required prior to use of treated effluent on the construction site. Upon successful completion of this agreement, the City of Sparks will begin an application for a TEMPORARY DISCHARGE PERMIT. The User should anticipate approximately 3 weeks from application to successful completion of the TEMPORARY DISCHARGE PERMIT.
3. The User shall provide all temporary facilities for the temporary use of effluent for construction purposes including but not limited to: easements, distribution piping, valving, vaults, meter, truck pads to City of Sparks specifications.

4. City of Sparks personnel will read the temporary meter and bill the User for effluent used on a monthly basis.

5. FEES;
   a. Application Processing Fee: $25.00
   b. Temporary Discharge Permit Fee: $250.00
   c. Effluent Use Fee: $1.84 per 1000 gallons delivered.

6. Treated effluent is available from the City of Sparks Effluent distribution system, at the times posted.

7. All vehicles proposed for delivery of effluent on the project site shall be inspected by City of Sparks environmental control section personnel prior to issuance of the permit at the time of application or be a current holder of City of Sparks Effluent Fill Station card.

8. Vehicles used for hauling and applying treated wastewater effluent shall be equipped with signs and lettering which:
   i. Are located on both sides and the rear of the vehicle;
   ii. Are marked, prior to issuance of a permit, with contrasting lettering at least two inches high and readable from at least a one hundred-foot distance; and
   iii. State: “Treated Wastewater Effluent—Avoid Contact”.

9. The vehicle transporting treated wastewater effluent shall not spill or leak during transportation.

10. Treated wastewater effluent shall not be discharged except at project sites that meet the requirements herein. No ponding or runoff shall occur.

11. Treated wastewater effluent shall not be discharged into any storm drainage system. Treated wastewater effluent shall not be used for street wash downs.

12. Persons at the project site must be informed, and the project site posted, that treated wastewater effluent is being used and that all persons shall avoid contact with said treated wastewater effluent.

13. No direct connections are allowed between the vehicle and any part of a domestic (potable) water system.
14. Any spills of treated wastewater effluent require oral notification within twenty- four hours of the spill to the City of Sparks, Environmental Control Section 861-4152 and a written report, detailing the circumstances and probable cause of the spill, within five days of the spill.

15. I have read and understand the conditions imposed for the use of treated wastewater effluent included herein. I do hereby agree to comply with all such conditions. Further, I agree to indemnify and hold the City of Sparks harmless for any and all liability or loss arising in any way out of my performance of this agreement.

COMPANY REPRESENTATIVE: ___________________________ Date: __________

(signature)
WORKING WITH TREATED EFFLUENT
HAZARDS AND HYGIENE

One of the major concerns with spray irrigation of wastewater effluent is aerosols containing pathogens. 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 becomes an aerosol. Aerosols are defined as particles ranging from 0.01 to 50µm in diameter that are suspended in the 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).

Some of the risks of working with treated wastewater effluent are:

- Exposure to disease causing organisms and viruses
- Skin contact can result in various types of rashes
- Open wounds are highly susceptible to infection

In order to minimize the likelihood of illness or injury, those working with treated effluent should take the following precautions:

1. Workers are to keep their typhoid, hepatitis and tetanus shots current and practice good hygiene.
2. No food or drink should be consumed while working with the reclaimed water.
3. Smoking is prohibited due to the possibility of hand to mouth contamination.
4. Wear boots, gloves or other protective clothing to minimize direct contact with reclaimed water.
5.Workers should wash thoroughly and, if possible, change from their work clothing before leaving the facility.
6. Wash thoroughly with a disinfectant soap before eating or smoking.
7. Drink only water obtained from the faucets in the control building or brought from home.
8. Workers should make sure that the area is clear of people that may get sprayed before running the irrigation system.

Finally, remember that you are ultimately responsible for your safety. Report any problem that you feel could pose a risk to your supervisor.
APPENDIX I – BARCELONA-SPARKS BLVD
Barcelona Crossing - Sparks Blvd

1.1 SITE DESCRIPTION

Barcelona Crossing-Sparks Blvd is located at 5200 Sparks Blvd at the northeast corner of Sparks Boulevard and Los Altos Parkway. Adjacent developments to Barcelona Crossing-Sparks Blvd include Village Knolls roadway and housing to the north, Caldera Drive to the east, Los Altos Parkway to the south, and Sparks Blvd. to the west. Figure I-1 shows a vicinity map of the Barcelona Crossing – Sparks Blvd. reuse site. Site location information for Barcelona Crossing – Sparks Blvd. is given it Table I-1 below.

<table>
<thead>
<tr>
<th>Property</th>
<th>Physical Address</th>
<th>Latitude/Longitude</th>
<th>Section/Township/Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barcelona Crossing - Sparks Blvd</td>
<td>5200 Sparks Blvd.</td>
<td>39°35'52&quot;N 119°43'26&quot;W</td>
<td>S22.T20N.R20E</td>
</tr>
</tbody>
</table>

Barcelona Crossing - Sparks Blvd has slopes ranging from approximately 0% to 2%. The development 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). Topography of the Barcelona Crossing site is shown in Figures I-2 and I-3.

1.2 SOILS

The Soil Conservation Service publication *Soil Survey of Washoe County, Nevada, Southern Part* (SCS, 1983) identifies a single native soil at the Barcelona Crossing reuse site. Figure I-4 shows the soil distribution at the Barcelona Crossing site.

**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 stream banks. The soil is strongly affected by sodium salt.

The present vegetation in most areas is mainly black greasewood and saltgrass.

The soil listed above is the natural soil in the area. During the construction of the development 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.

1.3 IRRIGATION PLAN

Barcelona Crossing is a 15-acre development consisting of approximately 15 commercial pads with parking and landscaping. Sparks Blvd median landscaping and common area landscaping within the development will be irrigated with effluent.

The majority of irrigating will occur at night when the public is absent. Effluent is applied using spray and drip type heads. Irrigation plans for Barcelona Crossing-Sparks Blvd are included as Figures I-5 through I-8.

1.4 IRRIGATION SYSTEM

The Barcelona Crossing – Sparks Blvd reuse site will be served by a single 2-inch diameter connection to the City of Sparks Effluent Pipeline. The effluent pipe will enter the Barcelona Crossing property at the northwest corner of the development, near the intersection of Sparks Blvd. and Village Knolls Drive. The effluent pipe will enter a pressure reducing-pressure sustaining valve vault at this location. After the PR-PSV, the flow will be split into two effluent mains, one serving the Barcelona Crossing landscaping and one serving the Sparks Blvd. streetscape.

The Barcelona Crossing landscape will be served by a 2-inch diameter effluent main, the Sparks Blvd streetscape will be served by a 1-inch diameter effluent main. Refer to Figure I-5 for the location of the PR-PSV vault and the effluent meters.

Both the Barcelona Crossing and Sparks Blvd. irrigation systems can be isolated by closing the gate valve located immediately upstream of the PR-PSV vault. Either irrigation system may be isolated individually by closing the gate valve immediately downstream of the respective effluent meter. Refer to Figure I-5 for the location of these gate valves.

1.5 EFFLUENT DEMAND

The estimated effluent demand for Barcelona Crossing/Sparks Blvd. is shown in Table I-2.
Table I-2 Barcelona Crossing and Sparks Blvd. 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>Peak Nighttime Demand (gpm)</th>
<th>Maximum Daily Flow (mgd)</th>
<th>Average Daily Flow (mgd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barcelona Crossing - Sparks Blvd</td>
<td>15.0</td>
<td>0.46</td>
<td>4.89</td>
<td>82</td>
<td>0.039</td>
<td>0.025</td>
</tr>
</tbody>
</table>

Irrigation requirements (acre-feet/year and gallons/year) were provided by Jeff Codega Planning/Design, Inc. A copy of the calculations is included in this Appendix. Site irrigation will occur during an 8-hour night period.

1.6 RUNOFF CONTROL PLAN

In the event of an emergency, the effluent irrigation system should be isolated by closing the gate valves located on either side of the effluent meter vault for the area involved in the emergency.

ISOLATION VALVE LOCATIONS

**Barcelona Crossing & Sparks Blvd. Streetscape** – The effluent meter vaults and isolation valves are located in the landscaping along the south shoulder of Village Knolls Drive approximately 75 feet north of the intersection with Sparks Blvd. Refer to Figure I-5 for the vault location.

After isolating the effluent irrigation system, follow the notification procedures on page 18 of the Effluent Management
LANDSCAPE WATER USE CALCULATIONS

for: Barcelona Crossing

Turf spray irrigation:

assumption:
(apply 0.75" water - twice per week for 12 weeks,
0.5" twice per week for 18 weeks)

area = 20,088 sq.ft.
x 0.0625 ft. depth (=0.75 inch water application) = 1255.5 c.f.
x 7.48 (7.48 gal. per cubic foot) = 9391.14 gallons per watering
x 24 waterings = 225387.36 gallons

area = 20,088 sq.ft.
x 0.042 ft. depth (=0.5 inch water application) = 843.696 c.f.
x 7.48 (7.48 gal. per cubic foot) = 6310.8481 gallons per watering
x 36 waterings = 227190.46 gallons

452577.82 total gallons per year

drip system:

assumption:
1 gallon per hour emitters - (1/1gal. plant; 1/4" 4" plant; 2/5 gal. plant; 3/15 gal. plant; 3/6" ht. B&B plant; 4/24" box plant)

no. of plants 1975 1 gal shrubs (x1)
382 4" pots (x.25)
342 5 gal shrubs (x2)
39 15 gal trees/shrubs (x3)
148 b&b 6' ht. evergreen trees (x3)
61 24" box trees (x4)
= 3559.5 drip emitters @ 1 gph
x 4 hours (4 hours per day) = 14238 gallons per day
x 64 waterings (twice/week x 32 weeks) = 911232 gallons per year

1363809.8 total gallons per year
/ 325851 gallons per acre foot
= 4.185 acre feet per year
LANDSCAPE WATER USE CALCULATIONS
for: Sparks Boulevard Widening - landscape improvements

<table>
<thead>
<tr>
<th>no of plants</th>
<th>277 1 gal shrubs (x1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>140</td>
<td>5 gal shrubs (x2)</td>
</tr>
<tr>
<td>32</td>
<td>15 gal trees/shrubs (x3)</td>
</tr>
<tr>
<td>15</td>
<td>b&amp;b 6' ht. evergreen trees (x4)</td>
</tr>
<tr>
<td>10</td>
<td>b&amp;b 8' ht. evergreen trees (x4)</td>
</tr>
<tr>
<td>3</td>
<td>b&amp;b 10' ht. evergreen trees (x5)</td>
</tr>
<tr>
<td>25</td>
<td>24&quot; box trees (x5)</td>
</tr>
</tbody>
</table>

\[
\text{no of plants} \\ 277 \times 1 \text{ gal shrubs (x1)} \\
140 \times 5 \text{ gal shrubs (x2)} \\
32 \times 15 \text{ gal trees/shrubs (x3)} \\
15 \times \text{ b&b 6' ht. evergreen trees (x4)} \\
10 \times \text{ b&b 8' ht. evergreen trees (x4)} \\
3 \times \text{ b&b 10' ht. evergreen trees (x5)} \\
25 \times \text{ 24" box trees (x5)} \\
\]

\[
= 893 \text{ drip emitters @ 1 gph} \\
\times 4 \text{ hours (4 hours per day)} \\
= 3572 \text{ gallons per day} \\
\times 64 \text{ waterings (twice/week x 32 weeks)} \\
= 228608 \text{ gallons per year} \\
/ 325851 \text{ gallons per acre foot} \\
\]

\[
= 0.702 \text{ acre feet per year}
\]
Kiley West & Sparks Blvd.

1.1 SITE LOCATION

Kiley West is a 44.6-acre single-family home development located in the central Spanish Springs Valley. Kiley West is located west of Sparks Blvd. between Los Altos Parkway and Oak Hill Drive. Figure J-1 shows a vicinity map for the Kiley West development. Adjacent developments to Kiley West include residential development to the north and west, Sparks Blvd. and Ion Drive to the east and Los Altos Parkway to the south. Table J-1 gives the site location data for the Kiley West development.

<table>
<thead>
<tr>
<th>Property</th>
<th>Physical Address</th>
<th>Latitude/Longitude</th>
<th>Township/ Range/ Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kiley West</td>
<td>Sparks Blvd.</td>
<td>39°35'54&quot;N 119°43'43&quot;W</td>
<td>S22.T20N.R20E</td>
</tr>
</tbody>
</table>

The topography of Kiley West is shown in Figure J-2. Kiley West has slopes ranging from approximately 0% to 2%. Kiley West 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 A (no base flood elevations determined).

1.2 SOILS

The Soil Conservation Service soil map delineates a single soil types present in the re-use area. The soil characteristics of the Kiley West and Sparks Blvd. site are shown in Figure J-3.

240 - **Updike loam.** This very deep, moderately well drained soil is on low-lying, slightly concave lake terraces. It formed in alluvium derived from mixed rock sources. Typically, the surface layer is light gray loam about 2 inches thick. The subsoil is brown, pale brown, and light gray clay and sandy clay about 18 inches thick. The substratum to a depth of 63 inches or more is pale brown, stratified sandy clay loam, clay loam, and clay. Included in this unit are Cradlebaugh soils, which occur as stringers in low-lying narrow channels; Sagouspe soils, on water–worked sand beaches; and Doten soils, near Playas and on clay dunes. The unit is about 8 percent Cradlebaugh soils, 5 percent Sagouspe soils, and 2 percent Doten soils.
Permeability of this Updike soil is very slow. Available water capacity is high. Effective rooting depth is 72 inches for water-tolerant plants but is limited to 60 to 72 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 60 to 72 inches in late winter and spring. This soil is affected by sodium salts.

The present vegetation in most areas is mainly black greasewood, shadscale, and cheatgrass.

451 - **Voltaire loam, slightly 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 15 inches. The underlying material to a depth of 60 inches is dark grayish brown, mottled, stratified 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 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 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 slight. A seasonal high water table is at a depth of 0 to 18 inches in later winter and early spring. This soil is subject to flooding during storms of prolonged high intensity. Channeling and deposition are common along streambanks. The soil is slightly affected by sodium salts.

The present vegetation is most areas is mainly grass.

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 stream banks. The soil is strongly affected by sodium salt.

The present vegetation in most areas is mainly black greasewood and saltgrass.

The soil description above is the natural soil in the area. During the construction of the development, 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.

1.3 IRRIGATION PLAN

All effluent irrigation at Kiley West and Sparks Blvd. will be done at night to minimize the possibility of public contact with the effluent. All irrigation will be done through automatic sprinklers to minimize the possibility of over-irrigating and subsequent ponding or runoff. Sprinkler heads will be placed to prevent ponding and runoff. Spray irrigators will discharge near the ground surface and away from areas of frequent public use. Plans for the effluent irrigation system at Kiley West – Sparks Blvd. are included as Figures J-4 through J-8.

Potable water lines will be identified and necessary adjustments made to provide the required separation between effluent and potable water lines. Any component of the irrigation system that is exposed will be posted and painted purple to clearly identify the component as an effluent fixture. All areas of the development shall be posted to notify the public that the landscaping is irrigated with effluent.

1.4 IRRIGATION SYSTEM

The Kiley West – Sparks Blvd. effluent irrigation site is served by a single 4-inch diameter service line off of the City of Sparks Effluent Pipeline. The service line enters the Kiley West Development approximately 200 feet north of the intersection of Sparks Blvd. and Ion Drive. Refer to Figure J-2 for the location of the point of connection. A pressure reducing-pressure sustaining valve and effluent meter will be located at the point of connection. Closing either of the two gate valves at the PR-PSV vault will isolate the effluent system. Refer to Figure J-9 for a detail of the PR-PSV vault and the location of the gate valves with respect to the vault.

The irrigation controllers will control the time and duration of 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 effluent supply at the meter vault (Figure J-2).
1.5 EFFLUENT DEMANDS

The projected effluent demand for Kiley West – Sparks Blvd. are shown in Table J-2 below. MacKay & Somps Civil Engineers provided the effluent demand. A copy of the demand calculations is included in this Appendix.

<table>
<thead>
<tr>
<th>Property</th>
<th>Total Area (Acre)</th>
<th>Irrigated Area (Acre)</th>
<th>Acre-Feet per Year</th>
<th>Peak Nighttime Demand (gpm)</th>
<th>Maximum Daily Flow (mgd)</th>
<th>Average Daily Flow (mgd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kiley West - Sparks Blvd</td>
<td>44.6</td>
<td>2.3</td>
<td>4.88</td>
<td>100</td>
<td>0.048</td>
<td>0.025</td>
</tr>
</tbody>
</table>

1.6 RUNOFF CONTROL PLAN

In the event of an emergency, the effluent irrigation system and truck fill stations should be isolated by closing the gate valves located on either side of the effluent meter vault.

ISOLATION VALVE LOCATIONS

**Kiley West and Sparks Blvd** – The effluent meter vault is located on the west shoulder of Sparks Blvd, approximately 200 feet north of the intersection with Ion Drive. The isolation valves are located on either side of the meter vault. Refer to Figure J-2 for the location of the vault and valves.

After isolating the effluent irrigation system, follow the notification procedures on page 18 of the Effluent Management Plan.
PRELIMINARY LANDSCAPE WATER CALCULATIONS
FOR
Kiley West Unit 2 - Sparks Blvd
Sparks, Nv.

1. Lawn (spray):
   Area (sq. ft.) 10,010 x 3.75 = 37,537.5 / 43,560 = 0.86 Ac Ft./yr.

2. Native Grass Areas (spray)
   Area (sq. ft) 0 x 1.7 = 0.0 / 43,560 = 0.0 Ac Ft./yr.

3. Trees (Drip):
   Formula for Deciduous Trees
   Number of trees multiplied by four (4) emitters, multiplied by 2 gal/hr, multiplied by
   three (3) hours/day, multiplied by two (2) times/wk x 32 wks = ____ divided
   by 325,851 = ____ acre feet/year. *

   49 x 4x2x3x2x32 = 75,264 / 325,851 = 0.23 Ac Ft./yr.

   Formula for Evergreen Trees
   Number of trees multiplied by three (3) emitters, multiplied by 2 gal/hr, multiplied by
   three (3) hours/day, multiplied by two (2) times/wk x 32 wks = ____ divided
   by 325,851 = ____ acre feet/year. *

   63 x 3x2x3x2x32 = 72,576 / 325,851 = 0.22 Ac Ft./yr.

4. Shrubs (Drip):
   Formula for 5-gallon to 1 gallon shrubs
   Number of shrubs multiplied by two (2) emitters, multiplied by 1 gal/hr, multiplied by
   three (3) hours/day, multiplied by two (2) times/wk x 32 wks = ____ divided
   by 325,851 = ____ acre feet/year. *

   233 x 2x1x3x2x32 = 89,472 / 325,851 = 0.27 Ac Ft./yr.

5. Shrubs and Groundcover (Drip):
   Formula for - 1 gallon, 4" pots, Flats:
   Number of shrubs multiplied by two (2) emitter, multiplied by .5 gal/hr, multiplied by
   three (3) hours/day, multiplied by two (2) times/wk x 32 wks = ____ divided
   by 325,851 = ____ acre feet/year. *

   72 x 2x.5x3x2x32 = 13,824 / 325,851 = 0.04 Ac Ft./yr.

TOTAL LANDSCAPE WATER USAGE 1.62 Ac Ft./yr. *

* Does not include a drought factor.
OPINION of PROBABLE LANDSCAPE WATER DEMAND
FOR
Kiley West - Unit 3

<table>
<thead>
<tr>
<th>Area (Acres)</th>
<th>Ft/Year</th>
<th>Acre ft/ year</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.18</td>
<td>3.41</td>
<td>0.61</td>
</tr>
<tr>
<td>3.14</td>
<td>0.00</td>
<td></td>
</tr>
</tbody>
</table>

1. Lawn (spray):

2. Native Grass Areas (spray)

3. Trees (Drip):
   Formula for Deciduous and Evergreen Trees:
   
   Number of trees multiplied by six (6) emitters, multiplied by 2 gal/hr, multiplied by
   two (2) hours/day, multiplied by two (2) times/wk x 31 wks, divided by 325,851 gal/ac-ft = acre feet/year. *

<table>
<thead>
<tr>
<th># of Trees</th>
<th>Emitters/ tree</th>
<th>gal/hr/ emitter</th>
<th>hours per day</th>
<th>times per week</th>
<th># of weeks /season</th>
<th>Ac-ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>102</td>
<td>6</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>31</td>
<td>0.47</td>
</tr>
</tbody>
</table>

4. Shrubs (Drip):
   Formula for 5-gallon to 1 gallon shrubs:
   
   Number of shrubs multiplied by two (2) emitters, multiplied by 1 gal/hr, multiplied by
   two (2) hours/day, multiplied by two (2) times/wk x 31 wks, divided by 325,851 gal/ac-ft = acre feet/year. *

<table>
<thead>
<tr>
<th># of Shrubs</th>
<th>Emitters/ shrub</th>
<th>gal/hr/ emitter</th>
<th>hours per day</th>
<th>times per week</th>
<th># of weeks /season</th>
<th>Ac-ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>454</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>31</td>
<td>0.35</td>
</tr>
</tbody>
</table>

5. Perennials and Groundcover (Drip):
   Formula for flats - 1 gallon:
   
   Number of shrubs multiplied by two (2) emitters, multiplied by .5 gal/hr, multiplied by
   two (2) time/day, multiplied by two (2) times/wk x 31 wks, divided by 325,851 galac-ft = acre feet/year. *

<table>
<thead>
<tr>
<th># of Shrubs</th>
<th>Emitters/ plant</th>
<th>gal/hr/ emitter</th>
<th>hours per day</th>
<th>times per week</th>
<th># of weeks /season</th>
<th>Ac-ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>608</td>
<td>2</td>
<td>0.5</td>
<td>2</td>
<td>2</td>
<td>31</td>
<td>0.23</td>
</tr>
</tbody>
</table>

TOTAL LANDSCAPE WATER USAGE IN AC.FT/YR.: 1.66

* Does not include a drought factor.

Prepared By: rmk

Notes:

1. Emitter schedule above may not match that shown on plans, since this schedule is designed to provide water for plants at maturity.

2. Assumptions for supplying water are as follows; for mature plants during growing seasons:
   - Trees - Supply 48 gallons per week per tree
   - Shrubs (1 gallon to 5 gallon) - Supply 8 gallons per week per plant
   - Perennials and Ground Covers (flats - 1 gallon) - Supply 4 gallons per week per plant
**OPINION of PROBABLE LANDSCAPE WATER DEMAND**

**FOR**

Kiley West - Unit 5

<table>
<thead>
<tr>
<th></th>
<th>Area (Acres)</th>
<th>Ft/Year</th>
<th>Acre ft/year</th>
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<tr>
<td>1. Lawn (spray):</td>
<td>0.18</td>
<td>3.41</td>
<td>0.61</td>
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<tr>
<td>2. Native Grass Areas (spray)</td>
<td>3.14</td>
<td>0.00</td>
<td></td>
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</tbody>
</table>

3. **Trees (Drip):**
   - Formula for Deciduous and Evergreen Trees:
     
     Number of trees multiplied by six (6) emitters, multiplied by 2 gal/hr, multiplied by two (2) hours/day, multiplied by two (2) times/wk x 31 wks, divided by 325,851 gal/ac-ft = acre feet/year.

<table>
<thead>
<tr>
<th># of Trees</th>
<th>Emitters/tree</th>
<th>gal/hr/Emitter</th>
<th>hours per day</th>
<th>times per week</th>
<th># of weeks/season</th>
<th>Ac-ft</th>
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<tr>
<td>85</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>31</td>
<td>0.39</td>
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</table>

4. **Shrubs (Drip):**
   - Formula for 5-gallon to 1gallon shrubs:
     
     Number of shrubs multiplied by two (2) emitters, multiplied by 1 gal/hr, multiplied by two (2) hours/day, multiplied by two (2) times/wk x 31 wks, divided by 325,851 gals/ac-ft = acre feet/year.

<table>
<thead>
<tr>
<th># of Shrubs</th>
<th>Emitters/shrub</th>
<th>gal/hr/Emitter</th>
<th>hours per day</th>
<th>times per week</th>
<th># of weeks/season</th>
<th>Ac-ft</th>
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<tr>
<td>339</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>31</td>
<td>0.25</td>
<td></td>
</tr>
</tbody>
</table>

5. **Perennials and Ground Cover (Drip):**
   - Formula for flats - 1 gallon:
     
     Number of shrubs multiplied by two (2) emitters, multiplied by .5 gal/hr, multiplied by two (2) time/day, multiplied by two (2) times/wk x 31 wks, divided by 325,851 gals/ac-ft = acre feet/year.

<table>
<thead>
<tr>
<th># of Shrubs</th>
<th>Emitters/ plant</th>
<th>gal/hr/Emitter</th>
<th>hours per day</th>
<th>times per week</th>
<th># of weeks/season</th>
<th>Ac-ft</th>
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<td>884</td>
<td>2</td>
<td>0.5</td>
<td>2</td>
<td>31</td>
<td>0.34</td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL LANDSCAPE WATER USAGE IN AC.FT/yr:** 1.60

*Does not include a drought factor.

---

**Notes:**

1. Emitter schedule above may not match that shown on plans, since this schedule is designed to provide water for plants at maturity.

2. Assumptions for supplying water are as follows; for mature plants during growing seasons:
   - Trees - Supply 48 gallons per week per tree
   - Shrubs (1 gallon to 5 gallon) - Supply 8 gallons per week per plant
   - Perennials and Ground Covers (flats - 1 gallon) - Supply 4 gallons per week per plant
4\" SERVICE: METER AND PRESSURE REDUCING/PRESSURE SUSTAINING VAULT;

GENERAL NOTES:
THIS DETAIL SHALL BE USED WHEN CONNECTING A USER DIRECTLY TO THE MAINLINE.

THE PRESSURE REDUCING VALVE WILL REDUCE THE PRESSURE FROM THE MAIN DISTRIBUTION SYSTEM TO THE IRRIGATION DISTRIBUTION SYSTEM PRESSURE. THE PRESSURE SUSTAINING FEATURE WILL CLOSE THE VALVE IN THE EVENT THAT THE PRESSURE IN THE MAIN DISTRIBUTION SYSTEM DROPS BELOW A SETPOINT.

ALL DIMENSIONS SHOWN ARE APPROXIMATE.

REFER TO NOTES PAGE SE–7.3.2.

**4\" EFFLUENT SERVICE**
METER AND PRESSURE REDUCING STATION

<table>
<thead>
<tr>
<th>REVISION</th>
<th>CITY OF SPARKS EFFLUENT REUSE SYSTEM DETAILS</th>
<th>DATE: 10/21/04</th>
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<tr>
<td></td>
<td>NOT TO SCALE</td>
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</tr>
<tr>
<td>DRAWING No.</td>
<td>SE–7.3.1</td>
<td></td>
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</tbody>
</table>

FIGURE J–9
4" SERVICE: METER AND PRESSURE REDUCING/PRESSURE SUSTAINING VAULT:

METER AND VALVE SIZE SHALL BE DETERMINED BY DESIGN FLOW. DESIGN FLOW SHALL BE BETWEEN 20% AND 80% OF PRESSURE REDUCING VALVE MAXIMUM FLOW AS PUBLISHED BY MANUFACTURER. ALL MATERIALS SHALL BE RATED FOR 200 PSI WORKING PRESSURE MINIMUM UNLESS SPECIFICALLY APPROVED BY THE CITY OF SPARKS.

1. SUPPLY PIPING SHALL BE RATED FOR NORMAL WORKING PRESSURE OF 200 PSI. PROVIDE SURGE ALLOWANCE TO 300 PSI. BURIED PIPING SHALL BE COLORED PURPLE OR WRAPPED IN PURPLE POLYETHYLENE PIPE ENCASMENT. AWWA C-900 PVC OR AWWA C151 DUCTILE IRON PIPE WITH AWWA C104 CEMENT MORTAR LINING ARE APPROVED MATERIALS.

2. 4" MECHANICAL JOINT, FUSION BONDED EPOXY COATED, RESILIENT WEDGE GATE VALVE WITH EBAA IRON SERIES 1100 MEGALIC OR EQUAL. PROVIDE RESTRAINED JOINT PIPE OR THRUST BLOCKS FOR 200 PSI WORKING PRESSURE. SEE STANDARD DETAIL SE-3.

3. 6' LONG FLANGE X PLAIN END DUCTILE IRON PIPE SPOOL, 200 PSI. DIRECT TAPS AS SHOWN ON PLANS. WRAP BURIED PIPE IN PURPLE POLYETHYLENE PIPE ENCASMENT.

4. 4" BADGER METER RECORDEALL TURBO 1000 METER WITH INTEGRAL STRAINER AND REGISTER AND PIT MOUNT REMOTE READ HEAD (ERT) PER SPECIFICATIONS. SEE STANDARD SPECIFICATIONS SP-2.

5. PIT MOUNT ERT PER SPECIFICATIONS. MOUNT ON VAULT WALL, 6" BELOW LID AT LID JOINT.

6. 41" LONG FLANGE X PLAIN END DUCTILE IRON PIPE SPOOL, 200 PSI. DIRECT TAP AS SHOWN ON PLANS.

7. 4" EBAA IRON, SERIES 2100 MEGALANCE RESTRAINED FLANGE ADAPTER, 200 PSI, OR APPROVED EQUAL. INSTALL FLANGE ADAPTER LEAVING SUFFICIENT GAP FOR FUTURE REMOVAL OF VALVES.

8. 4" FLANGED CLA-VAL MODEL 92-01-YBCS-KC PRESSURE REDUCING/PRESSURE SUSTAINING VALVE PER SPECIFICATIONS. SEE STANDARD SPECIFICATIONS SP-1.

9. INSTALL ORIFICE PLATE BETWEEN FLANGE GASKETS IF REQUIRED BY ENGINEER FOR FLOW CONTROL.

10. 1/2" DIRECT TAP; 1/2" CLOSE NIPPLE, 1/2" ISOLATION BALL VALVE, REDUCE TO 1/4", LIQUID FILLED PRESSURE GAUGE, 0-200 psi. BRASS FITTINGS. SEE STANDARD SPECIFICATIONS SP-2.

11. 1/2" DIRECT TAP; 1/2" CLOSE NIPPLE, 1/2" TEE; RUN: 1/2" ISOLATION BALL VALVE, REDUCE TO 1/4", LIQUID FILLED PRESSURE GAUGE, 0-150 psi; BRANCH: 1/2" CLOSE NIPPLE, 1/2" ISOLATION BALL VALVE, 1/2" CLOSE NIPPLE (SAMPLE TAP). BRASS FITTINGS. SEE STANDARD SPECIFICATIONS SP-2.

12. MANUAL PIPE DRAIN: 1/2" DIRECT TAP ON BOTTOM OF PIPE, 1/2" CLOSE NIPPLE, 1/2" BALL VALVE. BRASS FITTINGS.

13. 1-1/4" DIRECT TAP ON SIDE OF PIPE, CLOSE NIPPLE, BALL VALVE, 1-1/4" CLA-VAL, MODEL 50-01-YBCS-KC PRESSURE RELIEF VALVE SET TO RELEASE AT 100 PSI (OR IRRIGATION SYSTEM MAXIMUM OPERATING PRESSURE), CLOSE NIPPLE, 90° BEND, POINTED DOWN. PROVIDE PIPE SUPPORT FOR RELIEF VALVE. GALVANIZED OR BRASS FITTINGS.

14. PIPE SUPPORT.

15. INSTALL TWO, 4' X 4' X 3/32" FORD METER PIT INSULATING BLANKETS (FIB) OVER PIPING AND VALVES.

16. TWO SIDED, PURPLE, PLASTIC TAG READING "AVISO AGUA IMPURA NO TOMAR" AND "WARNING RECYCLED/RECLAIMED WATER DO NOT DRINK". T. CHRISTY ENTERPRISES, VALVE IDENTIFICATION TAG, ID-MAX-P2-RC-006, OR APPROVED EQUAL.

17. CONNECT TO IRRIGATION DISTRIBUTION PIPING PER PLANS. PROVIDE FITTINGS AND ADAPTERS AS NECESSARY.

18. PRECAST JENSEN UTILITY BOX, MODEL 4686 WITH SUMP KNOCKOUT. DESIGNED FOR "INCIDENTAL" H2O LOADING. INSTALL RISERS AND COVER AS NECESSARY TO MEET GRADE REQUIREMENTS. SEAL RISERS AND COVER WITH NON-SHRINK GROUT TO PREVENT GROUNDWATER INTRUSION. INSTALL LADDER (LENGTH PER FIELD CONDITIONS AND BILCO LADDER-UP SAFETY POST.

19. JENSEN 487BAT, TORSION ASSISTED COVER - EPOXY COATED PURPLE & LABELED "EFFLUENT" OR "RECLAIMED WATER", DESIGNED FOR "INCIDENTAL" H2O LOADING. NOT SUITABLE FOR FULL TRAFFIC LOCATIONS.

20. FIELD BORE VAULT PENETRATIONS FOR EXISTING OR PROPOSED CONDITIONS. INSTALL MODEL "C" LINK-SEAL MODULAR SEAL OR EQUAL. PACK VOID WITH NON-SHRINK GROUT.

21. CONSTRUCT TOP 4' ABOVE FINISHED GRADE IN UNIMPROVED OR LANDSCAPED LOCATIONS. PLACE TOP FLUSH IN HARRSCAPPED AREAS. GRADE TO DRAIN AWAY FROM VAULT.

22. INSTALL 12" CONCRETE COLLAR AROUND VAULT. CONFORM TO SSPWC SECTION 202.01.12.

<table>
<thead>
<tr>
<th>REVISION</th>
<th>CITY OF SPARKS EFFLUENT REUSE SYSTEM DETAILS</th>
<th>DATE: 10/21/04</th>
</tr>
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<tr>
<td></td>
<td>NOTES - 4&quot; EFFLUENT SERVICE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>METER AND PRESSURE REDUCING STATION</td>
<td></td>
</tr>
</tbody>
</table>

DRAWING No. SE-7.3.2
APPENDIX K – SPANISH SPRINGS REGIONAL SPORTS COMPLEX
Spanish Springs Regional Sports Complex

1.1 SITE DESCRIPTION

The proposed Spanish Springs Regional Sports Complex is to be located south of the Foothills at Wingfield Development. To the west and south of the Spanish Springs Regional Sports Complex is currently undeveloped land. With the exception of a single residence abutting the eastern boundary of the sports complex, the land to the east of the complex is undeveloped. The western and eastern land is hilly and mountainous and may not have development in the future. The land to the south is a BLM nature area.

The Spanish Springs Regional Sports Complex is only in conceptual design at this point, there is no irrigation plans, planting plans, or topographic maps. A vicinity map of the sports complex is shown as Figure K-1. Site location data is provided in Table K-1.

Table K-1 – Spanish Springs Regional Sports Complex 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>Spanish Springs Regional</td>
<td>Future</td>
<td>39°36'33&quot;N</td>
<td>S18.T20N.R21E</td>
</tr>
<tr>
<td>Sports Complex</td>
<td></td>
<td>119°40'12&quot;W</td>
<td></td>
</tr>
</tbody>
</table>

Spanish Springs Regional Sports Complex 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 AO (Flooding depth of 1 to 3 feet).

1.2 SOILS

The descriptions of the native soils at the Spanish Springs Regional Sports Complex are described below. This data is derived from the Soil Conservation Service publication Soil Survey of Washoe County, Southern Part (SCS 1983). Figure K-2 shows the soil characteristics of the sports complex site.

1194 - Sparspry stony sandy loam, 4 to 8 percent slopes. This moderately deep, well drained is on lake terraces and alluvial fans. It formed in alluvium derived dominantly from mixed rock sources. Typically, 1 to 3 percent of the surface is covered with stones. The surface layer is grayish brown stony sandy loam about 3 inches thick. The subsoil is brown clay loam about 11 inches thick. The upper
9 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 Incy soils on small sand dunes, Haybourne soils on inset alluvial fans, Indian Creek soils on higher terrace remnants, and Jowec Variant soils in shallow depressions. The unit is about 5 percent Incy soils, 3 percent Haybourne soils, 5 percent Indian Creek soils, and 2 percent Jowec Variant soils.

Permeability of this Spasprey soil is moderately slow. Available water capacity is 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 slight.

The present vegetation in most areas is mainly big sagebrush, spiny hopsage, and Douglas rabbit brush.

1192 - Spasprey sandy, 2 to 4 percent slopes. This moderately deep, well drained is on lake terraces and alluvial fans. It formed in alluvium derived dominantly 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.

1191 - Spasprey sandy loam, 2 to 4 percent slopes. This moderately deep, well drained is on lake terraces and alluvial fans. It formed in alluvium derived dominantly 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 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, spiny hopsage, and Douglas rabbit brush.

1172 - Wedertz sand, 2 to 4 percent slopes. This very deep, well drained is on lake terraces and alluvial fans. It formed in alluvium derived dominantly from mixed rock sources. Typically, the surface layer is pale brown sand about 7 inches thick. The subsoil is brown sandy clay loam about 18 inches thick. The upper 6 inches of the substratum is pale brown, weakly cemented sandy loam. The lower part to a depth of 60 inches is pale brown gravelly loamy sand. Depth to the weakly cemented layer ranges from 20 to 35 inches. Included in this unit are Aquinas soils on higher terraces remnants, Greenbrae soils on lower parts of alluvial fans and on lower terraces, and Turria soils on inset alluvial fans. The unit is about 5 percent Aquinas soils, 5 percent Greenbrae soils, and 5 percent Turria soils.

Permeability of this Wedertz soil is moderately slow in subsoil and upper part of the substratum and rapid in the lower part. 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 high. The soil is subject to flash flooding during storms of unusually high intensity.

The present vegetation in most areas is mainly big sagebrush, littleleaf horsebrush, and Indian ricegrass.

1170 - Wedertz sandy loam, 2 to 4 percent slopes. This very deep, well drained is on alluvial fans. It formed in alluvium derived dominantly from mixed rock sources. Typically, the surface layer is pale brown sandy clay loam about 6 inches thick. The subsoil is brown sandy clay loam about 16 inches thick. The upper 12 inches of the substratum is pale brown, weakly cemented sandy loam. The lower part to a depth of 60 inches is pale brown gravelly loamy sand. Depth to the weakly silica cementation ranges from 20 to 35 inches. Included in this unit are Aquinas soils on higher terraces remnants, Greenbrae soils on lower parts of alluvial fans and on lower terraces, and Jowec soils in shallow depressions. The unit is about 5 percent Aquinas soils, 5 percent Greenbrae soils, and 5 percent Jowec soils.

Permeability of this Wedertz soil is moderately slow in subsoil and upper part of the substratum and rapid in the lower part of the substratum. 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 high. The soil is subject to flash flooding during storms of unusually high intensity.
The present vegetation in most areas is mainly big sagebrush, littleleaf horsebrush, and Indian ricegrass.

971 – Aladshi sandy loam, 2 to 4 percent slopes. This very deep, well drained is on alluvial fans and low stream terraces. It formed in alluvium derived from mixed rock sources. Typically, the surface layer is light brownish gray sandy loam about 7 inches thick. The subsoil is brown sandy clay loam about 27 inches thick. The substratum to a depth of 60 inches or more is stratified very gravelly loam to extremely gravelly loamy sand. Included in this unit are Kayo soils on higher alluvial fan skirts, Indian Creek soils on higher terrace remnants, Turria soils on small, inset alluvial fans, and Holbrook soils, which occur near drainageways and are subject to flooding for short periods in most years. The unit is about 6 percent Kayo soils, 4 percent Indian Creek soils, 3 percent Turria soils, and 2 percent Holbrook soils.

Permeability of this Aladshi soil is moderately slow. 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. This soil is subject to flash flooding during storms of unusually high intensity. Channeling and depositions are common along streambanks.

The present vegetation in most areas is mainly big sagebrush, spiny hopsage, and bottlebrush squirreltail.

872 – Xman very stony sandy loam, 8 to 15 percent slopes. This shallow, well drained is on uplands. It formed in residuum derived from altered volcanic rock. Typically, 3 to 10 percent of the surface is covered in stones. The surface layer is grayish brown very stony sandy loam about 2 inches thick. The subsoil is brown clay about 12 inches thick. Weather bedrock is at a depth of 14 inches. Depth to weather bedrock varies from 10 to 20 inches. Included in this unit are Risley soils on colluvial slopes, Old Camp soils on ridges, Manogue soils in shallow depressions, and Rock outcrop that occurs as ridges or peaks. The unit is about 4 percent Risley soils, 5 percent Old Camp soils, 3 percent Manogue soils, and 3 percent Rock outcrop.

Permeability of this Xman soil is slow. Available water capacity is very low. Effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The present vegetation in most areas is mainly low sagebrush, and cheatgrass.

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 varies 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. The 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 moderate. 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. This soil is slightly to moderately affected by sodium salts.

The present vegetation in most areas is mainly big sagebrush, black greasewood, and saltgrass.

175 – **Indian Creek very cobbly loam, 4 to 8 percent slopes.** This shallow, well drained soil is on terraces and dissected alluvial fans. It formed in alluvium derived dominantly from mixed rock sources. Typically, about 40 to 60 percent of the surface is covered with cobbles. The surface layer is pale brown very cobbly loam about 7 inches thick. The subsoil is light brown gravelly clay about 12 inches thick. The upper 4 inches of the substratum is a white indurated duripan. The lower part to a depth of 60 inches is reddish yellow, stratified very gravelly loamy coarse sand through gravelly sandy clay loam. Depth to hardpan varies from 14 to 20 inches. Included in this unit are Barnard soils at higher elevations on smooth or slightly concave surfaces, Spasprey soils on lower alluvial fan skirts, and Washoe soils near drainageways. The unit is about 5 percent Barnard soils, 5 percent Spasprey soils, and 5 percent Washoe soils.

Permeability of this Indian Creek soil is very slow. Available water capacity is very low. Effective rooting depth is 14 to 20 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 is mainly low sagebrush and cheatgrass.

172 – **Indian Creek sandy loam, 4 to 8 percent slopes.** This shallow, well drained soil is on terraces and dissected alluvial fans. It formed in alluvium derived dominantly from mixed rock sources. Typically, about 10 to 20 percent of the surface is covered with gravel. The surface layer is pale brown sandy loam about 8 inches thick. The subsoil is light brown gravelly clay about 10 inches thick. The upper 7 inches of the substratum is a white indurated duripan. The lower part to a depth of 60 inches is reddish yellow, stratified very gravelly loamy coarse sand through gravelly sandy clay loam. Depth to hardpan varies from 14 to 20 inches. Included in this unit are Cassiro soils on higher smooth alluvial fans, Northmore soils on smooth, long slopes of alluvial fans in lower landscape
positions, and Washoe soils near drainageways. The unit is about 5 percent Cassiro soils, 5 percent Northmore soils, and 5 percent Washoe soils.

Permeability of this Indian Creek soil is very slow. Available water capacity is very low. Effective rooting depth is 14 to 20 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 is mainly low sagebrush and bottlebrush squirreltail.

The soil listed above is the natural soil in the area. During the construction of the park, there may be 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.

1.3 IRRIGATION PLAN

Effluent will be used to irrigate the golf course, sports fields, the community park, and all other green spaces requiring water. A conceptual plan of the Spanish Springs Regional Sports Complex is shown in Figure K-3.

All effluent irrigation at the Spanish Springs Regional Sports Complex will be done at night to minimize the possibility of public contact with the effluent. All irrigation will be done through automatic sprinklers to minimize the possibility of over-irrigating and subsequent ponding or runoff. Sprinkler heads will be placed to prevent ponding and runoff. Spray irrigators will discharge near the ground surface and away from areas of frequent public use.

Potable water lines will be identified and necessary adjustments made to provide the required separation between effluent and potable water lines. Any component of the irrigation system that is exposed will be posted and painted purple to clearly identify the component as an effluent fixture. All areas of the development shall be posted to notify the public that the landscaping is irrigated with effluent.

1.4 IRRIGATION SYSTEM

The Spanish Springs Regional Sports Complex effluent irrigation will be served by a 6-inch diameter service line. The service line will pass through a meter and a pressuresustaining valve to maintain system pressure. A main shut off valve will be located near the meter & PSV vault for use in the event of an emergency. A booster pump station will then distribute the effluent to the irrigation system. Pressure reducing valves may be required for irrigation zones near the booster pump station.

The future sports complex irrigation control system will be set up to control the time and duration of irrigation throughout the sports complex. This system will control a set of
valves independent of the master valve at the service connection. The irrigation system
will be designed with an emergency a shut down at the gate valve that connects the
system to the main water supply. Although the system is not yet designed, Figure K-4
shows potential irrigation zones.

It is not anticipated that the Spanish Springs Regional Sports Complex will have power 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 complex’s
ability to irrigate.

1.5 EFFLUENT DEMAND

The projected effluent demand for the Spanish Springs Regional Sports Complex is
provided in Table K-2 below. This demand is based on the assumption that only 25% of
the final sports complex will be built within 5 years.

<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>Maximum Daily Flow (mgd)</th>
<th>Average Daily Flow (mgd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spanish Springs Regional Sports Complex</td>
<td>448.0</td>
<td>100.8</td>
<td>394.80</td>
<td>400</td>
<td>0.192</td>
<td>0.173</td>
</tr>
</tbody>
</table>
NOTES

- Future effluent and potable water lines shall meet required separation standards.

The location of the future connection to the effluent main is undetermined at this time.

- Upon completion of construction and irrigation plans, the effluent management plan shall be updated for the sports complex site.

POTENTIAL IRRIGATION ZONES

- Spray irrigation
- Drip irrigation
- Spray and drip irrigation
The Foothills – Vista Blvd. - Pioneer Meadows

1.1 SITE LOCATION

The Foothills is a 690-acre planned residential and commercial development along the eastern edge of the Spanish Springs Valley. The community is bordered by undeveloped land to the east, residential development to the north and west and the Spanish Springs Regional Sports Complex (future) to the south. Vista Blvd. is the primary road serving the Foothills. The vegetation along Vista Blvd. will be irrigated with effluent within the Foothills development as well as for 2500 feet immediately west of the Foothills development.

Pioneer Meadows is a planned residential/commercial development in the Spanish Springs Valley. The development encompasses one square mile on Vista Blvd. Pioneer Meadows is bordered on the north and east by residential development, to the northwest by Lazy 5 Regional Park, by agricultural land to the southwest and a natural wetland to the south.

Refer to Figure L-1 for a vicinity map showing the location of the Foothills-Vista Blvd. and Pioneer Meadows.

<table>
<thead>
<tr>
<th></th>
<th>Property</th>
<th>Physical Address</th>
<th>Latitude/Longitude</th>
<th>Township/Range/Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>The</td>
<td>Foothills/Vista</td>
<td>7300 Vista Blvd.</td>
<td>39°38'17&quot;N</td>
<td>S06 &amp; 07,</td>
</tr>
<tr>
<td></td>
<td>Blvd.</td>
<td></td>
<td>119°40'22&quot;W</td>
<td>T20N.R21E</td>
</tr>
<tr>
<td>Pioneer</td>
<td>Meadows</td>
<td>Vista Blvd</td>
<td>39°37'22&quot;N</td>
<td>S11,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>119°42'12&quot;W</td>
<td>T20N.R20E</td>
</tr>
</tbody>
</table>

The Foothills & Pioneer Meadows will use effluent to irrigate streetscapes, parks, greenbelt areas and common area landscaping. Refer to the Foothills – Vista Blvd Master Irrigation Plan (figure L-2) for the general location of the re-use sites within the development. Figure L-3 shows the initial re-use areas in the Pioneer Meadows development.

The Foothills – Vista Blvd. has slopes ranging from 0% to 4%. The majority of the development is in FEMA flood zone X, identified as areas not in the 500-year flood plain. A small portion in the southwest quarter of section 7, T20N, R21E, is in flood zone AO with a 100-year flood depth of 1 foot.
Pioneer Meadows has slopes ranging from approximately 0% to 2%. The majority of the
development is identified in the flood zone A, areas within the 100-year floodplain where
the base flood elevation has not been established. The eastern ¼ of the project, with the
exception of the extreme southeast corner, is in flood zone AO, with 100-year flood
depths of 1 foot. The extreme southeast corner of the project is in zone X, areas outside
of the 500-year floodplain.

1.2 SOILS

The soils present in the Foothills — Vista Blvd. — Pioneer Meadows development are
described below. All soil data was taken from the Soil Conservation Service’s Soil
Survey of Washoe County, Nevada, Southern Part (1983). Figures L-4A and L-4B show
the native soil characteristics for the development.

160 — Incy sand, 4 to 8 percent slopes. This very deep, excessively drained soil is on
low-lying dunes superimposed over alluvial fans. It formed in eolian sand
derived from mixed, but dominantly granatic, rocks. Typically, the surface layer
is grayish brown sand about 9 inches thick. The underlying material to a depth of
60 inches is pale brown sand. Included in this unit are Greenbrae soils on the tow
slopes of lower alluvial fans, Wedertz soils on lower alluvial fans and terraces,
and Haybourne soils on higher alluvial fans near drainageways.

Permeability of this Incy soil is very rapid. Available water capacity is low.
Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of
water erosion is moderate. The hazard of soil blowing is high.

The present vegetation in most areas is mainly big sagebrush.

175 — Indian Creek very cobbly loam, 4 to 8 percent slopes. This shallow, well-
drained soil is on terraces and dissected alluvial fans. It formed in alluvium
derived dominantly from mixed rock sources. Typically, about 40 to 60 percent
of the surface is covered with cobbles. The surface layer is pale brown very
cobbly loam about 7 inches thick. The subsoil is light brown gravelly clay about
12 inches thick. The upper 4 inches of the substratum is a white indurated
duripan. The lower part to a depth of 60 inches is reddish yellow, stratified very
gravelly loamy coarse sand through gravelly sandy clay loam. Depth to hardpan
varies from 14 to 20 inches.

Permeability of this Indian Creek soil is very slow. Available water capacity is
very low. Effective rooting depth is 14 to 20 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 is mainly low sagebrush, and cheatgrass.
230 — Cradlebaugh Loam. This very deep, poorly drained soil is on low terraces. It is formed in alluvium from mixed rock sources. Slopes are 0 to 2 percent. The surface is a grayish brown loam approximately 10 inches thick. The upper 25 inches of the underlying material is a light yellowish brown, light gray and white, stratified silty clay loam through fine sandy loam. The lower part to a depth of 60 inches is a pale brown sandy loam. Depth to weak silica cementation ranges from 18 to 24 inches.

Permeability of this Cradlebaugh soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or greater for water tolerant plants. Runoff is slow and the hazard of water erosion is slight. The hazard of soil blowing is slight.

The present vegetation is mainly black greasewood, basin wildrye and saltgrass.

420— Godecke loamy sand. This very deep, somewhat poorly drained soil is on slightly concave to smooth terraces. It is formed in alluvium derived from mixed rock sources. Slopes are 0 – 2 percent. The surface layer is pale brown loamy sand about 5 inches thick. The subsoil is pale brown sandy clay loam about 10 inches thick. The substratum to a depth of 60 inches or more is stratified sandy loam through clay.

Permeability of this Godecke soil is slow. Available water capacity is high. Effective rooting depth is greater than 60 inches water tolerant plants. Runoff is very slow and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

The predominant vegetation is black greasewood and saltgrass.

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 varies from 20 to 40 inches.

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 moderate. 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. This soil is slightly to moderately affected by sodium salts.

The present vegetation in most areas is mainly big sagebrush, black greasewood, and saltgrass.
830 – **Fettic silty clay loam.** This very deep, poorly drained soil is on low terraces. It is formed in alluvium derived from mixed rock sources. Slopes are 0 to 2 percent. The surface layer is dark grayish brown silty clay loam about 1 inch thick. The subsoil is grayish brown clay loam about 20 inches thick. The substratum to a depth of 60 inches or more is light brownish gray stratified fine sandy loam through clay.

Permeability of this Fettic soil is very slow. Available water capacity is high. Effective rooting depth is 60 inches for water tolerant plants. Runoff is very slow and the hazard of water erosion is slight. The hazard of soil blowing is slight.

The predominant vegetation is saltgrass and basin wildrye.

910 – **Vamp fine sandy loam, slightly saline-alkali.** This moderately deep, somewhat poorly drained soil is on flood plains and low terraces. It formed in alluvium derived from mixed rock sources. Slopes are 0 to 2 percent. The surface layer is grayish brown fine sandy loam about 3 inches thick. Below this is a layer of light grayish brown and pale brown, stratified fine sandy loam and loam about 33 inches thick. The next layer is a white strongly cemented hardpan about 6 inches thick. The underlying material to a depth of 60 inches is yellowish brown and light olive gray, stratified loam, sandy loam and loamy sand. Depth to the hardpan ranges from 20 to 40 inches.

Permeability of this Vamp soil is moderate. Available water capacity is moderate. Effective rooting depth is 20 – 40 inches Runoff is slow and the hazard of water erosion is slight. The hazard of soil blowing is slight.

The predominant vegetation in this soil is grass.

993 – **Haplaquolls, nearly level.** These very deep, very poorly drained soils are on alluvial flood plains. The soils are reworked and the texture is highly variable. The soils have a dark surface layer. The vegetation varies from sparse to lush stands of sedges and rushes.

Included in this unit are small areas of aquents, Beaches and intermittent lakes. These soils produce food and cover for wetland wildlife. They are mostly used for wildlife habitat. The seasonal high water table and the periodic ponding are severe limitations to both agricultural and urban uses.

1172 - **Wedertz sand, 2 to 4 percent slopes.** This very deep, well drained is on lake terraces and alluvial fans. It formed in alluvium derived dominantly from mixed rock sources. Typically, the surface layer is pale brown sand about 7 inches thick. The subsoil is brown sandy clay loam about 18 inches thick. The upper 6 inches of the substratum is pale brown, weakly cemented sandy loam. The lower part to
a depth of 60 inches is pale brown gravelly loamy sand. Depth to the weakly cemented layer ranges from 20 to 35 inches.

Permeability of this Wedertz soil is moderately slow in subsoil and upper part of the substratum and rapid in the lower part. 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 high. The soil is subject to flash flooding during storms of unusually high intensity.

The present vegetation in most areas is mainly big sagebrush, littleleaf horsebrush, and Indian ricegrass.

1191 - Spasprey sandy loam, 2 to 4 percent slopes. This moderately deep, well drained is on lake terraces and alluvial fans. It formed in alluvium derived dominantly 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 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.

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, spiny hopsage, and Douglas rabbit brush.

1194 - Spasprey stony sandy loam, 4 to 8 percent slopes. This moderately deep, well drained is on lake terraces and alluvial fans. It formed in alluvium derived dominantly from mixed rock sources. Typically, 1 to 3 percent of the surface is covered with stones. The surface layer is grayish brown stony sandy loam about 3 inches thick. The subsoil is brown clay loam about 11 inches thick. The upper 9 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.

Permeability of this Spasprey soil is moderately slow. Available water capacity is 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 slight.

The present vegetation in most areas is mainly big sagebrush, spiny hopsage, and Douglas rabbit brush.
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. Slopes are 0 to 2 percent. 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.

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 predominant vegetation is black greasewood and Douglas rabbitbrush.

The soils listed above are the natural soil in the area. During the construction, 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.
1.3 IRRIGATION PLAN

All irrigation at the Foothills – Vista Blvd-Pioneer Meadows will be done at night to minimize the possibility of public contact with the effluent. All irrigation will be done through automatic sprinklers. The length of time each zone will irrigate can be adjusted according to seasonal temperature and precipitation data. Sprinkler heads will be placed to prevent ponding and runoff. Spray irrigators will discharge near the ground surface and away from areas of frequent public use. Registered Landscape Architects designed the irrigation systems for both the Foothills – Vista Blvd - Pioneer Meadows.

Potable water lines will be identified and necessary adjustments made to provide the required separation between effluent and potable water lines. Any component of the irrigation system that is exposed will be posted and painted purple to clearly identify the component as an effluent fixture. All areas of the reuse site shall be posted to notify the public that the landscaping is irrigated with effluent.

The irrigation control system will control the time and duration of effluent application. 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 effluent supply. These gate valves are located at each point of connection, as shown on Figures L-2 and L-3.

1.4 IRRIGATION SYSTEM

1.4.1 – The Foothills – Vista Blvd

The effluent irrigation system for the Foothills – Vista Blvd. is served by a single, 16-inch connection to the City of Sparks effluent pipeline. The connection is located where Vista Blvd. enters the Foothills at the southwest corner of the development. The effluent connection flows to an effluent pump station that provides pressure for the distribution system within the development. The distribution pipe network, shown in Figure L-2, will serve the entire project with 49 points of connection. Each point of connection will have an isolation gate valve for use during maintenance or emergencies. A master effluent meter will be located at the pump station. Pressure reducing valves will be located as necessary within the effluent distribution network to protect the piping. The pump station and all distribution piping will be dedicated to the City of Sparks at the completion of construction. Homeowner’s associations will retain ownership of all distribution piping smaller than 4-inches and all irrigation infrastructure.
1.4.2 – Pioneer Meadows

The Pioneer Meadows effluent irrigation system is served by two connections to the City of Sparks Effluent Pipeline. The first connection will be at the intersection of Vista Blvd. and Hills Drive. The second connection will be at the western terminus of Kiley Ranch Drive. Both connections will be 6-inch diameter Schedule 40 PVC pipe with 3-inch diameter meters. Both connections will require pressure reducing-pressure sustaining valves to protect the irrigation system and to maintain pipeline pressure. Isolation gate valves will be installed on both sides of the meter vault both to allow for maintenance of the meter and PR-PSV as well as provide the ability to isolate the irrigation system in the event of an emergency. Figure L-5A through L-5D show the irrigation plan for Pioneer Meadows.

The irrigation system is pressurized by the main pump station at TMWRF and a booster pump station located in Kiley Ranch. The effluent storage tank in Spanish Springs provides storage to reduce pump operation time. The Pioneer Meadows streetscape will not be able to irrigate if the system pressure falls below the PSV setting initially 60 psi. If electrical power is interrupted to either pump station irrigation may not be possible because the storage tank alone may not be able to maintain system pressure above the PSV set point. Any electrical power interruption to the irrigation controllers will prevent irrigation.

1.5 EFFLUENT DEMAND

The estimated irrigation demands for the Foothills – Vista Blvd. – Pioneer Meadows are shown in Table L-2 below. Hansen Landscape Architects provided the demands for the Foothills and Vista Blvd. Moana Lane Nursery provided the demand for Pioneer Meadows. The demand for Pioneer Meadows includes all of the Streetscape, the school, the parks and a portion of the commercial development. Effluent demands will be re-evaluated as the three phases of the project are constructed and actual flows are available.

<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>Maximum Daily Flow (MGD)</th>
<th>Average Daily Flow (mgd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Foothills – Vista Blvd.</td>
<td>690</td>
<td>69.6</td>
<td>90.8</td>
<td>550</td>
<td>0.264</td>
<td>0.154</td>
</tr>
<tr>
<td>Pioneer Meadows</td>
<td>640</td>
<td>48.7</td>
<td>135.0</td>
<td>500</td>
<td>0.240</td>
<td>0.229</td>
</tr>
<tr>
<td>Total</td>
<td>1330</td>
<td>118.3</td>
<td>225.8</td>
<td>1050</td>
<td>0.504</td>
<td>0.383</td>
</tr>
</tbody>
</table>
1.6 RUNOFF CONTROL PLAN

In the event of an emergency, the effluent reuse system should be isolated at the gate valve located adjacent to each effluent meter vault.

Isolation Valve Locations:

**Foothills – Vista Blvd** – The main isolation valve is located at the meter vault adjacent to the effluent pump station. Refer to Figure 1-2.

**Pioneer Meadows** – There is an isolation valve located at each of the two effluent meters – one at the west end of Kiley Ranch Drive and one at the intersection of Vista Blvd. and Hills Drive. Refer to Figure 1-3 for the points of connection.

After isolating the effluent irrigation system, follow the notification procedures on page 18 of the Effluent Management Plan.
The Foothills Entry Feature

1.1 SITE LOCATION

The proposed entry feature will be located on the south side of Vista Blvd. just west of the Foothills at Wingfield project boundary, approximately 2400 ft east of Wingfield Parkway. Refer to Figure 1. The south side of Vista Boulevard does not have a pedestrian pathway in this location. The pedestrian pathway is located across the street on the north side of the Vista Boulevard which is a four lane divided arterial. The closest residential lot is located on the north side of Vista Boulevard approximately 150 feet away from the entry feature. The closest residence on the south side of the road is more than 300 feet away horizontally and is estimated to be 40 feet higher than the entry feature vertically.

1.2 DESCRIPTION

The proposed entry feature utilizes the existing sloping terrain and consists of a water wheel fed by a wooden flume located on the hillside. The 12-foot diameter water wheel will discharge water into an open pond approximately 25 feet wide and 60 feet long holding approximately 15,000 gallons of water. The pond will have an EPDM rubber liner which is placed over the ground and then covered in concrete. The water from the pond will be circulated to the flume via timer-controlled pumps. The entry feature consists of four 7 horsepower pumps capable of delivering a total of up to 1100 gallons per minute. The pond system will also include an automatic chemical treatment of bromide to inhibit algae growth.

In addition to the water features, the entry will include dense landscaping, retaining walls, fencing, and project monumentation. Turf and temporary irrigation areas as shown in Figures 2 and 3 will be spray irrigated. Prevailing wind direction is shown on Figure 2. Flowers, shrubs, and trees as shown in Figure 2 will be drip irrigated.

The reclaimed water distribution system was extended across the front of the entry feature location with an 8-inch distribution main constructed with Vista Boulevard as part of the Foothills development. A connection will be made to the existing distribution main with a valve to isolate the entry feature. One or two 3/8-inch float valves will replenish water lost to evaporation and keep the pond full. Water in the pond will be recirculated with pumps to the top of the feature. Some of the water will be directed to the flume where it will cascade over the water wheel and back into the pond. The rest of the water will be directed to a series of waterfalls that will cascade down and back into the pond.

1.3 EFFLUENT PLAN

The entry water feature pumps will operate on a timer and will run continuously from early morning though late in the evenings. Signs identifying the entry feature as a
reclaimed water facility will be placed in highly visible locations around the perimeter of the feature consistent with the requirements of the City of Sparks' reclaimed water permit. Special attention will be paid to the roadside edge to ensure clear identification. There is not a pedestrian pathway at the entry feature location. A 6-foot ornamental steel fence will be installed around the sides and rear perimeter of the water feature to reduce access to the rear of the feature. Figure 2 identifies the proposed location of the fencing and signage.

Potable water lines will be identified and necessary adjustments made to provide the required separation between effluent and potable water lines. Any component of the irrigation system that is exposed will be posted and painted purple to clearly identify the component as an effluent fixture.

In case of an emergency the system should be shut down at the gate valve that connects the system to the main effluent supply. The gate valve is located at the point of connection, as shown in Figure 3.

1.4 OPERATION AND MAINTENANCE

The effluent water in the feature will be circulated using four 7 horsepower pumps capable delivering a total of up to 1100 gallons per minute. This volume of flow will keep the surface water agitated and well circulated. The pumps will operate on a timer and will run continuously from early morning through late in the evenings.

An isolation valve located at the connection point to the distribution system shall be closed when needed for maintenance or winterization. The pond may be drained by one of two methods. It is expected that shut down and draining of the pond will be infrequent. So initially the pond will be drained by pumping into water trucks. The reclaimed water from the trucks will be spread over other common area landscaping or used as dust control. If it is determined that an alternative method of draining the pond is needed, facilities will be installed to pump the reclaimed water to an irrigation system to spread the reclaimed water over the roadside landscaping east of the water feature.

The water feature will be operated and maintained by a professional landscaped company under the direction of the master developer initially and ultimately the homeowner's association. The HOA will be educated on the precautions necessary when dealing with effluent to ensure the safety of the residents and operators. The City of Sparks will manage the use of the treated effluent under the terms and conditions of the discharge permit NEV2004530. The facility will be operated in accordance with the City of Sparks Spanish Springs Master Effluent Management Plan.
1.5 RUNOFF CONTROL PLAN

In the event of an emergency, the entry feature effluent reuse system should be isolated at the gate valve located at the connection to the effluent mainline within Vista Blvd.

Isolation Valve Locations:

Foothills Entry Feature – The isolation valve is located west of the entry feature at the connection to the effluent mainline within Vista Blvd. The valve location is shown on Figure 3.

After isolating the effluent irrigation system, follow the notification procedures on page 18 of the Effluent Management Plan.
APPENDIX M – CALLE DE LA PLATA & HAWCO BUSINESS PARK:

- CALLE DE LA PLATA PHASE II & WEST CALLE DE LA PLATA
- HAWCO OFFICE BUILDING I
- HAWCO OFFICE BUILDING II
- SPANISH SPRINGS PROFESSIONAL CENTER
- RW RAMSEY
- SILVER STATE LIQUOR
- LINDELL'S PAINTING
- SIERRA DESIGN CONCRETE
- VALLEY BUILDING SUPPLY
Calle de la Plata Streetscape & Hawco Business Park

1.1 SITE LOCATION

Calle de la Plata Street runs west from Pyramid Highway (SR 445) then turns southwesterly and connects to Eagle Canyon Drive. Adjacent developments include the Hawco Business Park to the north, Eagle Canyon III units 4 and 5 residential development to the west, Eagle Canyon III Units 2 and 3 and Eagle Canyon IV residential developments to the south, and State Route 445 to the east. Refer to Figure 1 for a vicinity map of the re-use site.

The Hawco Business Park permitted reuse site encompasses an area from Calle De La Plata north past Ingenuity Ave and from the west side of Pyramid Highway approximately 1 mile to the west. To date, developments within the Hawco Business Park include: Hawco Office Building I, Hawco Office Building II, Spanish Springs Professional Center, RW Ramsey, Silver State Liquor, Lindell's Painting Service, Sierra Design Concrete, and Valley Building Supply. A site map of the Hawco Business Park is shown in Figure 2.

<table>
<thead>
<tr>
<th>Property</th>
<th>Physical Address</th>
<th>Latitude/Longitude</th>
<th>Township/Range/Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calle de la Plata Streetscape</td>
<td>Calle de la Plata Street</td>
<td>39°40'28&quot;N 119°40'28&quot;W</td>
<td>S22 &amp; 23, T21N.R20E</td>
</tr>
<tr>
<td>Hawco Business Park</td>
<td>9732 SR 445</td>
<td>39°40'41&quot;N 119°42'14&quot;W</td>
<td>S22 &amp; 23, T21N.R20E</td>
</tr>
</tbody>
</table>

Hawco Business Park and Calle de la Plata Road are located in FEMA flood zones AO, with a 100-year flood depth of 2 feet and Zone X, areas outside of the 500-year floodplain.

1.2 SOILS

The Soil Conservation Service describes the geology of the southern Washoe County area as follows (SCS, 1983). Figure 3 shows the soil characteristics.

120 – *Doten Silty Clay, 0 to 2 percent slopes.* This very deep, moderately well drained soil is on lake terraces. It formed in alluvium derived from mixed rock. The surface layer is grayish brown silty clay about 7 inches thick. The underlying material to a depth of 60 inches is grayish brown and averages clay and silty clay.
LEGEND

120  DOTEN SILTY CLAY, 0–2% SLOPES
140  HAYBOURNE LOAMY SAND, 2–4% SLOPES
160  INCY SAND, 4–8% SLOPES
971  ALADSHI SANDY LOAM, 2–4% SLOPES
1160 JOWEC SANDY LOAM
1170 WEDERTZ SANDY LOAM, 2–4% SLOPES
1210 LINHART STONY COARSE SAND, 4–8% SLOPES

CALLE DE LA PLATA / HAWCO BUSINESS PARK
SOILS MAP

FIGURE 3

Infrastructure, Inc.
9450 DOUBLE "H" BLVD.
RENO, NEVADA  89512
PHONE (775) 788-5873  FAX (775) 788-8136
Permeability of this Doten soil is very slow. Available water capacity is high. Effective rooting depth is 60 inches or greater. Runoff is ponded or very slow and the hazard of water erosion is slight. The hazard of soil blowing is slight.

The present vegetation in most areas is mainly black greasewood, shadscale and bottlebrush squirreltail.

140 – Haybourne loamy sand, 2 to 4 percent slopes. This very deep, well-drained soil is on alluvial fans. It formed in alluvium derived dominantly from granitic rocks. The surface layer is pale brown loamy sand about 10 inches thick. The subsoil is brown sandy loam about 16 inches thick. The substratum to a depth of 63 inches or more is brown, stratified fine sandy loam through coarse sand.

Permeability of this Haybourne soil is moderately rapid in the subsoil and moderately rapid to rapid in the substratum. Available water capacity of the soil 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 moderate.

The present vegetation in most areas is mainly big sagebrush, green ephedra and Anderson peachbursh.

160 – Inchy Sand, 4 to 8 percent slopes. This very deep, excessively drained soil is on low-lying dunes superimposed over alluvial fans. It formed in eolian sand derived from mixed, but dominantly granitic, rocks. Typically, the surface layer is grayish brown a=sand about 9 inches thick. The underlying material to a depth of 60 inches is pale brown sand.

Permeability of this Inchy soil is very rapid. Available water capacity is low. Effective rooting depth is 60 inches or greater. Runoff is slow and the hazard of water erosion is slight. The hazard of soil blowing is high.

The present vegetation in most areas of this soil is mainly big sagebrush, Anderson peachbrush and antelope bitterbrush.

530 - Sagouspe Sand. This very deep, somewhat poorly drained soil is on flood plains and low terraces. It formed in sandy alluvium derived dominantly from mixed rock sources. Slopes are 0 to 2 percent. Typically, the surface layer is dark grayish brown sand about 21 inches thick. The underlying material to a depth of 60 inches is stratified, dark grayish brown and brown coarse sand and silt loam.

Permeability of this Sagouspe soil is rapid. Available water capacity is moderate. Effective rooting depth is 60 inches for water-tolerant plants but limited to 36 to 60 inches for water-sensitive plants. Runoff is slow, and the hazard of soil blowing is high. A seasonal high water table is at a depth of 36 to 40 inches in late winter and spring. This soil is subject to brief periods of flash flooding during storms of unusually high intensity.
The present vegetation in most areas is grass.

971 - **Aladshi sandy loam, 2 to 4 percent slopes.** This very deep, well drained is on alluvial fans and low stream terraces. It formed in alluvium derived from mixed rock sources. Typically, the surface layer is light brownish gray sandy loam about 7 inches thick. The subsoil is brown sandy clay loam about 27 inches thick. The substratum to a depth of 60 inches or more is stratified very gravelly loam to extremely gravelly loamy sand.

Permeability of this Aladshi soil is moderately slow. 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. This soil is subject to flash flooding during storms of unusually high intensity. Channeling and depositions are common along stream banks.

The present vegetation in most areas is mainly big sagebrush, spiny hopsage, and bottlebrush squirreltail.

1160- **Jowec Silty Clay Loam** - This very deep, well-drained soil is on low lake terraces. It formed an alluvium derived from mixed rock sources. Typically, the surface layer is very light brownish silty clay loam about 2 inches thick. The subsoil is dark yellowish brown clay loam about 18 inches thick.

Permeability of this Jowec soil is slow. Available water capacity is high. Effective rooting depth is more than 60 inches. Runoff is very 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.

The present vegetation in this soil is big sagebrush and spiny hopsage.

1170 - **Wedertz Sandy Loam, 2 to 4 percent slopes.** This very deep, well-drained soil is on alluvial fans. It formed in alluvium derived mixed rock sources. Typically, the surface layer is a pale brown sandy loam about 6 inches thick. The subsoil is a brown sandy clay loam about 16 inches think. The upper part of the substratum is a pale brown, weakly cemented sandy loam about 12 inches thick and the lower part, to a depth of 60 inches, is a pale brown gravelly loamy sand.

Permeability of this Wedertz soil is moderately slow. Available water capacity is moderate. Effective rooting depth is more than 60 inches. 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 stream banks. The soil is slightly affected by sodium salts.
The present vegetation in most areas is big sagebrush, littleleaf horsebrush and Indian ricegrass.

1210 - Linhart Stony Coarse sand, 4 to 8 percent slopes. This very deep, somewhat excessively drained soil is on alluvial fan. The soil formed in alluvium derived from granite. Typically, the surface layer is very dark grayish brown stony coarse sand about 14 inches thick. The underlying material, to a depth of 60 inches, is grayish brown to light brownish gray stratified very gravelly coarse sand to very gravelly loamy coarse sand.

Permeability of this Linheart soil is rapid. Available water capacity is very low. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight. This soil is subject to flash flooding during storms of unusually high intensity.

The present vegetation in most areas is mainly big sagebrush.

The soils listed above are the natural soil in the area. During the construction 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.

1.3 IRRIGATION PLAN

All irrigation of the Calle De La Plata & Hawco Business Park will be done at night to minimize the possibility of public contact with the effluent. All irrigation will be done through automatic sprinklers. The length of time, each zone will be irrigated can be adjusted according to seasonal temperature and precipitation data. Sprinkler heads will be strategically placed to prevent ponding and runoff. Spray irrigators will discharge near the ground surface and away from areas of frequent public use.

Potable water lines will be identified and necessary adjustments made to provide the required separation between effluent and potable water lines. The existing portions of Calle de la Plata, west of the reuse site are irrigated with potable water. These areas will be separated from the effluent re-use site by 36" deep concrete slurry trenches to prevent cross-connection. Any component of the irrigation system that is exposed will be posted and painted purple to clearly identify the component as an effluent fixture. All areas of the reuse site shall be posted to notify the public that the landscaping is irrigated with effluent.

The irrigation control systems will control the time and duration of effluent application. Each 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.
1.4 EFFLUENT DEMAND

The Calle De La Plata/Hawco Business Park reuse site has been permitted for an annual irrigation demand of 224.15 acre-feet/year and a peak demand of 465 gpm. To date, ten properties within the Business Park have draft effluent agreements with the City of Sparks. Irrigation demands for the ten sites total 87.18 acre-feet/year and 346.20 gpm. The irrigation demands are shown in Table M-2.
Table M-2 – Calle de la Plata Streetscape & Hawco Business Park 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>Peak Demand (gpm)</th>
<th>Maximum Daily Flow (mgd)</th>
<th>30-Day Average Daily Flow (mgd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calle De La Plata Phase 2</td>
<td>4.05</td>
<td>4.05</td>
<td>10.95</td>
<td>120 (Nighttime)</td>
<td>0.016</td>
<td>0.015</td>
</tr>
<tr>
<td>West Calle De La Plata</td>
<td>1.44</td>
<td>1.44</td>
<td>12.97</td>
<td>38.9 (Nighttime)</td>
<td>0.008</td>
<td>0.004</td>
</tr>
<tr>
<td>Hawco Office Building I</td>
<td>1.16</td>
<td>0.35</td>
<td>11.00</td>
<td>33 (Nighttime)</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>Hawco Office Building II</td>
<td>0.99</td>
<td>0.29</td>
<td>4.00</td>
<td>12 (Nighttime)</td>
<td>0.007</td>
<td>0.005</td>
</tr>
<tr>
<td>Spanish Springs Professional Center</td>
<td>1.64</td>
<td>0.54</td>
<td>9.00</td>
<td>27 (Nighttime)</td>
<td>0.009</td>
<td>0.007</td>
</tr>
<tr>
<td>RW Ramsey</td>
<td>7.52</td>
<td>1.12</td>
<td>4.00</td>
<td>12 (Nighttime)</td>
<td>0.005</td>
<td>0.002</td>
</tr>
<tr>
<td>Silver State Liquor</td>
<td>24.48</td>
<td>5.70</td>
<td>29.60</td>
<td>55 (Nighttime)</td>
<td>0.026</td>
<td>0.022</td>
</tr>
<tr>
<td>Lindell's Painting</td>
<td>0.46</td>
<td>0.46</td>
<td>5.00</td>
<td>15 (Nighttime)</td>
<td>0.004</td>
<td>0.001</td>
</tr>
<tr>
<td>Sierra Design Concrete</td>
<td>1.21</td>
<td>0.24</td>
<td>0.06</td>
<td>3.3 (Nighttime)</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>Valley Building Supply</td>
<td>1.54</td>
<td>0.20</td>
<td>0.60</td>
<td>30 (Daytime)</td>
<td>0.004</td>
<td>0.003</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>44.49</strong></td>
<td><strong>14.38</strong></td>
<td><strong>87.18</strong></td>
<td><strong>346.20</strong></td>
<td><strong>0.080</strong></td>
<td><strong>0.061</strong></td>
</tr>
</tbody>
</table>
1.5 RUNOFF CONTROL PLAN

In the event of an emergency, the effluent reuse system should be isolated at the gate valve located adjacent to each effluent meter vault. The effluent irrigation system may be isolated by closing the gate valve located at the connection to the City of Sparks Effluent Pipeline or by closing either of the gate valves located at the master effluent meter.

Isolation Valve Locations:

**Calle de la Plata Phase 2 & West Calle De La Plata** – The isolation valve for Calle De La Plata Phase 2 is located on the south side of the Calle De La Plata approximately 3600 feet west of the intersection with Pyramid Highway. Refer to **Figure M-2C**. The isolation valve for West Calle De La Plata is located on the south east corner of Isidor Court and Calle De La Plata. Refer to **Figure M-2E**.

**Hawco Office Building I** – The isolation valve is located at the south east corner of the re-use site at the meter vault. Refer to **Figure M-3A**.

**Hawco Office Building II** – The isolation valve is located at the south west corner of the re-use site at the meter vault. Refer to **Figure M-4A**.

**Spanish Springs Professional Center** – The isolation valve is located at the north east corner of the re-use site at the meter vault. Refer to **Figure M-5A**.

**RW Ramsey** – The isolation valve is located at the end of Circuit Court and on the north side of the re-use site at the meter vault. Refer to **Figure M-6A**.

**Silver State Liquor** – The isolation valve is located towards the south eastern side of the re-use site at the meter vault. Refer to **Figure M-7A**.

**Lindell's Painting** – The isolation valve is located at the south west corner of the re-use site at the meter vault. Refer to **Figure M-8A**.

**Sierra Design Concrete** – The isolation valve is located at the north west corner of the re-use site at the meter vault. Refer to **Figure M-9A**.

**Valley Building Supply** – The isolation valve is located at the south west corner of the re-use site at the meter vault. Refer to **Figure M-10A**.
CALLE DE LA PLATA PHASE 2 & WEST CALLE DE LA PLATA

2.1 SITE DESCRIPTION

Calle de la Plata Street runs west from the Pyramid Highway (SR 445) then turns southwesterly and connects to Eagle Canyon Drive. Adjacent developments include the Hawco Business Park to the north, Eagle Canyon III units 4 and 5 residential development to the west, Eagle Canyon III Units 2 and 3 and Eagle Canyon IV residential developments to the south, and State Route 445 to the east. Refer to Figure 2 for a vicinity map of the re-use site. Prevailing wind direction is shown on Figure 2.

2.2 IRRIGATION SYSTEM

The effluent irrigation system for the Calle De La Plata Phase 2 streetscape is served by a 6-inch x 16-inch connection to the effluent supply line. The service connection is on the south side of Calle de la Plata road, approximately 3600 LF west of the intersection with Pyramid highway. The effluent meter, pressure reducing valve, and isolation valves are located at this point, as shown on Figure M-2C. Refer to Figures M-2A through M-2C.

The effluent irrigation system for the West Calle De La Plata streetscape is connected to a 6-inch effluent supply line in Isidor Court. From the point of connection, 2½-inch, 2-inch, and 1½-inch laterals will irrigate the re-use site. Refer to Figures M-2D and M-2E.

2.3 RUN-OFF CONTROL PLAN

In the event of an emergency, the Calle De La Plata effluent irrigation system should be isolated by closing the gate valves located at the effluent meter vault.

The isolation valve for Calle de la Plata Phase 2 is located at the meter vault as shown in Figure M-2C.

The isolation valve for West Calle De La Plata irrigation near Isidor Court is located at the meter vault as shown in Figure M-2E.
3.1 SITE DESCRIPTION

Hawco Office Building I is located within the Hawco Business Park at 145 Isidor Court in Sparks, Nevada. Surrounding developments include Lindell’s Painting to the north, Hawco Office Building II to the east, Calle De La Plata Street to the west, and Isidor Court to the south. Refer to Figure 2 for a vicinity map of the re-use site. Prevailing wind direction is shown on Figure 2.

3.2 IRRIGATION SYSTEM

At the south east corner of the re-use site, the on-site irrigation system connects to a 6-inch effluent line which runs north and south between Hawco Office Building I and Hawco Office Building II. From the point of connection, a 1½-inch pipe will serve 1-inch and ¾-inch tubing that will irrigate the reuse site. See Figure M-3A.

3.3 RUN-OFF CONTROL PLAN

In the event of an emergency, the Hawco Office Building I effluent irrigation system should be isolated by closing the gate valve located at the effluent meter vault.

The isolation valve for Hawco Office Building I is located at the meter vault as shown in Figure M-3A.
HAWCO OFFICE BUILDING II

4.1 SITE DESCRIPTION

Hawco Office Building II is located within the Hawco Business Park at 135 Isidor Court in Sparks, Nevada. Surrounding developments include Isidor Court to the south, undeveloped land to the north and east and the Hawco Office Building I to the west. Refer to Figure 2 for a vicinity map of the re-use site. Prevailing wind direction is shown on Figure 2.

4.2 IRRIGATION SYSTEM

At the south west corner of the site, the on-site irrigation system connects to a 6-inch effluent line which runs north and south in between Hawco Office Building I and Hawco Office Building II. From the point of connection a 1-½ -inch pipe will serve ¾-inch tubing that will irrigate the reuse site. See Figure M-4A.

4.3 RUN-OFF CONTROL PLAN

In the event of an emergency, the Hawco Office Building II effluent irrigation system should be isolated by closing the gate valve located at the effluent meter vault.

The isolation valve for Hawco Office Building II is located at the meter vault as shown in Figure M-4A.
5.1 SITE DESCRIPTION

The Spanish Springs Professional Center is located in the Hawco Business Park at 150 Isidor Court Sparks, Nevada. Surrounding developments include Calle De La Plata Street to the west, Isidor Court to the north, and undeveloped land to the south and east. Refer to Figure 2 for a vicinity map of the re-use site. Prevailing wind direction is shown on Figure 2.

5.2 IRRIGATION SYSTEM

At the north east corner of the site, the onsite irrigation system is supplied by a 6-inch effluent line in Isidor Court. From the point of connection a 1½-inch mainline will feed into 1½-inch and 1-inch laterals that will irrigate the re-use site. See Figure M-5A.

5.3 RUN-OFF CONTROL PLAN

In the event of an emergency, the Spanish Springs Professional Center effluent irrigation system should be isolated by closing the gate valve located at the effluent meter vault.

The isolation valve for Spanish Springs Professional Center is located at the meter vault as shown in Figure M-5A.
RW RAMSEY

6.1 SITE DESCRIPTION

The RW Ramsey re-use site is located in the Hawco Business Park at 150 Circuit Court Sparks, Nevada. Surrounding developments include Calle De La Plata to the south and undeveloped land to the north, east, and west. Refer to Figure 2 for a vicinity map of the re-use site. Prevailing wind direction is shown on Figure 2.

6.2 IRRIGATION SYSTEM

The irrigation system is supplied by a 6-inch effluent line in Circuit Court and connects to the system on the north side of the site at Circuit Court. From the point of connection a 1½-inch mainline will feed into ¾ laterals that will irrigate the re-use site. See Figure M-6A.

6.3 RUN-OFF CONTROL PLAN

In the event of an emergency, the RW Ramsey effluent irrigation system should be isolated by closing the gate valves located at the effluent meter vault.

The isolation valve for RW Ramsey is located at the meter vault as shown in Figure M-6A.
SILVER STATE LIQUOR

7.1 SITE DESCRIPTION

The Silver State Liquor re-use site is located at 100 Distribution Drive in Sparks, Nevada. Surrounding developments include undeveloped land to the east, Isidor Court to the north, Calle De La Plata to the south, and Distribution Drive to the west. Refer to Figure 2 for a vicinity map of the re-use site. Prevailing wind direction is shown on Figure 2.

7.2 IRRIGATION SYSTEM

The on-site irrigation system is supplied by an effluent line that runs along the drainage channel on the east side of the site. The point of connection is a 2-inch meter on the south eastern corner of the re-use site. From the point of connection, 3-inch through ¾ laterals will irrigate the re-use site. See Figures M-7A through M-7F.

7.3 RUN-OFF CONTROL PLAN

In the event of an emergency, the Silver State Liquor effluent irrigation system should be isolated by closing the gate valves located at the effluent meter vault.

The isolation valve for Silver State Liquor is located at the meter vault as shown in Figure M-7B.
FIGURE M-7A
LINDELL'S PAINTING SERVICE

8.1 SITE DESCRIPTION

Lindell's Painting Service is located at 140 Inventor Place in Sparks, Nevada. Surrounding developments include Hawco Office Building I to the south, Calle De La Plata Street to the west, and undeveloped land to the north and east. Refer to Figure 2 for a vicinity map of the re-use site. Prevailing wind direction is shown on Figure 2.

8.2 IRRIGATION SYSTEM

The on-site irrigation system is supplied by a 6-inch effluent line that runs in Calle De La Plata Street and connects to the system on the south western corner of the re-use site. From the point of connection, a 1-inch mainline will feed into ¾ laterals that will irrigate the re-use site. See Figure M-8A.

8.3 RUN-OFF CONTROL PLAN

In the event of an emergency, the Lindell's Painting effluent irrigation system should be isolated by closing the gate valves located at the effluent meter vault.

The isolation valve for Lindell's Painting Service is located at the meter vault as shown in Figure M-8A.
9.1 SITE DESCRIPTION

Sierra Design Concrete is located at 130 Circuit Court in Sparks, Nevada. Surrounding developments include Isidor Court to the north, Circuit Court to the west, and undeveloped land to the north and east. Refer to Figure 2 for a vicinity map of the re-use site. Prevailing wind direction is shown on Figure 2.

9.2 IRRIGATION SYSTEM

The irrigation system is supplied by a 6-inch effluent line in Circuit Court and connects to the system on the east side of Circuit Court at the north corner of the reuse site. From the point of connection a ¾-inch mainline will feed into ½ laterals that will irrigate the reuse site through drip irrigation. See Figure M-9A.

9.3 RUN-OFF CONTROL PLAN

In the event of an emergency, the Sierra Design Concrete effluent irrigation system should be isolated by closing the gate valves located at the effluent meter vault.

The isolation valve for Sierra Design Concrete is located at the meter vault as shown in Figure M-9A.
VALLEY BUILDING SUPPLY

10.1 SITE DESCRIPTION

Valley Building Supply is located at 85 Isidor Court in Sparks, Nevada. Surrounding developments include Isidor Court to the east, undeveloped land to the north and west, and an existing building to the south. Refer to Figure 2 for a vicinity map of the re-use site. Prevailing wind direction is shown on Figure 2.

10.2 IRRIGATION SYSTEM

The irrigation system is supplied by a 6-inch effluent line that connects to the system along the back (south west) side of the property. From the point of connection a 1” laterals and ¾” drip tubing will irrigate the re-use site. See Figure M-10A.

10.3 RUN-OFF CONTROL PLAN

In the event of an emergency, the Valley Building Supply effluent irrigation system should be isolated by closing the gate valves located at the effluent meter vault.

The isolation valve for Valley Building Supply is located at the meter vault as shown in Figure M-10A.
VALLEY BUILDING SUPPLY

10.1 SITE DESCRIPTION

Valley Building Supply is located at 85 Isidor Court in Sparks, Nevada. Surrounding developments include Isidor Court to the east, undeveloped land to the north and west, and an existing building to the south. Refer to Figure 2 for a vicinity map of the re-use site. Prevailing wind direction is shown on Figure 2.

10.2 IRRIGATION SYSTEM

The irrigation system is supplied by a 6-inch effluent line that connects to the system along the back (south west) side of the property. From the point of connection a 1” laterals and ¾” drip tubing will irrigate the re-use site. See Figure M-10A.

10.3 RUN-OFF CONTROL PLAN

In the event of an emergency, the Valley Building Supply effluent irrigation system should be isolated by closing the gate valves located at the effluent meter vault.

The isolation valve for Valley Building Supply is located at the meter vault as shown in Figure M-10A.
RECLAIMED WATER IRRIGATION SYSTEM NOTES:

ALLO EMBANKMENT TRENCHES SHALL BE PAINTED PURPLE (PANTONE COLOR 8113)
AND A PURPLE TAG WITH THE WORDING "RECLAIMED WATER -- DO NOT DRINK" IN ENGLISH AND SPANISH, ATTACHED TO THE ASSEMBLAGE. ENTERPRISES, VALUE IDENTIFICATION TAG, E-010-F2-P/SP2 OR APPROVED EQUIVALENT.

ALL RECLAIMED WATER PIPES ARE TO BE MARKED TO IDENTIFY THE ENTERPRISE, ENTERPRISE VALUE IDENTIFICATION TAG, E-010-F2-P/SP2 OR APPROVED EQUIVALENT.

ALL RECLAIMED WATER PIPES SHALL BE CUT AT 90 DEGREES WITH SHARP TOOLS, OR THE USE OF A CIRCULAR SAW OR CHAIN SAW, AS PER THE MANUFACTURER'S INSTRUCTIONS, AND THE ENDS SHALL BE SMOOTHED AND SMOOTHED AS REQUIRED.

ALL RECLAIMED WATER PIPES SHALL BE CONNECTED USING RECLAIMED WATER LEGEND.

RECLAIMED WATER LEGEND:

1. IRRIGATION CONTROLLER: RAIN BIRD ESP-881 PLUS 8-STATION CONTROLLER

2. 1" WATER METER (SEE CIVIL PLANS)

3. MANUAL DRAIN VALVE, 3/4" Brass Gate Valve (CONNELL OR OTHERS) INSTALL AT ALL LOW POINTS ALONG PIPE RUNS.

4. Brass Gate Valve (CONNELL OR CONNELL) FOR MAXIMUM ISOLATION. SAME SIZE AS MANIFOLD.

5. DRIP VALVE ASSEMBLY: RAIN BIRD PS-2 (PS-2) CONTROL ZONE KIT, PROVIDE PRESSURE REGULATION PS-2 FOR WELS' RECOMMENDATIONS. NOTE DRIP VALVE ASSEMBLY IS TO BE PROVIDED AS SHOWN ON PLANS, USE TEE SHAPE TO ATTACH TO MAIN PIPING, PROVIDE VALVES AND YELLOW AIDS AS NEEDED TO ISOLATE ALL TEE VALVES AND VALVES INDICATED ON THE PLANS.

6. TURF VALVE: RAIN BIRD 150-PCSCBHP-30-

7. RAIN BIRD LH SERIES UP-SURFACE SPRAY HEADS

8. 3/4" HOSE WITH 1/2" HOSE AND 1/2" HOSE (1000 FT COVER FOR HOSE HEAD)

9. RAIN BIRD 986 SERIES FFP-UP SPRAY HEADS

10. RAIN BIRD 986 SERIES FOR UP-SURFACE SPRAY HEADS

11. QUICK COUPLERS RAIN BIRD 441BSC (4) quick couplers at locations shown on the plans. At A MINIMUM, PROVIDE ONE QUICK COUPLER EVERY 10 FT ALONG MANIFOLD.

12. VALVE LS. = STATION V, SIZE VALVE, AND APPROVAL G.P/M.

13. SCH. 40 PVC MANSION -- SIZE PLAN

14. SCH. 40 PVC LATERAL LINE -- 1" PIPING

15. 3/4" PVC POLY IRRIGATION TUBE W/ FLASHING END PLUG

16. SLEEVES ALLEYS WILL REPLACE DRAIN PIPES AND PARKING LOTS WILL BE 4" SCH. 40 PVC MANSION SLEEVES UNDER SLEEVE kB4, ETC. (SLEEVE kB4) SHALL BE LOCATED 1 BY CONSTRUCTION, 2" SCH. 40 PVC, PROVIDE ONE SLEEVE PER PIPE AND ONE SLEEVE PER PIPE.

EMITTER SCHEDULE

DESIGN pressurR NOTE:

MOUNTED WATER PRESSURE AT P.O.P. IS 85 PSI. BASED FLOW IS 60 GPM @ 8.75 PSI CONTRACTION TO INCREASE PRESSURE TO SYSTEM INSTALLATION. FUTURE PRESSURES MOUNTED TO INCREASE PRESSURE TO SYSTEM INSTALLATION. FUTURE PRESSURES MOUNTED TO 85 PSI. DEPEND ON WATER PRESSURE AND NOT RECOMMENDED FOR USE. RECLAIMED WATER PRESSURES SHALL BE SHOWN IN SHADERS FOR GRAPHIC CLARITY. WHERE POSSIBLE, ALL IRIGATION SYSTEMS SHALL BE LOCATED IN PLANTING AREAS.

\[ \text{Spray Irrigation} \]

\[ \text{Drip Irrigation} \]

GRAPHIC SCALE
APPENDIX N – SHA NEVA FILL STATION
Sha Neva Fill Station

1.2 SITE DESCRIPTION

The Sha Neva Fill Station will serve construction water trucks in the north Spanish Springs Valley. See Figure N-1 for a vicinity map of the fill station. Adjacent developments to the Sha Neva Fill Station include Sha Neva Road to the north and undeveloped area to the east, south, and west. Table N-1 give location information for the Sha Neva reuse site.

<table>
<thead>
<tr>
<th>Property</th>
<th>Physical Address</th>
<th>Latitude/Longitude</th>
<th>Section/Township/Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sha Neva Fill Station</td>
<td>1102 Calle De la Plata</td>
<td>39°41'12&quot;N 119°42'31&quot;W</td>
<td>S23 T21N R20E</td>
</tr>
</tbody>
</table>

The Sha Neva fill station has slopes ranging from 0 – 2 percent. The topography for the Sha Neva fill station is shown on Figure N-2. The fill station site plan is shown as Figure N-3. The entire site is located in the Flood Insurance Rate Map 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).

1.2 SOILS

The Soil Conservation Service describes the geology of the southern Washoe County area as follows (SCS, 1983). Figure N-4 shows the soil characteristics.

1160 - Jowec silty clay loam. This very deep, well-drained soil is on low lake terraces. It formed in alluvium derived from mixed rock sources. Typically, the surface layer is light brownish gray silty clay loam about 2 inches thick. The subsoil is dark yellowish brown clay loam about 18-inches thick, and the lower part to a depth of 60-inches is stratified loam and sandy loam. Included in this unit are Mellor solids on lower terraces; Turria soils, which are drainageways and are subject to occasional flooding; and Haybourne soils on higher alluvial fan skirts.

The permeability of this Jowec soil is slow. Available water capacity is high. Effective rooting depth is more than 60 inches. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight. This soil is subject to shallow flash flooding during storms of unusually high intensity.

Present vegetation is mainly big sagebrush and spiny hopsage.

The soil listed above is 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.

1.3 EFFLUENT REUSE PLAN

Effluent reuse for this site will consist primarily of filling construction water trucks. The distribution of effluent will be controlled by a card reader system, allowing only authorized users to receive effluent. The fill station will be operational during daytime only.

A small amount of effluent will be used to irrigate the landscaping around the fill station. The landscape irrigation plan is attached as Figure N-5.

1.4 EFFLUENT SYSTEM

The effluent reuse system consists of a truck fill station and landscape irrigation piping for the area immediately surrounding the fill station. All exposed components of the effluent reuse system will be posted and painted purple to clearly identify the component as an effluent fixture. All areas of the fill station shall be posted to notify the public that effluent is being used at the truck fill and for landscape irrigation.

1.4.1 Truck Fill Station

A 6-inch diameter effluent line serves the truck fill station. This line enters the fill station site from the west, generally following the Sha Neva Road alignment. The line enters a meter & PR-PSV vault. Refer to Figure N-3 for the location of the meter & PR-PSV vault. In the event of an emergency requiring the effluent be turned off, the entire fill station can be isolated by closing the gate valve adjacent to the effluent meter & PR-PSV vault. Refer to Figure N-3 for the isolation valve location.

There is no connection to any potable water system at the fill station, thus no potential for cross-connection contamination exists.

1.4.2 Landscape Irrigation

The fill station irrigation control system will control the time and duration of irrigation. This system controls a set of valves independent of the master valve at the service connection. In order to minimize the possibility of public contact, all irrigation will be done at night with automatic sprinklers. The sprinkler heads will be placed to prevent ponding and runoff. The length of irrigation will be adjusted according to seasonal temperature and precipitation conditions.
1.5 EFFLUENT DEMAND

The construction water truck fill station is expected to serve a maximum of 67 trucks per day with an average volume of 3000 gallons each. The fill station will be operational during the daytime only, but will operate 7 days per week, year around. In addition to the construction water truck fill station, the Sha Neva Fill station has approximately 0.11 acres of landscape area that will be irrigated with effluent. The maximum effluent flow for landscape irrigation is 10 gpm.

Table N-2 – Sha Neva Fill Station 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>Peak Demand (gpm)</th>
<th>Maximum Daily Flow (mgd)</th>
<th>Average Daily Flow (mgd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sha Neva Fill Station – on-site landscape irrigation</td>
<td>0.36</td>
<td>0.11</td>
<td>0.20</td>
<td>10 (nighttime)</td>
<td>0.0048</td>
<td>0.001</td>
</tr>
<tr>
<td>Sha Neva Fill Station – truck fill demand</td>
<td>N/A</td>
<td>N/A</td>
<td>103.11</td>
<td>800 (daytime)</td>
<td>0.201</td>
<td>0.120</td>
</tr>
<tr>
<td>Total</td>
<td>0.36</td>
<td>0.11</td>
<td>103.31</td>
<td>800</td>
<td>0.206</td>
<td>0.121</td>
</tr>
</tbody>
</table>

Irrigation requirements (acre-feet/year and peak demand) for on-site landscaping were calculated by Hansen Landscape Architects, Inc. Maximum Daily Flow and Average Daily Flow were calculated by AMEC Infrastructure, Inc. based on the peak demand and acre-ft/yr. Site irrigation will occur during an 8-hour night period. Truck fill demands are based on 3000 gallon trucks filled at a rate of 800 gpm for a 12-hour daytime period.

1.6 RUNOFF CONTROL PLAN

In the event of an emergency, the effluent reuse system should be isolated at the gate valve located adjacent to each effluent meter vault.

Isolation Valve Location: – The main isolation valve is located adjacent to the effluent meter vault. Closing this valve will isolate both the truck fill station and the effluent irrigation system. Refer to Figure N-3.

After isolating the effluent irrigation system, follow the notification procedures on page 18 of the Effluent Management Plan.
April 29, 2005

Angie Hueftle, P.E.
AMEC Inc.
Project Manager
Infrastructure, Reno, Nevada

Dear Ms. Hueftle:

RE: CITY OF SPARKS — SPANISH SPRINGS MASTER EFFLUENT MANAGEMENT PLAN (EMP)

The Nevada Division of Environmental Protection (NDEP) has reviewed and approved the above referenced EMP as submitted.

Should you have any questions, I can be reached at (775) 687-9429.

Sincerely,

Clifford M. Lawson, P.E.
Technical Services
Bureau of Water Pollution Control

CC: Icy Mulligan

amec sparks span sprgs app.doc
Angie Hueftle, P.E.
AMEC Inc.
Project Manager
Infrastructure, Reno, Nevada

Dear Ms. Hueftle:

RE: CITY OF SPARKS SPANISH SPRINGS MASTER EFFLUENT MANAGEMENT PLAN (EMP) – SUB-APPENDIX L (FOOTHILLS-VISTA BLVD.-PIONEER MEADOWS)

The Nevada Division of Environmental Protection (NDEP) has reviewed and approved the above referenced EMP as submitted.

Should you have any questions, I can be reached at (775) 687-9429.

Sincerely,

Clifford M. Lawson, P.E.
Technical Services
Bureau of Water Pollution Control

CC: Icyl Mulligan
April 27, 2005

Iciyl Mulligan
Nevada Division of Environmental Protection
333 West Nye Lane
Carson City, NV 89704

Subject: Shaw Middle School Effluent Management Plan

Dear Ms. Mulligan:

The Washoe County Department of Water Resources (DWR) has reviewed the City of Sparks Spanish Springs Master Effluent Management Plan (Plan). The DWR currently supplies domestic water to a number of irrigation services in the proposed Foothills and Hawco Business Park reuse areas. The DWR is providing conditional approval of the plan within these areas. The following conditions must be met:

1. Irrigation systems to be converted to reclaimed water must be properly abandoned at the domestic water point of connection. Prior to connection with the reclaim water supply, the DWR will require an open trench inspection to confirm the existing domestic point of connection has been properly abandoned.

2. Prior to abandonment, the DWR will conduct a shutdown inspection and pressure test. The shutdown test will require up to seven days without irrigation system use.

3. The property owner will be responsible for conducting a cross-connection inspection of the on-site water systems every three years following connection to the reclaimed water system. An American Water Works Association certified Cross Connection Control Specialist must conduct the inspection.

4. Copies of all cross connection control reports and shutdown inspection materials are to be provided to the Washoe County Department of Water Resources.

If you have any questions, please contact Joe Howard at 954-4623 or myself at 954-4625.

Sincerely,

[Signature]

John P. Hulet
Environmental Engineer II

JPH/dr

C: Steve Bradhurst, Director, Department of Water Resources
Shawn Gooch, City of Sparks
Michael A. Drinkwater, P.E., AMEC Infrastructure
Joe P. Howard, P.E., Licensed Engineer
Bill Campbell, Washoe County School District.
October 12, 2004

Icyl Mulligan
Permits Officer
Nevada Division of Environmental Protection
333 W. Nye Lane, Room 138
Carson City, Nevada 89706

Subject: TMWA Review of City of Sparks, Spanish Springs Master EMP

Dear Icyl:

This office has reviewed the City of Sparks, Spanish Springs Master EMP relative to the expansion of the effluent system in the Truckee Meadows Water Authority’s service area in Northeast Sparks and Spanish Springs Valley.

Our review has been confined to ensuring that proper cross-connection control requirements have been included in the revised permit.

Please consider this letter as acceptance by TMWA of the EMP as it relates to cross-connection control and backflow prevention.

Very truly yours,

Eric Parks
Backflow Administrator

Cc Michael A. Drinkwater, P.E.- Amec Infrastructure, Inc.
May 3, 2006

Mr. Joe Howard, P.E.
Washoe County Department of
Water Resources
4930 Energy Way
Reno, NV 89502

Subject: Sparks Spanish Springs Master Effluent Management Plan

Dear Mr. Howard:

Enclosed are revisions to the City of Sparks Spanish Springs Master Effluent Management Plan. Please replace the following items in the City of Sparks Spanish Springs Master Effluent Management Plan of December 2004, revised May 2006.

- Cover sheet – Revision date has been added.
- List of revisions – Insert into document.
- Table of Contents page iii – Updated Calle De La Plata – Hawco Business Park titles to include Hawco Office Building I, Hawco Office Building II, Spanish Springs Professional Center, RW Ramsey, Silver State Liquor, Lindell’s Painting, Sierra Design Concrete, and Valley Building Supply. Added Appendix O – Agency Approvals.
- List of Tables page v – Inserted Permit Number NEV2004530.
- Pages 1, 2, 3, and 4 – Inserted Permit Number NEV2004530 and updated permit information.
- Insert Staff Contact divider before page 18.
- Appendix A – Replace TMWRF NDEP Discharge Permit NV0020150 with discharge permit NEV2003506. Add Discharge Permit NEV2004530.
- Appendix M – Replace Appendix M in its entirety. Appendix M now includes Calle De La Plata Phase 2, West Calle De La Plata, Hawco Office Building I, Hawco Office Building II, Spanish Springs Professional Center, RW Ramsey, Silver State Liquor, Lindell’s Painting, Sierra Design Concrete, and Valley Building Supply.
- Appendix O – Agency Approvals. Add new Appendix O which contains agency approvals of EMP.

Approval of these revisions from NDEP is pending. If you have any questions, please feel free to contact me at (775) 786-5873.

Sincerely,

Angie Hueftle, P.E.
Project Manager

Enclosure

C: Andrew Hummel, file
May 3, 2006

Mr. Joe Howard, P.E.
Washoe County Department of
Water Resources
4930 Energy Way
Reno, NV  89502

Subject: City of Sparks Spanish Springs Master Effluent Management Plan - Foothills

Dear Mr. Howard:

Enclosed is a sub-appendix to Appendix L (Foothills-Vista Blvd-Pioneer Meadows) of the City of Sparks Spanish Springs Master Effluent Management Plan. This effluent management plan is for the Foothills at Wingfield Entry Feature. The entry feature is located within the Foothills-Vista Blvd permitted streetscapes site on the City of Sparks Spanish Springs Discharge Permit NEV2004530.

NDEP approved the EMP for the Foothills entry feature in September, 2005, but the sub-appendix was not distributed at that time. Please add this sub-appendix to Appendix L of the City of Sparks Spanish Springs Effluent Management Plan. If you have any questions, please feel free to contact me at (775) 786-5873.

Sincerely,

Angie Hueftle, P.E.
Project Manager

Enclosure

C: Andrew Hummel
GENERAL NOTE:

THIS PLAN IS FOR PLANNING PURPOSES ONLY AND IS INTENDED AS A 'BEST GUESS' ESTIMATE OF ANTICIPATED NON-POTABLE IRRIGATION FLOWS AT THE FOOTHILLS PROJECT. SERVICE SIZE INDICATES PIPE SIZE ONLY. INDIVIDUAL METER SIZES WILL BE DETERMINED DURING THE DEVELOPMENT OF FINAL IRRIGATION PLANS FOR THE VARIOUS ZONING AREAS THROUGHOUT THE DEVELOPMENT.