Chapter 4 – Wastewater and Watershed-based Water Quality Planning

Purpose and Scope
This chapter provides background information as well as the current status of regional wastewater facilities and watershed based water quality issues. It also presents a number of planning and management issues that require action and/or further evaluation. These issues must be considered together with other water management planning objectives to determine appropriate future actions and recommendations.

Summary and Findings
Following are the major findings resulting from the analysis of water quality and wastewater treatment issues in the planning area:

(Under Development)

Introduction
Regional wastewater treatment facilities provide an effective means to manage the area’s water resource and water quality objectives. The water is treated to high standards, and returned back into the environment. The Cities of Reno and Sparks have each created Environmental Control pretreatment programs which further protect the integrity of the large wastewater treatment systems. Additionally, reclaimed water use is also providing a beneficial use for the treated effluent. Reclaimed water irrigation programs are underway in the cities of Sparks and Reno, and additional areas of unincorporated Washoe County. Reclaimed water use provides a predictable way to manage treated effluent, and provides a relatively drought-proof alternative water supply for non-potable uses, thereby extending the region’s limited water resources.

The Truckee River and its tributaries face water quality challenges, and varied regulations have been set forth by the Clean Water Act to protect water quality and the watershed. In addition to receiving treatment plant discharges from the Truckee Meadows Water Reclamation Facility and an upstream California facility east of Truckee, the Truckee River carries snowmelt, rainwater and urban stormwater – each of which may carry diffuse sources of pollutants, such as suspended sediment or dissolved solids. These diffuse sources of pollutants are referred to non-point source (NPS) pollution. Treatment plant discharges (point sources) and non-point sources of pollution have the potential to impair water bodies and therefore are regulated by the Nevada Division of Environmental Protection (NDEP) and U.S. Environmental Protection Agency (EPA) to protect water quality.

A host of agencies and groups involved in monitoring water quality on the Truckee River system signed a Memorandum of Understanding (MOU), agreeing to coordinate their programs for better public understanding of the river’s health. In efforts to manage non-point source pollution entering the river, restoration projects in the Truckee River watershed have been funded and planned, and several have been implemented. A prioritized list of lower Truckee River restoration projects are in various stages of completion and monitoring. Tributaries to the Truckee River have also been assessed annually to prioritize stream restoration efforts. The City of Reno, City of Sparks, and Washoe County jointly hold a federal NPDES permit to manage urban stormwater quality and have signed an MOU for joint protection of the Truckee River Watershed.
4.1 Wastewater Service Providers

Figure 4-1 depicts the wastewater treatment facilities within the jurisdiction for this plan. There are five municipal wastewater treatment facilities with well-defined service areas in the region. These major facilities are summarized in Table 4-1, and are described in the following sections. Three private facilities have also operated in the region for years. Recently, two of these facilities were decommissioned and connected to the Lawton/Verdi interceptor, which conveys the wastewater to TMWRF for treatment.

<table>
<thead>
<tr>
<th>Facility</th>
<th>2009 Average (Permitted) Daily Flow</th>
<th>Hydrographic Basin</th>
<th>Owner Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truckee Meadows Water Reclamation Facility</td>
<td>26.47 MGD (46.48 MGD)</td>
<td>Truckee Meadows, Sun Valley, Spanish Springs Valley, Truckee Canyon</td>
<td>Discharges to the Truckee River via Steamboat Creek, with effluent reuse</td>
</tr>
<tr>
<td>Verdi Meadows Wastewater Treatment Facility</td>
<td>Decommissioned</td>
<td>Truckee Canyon</td>
<td>Verdi Meadows Utility Company</td>
</tr>
<tr>
<td>Boomtown Wastewater Treatment Facility</td>
<td>Decommissioned</td>
<td>Truckee Canyon</td>
<td>Boomtown</td>
</tr>
<tr>
<td>Gold Ranch Wastewater Treatment Facility</td>
<td>0.010 MGD (0.010 MGD)</td>
<td>Truckee Canyon</td>
<td>Gold Ranch</td>
</tr>
<tr>
<td>South Truckee Meadows Water Reclamation Facility</td>
<td>2.65 MGD (4.1 MGD)</td>
<td>Truckee Meadows, Pleasant Valley</td>
<td>100% reuse of effluent</td>
</tr>
<tr>
<td>Reno-Stead Water Reclamation Facility</td>
<td>1.4 MGD (2.35 MGD)</td>
<td>Lemmon Valley</td>
<td>City of Reno</td>
</tr>
<tr>
<td>Lemmon Valley Wastewater Treatment Plant</td>
<td>0.20 MGD (0.3 MGD)</td>
<td>Lemmon Valley</td>
<td>Washoe County</td>
</tr>
<tr>
<td>Cold Springs Wastewater Treatment Facility</td>
<td>0.28 MGD (0.70 MGD)</td>
<td>Cold Springs Valley</td>
<td>Washoe County</td>
</tr>
</tbody>
</table>

Discharges to the Truckee River via Steamboat Creek, with effluent reuse.
4.2 Water Reclamation Facilities

Regional wastewater treatment facilities provide an effective means to manage the area’s water resource and water quality objectives. The water is treated to high standards, and returned back into the environment. Additionally, reclaimed water use is also providing a beneficial use for the treated effluent. Reclaimed water irrigation programs are underway in the Cities of Sparks and Reno, and additional areas of unincorporated Washoe County. Reclaimed water use provides a predictable way to manage treated effluent, and provides a relatively drought-proof alternative water supply for non-potable uses, thereby extending the region’s limited water resources. This practice is constrained, however, because when reclaimed water use diverts water that would have otherwise been returned to the Truckee River, water rights must be dedicated in order for downstream water rights to be satisfied. Careful consideration must be given to balancing the need for reclaimed water to meet disposal requirements compared with the water rights needed to implement the reclaimed water programs. Sections 3.8 and 3.9 describe the current status of reclaimed water use within the Truckee Meadows. The following sections describe each of the water reclamation facilities in more detail.

4.2.1 Truckee Meadows Water Reclamation Facility

TMWRF is located on the east side of the Truckee Meadows at the confluence of Steamboat Creek and the Truckee River. The facility serves the central Truckee Meadows, including areas within the City of Reno, the City of Sparks, the Sun Valley General Improvement District, and portions of Washoe County that are within the Truckee Meadows and the Spanish Springs Valley. The TMWRF sewer system conveys wastewater flows from the Truckee Meadows Valley, Spanish Springs Valley, Sun Valley, Verdi/Truckee Canyon, and portions of the Golden Valley and Lemmon Valley hydrographic basins through a combination of gravity sewers, inverted siphons and lift stations. The service area is shown on Figure 4-1.

The Cities of Reno and Sparks commissioned the construction of TMWRF in 1964 and the cities have jointly owned and operated TMWRF since 1967, when the first phase of the present treatment facility was completed with a permitted capacity of 20 million gallons per day (MGD). In 1978-80 the TMWRF permitted capacity was expanded to 30 MGD and phosphorous removal facilities were added. In the 1980s the TMWRF permitted capacity was increased to 40 MGD and nitrogen removal facilities were added. The TMWRF Phase III Expansion Project was initiated in 1999 and was completed in 2007. The goal of the project was to replace older equipment, upgrade treatment processes, and increase the permitted capacity of TMWRF to 46.5 MGD.

TMWRF has a permitted capacity of 44 MGD, a design capacity of 40 MGD, and currently operates at about 28 MGD. The design capacity is limited by the loading capacity of the secondary clarifiers. The TMWRF unit processes are designed and operated to meet the stringent permit limits established for the discharge of nitrogen and phosphorus to the Truckee River. The total phosphorus limit of 134 pounds per day (ppd) is maintained with aeration basins configured with selector zones to achieve biological phosphorus removal (Bio-P), tertiary effluent filtration and the treatment of dewatering centrate with ferric chloride. The total nitrogen limit of 500 ppd is maintained by passing all secondary clarifier effluent through nitrification towers and denitrification reactors. Typically, the filtered TMWRF effluent contains less than 0.3 mg/L of TP and less than 2.0 mg/I of TN. TMWRF effluent is disinfected and dechlorinated prior to discharge to Steamboat Creek. During irrigation season, typically April through September, approximately 4,000 acre-feet (7 MGD) of the TMWRF effluent is pumped to reuse sites in Reno and Sparks.
Primary solids are gravity thickened to 4% solids prior to anaerobic digestion. The primary sludge thickener serves as a fermenter, producing volatile fatty acids to support the Bio-P process. Waste activated solids are thickened to 4.5% solids with diffused air floatation prior to anaerobic digestion. The thickened sludge streams are combined just prior to entering the digester complex. The anaerobic digestion process includes one acid phase digester and four standard digesters. All digesters are operated in the mesophilic range with mechanical mixing. A fourth digester is used as a holding and feed tank for the centrifuge dewatering operation. The digested sludge is dewatered with vintage Bird centrifuges to 16-17% solids content. The dewatered solids are hauled daily to the local municipal landfill. The gas from the acid phase digester is flared for odor and air emission control. The gas from the standard digesters is burned to heat water. The hot water is used for heating digester sludge and for heating the TMWRF buildings. Excess gas is flared. A project to replace the aging electricity generator, which is driven by an engine fueled with digester gas, is being developed with the goal of generating nearly 40% of the TMWRF electrical demand with digester gas.

The City of Sparks employs the TMWRF staff and manages the day to day operations of TMWRF. The City of Reno provides oversight of the TMWRF budget, capital improvements, facilities planning, regulatory compliance and permitting issues. Reno and Sparks share the cost of the TMWRF operations and maintenance budget under a long-standing agreement, which apportions costs based on the measured sewer flow generated within each city’s service area. Currently, Reno funds about 70% of the TMWRF costs and Sparks about 30%. The TMWRF costs represent about 33% of the Reno and Sparks' non-capital sewer budgets. TMWRF has an estimated replacement value of at least $500 million.

The ownership of the TMWRF capacity is shared between Reno and Sparks via an Interlocal Agreement, as follows:

Reno Share = 68.63%
Sparks Share = 31.37%

Sparks leases 1.80 MGD of its capacity to the Sun Valley General Improvement District.
Sun Valley General Improvement District subleases 0.48 MGD to Washoe County.
Reno provides up to 1.35 MGD of its capacity to serve areas of Washoe County.

**South Truckee Meadows Water Reclamation Facility**

Washoe County Department of Water Resources manages the South Truckee Meadows Water Reclamation Facility (STMWRF). Located at the southern base of the Huffaker Hills and originally constructed in 1991, the STMWRF is a secondary treatment facility with tertiary filtration. The facility is presently permitted for 4.1 MGD (influent flow, 30 day average), expandable to 6 MGD. STMWRF currently serves 11,700 customers in the South Truckee Meadows and current influent flow is approximately 2.6 MGD.

The treatment process consists of influent pumping, fine screening, metering, and secondary treatment by oxidation ditch process combined with two conventional secondary clarifiers for solids separation. Effluent from the facility is filtered, disinfected to the 2.2 Total Coliform Standard, stored year-round in the Huffaker Reservoir, and reused for irrigation water. Huffaker Reservoir has a storage capacity of 4,000 acre-feet, and was recently improved with a partial membrane liner to elevation 4,482. Waste solids are pumped to the TMWRF for final treatment and disposal.
Improvements in wastewater collection system infrastructure consist principally of expansion of sewer interceptors, particularly those serving the Galena Fan area. The Mt. Rose interceptor was recently extended from the Montreux subdivision to the Mt. Rose ski area. The St. James’s subdivision is planning a future sewer interceptor alignment that will follow U.S. 395 south through Pleasant Valley before turning west toward that subdivision.

**Reno-Stead Water Reclamation Facility**

The Reno-Stead Water Reclamation Facility (RSWRF) is located in Stead and is owned and operated by the City of Reno. It serves the area of Stead within the Reno city limits on the west side of the valley, including the Stead Airport and Silver Lake areas as shown in Figure 4-1. In 1974, the City of Reno replaced the original trickling filter plant with an activated sludge plant. The plant was modified in 1987 to improve the secondary clarification and effluent disinfection processes and in 1994; the sludge drying beds were replaced with centrifuge dewatering. The plant was upgraded in 2000 to provide high quality effluent for reuse purposes. The City of Reno recently completed an expansion which increased treatment capacity to 2.0 MGD. The improvements included a new headworks, new aeration basins and blower building, an additional secondary clarifier, activated sludge pump station improvements, conversion of the oxidation ditch to an emergency storage basin, new tertiary filter equipment, and a new solids handling and disposal system. Waste solids are pumped to TMWRF for final treatment and disposal, similar to the solids disposal operation at STMWRF.

The RSWRF has the capacity to treat an average monthly flow of 2.35 MGD. The plant effluent either discharges by gravity to Swan Creek, which drains to the Swan Lake wetlands, or it is reclaimed and pumped to several sites within the community for turf irrigation. All effluent is disinfected to meet the Total Coliform Standard for unrestricted reuse. The reclaimed water typically carries a residual chlorine concentration of 1 mg/l. Effluent discharged to the creek is dechlorinated to meet the 0.1 mg/l total residual chlorine concentration standard.

**Lemmon Valley Wastewater Treatment Plant**

The Lemmon Valley Wastewater Treatment Plant is located in East Lemmon Valley at the southeast end of Swan Lake and is owned and operated by Washoe County. It currently serves 1,100 homes within East Lemmon Valley, Black Springs, and Horizon Hills. It is a secondary treatment plant and was built in 1971. It currently processes 0.2 MGD and has a permitted capacity of 0.3 MGD.

The treatment plant consists of a grit well, comminutor, wet well pump station, contact stabilization tank, secondary clarification, and aerobic sludge digestion. Effluent is discharged to evaporation ponds, including a 0.65 MGD discharge allowed to the Swan Lake playa for water balance management. The facility does not have an effluent reuse program. Digested solids are sent to sludge-drying beds or to solids ponds during wet weather months.

**Cold Springs Water Reclamation Facility**

Washoe County also owns and operates the Cold Springs Water Reclamation Facility (CSWRF), a secondary treatment plant located in the northern portion of Cold Springs Valley. The plant currently serves approximately 1,800 homes, and the average daily influent flow is about 0.35 MGD. In 1997 a nitrate plume in the shallow aquifer of Cold Springs Valley was found to exceed the 10 mg/l state action level. Monitoring of the shallow aquifer in 2001
showed a significant increase in the nitrate concentrations. The Cold Springs Wastewater Facility Plan recommends alternatives that include sewering several areas currently served by septic systems. Based on groundwater studies, once these areas are taken off septic systems, the nitrate concentrations in the shallow aquifer should start a gradual decrease to below the 10 mg/l action level. New development in the area is connecting to CSWRF.

The CSWRF has recently been changed from the former sequencing batch reactor (SBR) facility collecting and treating 0.35 MGD, to a new 0.7 MGD (average daily flow) facility including a new headworks, oxidation ditch, solids processing facilities, and two secondary clarifiers to aid in activated sludge wasting and recycling. Secondary treated wastewater is denitrified and disposed of at 12 rapid infiltration basins, which range in size from 1.2 to 2.1 acres. With these recent upgrades reclaimed water may be used onsite and for irrigation at approved sites in the near future. Additionally, plant capacity may be expanded to 1.2 MGD by adding another oxidation ditch when growth requires it. In the past, sludge was dried in lined sludge lagoons. Presently, the three original SBR basins are used for aerobic sludge digestion prior to sludge dewatering via centrifuge for disposal in the landfill.

4.3 Regional Wastewater Facility Planning

The reuse and disposal of reclaimed water from the various water reclamation facilities in the region may eventually be constrained by a number of factors if they continue to be operated as independent systems. Regional water challenges in the planning area include such complex, integrated issues as:

- Ensuring the availability of sustainable water supplies to meet existing and future demands within the Truckee Meadows Services Area (TMSA)
- Providing appropriate water quality and treatment capacity at various wastewater treatment facilities (WWTF)
- Providing for adequate reclaimed water demands, reclaimed water system capacity and effluent disposal capacity

Addressing competing needs for the limited water resources available in the planning area to meet commitments to water supply, water quality, instream flows and the environment. With regional coordination and cooperation, the possible uses for reclaimed water could be expanded to include uses such as residential landscape irrigation or groundwater recharge. NDEP does not permit the use of reclaimed water on residential homes and is not currently considering a change in this position. However, the use of high quality reclaimed water for this purpose would provide additional means of beneficially utilizing the reclaimed water, while at the same time extending the region’s limited water supplies.

High-level plans for wastewater infrastructure improvements envisioned to provide for the needs of the planning area’s service providers to the year 2030 are included in two documents completed in late 2007 and early 2008: the City of Reno and Washoe County TMSA/FSA Water, Wastewater and Flood Management Facility Plan (ECO:LOGIC, 2007) and the City of Sparks Conceptual Facility Master Plan (Stantec, 2008), referred to collectively as the “TMSA Facility Plan”. This facility plan is the most current comprehensive, regional planning-level compilation available and serves as an important source of information for this chapter.
North Valleys Planning

In 2008 the Northern Nevada Water Planning Commission and the Western Regional Water Commission initiated a collaborative effort among key staff from the City of Reno (Reno), the City of Sparks (Sparks), Washoe County Department of Water Resources (WCDWR), Sun Valley General Improvement District (SVGID) and the Truckee Meadows Water Authority (TMWA) to develop recommended solutions to certain water issues in the planning area using current water management circumstances in the North Valleys.

The first objective was to evaluate the feasibility and merits of expanding reclaimed water uses in Stead, Lemmon Valley and Cold Springs. Water, wastewater and reclaimed water issues in the North Valleys were selected as a representative example of significant regional concern to be addressed through a collaborative process, referred to as the North Valleys Initiative (NVI). The recommended solutions and lessons learned from this process can be applied to other similar regional water management issues within the planning area.

The TMSA Facility Plan (ECO:LOGIC, 2007) estimates that future wastewater flows from Stead and Lemmon Valley could eventually reach as much as 8,000 acre-feet per year, based on the long-term development potential. The Swan Lake wetlands and playa can benefit from more water, and an agreement has been reached with the Swan Lake Advisory Committee and the Nevada Division of Environmental Protection (NDEP) to allow as much as 2,240 acre-feet per year to be released to the playa in the future. This is the maximum amount of water that the wetlands and playa can accommodate. More water could disrupt the natural wetland and playa processes and increase potential 100-year flood hazards for surrounding properties. Other means to reuse or dispose of the reclaimed water will be needed.

Cold Springs is in a similar situation. Currently, the reclaimed water from the Cold Springs Water Reclamation Facility percolates into the groundwater through a series of infiltration basins. The amount of water the basins can infiltrate is limited; therefore, the disposal capacity will not be sufficient for the projected future flows. Because of their proximity and similarities concerning water supply and wastewater disposal, NVI considered Stead, Lemmon Valley and Cold Springs as one planning area.

A number of alternatives for reusing and/or disposing of reclaimed water have been evaluated in the past. For instance, plans have been developed to expand the reclaimed water distribution system in the Stead area to include existing and future commercial irrigation demands. Future irrigation demands could use hundreds more acre-feet of reclaimed water per year. Some additional reuse and disposal alternatives allowed under current NDEP regulations and policies include:

- Create beneficial year-round wetlands at the White Lake playa, similar to what has been developed as a park and wildlife viewing area at Swan Lake
- Export to Long Valley Creek in California, which could provide an outlet during the non-irrigation season or other periods when not all of the reclaimed water generated in the area can be placed to beneficial use
- Export to other areas such as Bedell Flat or Warm Springs

Considering these alternatives, the NVI team developed other options that would make better use of the reclaimed water resource. In general, potential water resource benefits could include...
water supply reliability for both municipal and domestic wells, a new source of water to help meet water rights and water quality obligations, and more water available for the environment.

Research of reclaimed water uses throughout the United States showed that numerous states, including California, Arizona, Washington and Idaho, allow reclaimed water use for residential landscape irrigation. Most notably, the award-winning community of Serrano, in El Dorado Hills, California, has been successfully using reclaimed water to irrigate both front and back yard landscaping throughout the development for 10 years.

Citizens locally are already familiar with the reclaimed water irrigation systems in widespread use today in the South Truckee Meadows and Sparks. These systems are used to supply irrigation water to schools, parks and landscape medians. In Nevada however, NDEP does not permit the use of reclaimed water for residential homes and is not officially considering a change in this position. One reason is that Nevada’s current reclaimed water regulations do not provide for the same level of treatment and reliability as required in states that allow residential landscape irrigation. To allow reclaimed water use for residential irrigation, changes to the regulations would be necessary, as would improvements at the wastewater reclamation facilities to provide the necessary high quality water.

Another use of reclaimed water in other states is groundwater recharge. California, Arizona, Texas and Florida are leading the way in advancing technologies and regulations to expand this practice. Groundwater recharge is being performed for a number of reasons, such as to form a water quality or sea water intrusion barrier, to bolster declining groundwater levels due to over-pumping, and to augment potable water supplies, referred to as indirect potable reuse (IPR). The Orange County Groundwater Replenishment System in California is the best example of a large-scale reclaimed water groundwater recharge project implemented in the United States. The following excerpt is taken from the Overview section of the Groundwater Replenishment System website (www.gwrsystem.com):

The Groundwater Replenishment System has evolved and changed over time as new goals, data, regulations and facts have been identified. However, the needs and benefits of the project have remained constant:

- Orange County needs more reliable, high-quality water in the future to replenish the groundwater basin, to protect the groundwater basin from seawater intrusion, and for industrial uses.
- The Groundwater Replenishment System decreases Orange County's reliance on imported water from northern California and the Colorado River.
- The Groundwater Replenishment System's locally-controlled water helps drought-proof Orange County.
- The Groundwater Replenishment System helps reduce mineral build up in Orange County's groundwater by providing a new source of ultra-pure water to blend with other sources, including imported water.

Many of these benefits, and others, could be realized locally with additional uses of reclaimed water. Residential landscape irrigation could play a significant role in meeting future water supply requirements. Highly treated reclaimed water could be used as an economic development incentive to attract specialized water intensive industries to commercial and industrial properties. Reclaimed water could be used to enhance existing wetlands, develop...
new ones, and help maintain important wildlife habitat. Groundwater replenishment could also be implemented with purified reclaimed water in a technically and environmentally sound manner that would enhance the sustainability of the region’s water supplies.

These new uses of the reclaimed water would require regional coordination and cooperation between local governments, water and wastewater service providers, regulatory entities and other stakeholders. With appropriate treatment, regulatory oversight and buy-in from the general public, reclaimed water resources could be used to help provide watershed sustainability.

**Reno’s Advanced Treatment Pilot Test:** In addition to the NVI process, an ongoing advanced treatment pilot study at the Reno-Stead Water Reclamation Facility has been undertaken by the City of Reno and ECO:LOGIC Engineering. Consideration of groundwater replenishment and IPR using highly treated municipal wastewater effluent must include demonstration of safe, reliable water quality, practicality, affordability and public acceptance. Coastal communities such as Orange County, California utilize reverse osmosis (RO), high-energy UV and peroxide treatment because RO brine disposal to the ocean is available. This approach may be neither affordable nor appropriate for many inland areas such as the Truckee Meadows. To address the feasibility of IPR without RO, the City of Reno developed an alternative treatment demonstration project for public review and regulatory evaluation using either sand filtration or membrane filtration (MF), ozonation (O3), and biologically activated carbon (BAC). Reno’s MF-O3-BAC pilot project successfully demonstrated the following process capabilities:

- Produces a water quality that meets or exceeds all drinking water regulations, as well as reduces non-regulated endocrine disrupting compounds (EDCs) and pharmaceuticals and personal care products (PPCPs) to very low and non-detect concentrations.
- Avoids increasing the corrosivity of the product water, a serious concern for recharge in arsenic-rich aquifer formations.
- Significantly reduces biodegradable dissolved organic carbon (BDOC) concentrations to minimize bio-fouling of aquifer injection wells.
- Removes ozonation transformation byproducts.
- Reduces product water estrogen activity in human cell bioassays to background levels.

Compared to reverse osmosis-high energy UV systems, Reno’s MF-O3-BAC process has the benefits of multi-barrier treatment for all major categories of contaminants of concern, which provides additional reliability; lower capital costs; lower operation and maintenance (O/M) costs and simpler O/M tasks, lower energy use; and eliminates treatment and disposal of process reject water.

**Regulatory Collaboration:** A number of specific activities and workshops were conducted for the benefit of NDEP and Washoe County District Health Department (WCDHD). CH2MHill was hired to meet independently with regulators from NDEP and WCDHD to obtain feedback regarding the implementation of expanded reclaimed water uses. Possible changes to the existing Nevada Administrative Code (NAC) and/or Nevada Revised Statutes (NRS), proposed public education and input programs, and additional studies relative to health impacts and reuse options were the primary take-home messages from these interviews.

NDEP also initiated discussions with the WCDHD concerning the potential use of reclaimed water for residential use. Issues being discussed will be addressed through NDEP’s permitting
process of WWTFs and include appropriate effluent limitations, treatment reliability standards, as well as compliance points and assurances. Additionally, NDEP would need to seek a change to NAC 445A to include higher water quality standards and treatment requirements. Assuming regulatory changes were completed, a service provider would need to request a modification of its permit. NDEP does not regulate, nor does it have the authority to regulate a residential reclaimed water program, therefore, the county or other local government would have to be the primary regulatory agency. All of these issues will need to be resolved prior to any future decision on residential reuse.

Cost of Service Evaluation: A planning level evaluation of the various costs of three disposal or reuse scenarios was also conducted. The evaluation considered the cost implications of both water supply and wastewater disposal for three scenarios. Each scenario considered RSWRF’s next 2-MGD expansion for wastewater treatment and disposal. Scenario 1 is representative of the current water management approach; import water to the North Valleys, use it once, treat it and dispose of it. Discharge of the treated wastewater to Long Valley Creek was selected as a representative disposal alternative to evaluate this scenario.

Scenario 2 represents expansion of existing reclaimed water uses by incorporating front and back yard residential irrigation for new construction. Factors such as added costs for wastewater treatment, dual water systems, reduced water rights, differences in potable water distribution piping and connection fees were taken into consideration. In coordination with the NVI team, the City of Sparks contracted for an outside evaluation by Optimatics, Inc. to evaluate the differences between a conventional water distribution system, and a dual water system where residential irrigation demands were provided by reclaimed water. The evaluation generally concluded that a dual water system costs about twice as much as a conventional system. This result is due to the reclaimed water system requirement for a 10-hour, night-time irrigation period, rather than spreading the demand out more evenly over a 24-hour period. The local fire department’s requirement to provide fire flows from the potable system also prevents downsizing the potable system.

Scenario 3 represents one potential indirect potable reuse scenario, whereby treated wastewater is purified through an advanced treatment process, and recharged to replenish the local aquifer. For cost estimating purposes, Reno’s MF-O3-BAC pilot treatment process was utilized, and it was assumed that the water would be recharged on Washoe County property north of the Stead Airport, which is an area generally isolated from municipal and domestic wells.

Findings: The NVI team presented the findings from this work to the management and director level staff of Reno, Sparks, Washoe County, TMWA and SVGID. One conclusion was that the feasibility and public perception issues associated with implementing, or not implementing, a groundwater recharge option using reclaimed water impacts the implementation of other forms of reuse. In many cases, groundwater recharge provides the most efficient and productive use of reclaimed water resources. It can also result in higher overall water quality for the region. Past experience in other states, however, has shown that proposals to replenish potable water supplies using reclaimed water can meet resistance due to public concerns about water quality; therefore the feasibility issue is primarily a public acceptance issue.

Much has been learned regarding the use of reclaimed water for residential irrigation and groundwater recharge, and what will be necessary to move forward with implementation of one or both programs. Many questions remain, depending on what direction the region wants to take in using reclaimed water to help develop and implement sustainable solutions.
Groundwater recharge does not diminish the benefits of other forms of reuse, such as the current practice of non-potable irrigation reuse in specific areas and applications. However, if groundwater recharge is not accepted in Washoe County, future reclaimed water programs may be limited to non-potable applications, regardless of the compelling benefits that groundwater recharge could provide.

The North Valleys Initiative process also resulted in a broad realization that reclaimed water is not limited to one product or one type of use. Reclaimed water is a resource that can satisfy multiple purposes where the water quality is tailored to the specific use. Reclaimed water can provide high quality water for people, a healthy economy, and a healthy environment.

Interconnection of Reno-Stead Water Reclamation Facility to Spanish Springs Valley

Connecting the Reno Stead WRF to the reclaimed water system in Spanish Springs with an intertie pipeline may provide substantial benefits to the community. The City of Sparks has an extensive reclaimed water system, with existing demands approaching 2,000 af/yr. The City is also looking at serving additional customers, such as the West Pyramid area, which have estimated year-round demands of 750 af. If reclaimed water from RSWRF could be used to meet a portion of these existing and future demands, the displaced water from TMWRF would be available to satisfy additional beneficial uses. For example, the reclaimed water could be recharged in Spanish Springs to help replenish the local aquifer as part of a long-term groundwater management strategy. The RWPC previously determined that the available water rights are out of balance with available groundwater resources in Spanish Springs, and recommended that stakeholders in this basin work together to ensure a comprehensive sustainable management plan for the basin is implemented.

The displaced water could also be used to provide additional irrigation demands in the Truckee Meadows, such as extension of the reclaimed water system to other areas within Sparks and the City of Reno. The displaced water could also provide increased flows in the Truckee River, as long as the TMWRF discharge permit conditions and WLAs are satisfied. Alternatively, an intertie pipeline could be used to convey reclaimed water from Sparks to Stead. Operation of the pipeline in this manner could be beneficial to help TMWRF meet discharge permit limitations, or it could provide additional reclaimed water for aquifer storage and recovery in Lemmon Valley or other groundwater basins.

Interconnection of Truckee Meadows Water Reclamation Facility to South Truckee Meadows Water Reclamation Facility

A reclaimed water intertie pipeline, which would interconnect TMWRF and STMWRF via Huffaker Reservoir, is another alternative that has the potential to provide regional benefits. The TMWRF supply would provide additional seasonal irrigation water to the South Truckee Meadows that would facilitate the earlier conversion of tributary creek water currently used for irrigation to potable supplies.

The interconnection could also provide a potential short-term solution to help TMWRF meet discharge limitations to the Truckee River. For instance, as the TMWRF service area continues to develop, reclaimed water in excess of the permit limit could be sent to Huffaker Reservoir. In this case, the excess flow could be used for irrigation in the summer months and stored in the winter months. The winter storage volume could either be used for the next year’s irrigation season or returned to TMWRF and discharged to the Truckee River during low effluent flow
periods. An integrated water balance of existing and future TMWRF and STMWRF flows, discharges, reclaimed water demands and storage is needed to determine the feasibility of this alternative.

**Decommissioning of the Gold Ranch Wastewater Treatment Facility**

The Gold Ranch Wastewater Treatment Facility is a small privately-owned extended aeration activated sludge treatment facility utilizing ON/OFF aeration. It has a rated capacity of 25,000 GPD and currently processes 10,000 GPD serving the Gold Ranch tourist commercial property near the California – Nevada border. Effluent disposal is via a leach field system.

Reno and Washoe County have taken a proactive approach in developing plans to identify possible pollutant loading to the Truckee River within the Verdi area. A general consensus has been to plan for facilities that will remove the major wastewater contributions from this area and sewer to TMWRF. In 2001, Washoe County received federal grant funds and moved forward with the extension of the Lawton/Verdi Interceptor. The Boomtown and Verdi Meadows areas were connected to the interceptor, and their respective wastewater treatment facilities have been decommissioned. The interceptor will also allow for removal of numerous septic systems, and the future decommissioning of the Gold Ranch wastewater treatment plant. This facility’s discharge permit contains a condition requiring it to be abandoned when the Lawton/Verdi Interceptor is available.

**4.4 Wastewater Planning for Other Areas**

In addition to the existing water reclamation facilities, wastewater facility planning for other developing areas needs to be coordinated with ongoing, regional planning efforts.

**Lower Truckee River**

**Mustang and Patrick / Tracy Areas**

Significant undeveloped, industrial zoned lands are located in the Mustang and Patrick / Tracy areas. For instance, the proposed Patrick Nevada Technology Park is located on 2,205 acres adjacent to Interstate 80 E., approximately 8 miles east of Vista Blvd. in the East Truckee Canyon planning area. The entire project is located either in the City of Sparks or in the sphere of influence of the City of Sparks. Currently, the land owner and developer are engaged in a master planning/pre-annexation process with the City for land-use, infrastructure, and public safety facilities. This master planning/pre-annexation process is scheduled to be completed in the fall of 2010.

The proposed Patrick Nevada Technology Park intends to capitalize on the unique infrastructure the site affords, including accessibility I-80; fiber optics capacity, natural gas accessibility and renewable energy (solar energy approval, proposed wind energy projects, and geothermal resources). In addition to 1,125 acre-feet of permitted groundwater rights, which the land owner has banked with Washoe County, the developer is seeking delivery of a minimum of 4,000 acre-feet annually of TMWRF reclaimed water via a new pipeline to be developed to the project site.

The reclaimed water would be utilized for water cooling a state-of-the-art energy generation complex to supply dedicated power to a technology campus hosting data centers.
The use of reclaimed water would provide a strategic benefit to the development of the technology park, as well as provide benefits for the Truckee River. Use of reclaimed water would not compete for the region’s limited water resources needed for municipal demands and environmental uses, and the project would use reclaimed water year round, compared to existing seasonal irrigation. Year round use of reclaimed water improves the ability of the Truckee Meadows Water Reclamation Facility to meet the stringent Total Nitrogen discharge limits to the Truckee River.

In addition to the potential development of industrial areas within Sparks’ East Truckee Canyon planning area, there is also significant development potential on the Storey County side of the river. This area includes existing industrial development such as Kal Kan and Kaiser Aluminum, and continued commercial and industrial development within the Tahoe Reno Industrial Center (TRIC). Wastewater from the existing industries is treated either through on-site facilities, or in the case of TRIC, through a small community sewer collection and treatment system. Wastewater disposal is managed by a combination of reclaimed water irrigation and/or subsurface infiltration. Wastewater treatment facilities along the Lower Truckee River are shown in Figure 3-4. To help protect water quality within the Truckee River, wastewater facility plans for these areas recommend that facilities be implemented that include biological nitrogen removal, with subsurface disposal and/or landscape irrigation. Joint wastewater treatment and facility planning could be economically advantageous to both Washoe and Storey counties and should be considered in future work.

As this area of Sparks and Storey County continues to grow, it will be important to monitor groundwater and surface water quality to check for non-point source pollutants entering the Truckee River. These additional pollutant loads have the potential to impact sensitive river water quality improvement programs underway in Washoe County.

**Wadsworth Wastewater Treatment Facility**

This area’s long-term sewer and potable water supply may require a separate planning effort as this area continues to grow. Possible solutions include an interagency approach for combined facilities with the Tribe, the Town of Fernley and Washoe County. Currently, the Pyramid Lake Paiute Tribe facility provides secondary treatment and disposal through sedimentation and facultative lagoons for the town of Wadsworth. Rapid infiltration basins are constructed, but evaporation in the lagoons has dominated the disposal process. Current influent flow is approximately 35,000 GPD. No discharge permit is required for this facility. The Wadsworth Wastewater Treatment Facility is mentioned for regional information and coordination purposes only; it does not fall under the jurisdiction of this Regional Water Plan.

Septic systems will continue to be used in this area within the planning time frame. There is evidence of nitrate contamination to the groundwater within the Wadsworth area, indicating the need for community sewering. Additionally, the Stampmill Estates subdivision may need sewer. A large residential development has been proposed adjacent to Stampmill Estates, which would require a municipal water and sewer system. If this project develops in the future, Stampmill Estates should be included in plans for municipal sewer service. Discussions among Washoe County, the Tribe, and the Town of Fernley to seek an area-wide water and wastewater strategy should also be revisited.
Warm Springs

Septic systems will continue to service a majority of this area. However, within the Specific Plan Area east of Pyramid Highway, a future wastewater treatment plant is anticipated to eventually serve a planned development of approximately 750 lots. The proposed 0.2 MGD treatment plant would be built in phases, with effluent disposal from the first phase accomplished using rapid infiltration basins. For future phases, seasonal storage and irrigation using reclaimed water will likely be considered. The planned development is not being actively pursued at this time.

Washoe Valley

Within New Washoe City, nitrate contamination to the groundwater system is occurring. Effluent from septic systems is suspected as the nitrate source. Community sewer would seem to be the appropriate method of protecting this drinking water source; however, none is currently planned or anticipated. The extent to which this contamination is a potential health problem has not been determined.

Spanish Springs

In 2000, NDEP issued a directive to the County to plan for sewering of existing lots with septic systems in the Spanish Springs area due to elevated nitrate concentrations detected in public drinking water wells. The subdivisions which are not sewered include: Bridle Path, Sky Ranch, Surprise Valley Ranchos Phase I, Desert Springs and Pyramid Ranch Estates. Various design alternatives associated with the construction of a new facility in Spanish Springs Valley that would provide service to the residents in Spanish Springs were evaluated by Washoe County. The two primary alternatives were the construction of a new plant in Spanish Springs Valley and continued servicing via TMWRF. The Spanish Springs Valley Wastewater Reclamation Facility Plan, drafted in November 2004, indicates that the alternatives are essentially of equal cost. However, the connection fee for a new Spanish Springs plant would exceed the current rate being offered by the City of Sparks for a connection to TMWRF. Thus, the recommended alternative was to continue service to TMWRF and negotiate an acceptable service agreement with the City of Sparks.

The facility plan was adopted by the Board of County Commissioners for phased sewering of the existing lots with septic systems in the area. The plan requires 75% grant funding for the sewering to proceed. Phased sewering commenced in early 2005; Phase IA of the program is complete and serves approximately 230 homes. Washoe County recently received grant funding from the Corps of Engineers for the construction of Phase 1B.

The wastewater collection systems have been and will continue to be extended into new areas of growth.

Lemmon Valley and Golden Valley

Both the East and West Lemmon Valley hydrographic basins and Golden Valley, a sub-basin within East Lemmon Valley, are deficient in sustained perennial yields for water supply. All of Golden Valley’s domestic wastewater treatment and disposal needs are provided by individual septic systems.
Groundwater samples from some areas of Golden Valley exceed state and federal drinking water standards for nitrate. Additionally, Widmer and McKay (1992) predicted that nitrate concentrations would increase over time. Washoe County and the Bureau of Reclamation (BOR) implemented a federally funded artificial groundwater recharge pilot project by injecting fresh water into the Golden Valley aquifer from 1989 to 1998. Results of the study indicated that injection improved water quality with respect to nitrate.

Based on the groundwater recharge pilot project, a recharge program has been approved, funded by establishing a Golden Valley recharge service area, and implemented. Presently, the program injects approximately 60 acre-feet of fresh water per year into the Golden Valley aquifer, and WCDWR is investigating further options of expanding the injection system. The volume of recharge required is estimated to be as much as 300 af/yr.

4.5 Septic Systems

The cumulative effect of septic systems on surface waters is not easily calculable or measurable. It may take years to begin detecting increased pollutant loads in surface water resources. Because groundwater quality standards are often much less restrictive than river standards, protection of groundwater quality to the level of the drinking water standard may not provide adequate protection to nearby surface waters. This situation may potentially exist in the Verdi, Spanish Springs, Mogul, Ambrose Park, and Island 18 areas (Figure 3-3).

In areas where there is little recharge, effluent from septic system leach fields can recycle through the groundwater system, increasing pollutants to unacceptable levels. This trend was found in sampling of municipal wells in portions of Spanish Springs, Lemmon Valley, Golden Valley and New Washoe City.

RWPC Policy 2.2.a, in conjunction with Washoe County District Health Department regulations and Washoe County development policies, responds to issues of groundwater contamination resulting from septic systems. The policy is as follows:

**Policy 2.2.a: Septic Tank Density and Groundwater Pollution**

Development density and groundwater quality/accountability issues should determine whether individual sewage disposal systems can be utilized. When adverse surface or groundwater impacts occur as a result of a concentration of septic systems, alternative sewage disposal, groundwater treatment, or other techniques shall be implemented. The selection of techniques to achieve this performance standard shall be based on cost, longevity of the solution, and existence of a credible entity to be responsible for the continuing performance of the selected system. Future individual septic systems shall not be allowed in densities that would degrade groundwater or surface water quality such that it no longer meets beneficial use standards.

In some areas of Washoe County, the number of septic systems allowed has been limited based on an analysis of the potential impacts to water quality. One such area is Verdi, where the Washoe County Comprehensive Plan allows a maximum of 1,300 septic systems (Washoe County, 2002).

The options for mitigation of nitrate contamination due to high densities of septic systems have been studied regionally (AGRA, 2000), in Spanish Springs (WCDWR, 2002), Cold Springs...
(Kennedy/Jenks, 2002) and Golden Valley (WCDWR, 2004). The results of these various analyses have coalesced around four possible mitigation strategies:

- Conversion of septic systems to a municipal sewer system
- Conversion of septic systems to nitrate reducing septic systems
- Dilution of groundwater via artificial recharge with treated drinking water resources

Pumping of high nitrate groundwater for non-potable uses to remove nitrates from the groundwater aquifer

The Washoe County District Health Department has undertaken several measures to reduce future potential impacts from septic systems. For example, effective 2001, the minimum lot or parcel size for new subdivisions and second or subsequent parcel maps proposing to use septic disposal was established at 5 acres. Smaller lots may be considered if it can be shown that adequate measures have been taken to ensure that the smaller lot area will not have a greater impact to the groundwater quality than the 5 acre lot size.

Adequate measures might include the installation of nitrate reducing septic systems. These systems received considerable interest from the public in Spanish Springs Valley as a potential low cost alternative to conventional sewer service for dwellings currently using septic systems.

The Oregon Department of Environmental Quality conducted the La Pine National Decentralized Wastewater Demonstration Project in cooperation with Deschutes County, the EPA, and USGS. The multi-year project studied the performance of 11 individual nitrate reducing systems installed at residences in the La Pine, Oregon area. After visiting with the investigators at the project site, WCDWR staff concluded that the results would be applicable to the issues and needs in this region.

The project’s main tasks included field-testing the individual systems, development of a three dimensional groundwater/nitrate fate and transport model, development of a long-term maintenance program and development of a low-interest loan program. The project also evaluated septic tank and sand filter performance in order to provide baseline information on the impacts of conventional systems on the aquifer. The study found that several systems can effectively reduce typical water quality parameters (5-day biochemical oxygen demand, total suspended solids, and fecal coliform) but that nitrogen reduction can be more difficult to achieve in the field. Several systems that showed high levels of nitrogen reduction in test centers did not perform as well in the field and nitrogen reduction below 10 mg/L appears to be difficult to achieve consistently without a secondary carbon source.

Conversion of septic systems to a municipal sewer system appears to be the most reliable, albeit expensive, mitigation of nitrate contamination due to high densities of septic systems. Artificial groundwater recharge using fresh water injected into the aquifer, such as in Golden Valley, has also proven beneficial in improving water quality with respect to nitrate.
4.6 Watershed Management Programs to Protect the Availability and Quality of Water Resources

4.6.1 Point and Non-Point Source Pollution

Point Source Pollution

This system rests on the definition of point source: “any discernible, confined, and discrete conveyance” of pollutants to a water body. The definition of discrete conveyance includes, but is not limited to, “any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged.”

Non-point source pollution

The term “non-point source pollution” has been used in many different ways in many different contexts over the past twenty-five years. Some define it as “polluted runoff from rain or snow,” others as pollution from “diffuse sources,” and still others, colorfully, as “poison runoff.”

When all is said and done, the most accurate, complete, and enduring definition of the term is the very simplest. A “non-point source” is exactly what the words say: Any source of pollution that is not a point source.

Reduction of Non-point Source

RWPC Policy 2.1.b, below, supports the concept of reducing non-point source loading to the Truckee River and water quality trading:

Policy 2.1.b: Reduction of Non-point Source Pollution for TMWRF Pollution Credit

Options for centralized wastewater treatment with surface water discharge shall include alternatives for reducing non-point source pollution, which may be more environmentally sensitive, and shall be pursued as pollutant credits for TMWRF.

4.6.2 Regulatory Considerations

Clean Water Act

In 1972, Congress passed the Federal Water Pollution Control Act, commonly referred to as the Clean Water Act (“CWA”). The CWA, whose mission was to “restore and maintain the chemical, physical, and biological integrity of the nation’s waters,” laid out as its main goals as zero discharge of pollutants into fishable and swimable waters by 1983 and zero discharge of pollutants into navigable waters by 1985.

NPDES Permit Program

One of the first steps taken was the implementation of the National Pollutant Discharge Elimination System (“NPDES”). This program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Point sources are discrete
conveyances such as pipes or man-made ditches. Industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters.

**NPDES** is a progressive program that continually attempts to identify and control “new” point sources of pollution. Over the years, the EPA has included more sources under its definition of point source pollution. These sources are now regulated under the NPDES program.

For example, in the early years of the Act, municipal stormwater pollution, or “urban runoff,” was an unregulated, non-point source, even though it is responsible for many of our nation’s most severe water quality problems. Much of it is collected in and discharged through stormwater pipes; however, that perspective is changing nationally. Stormwater management programs are expected to control many forms of urban runoff by bringing them under the NPDES umbrella.

In the 1980s, studies conducted by the EPA and others indicated that stormwater runoff from urbanized areas is a leading cause of impairment to the nation’s receiving water bodies. These studies and numerous legal actions by environmental organizations culminated with the publication of Federal regulations that required municipalities to control non-point source pollution in urban runoff that flows through their storm drain systems. The regulatory process began in 1987 when Congress amended the Clean Water Act. In 1990, under Phase I, the EPA required NPDES permit coverage for stormwater discharges from medium and large municipal separate storm sewer systems (MS4s) located in urban areas with populations of 100,000 or more. On March 10, 2003, Phase II of the NPDES stormwater program became effective. In addition to requiring permit coverage for certain regulated small MS4s, Phase II also lowered the threshold for regulation of construction activities from 5 acres to 1 acre of land disturbance.

**Water Quality Standards**

The CWA also sets specific water quality standards based on the intended use of the water, i.e. “beneficial uses”. These include water quality for aquatic life, recreational, agricultural, industrial, and municipal uses. Specific water quality standards are set by states, territories, and authorized tribes. They associate the uses for each water body; for example, drinking water supply, contact recreation (swimming), and aquatic life support (fishing), and the scientific criteria to support those uses. States cannot set standards that allow higher concentrations of pollutants than EPA standards; they can be more restrictive, but not less.

**Clean Water Act Section 303(d)**

Under section 303(d) of the 1972 CWA, the states, territories, and authorized tribes are required to develop lists of impaired waters. Impaired waters are those waters that do not meet water quality standards that have been established. The law requires that these jurisdictions establish priority rankings for waters on 303(d) lists and develop total maximum daily loads for these waters. As stated before, the CWA requires states to establish water quality standards based on beneficial uses established for a given water body.

**Total Maximum Daily Load**

A Total Maximum Daily Load (“TMDL”) is a calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards. A TMDL is the total allowable amount of a single pollutant from all contributing point and non-point sources. The calculation must include a margin of safety to ensure that the water body can be used for the purposes the State has designated. The calculation must also account for seasonal variation in
water quality. The point source portion of the TMDL is called the Wasteload Allocation ("WLA").
The non-point source portion of the TMDL is called the Load Allocation. The Load Allocation
also includes background sources of the pollutant.

Water Quality Issues Specific to the Truckee River

The Truckee River is the sole outlet of Lake Tahoe, is 140 miles long in northern California
and Nevada, and drains 3,120 square miles of land. Moving through two states, one sovereign
nation, multiple counties, towns, and a large city, there are many entities which must cooperate
to truly provide watershed protection. It is also filled by many creeks and urban stormwater
outlets as it moves through Truckee, Reno, Sparks, and out into the desert, finally emptying into
Pyramid Lake.

Historically, entities have been permitted for discharge to or work on the Truckee River, without
interaction or consequence to other agencies. More recently, coordination efforts focused on
protection of the whole watershed have been implemented, with agreements, collaborative
projects and funding sources, and overall visions for how improvement of water quality may be
inextricably linked to protection of soil resources and conservation, smaller creeks and streams
that may carry heavy loads of pollutants, and urban stormwater which may provide thermal
pollution to the Truckee River.

Current Watershed Management Efforts

Watershed Management is an integrated approach to protecting water resources. The
watershed approach coordinates environmental management within geographic boundaries to
focus efforts of stakeholders, public and private, to address the highest priority problems, in the
maintenance and improvement of the quality of water resources. The objective of watershed
protection is to develop management strategies to allow for demands and protect beneficial
uses throughout the watershed. Water Resource specialists within the Truckee River
watershed must manage these most regulated resources and find creative solutions to issues
which continue downstream and upstream across political jurisdictions. By using the watershed
approach to bring together stakeholders most affected by management decisions, sharing data
and other technical resources, the larger community may use an iterative process to assess,
set environmental objectives, identify priority problems, develop management options and
action plans, and implement these plans, gaining consensus and evaluating effectiveness
throughout the process.

River Permitting

Working in or around the Truckee River on restoration, flood control, and construction projects
requires many permits, protective measures and monitoring to meet Federal, State and local
guidelines and regulations. The Northern Nevada Water Planning Commission funded the
Updated Truckee River Restoration and Construction Site Permitting Handbook (2009), which
includes a Permitting Process Flowchart to assist users in completing all required permits for
river protection. As precursory steps, The Regional Water Management Fund contributed funds
to developing River Permitting Technical Memos and preliminary maps (year?), which were
used to prepare the Updated Truckee River Restoration and Construction Site Permitting
Handbook (2009, available for download at www.tmstormwater.com or
www.washoeCounty.us/water/index.htm). In May 2009, a Working in the River and Permitting
Workshop was offered in Reno, to guide users through the handbook and permitting process.
**Watershed Mapserver**

The Truckee Meadows Stormwater ___ (“TMSWPCC”) has been providing watershed assessments to the tributaries of the Truckee River since 2005 (see Section xxx), in order to record changes to the tributaries in the Truckee Meadows, and compare with baseline conditions captured in 2002 (Widmer and Jesch). These tributary assessments provide valuable information on our creeks and streams, and the 2008 assessment is accessible through the City of Reno Watershed Map Server. This GIS tool is linked to the River Permitting Section as a free enhancement for users. This map server illustrates the Truckee River from the California-Nevada border to Pyramid Lake and lists the agencies that have regulatory authority of various reaches. This map server is also available as a link on www.tmstormwater.com.

**Truckee River Info Gateway (“TRIG”)**

The City of Reno and City of Sparks recognized a great need for a watershed clearinghouse for all stakeholders to share technical data, maps, and other valuable resources collected on the Truckee River and tributaries. The Truckee River Info Gateway (www.truckeeriverinfo.org) was developed in 2004 by Ecological Resource Associates (ERA) for Reno and Sparks, and has become the premier data gathering/sharing tool for technical users in the Truckee watershed. This resource was intended to save local resources by providing a platform and online database to share valuable information through, and build better understanding of the complexity of the watershed. In 2009, the TRIG server was moved from its original home at UC Davis to the Nevada Department of Information Technology, to provide local hosting. During 2010, it is hoped that the NNWPC will begin sharing in routine maintenance and expansion costs for TRIG through an Interlocal Agreement with the City of Reno.
Water Quality Standards

Water quality standards for Nevada are contained in the Nevada Administrative Code (NAC), Chapter 445A.118-445A.225.

Current 303d Listings for the Truckee River and its Tributaries

Nevada's 2006 303(d) Impaired Waters List: Section 303(d) of the Clean Water Act requires that each state develop a list of waterbodies that need additional work beyond existing controls to achieve or maintain water quality standards, and submit an updated list to the Environmental Protection Agency (“EPA”) every two years. Nevada's 2006 303(d) Impaired Waters List provides a comprehensive inventory of water bodies impaired by all sources. This inventory is the basis for targeting water bodies for watershed-based solutions, and the TMDL process
provides an organized framework to develop these solutions. The list can be obtained online at http://ndep.nv.gov/bwgp/file/303d_list09-att1.pdf

(consider including the lists in an appendix?)

**Total Maximum Daily Loads (“TMDLs”)**

The additional work that may be necessary beyond existing controls for listed waterbodies, includes the establishment of *Total Maximum Daily Loads (TMDLs)*. The TMDL process provides an analytical framework to identify the relative contributions of each pollutant. The TMDL identifies the sources and causes of pollution, e.g., point sources, non-point sources, or a combination of both, and establishes allocations for each source of pollution as needed to attain water quality standards.

TMDLs are measured at Lockwood under the assumption that if the TMDLs are being met at Lockwood, located downstream from the Truckee Meadows Water Reclamation Facility, they are being met on the rest of the “impaired” river stretch. TMDLs are established for pollutants that exceed water quality standards 10 percent or more of the time for the five-year listing period for 303(d) listed impaired waters. The three constituents for which TMDLs have been established on the Truckee River, total nitrogen, total phosphorus, and total dissolved solids (TDS, or salts dissolved in the water), are by no means the only pollutants in the water at Lockwood.

Wasteload allocations (WLA) are determined for each identified point source of pollution. For example, there are allocations for TMWRF, Vista Canyon, and the Sparks Marina Park, which all discharge to the Truckee River. These entities must comply with their NPDES permit requirements.
Table 4-2 Summary of Truckee River Total Maximum Daily Loads, Waste Load Allocations and Load Allocations

<table>
<thead>
<tr>
<th>Source</th>
<th>Nitrogen</th>
<th>Phosphorus</th>
<th>TDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Point Sources/Background (LA)</td>
<td>450 lbs/day</td>
<td>75.25 lbs/day</td>
<td>None assigned</td>
</tr>
<tr>
<td>TMWRF (WLA)</td>
<td>500 lbs/day (annual average)</td>
<td>134 lbs/day</td>
<td>120,168 lbs/day</td>
</tr>
<tr>
<td></td>
<td>500 lbs/day (30 day average, May–Oct.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vista Canyon Group (WLA)</td>
<td>16.7 lbs/day</td>
<td>4.75 lbs/day</td>
<td>9,730 lbs/day</td>
</tr>
<tr>
<td>Sparks Marina Lake (WLA)</td>
<td>33.3 lbs/day</td>
<td>WLA Trade Agreement</td>
<td>19,390 lbs/day</td>
</tr>
<tr>
<td>TMDL</td>
<td>1,000 lbs/day</td>
<td>214 lbs/day</td>
<td>900,528 lbs/day</td>
</tr>
</tbody>
</table>

To be developed:
- TMDL Development History
- Impact upon TMWRF Permit
- Truckee River Modeling for Water Quality
  - TRHSPF
  - WARMF
  - TROM
- TMDL revision
- Non-point sources of Nitrogen
- Non-point sources Phosphorus
- Water quality trading of total phosphorus, total Non-point sources TDS

**Truckee River Coordinated Monitoring Program**

**Background:** The Truckee River watershed is currently monitored and sampled by many different groups for water quality. Under the Clean Water Act, the co-permittees under the Truckee Meadows Municipal Stormwater Permit (Section xx) monitor the North Truckee Drain, Whites Creek, and Steamboat Creek, above and below heavily developed areas quarterly per the MS4 permit requirements and Sample Analysis Plan.

The TMWRF monitors the Truckee River at various points upstream and downstream of the urbanized area, as well as Steamboat Creek above and below the discharge point, to track potential water quality impacts on the river, per discharge permit requirements. The quality of our water supply is monitored by TMWA and Washoe County under the Safe Drinking Water Act. The Truckee River Flood Project monitors flows for flood prediction and future projects. Nevada Division of Environmental Protection (“NDEP”) monitors streams for setting standards and identifying Impaired Water Bodies to update the NV 303(d) list of Impaired Waters.
Current: Raising concerns over the health of the Truckee River, the Legislative Committee to Oversee the Western Regional Water Commission requested a bill draft for a Truckee River monitoring resolution during August 2008. With the Legislative direction (BDR R-237), NDEP gathered a working group to create a Memorandum of Understanding (“MOU”) to encourage entities that are engaged in water quality monitoring of the Truckee River to coordinate activities. With 14 signatories, the MOU sought to bring parties together, provide a platform for collaboration and quality control, provide a data clearinghouse for technical resources and dissemination of public information on the health of the Truckee River.

The Truckee Meadows Watershed Committee (“TMWC”) applied for Nevada Clean Water Act funding under 319(h), and was awarded grant funds to contract a consultant for facilitation of the coordinated monitoring efforts. The City of Reno, as Coordinator for the TMWC, entered into a contract with NDEP for facilitation support. The City released a Request for Qualifications (“RFQ”) for facilitation in Fall 2009, and 14 firms responded. The TMWC screened firms, and presented the top 5 to the MOU committee, who performed interviews and awarded Kennedy/Jenks Consultants the contract for facilitating the process with MOU stakeholders. The kickoff meeting was held in May 2010, with the goals of determining a roadmap to create a Coordinated Monitoring Plan, and scheduling a series of technical meetings to compile and coordinate information. The group envisions a fully edited Coordinated Monitoring Plan in February 2011 to report back to the Legislative Committee.

Coordination with the Tribe’s Water Quality and Quantity Goals
Yet to be developed

Seasonal Modifications of Total Maximum Daily Loads for the Truckee River
Yet to be developed

Flow Augmentation Benefits on River Water Quality
Yet to be developed

Viability of Water Quality Trading
Yet to be developed

Water Chemistry
Pollution and Problem Areas

Current Watershed Management Efforts

Current watershed management efforts include the following and will be discussed in greater detail within this section:

Lower Truckee River Restoration
    Restoration MOU
    BOR
    Flood Project
Truckee Meadows Watershed Management Program
Initial Plan Development
Tributary Assessments
Watershed Coordinator
Watershed Management Manual
LID manual
2004 Interlocal agreement

4.7 River and Stream Restoration

The community is actively engaged in restoration efforts on the middle and lower Truckee River. Land uses including timber harvesting and ski resorts in the middle reach, and flood control, irrigation, channelization, and urbanization with resulting hydromodification downstream has greatly altered instream and adjacent riparian habitats. In some locations, such alterations to waterways have eliminated floodplains and meanders, causing steeper instream gradients, bank erosion, channel downcutting, lower stream bed elevations and lower groundwater tables. Lowered water tables quickly disconnect the floodplain and vegetation requiring water from the water surface, and loss of streamside vegetation results. Here in the Truckee River watershed, this has resulted in warmer water temperatures instream and subsequent reduced amounts of dissolved oxygen available for native fish communities. The reduced or absent riparian and instream complexity has caused a decline in habitat available to fish as cover, for spawning, and migration. The results of all this has lead to the non-functional river and stream reaches observable in the region today, necessitating watershed restoration efforts.

4.7.1 Middle Truckee River Restoration

The middle Truckee River, from Fanny Bridge at Tahoe City, to the Verdi area in Nevada, has many beneficial uses and demands. The Truckee River Watershed Council is a nonprofit organization committed to “collaborative solutions to protect, enhance, and restore the Truckee River watershed”, facilitating partnerships to benefit the watershed. Projects prioritized highest are located throughout the middle Truckee River, and on tributaries feeding it, including restoration projects as well as behavior-changing education on best management practices.

These projects have been assembled with a wide inclusion of stakeholders, and include meadow and riparian restoration to re-establish proper functioning condition and reduce erosion, urban stream management using best management practices to reduce stormwater pollution, bank stabilization of incised creeks, floodplain restoration, habitat restoration, agricultural lands restoration, acquisitions of key properties in the river canyon, with assessment and restoration following, road improvements to decrease sediment reaching streams and river, mapping of forest road and trail networks, upgrade and replacement of culvert and bridge systems, fuels reductions, and low impact development projects to recharge local aquifers, treat runoff, and prevent hydromodification from urbanization wherever possible.

4.7.2 Lower Truckee River Restoration

The lower Truckee River, running from the Truckee Meadows metropolitan area to Pyramid Lake, is a vital resource that serves multiple public and private benefits. Due to significant channelization efforts during the 20th century much of the river between Sparks and Wadsworth has been highly degraded. The extent, size and condition of the riparian forest, and of bird, amphibian and native fish species, are greatly reduced compared to their 19th century pre-settlement states. Restoration requires rebuilding the physical environment, especially to restore
channel geometry and the connection of the river to the floodplain, and active reintroduction of native plants.

The Nature Conservancy began working in partnership with a team of public agencies toward a sustainable Truckee River from its headwaters in the Sierra Nevada to its terminus at Pyramid Lake. The Nature Conservancy (TNC) has been working actively to restore key reaches of the lower river and floodplain since 2000 when it entered into contract to purchase McCarran Ranch along five miles of the river. The Conservancy’s partner agencies each have their own distinct goals for the river, but as a whole they are compatible and mutually reinforcing: improve water quality, wildlife habitat and the fishery, flood protection, and opportunities for recreation.

The partner agencies include:
- U.S. Bureau of Reclamation (BOR)
- City of Reno (Reno)
- City of Sparks (Sparks)
- U.S. Bureau of Land Management (BLM)
- U.S. Fish and Wildlife Service (FWS)
- Nevada Department of Wildlife (NDOW)
- Washoe County
- Water Planning Commission (WPC)
- Truckee Meadows Flood Management Project (Flood Project)

The overall goal of the Truckee River Project is to conserve priority native Truckee River plants and animals by protecting and restoring the lands and waters they need to survive. The project has two separate but integrated parts. On the lower river in Nevada, downstream of the Truckee Meadows to Wadsworth, TNC is implementing a large-scale floodplain acquisition and restoration program. The riparian forest and wetlands, and the birds that depend on them, are TNC’s focal interests in the lower river. Restoration will also improve the river’s ability to sustain a higher flow for eventual flood protection efforts in the Truckee Meadows. River restoration is considered a “non-structural improvement” in Reno and Sparks wastewater facility planning for water quality improvements. Reno and Sparks began participating in river restoration on the lower Truckee River in 2003 when the McCarran Ranch pilot project was initiated.

4.7.3 2002 Memorandum of Understanding

The three local governments and the Pyramid Lake Paiute Tribe have signed a Memorandum of Understanding supporting the multiple goals to be achieved through river restoration acknowledging a regional collaborative effort to restore the lower Truckee River below Vista. The Memorandum of Understanding generally describes the benefits, goals and management principles that the major stakeholders agree are necessary to develop a comprehensive program to restore the lower Truckee River.

The lower river falls under the jurisdiction of multiple local, state, and federal agencies and units of government, and involves multiple private landowners. To successfully take advantage of this opportunity, public agencies and private landowners needed to cooperate and coordinate their river restoration activities. This statement of public benefits, goals, and management principles agreed upon by key lower-river stakeholders, represented a common understanding and foundation from which more detailed work programs have been pursued with a high likelihood of success.
These goals and benefits are:

Public Benefits:

- Recreation, open space, fishing, non-motorized boating and activities that are fundamental to the region’s quality of life
- Water quality and the related wastewater treatment capacity of the region, which is fundamental to economic growth
- Attenuation of peak flood flows for public safety and to protect private and public property and infrastructure
- Habitat and wildlife benefits for fish, birds, mammals and plant communities that are part and parcel of our region’s natural heritage

Public Goals:

- Mitigation of flood flows
- Cost-effective wastewater quality treatment
- Public recreation opportunities that are high quality, easy to access and ample in number
- Preservation and restoration of aquatic and terrestrial habitat in the river corridor

Management Principles:

- The goals of public recreation, water quality, flood attenuation, and habitat restoration are, by and large, compatible.
- Planning and implementation efforts for any single public goal (e.g. flood protection) in the lower river corridor shall consider and be consistent with other public goals, private interests, regional economic growth and preservation of tax revenue and public fiscal capacity.
- Coordination of lower river activities is highly desirable to achieve economies of scale and avoid potential conflicts.

4.7.4 On the Ground Restoration Efforts

The Nature Conservancy ("TNC")’s demonstration project began in 2001 at McCarran Ranch with revegetation. Then, in 2003, the Conservancy and partner agencies implemented a $1.2 million 1-mile pilot restoration project at McCarran Ranch that included channel and floodplain restoration and revegetation.

From 2003 until November 2005 the Cities and TNC worked to implement the remainder of the McCarran Ranch restoration under the auspices of an Army Corps of Engineers 1135 Ecosystem Restoration Project. Under that program the Cities would have funded roughly 35% of the costs, and the federal government would have provided the remainder. In the aftermath of Hurricane Katrina, however, nearly all discretionary funds for the Army Corps of Engineers were redirected to the Gulf recovery effort, and the near term McCarran Ranch project funding was lost.

The Desert Terminal Lakes (DTL) program was created by Senator Reid for purposes of restoring the health of Walker Lake and Pyramid Lake. The U.S. Bureau of Reclamation (BOR) issued a Request for Proposals in May 2005 for projects to improve the health and increase flow to Pyramid Lake and the Truckee River. Together Reno, Sparks and The Nature Conservancy
were awarded $9.6 million to complete river restoration at McCarran Ranch and implement river restoration at Mustang Ranch, Lockwood and below Derby Dam. To satisfy the requirement of the DTL grant program to increase flows to Pyramid Lake, the Cities committed 250 acre-feet of Truckee Meadows Water Reclamation Facility (“TMWRF”)’s groundwater component of treated effluent to Pyramid Lake. An additional $5.0 million of Nevada Question 1 funds, administered by Washoe County, has also been used to implement the program.

The entire McCarran Ranch site is 305 acres and has 5 miles of restored river. Habitat improvements include: 120 acres of native plantings, 18 riffles, 11 wetlands, and improved channel sinuosity.

The Lockwood property, owned by Washoe County, is located about 10 miles downstream of Reno. Completed in 2009, the restoration includes a new river meander, 8 riffles, 2 wetlands, and 28 acres of revegetation. The Lockwood restoration project also includes recreational elements such as a non-motorized, multi-use trailhead, onsite parking, restroom facilities, picnic tables, and interpretive signs.

Improvements at the Mustang restoration site completed in February of 2010 include new meanders in the river channel.

Below Derby Dam, the initial vision was an installation of a low flow channel to assist in fish passage. However, after the Environmental Impact Statement (“EIS”) was completed, it was concluded that revegetation alone would be most beneficial. The revegetation and white top control project was launched in 2009.

Consequently, since 2003, the floodplain along 11 miles of the lower river between Sparks and Wadsworth has been restored. As of this writing, there is still revegetation and establishment in progress. When finished, the restored sites will help floodwaters spread naturally over the landscape, improving fish habitat and boosting water quality.

4.7.5 The Flood Project and River Restoration

Need to coordinate with Chapter 5 and refer to (or expand on) explanation for ACOE flood project credit for restoration.

In the mean time, negotiations for restoration of the 102 Ranch located about 20 miles downstream of Reno, also progressed once the Bureau of Land Management (BLM) acquired ownership. The Cities of Reno and Sparks funded the design at the 102 Ranch. Funding for the construction came to fruition through the State of Nevada AB-5 allocated to the Truckee River Flood Project and additional Desert Terminus Lakes Program funds from BOR. The restoration at the 102 Ranch includes 2 new river meanders, 6 riffles, 5 wetlands, and 115 acres of revegetation.

The Corps and Washoe County have proposed a flood control alternative that would increase the rate of Truckee River floodwaters downstream of the Truckee Meadows. There is also an expected increase in erosional damage from these events. In order to mitigate these floodwaters, the Corps is interested in river restoration efforts on the lower Truckee River.

Restoration efforts would include:
• Increasing the river sinuosity to help reduce floodwater velocity
• Reconnecting the flood plain to the river to reduce flood flow depths, velocity and scour
• Re-vegetating the banks and flood plains to reduce erosion of the banks and soils
• Increase the flood storage of reaches to attenuate flood peaks

Collaboration and cost sharing by and between agencies and land owners will, in many instances, help achieve the greatest benefits in the most cost-effective manner. As a result of these efforts, the WPC has adopted the following policy:

**Policy 3.1.d: Truckee River Restoration**

In review of proposed projects and proposed land use changes within the areas identified for restoration in Exhibit A, the local governments shall make findings supporting the implementation of potential restoration projects as identified in the Lower Truckee River Restoration Plan or the Truckee River Flood Management project being developed in conjunction with the Corps of Engineers.

4.7.6 Steamboat Creek Restoration

Several studies based on water quality monitoring data have shown that Steamboat Creek is a major source of non-point source pollution to the Truckee River. The pollution contribution results from bank erosion, exotic weed populations, geothermal mineral deposits, irrigation return waters, urban stormwater, and the cumulative impacts of human activities throughout the watershed. Steamboat Creek flows from Washoe Lake flowing through Pleasant Valley, Steamboat Valley, and along the eastern edge of the south and central Truckee Meadows before discharging to the Truckee River. Steamboat Creek receives flows from many streams flowing down the north Carson Range, including Browns, Galena, Jones, Whites, Thomas, Dry and South Evans Creeks, most of which have undergone significant urbanization in the last twenty years, changing their functionalities and increasing non-point source pollution.

Steamboat Creek restoration projects were evaluated and the subwatershed assessed for feasibility and prioritization. Unfortunately, mercury was found in project reaches and has been identified as a significant obstacle in the way of restoring this watershed. Mercury is a dangerous neurotoxin, and once converted from elemental mercury to methylated mercury, effectively makes its way up the food chain. Studies have shown geothermal areas in the Truckee Meadows to be high in mercury, and fish in Washoe Lake have been recognized as containing high levels of methyl mercury. Projects implementing the Steamboat Creek Restoration Master Plan, including excavation and re-vegetation of new floodplains, would liberate mercury that is currently buried in sediment. These projects have been postponed indefinitely since findings were made.

The Regional Transportation Commission (“RTC”) is planning a new southeast connector route in the Truckee Meadows, which would run north-south through the Steamboat Creek area. While the planning is still underway for this connector route, there would be significant changes to the location of this drainage, as well as its configuration.

4.7.7 Watershed Management and Protection in the Truckee Meadows

Watershed health is greatly dependent upon the integrity of riparian conditions and how well streams function without eroding. In annual assessments, named streams have been rated for how well they behave as naturally functioning drainageways, and how vulnerable they are to
degradation caused by improper adjacent land use. Year by year comparisons are made in annual assessments with recommendations for maintenance and restoration of each stream. The Truckee Meadows Watershed Protection Manual was developed by Kennedy/Jenks Consultants in 2005. This manual, funded by a combination of the Water Planning Commission and NDEP, was produced to establish the protocol. The Monitoring Program, Section 4 includes procedures for performing tributary assessments.

4.7.8 Watershed Assessments for Tributaries to the Truckee River (historical)

In 2002, the Washoe County Department of Water Resources, the University of Nevada Cooperative Extension, and the Washoe-Storey Conservation District partnered to develop a Watershed Management and Protection Plan. The RWPC published "Watershed Assessment for Tributaries to the Truckee River" (Widmer and Jesch, 2002), to provide the community a report card on the baseline condition of tributaries. It was suggested that comparing it to current conditions of each tributary annually would provide decision makers with the most relevant and up to date opportunities for restoration, locate weed populations, provide opportunities for watershed protection, determine whether BMPs are mitigating stormwater pollution; help identify locations for trails or other open space amenities, and greatly assist planners and regulators. This report contained substantial mapping of geographic information and stream surveys noting the condition of the various stream reaches that were used to trace the sources of watershed problems.

4.7.9 Stream Surveys (current)

The Watershed Protection Manual (Kennedy/Jenks, 2005) provided a reference and compendium of watershed protection activities and programs developed in 2004 and 2005 for the jurisdictions of City of Reno, City of Sparks, and Washoe County. Twenty-five tributaries draining to the Truckee River were assessed initially (Widmer and Jesch, 2002), most of which are assessed annually (beginning in 2005). Upper, middle and lower creek reaches were established (2002) and assessed on a rotating basis, funded by the Truckee Meadows Watershed Committee (TMWC):

- **North Carson Range - Peavine Creeks**: Hunter, Alum, Peavine, Mogul, Chalk, North Evans, Dog, Sunrise, Bull Ranch, and Towers/Roberts
- **Washoe Valley Creeks**: Jumbo, Davis, Ophir, Winter, Lewers, Franktown, McKewen and Muskgrove
- **North Truckee Drain**
- **South Truckee Meadows Creeks**: Galena, Whites, Thomas, Jones, Bailey and Browns

Watershed health is greatly dependent upon the integrity of riparian conditions and how well streams function without eroding. In annual assessments, named streams have been rated for how well they behave as naturally functioning drainageways, and how vulnerable they are to degradation caused by improper adjacent land use. Year by year comparisons are made in annual assessments with recommendations for maintenance and restoration of each stream.

The “Watershed Assessment for Tributaries to the Truckee River” (2005-2009) provides annual survey results for streams, including apparent hydrologic functioning patterns for each stream (upward or downward), and prioritization for restoration. The Manual identified methods available for evaluating stream health (BLM, 1988) and reaches of each tributary for
assessment, to be assessed on a rotating basis. Information from the assessments has been used in the development of the City of Reno Truckee River Mapserver and the City of Reno Truckee River Watershed MapTool. In an effort to involve more local experts in Assessments, invitations are offered for volunteers to assist in the team assessments of waterways. Team assessments are performed during summer months, and scheduled generally on Fridays to facilitate attendance of agency representatives.

In the 2009 Watershed Assessment (Jesch and Jesch), the program was expanded to include water quality, Geographic Information System (GIS) access, and a listing of impaired waters. Basic water chemistry measurements were made during one week in October, which included temperature, pH, electrical conductivity and dissolved oxygen in the streams. Photo points and assessment team observations were provided in a GIS database. This GIS data should facilitate users in having a better understanding of specific locations, building familiarity of our streams and watershed. The Nevada 303(d) list of impaired waters included six tributaries within our watershed, which were listed, with their constituents, in the Assessment.

Streams were assessed in groupings of geographic area, and ranked from low to high for restoration priorities. The North Truckee Drain had no high priority needs in 2009. The Northern Carson, Verdi and Peavine Creeks had some high priority needs, including Alum Creek middle and lower reaches, Hunter Creek middle reach, and North Evans Creek middle reach. The Southwest Truckee Meadows watersheds had high priority needs also, including Jones Creek middle reach, South Evans mid-upper, mid-mid, and mid-lower reaches, and Whites north fork mid-lower reach, and Whites south fork, middle reach. Washoe Valley streams had no high priority restoration needs, as all streams appear to be functioning properly. See Table 4-3 and 4-4 for these listings and action items established to restore stream and watershed health.
### Table 4-3 Northern Carson, Verdi, and Peavine Creeks

<table>
<thead>
<tr>
<th>Creek</th>
<th>Trend</th>
<th>Restoration Priority</th>
<th>Reshape Channel Banks</th>
<th>Restore Channel Floodplain</th>
<th>Restore Riparian Vegetation</th>
<th>Stormwater Runoff Treatment</th>
<th>Control Encroachment</th>
<th>Reduce Lawn Care Chemicals</th>
<th>Control Invasive Weeds</th>
<th>Enforce Construction Site BMPs</th>
<th>Public Education</th>
<th>Limit Herbicide Applications</th>
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<th>Monitor Channel Stability</th>
<th>Control Head-Cut Erosion</th>
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*Source: Watershed Assessment for Tributaries to the Truckee River (Jesch and Jesch, 2009)*
### Table 4-4 Southwest Truckee Meadows Creeks

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<th>Creek</th>
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<th>Restore Channel Floodplain</th>
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<tr>
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<td>Not Apparent</td>
<td>Low</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td></td>
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<tr>
<td>Whites North Mid/Lower</td>
<td>Downward</td>
<td>High</td>
<td>✓</td>
<td>✓</td>
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<td>✓</td>
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</table>

Source: Watershed Assessment for Tributaries to the Truckee River (Jesch and Jesch, 2009)
Table 4-5 North Truckee Drain

<table>
<thead>
<tr>
<th>Reach</th>
<th>Trend</th>
<th>Restoration Priority</th>
<th>Restore Low Flow Channel</th>
<th>Erosion Control Channel Banks</th>
<th>Restore Channel Floodplain</th>
<th>Restore Riparian Vegetation</th>
<th>Stormwater Runoff Treatment</th>
<th>Control Encroachment</th>
<th>Reduce Lawn Care Chemicals</th>
<th>Control Invasive Weeds</th>
<th>Enforce Construction Site BMPs</th>
<th>Public Education</th>
<th>Treatment Basins</th>
<th>Monitor Water Chemistry</th>
<th>Monitor Channel Stability</th>
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<td>NTD A Upper</td>
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<tr>
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As evaluated between 2005 and 2009, construction and development projects remain the largest single land use (affecting) Truckee Meadows stream health, when BMPs are not followed to protect riparian buffer zones around streams. Encroachment, like that seen at Jones Creek (middle reach, high priority) and Hunter Creek (middle, high priority), causes dramatic changes in the stream zone in the affected area and downstream. The NEMO program (see Outreach section) led a Riparian Buffers workshop in March 2010, the first of its kind in the Truckee Meadows.

With the local agencies passing Ordinances to protect the watershed over the last few years (City of Reno, Structural Controls Ordinance 2009; Washoe County, xxx, 2010), the waterways should be protected through local code enforcement activities. Streams of the Truckee River system facing downward trends in functionality such as Hunter and Jones Creeks may be restored by collaborative efforts. With an upturn in the economy, it is hoped that development projects requiring mitigation of streams may be directed towards high priority streams such as these.

In 2010, the TMWC agreed to concentrate funds on evaluating tributaries impacted by development and reduce efforts on those tributaries emptying into Washoe Lake, which do not appear to be under development pressures.

4.7.10 Tributary Water Quality

(add data/reference from TRIG)

Yet to be developed
4.8 Special Projects

4.8.1 Chalk Creek Outreach

Chalk Creek in Northwest Reno was found to be heavily laden with phosphorus, nitrogen, and total dissolved solids (see section xx on water quality). Residents and owners of large turf areas were targeted through public outreach and encouraged to adopt more responsible outdoor water and chemical use. With assistance from the Truckee River Fund as part of the three-prong Chalk Creek watershed assessment and feasibility study, the City of Reno contracted with Olsen and Associates to perform a geographically-determined outreach program.

Initial meetings involved crafting a positive take-home message for residents, not based upon fear of contaminating the water supply, but one of stewardship instead. Next, initial surveys on residents’ knowledge of outdoor runoff and stormwater pollution were completed, large turf areas were identified and owners addressed, a public outreach presentation was created with the results of technical studies, and various groups received information through target site presentations, including the NW Neighborhood Advisory Board (NAB), the Parent-Teacher Association at Westergard Elementary School, and sixth grade science students at Billinghurst Middle School by the City Hydrologist.

Through discussion of the current situation, and a brief, citizen-friendly discussion of what can be done to improve Chalk Creek’s water quality, residents were encouraged to adopt more responsible outdoor water and chemical use habits. Surveys given after the presentations suggested 71% of those surveyed were unaware of the creeks and trails in their neighborhood before seeing the City’s presentation; 97% indicated an increased awareness of what goes into their neighborhood creeks after the presentation; and 82% of respondents either agreed or strongly agreed with the statement, “The presentation influenced me to change my watering, yard care and/or storage practices.”

4.8.2 Alum Creek

Other Tributaries

North Truckee Drain

Steamboat Tributaries

4.9 Truckee Meadows Regional Stormwater Quality Management Program

The WPC has adopted the following policy in support of the Truckee Meadows Stormwater Quality Management Program (“TMSWMP”):

Policy 3.1.f: Adoption of Uniform Stormwater Quality Programs

A stormwater quality program shall be implemented region-wide, including the continuation and/or enhancement of existing programs in Reno/Sparks/Washoe County, such as the Truckee Meadows Regional Stormwater Quality Management Program, to address not only urban runoff but also other non-point source contributions.
4.9.1 TMSWMP Program Area

Program Schedule and Annual Reporting Requirements
Yet to be developed

Intergovernmental Coordination
Yet to be developed

Public Education and Outreach

The MS4 co-permittees have a website that shares program elements with the public, at www.tmstormwater.com. This website provides portals for three audiences: general citizens, regulators or parties interested in the MS4 permit and information, and industry and developers. Each of these portals provides a host of content for that audience, including contact information for committee members, program elements, posted guidance documents, upcoming trainings, online mapping, data, and permit tools, program news and meetings, frequently asked questions, hotlines for reporting spills and water quality related issues, information about stormwater pollution and the storm drain system, related community programs, federal and state requirements, Best Management Practices, commonly used terms, and other sources of information. Downloads of all guidance and technical documents, such as the Construction Site BMP Handbook, NV Construction Site Field Guide, Low Impact Development manual, etc.

Public Education and Outreach Program Needs
Yet to be developed

Stormwater Discharge Monitoring
Yet to be developed

Stormwater Discharge Monitoring Program Needs

Construction Site Discharge
Yet to be developed

Stormwater Pollution Prevention Plan (“SWPPP”)
Yet to be developed

Industrial Discharge
Yet to be developed

Illicit Discharge Detection and Elimination
Yet to be developed

Municipal Operations Program
Yet to be developed

Structural Controls
Yet to be developed
4.10 Land Use Planning

Yet to be developed

4.10.1 Low Impact Development

Yet to be developed

4.10.2 Stormwater Program Needs

Yet to be developed

4.10.3 Other Programs

Hill Slope Development

Noxious Weed Control

“The rapid spread of invasive species remains one of our country's biggest environmental problems, a situation complicated by the sheer number of invasive species, lack of a coordinated and comprehensive effort to prevent introductions, monitor and survey for new introductions, and the remarkable ability of invasive species to adapt, reproduce and ultimately overtake entire ecosystems” (Western Governor's Association Policy Resolution 10-4). Invasive weeds are increasingly recognized as threats to water quality, wildlife habitat, recreational activities and the economic stability of the agricultural industry. They increase the cost of water purification, power generation and irrigation supply, reduce property values, and degrade ecosystem functions.

In 2004, in an effort to better coordinate the management of invasive weeds, the Truckee Meadows Weed Coordinating Group was formed. Members include federal agencies, state agencies, county and city parks and roads staff, environmental organizations, the University of Nevada Cooperative Extension, and others. Operating under an MOU and annual action plans, this group seeks grant funding to inventory, control and monitor weeds, as well as restore degraded sites. In 2009, a weed management plan was completed. No dedicated funds are supplied to the group. Projects include broad weed surveys in 2005 and 2007; weed mapping; guidelines on preventing the spread of weeds; weed treatment along tributaries to the Truckee River, as well as along the river; weed treatment in other areas, such as Swan Lake Nature Study Area; weed management and restoration of burned sites; a website with a weed reporting form; and broad public outreach. The group seeks to avoid duplication of efforts and strategically focus on those invasive weeds that represent the greatest opportunity for successful elimination, such as medusahead, as well as the species that impair riparian habitat.

In 2010, with grant funds from the Truckee River Fund, a boat inspection program modeled on the program at Lake Tahoe was launched on Boca and Stampede Reservoirs and Independence Lake to monitor for invasive aquatic organisms including quagga mussels and Asian clams, as well as invasive aquatic weeds. If the Truckee River becomes infested with invasive mollusks, costs for water treatment and energy production are expected to increase sharply. A focus on proactive monitoring and prevention techniques will help reduce the threat of invasion, but the program requires continuing funding.
4.10.4 Public Outreach Programs

Non-point Education for Municipal Officials (“NEMO”)

The University of Nevada, Reno Cooperative Extension houses and staffs the NEMO Nevada Program. NEMO has provided workshops and education for advisory board members, city councils, county commissioners, planners, engineers, and others since 2004. The program is funded via 319(h) grants from Nevada Division of Environmental Protection. Free 3.5-hour trainings are offered in the spring and fall each year to help attendees understand the link between changes in land use and water quality impacts. The trainings focus on the use of Low Impact Development (LID) as a tool for capturing and processing stormwater. Beginning in the Truckee Meadows, the program has now expanded to include Douglas and Lyon Counties.

Many presentations have also been made directly to the state land-use planning advisory committee, advisory boards, planning commissions, conservation districts, river coalitions, landscape architects, master gardeners and others interested in strategies for managing stormwater pollution. Special seminars address issues such as water harvesting, riparian buffers, and slope stabilization. In 2010, NEMO began offering free field trainings in the appropriate choice and correct installation and maintenance of construction site BMPs.

Additional educational elements include a website (www.unce.unr.edu/nemo) that includes information on local LID projects, a photo gallery, a searchable database of plants for LID, and many publications and action guides. These publications are available upon request for use at public events.

City of Reno Watershed Map Server

The City of Reno Map Server is a tool available to all internet users through the City of Reno website (http://maps.cityofreno.net/). In 2007, sufficient interest built in extending mapping abilities to the watershed by incorporating tributaries to the Truckee River, including all creeks assessed in the Watershed Assessments (Jesch, 2005-2009). The City built a Watershed Map Server as part of the existing GIS tool, but took information directly from the Assessment. Content included from the 2008 Assessment.

The Watershed Map Server (http://maps.cityofreno.net/watershed/) includes: photos and photo points referenced on the map, introduction, assessment text of middle and lower reaches of each stream, and “tips to help your creek”. Individual maps may be accessed by creek name or region, and drilled down to an aerial photo at the greatest level of resolution. Technical users who understand GIS are able to optimize its use and the latest in upgrades to this system include a permit area portal. Parties looking at completing a construction, restoration, or flood project on a portion of the Truckee River, can access all permitting agencies for that location by zooming to “permit area”. This last section was completed to accent the River Permitting class offered in 2008.

Truckee River Watershed Map Tool

The Truckee River Watershed Map Tool was initiated by the City of Reno, with support from the Truckee River Fund as an outreach tool targeting middle and high school students. The existing Map Server, as a GIS tool, was not readily usable by non-technical internet users. This interactive, intuitive map-based tool allows users to view and explore the creeks near homes and schools online. The tool includes vegetation, wildlife, photos from the Watershed Assessment (Jesch and Jesch, 2009), and other interesting facts about each subwatershed.
This tool has been shared with teachers throughout the Washoe County School District and throughout northern Nevada, and will be finished and online for student use in Fall 2010.

Over 40 teachers throughout the Washoe County School District have been advised of this tool, while it was still in the production phase. Teachers will be trained on using the Truckee River Watershed Map Tool with students during Fall 2010, as the last phase of this project. This will be completed in conjunction with existing trainings throughout the school district, as well as with environmentally-directed teacher trainings hosted by NDEP such as Project Wet.

**Chalk Creek Outreach**

See Section 4.8.1, above

**TMWA Outdoor Water Conservation**

TMWA offers an online water efficient landscape guide for maximizing responsible water use in the desert, using the seven horticultural principles to reduce outdoor irrigation while providing a lush and attractive outdoor area. The vast array of informational topics covered in the interactive tool include: landscape design and proper planning, planning an efficient irrigation system, plant search (by exposure or other needs), soil improvement, mulching, planting and maintenance.

This online, interactive guide for homeowners can be found at [www.tmwalandscapeguide.com/landscape_guide/interactive/index.php](http://www.tmwalandscapeguide.com/landscape_guide/interactive/index.php). TMWA also provides an incentive to reducing water use outdoors, the Water Efficient Landscape Awards. This annual competition has two categories for either design by homeowner or designer, and TMWA provides free community tours of the winners’ properties the following year, to share the wealth of learning by seeing conservation in action.

**TMWA Watershed Academy**

Truckee Meadows Water Authority (TMWA) is dedicated to educating our youth for better tomorrows. The watershed academy web site ([http://www.tmwaacademy.com/index.shtml](http://www.tmwaacademy.com/index.shtml)) is provided to inform students and teachers and to give them the skills and knowledge they need to become informed conservers and consumers. Educational curriculum is available for teachers to use with students in four grade ranges, from kindergarten through high school. TMWA routinely holds poster contests for students and the educational approach is a high TMWA priority in outreach. Resources available to teachers include lesson plans for each grade, as well as online tools for use with students, a library of TMWA and other water-related publications, and other resources.

**Truckee Meadows Urban Forestry Coalition**

In 2008, led by TMWA, a group of agency members began meeting with the goals of preserving, protecting, and promoting a sustainable urban forest for the Truckee Meadows community. The group drafted a Memorandum of Understanding (MOU) to recognize this commitment, and City of Sparks, City of Reno, TMWA, and the Washoe County Parks and Recreation signed on as members. The priorities of this Coalition are public education, community benefits and buy-in, and protecting and saving areas of concern within the Truckee Meadows.
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Summary and Findings
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4.2 Water Reclamation Facilities
4.2.1 Truckee Meadows Water Reclamation Facility
South Truckee Meadows Water Reclamation Facility
Reno-Stead Water Reclamation Facility
Lemmon Valley Wastewater Treatment Plant
Cold Springs Water Reclamation Facility
4.3 Regional Wastewater Facility Planning
North Valleys Planning
Interconnection of Reno-Stead Water Reclamation Facility to Spanish Springs Valley
Interconnection of Truckee Meadows Water Reclamation Facility to South Truckee Meadows Water Reclamation Facility
Decommissioning of the Gold Ranch Wastewater Treatment Facility
4.4 Wastewater Planning for Other Areas
Lower Truckee River
Mustang and Patrick / Tracy Areas
Warm Springs
Washoe Valley
Spanish Springs
Lemmon Valley and Golden Valley
4.5 Septic Systems
4.6 Watershed Management Programs to Protect the Availability and Quality of Water Resources
4.6.1 Point and Non-Point Source Pollution
NON-POINT SOURCE POLLUTION
Reduction of Non-point Source
4.6.2 Regulatory Considerations
Current Watershed Management Efforts
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4.7.1 Middle Truckee River Restoration
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