2368-00020

Amendment to the Washoe County

Comprehensive Regional Water Management Plan

February 6, 2008

RWPC

AMENDMENT TO THE
WASHOE COUNTY COMPREHENSIVE REGIONAL WATER MANAGEMENT PLAN

February 6, 2008

Purpose

NRS 540A requires that the Regional Water Planning Commission (RWPC) review the Washoe County Comprehensive Regional Water Plan (Regional Water Plan) every three years and prepare an amendment if one is deemed necessary. This 2008 Amendment is prepared as a result of the RWPC's review of the 2004 – 2025 Regional Water Plan, adopted in January 2005 and amended in January 2006. The purpose of the 2008 Amendment is to include pertinent information and documents that have been completed since 2006. This amendment is not a comprehensive re-write of the entire plan, therefore the 2004 – 2025 Regional Water Plan as amended remains a useful reference document. Additionally, this Amendment is intended to provide a current foundation for the development of the comprehensive plan required by the Western Regional Water Commission Act (SB 487), passed by the 2007 Legislature and, along with the 2004 – 2025 Regional Water Plan as amended, serve as the comprehensive plan in effect until the Western Regional Water Commission adopts its plan on or before January 1, 2011.

Contents

Documents included in this Amendment are either attached or incorporated by reference.

1. Revised "Policy 4.1.a. Facility Plans and Infrastructure Studies – Conformance with Regional Water Plan", see Attachment A.
2. City of Reno and Washoe County TMSA/FSA Water Wastewater and Flood Management Facility Plan, November 2007, prepared for the City of Reno, Washoe County and the Regional Water Planning Commission by ECO:LOGIC Engineering, incorporated by reference.
3. City of Sparks TMSA/FSA Conceptual Facility Master Plan, January 2008, prepared for the City of Sparks and the Regional Water Planning Commission by Stantec Consulting, incorporated by reference.
4. Sun Valley General Improvement District Water System Master Plan Update, September 2007; Water System Master Plan Update, July 2003; Wastewater System Master Plan, April 2004; and Sun Valley West Basin Water System Improvements, November 2004, each prepared for Sun Valley GID by Shaw Engineering, incorporated by reference.
5. Water Baseline Table for Selected Basins, see Attachment B.
6. Revised Water Conservation Chapter, see Attachment C.
7. Truckee River Flood Project Update including "TRACTION" Projects, see Attachment D.
8. Washoe County 208 Water Quality Management Plan, October 2007, prepared for the Truckee Meadows Regional Planning Agency by Farr West Engineering and MWH, incorporated by reference.
9. Reclaimed Water Programs, see Attachment E.

Discussion

1. Revised Policy 4.1.a replaces existing Policies 4.1.a and 4.1.f. The revisions consolidate two policies on the same subject into one and add clarity to the RWPC facility conformance review process.

2 - 4. Planned water, wastewater and flood control infrastructure improvements for the year 2030 are presented in two primary documents: The City of Reno and Washoe County TMSA/FSA Water, Wastewater and Flood Management Facility Plan, and the City of Sparks Conceptual Facility Master Plan. The TMSA for the region is subdivided into planning areas, including Spring Mountain, Sage, Warm Springs, Cold Springs, Stead and Lemmon Valley, Spanish Springs, Sun Valley, Sparks Priority Areas 1 – 4, Truckee Meadows, and South Truckee Meadows. Planning for Future Service Areas was also completed for Reno, Sparks and Washoe County. Each planning area represents a portion of the overall TMSA. The facility recommendations provide the foundation for subsequent detailed planning and design. As development occurs within the TMSA, more detailed information and project specific plans will be generated. These future planning efforts will further refine and define the exact facility requirements presented in these plans.

Projections of available water resources compared to potential demands are presented in Table 1. In many of the TMSA planning areas, additional water resources will be required to fulfill the development potential of the area.

Table 1 - TMSA Water Resources and Demands (a)

TMSA Area	Supply Net Increase (AFA)	2030 Demand Net Increase (AFA)	Supply / Deficit (AFA)
Spring Mountain (b)	1,700-2,200	4,874	(2,674-3,174)
Sage	764-1,460	865	(101)-595
Warm Springs	2,365	1,502	863
Stead, Lemmon Valley and Cold Springs (b), (c)	11,909	18,485	(6,576)
Truckee Meadows TMSA (c)	22,363	17,021	(d)
Sun Valley TMSA (c)	-	2,607	(d)
Spanish Springs TMSA (c)	-	3,362	(d)
Sparks TMSA, Priority Areas 1-4 (c)	-	23,915 (e)	(d)
South Truckee Meadows TMSA (c)	8,380	12,137	(d)
Bedell Flat	-	21,355	(21,355)
Washoe County FSA	-	10,270	(10,270)
Sparks FSA, Priority Areas 5-6	-	4,562	(4,562)

(a) Reclaimed water is not included as part of the supply.

(b) 10,000 AF of water resources are potentially available and shared between Stead, Lemmon Valley, Cold Springs and Spring Mountain TMSA based on the Vidler and Intermountain water supply projects. A combination of imported and onsite water resources will be needed to satisfy the projected 2030 demands.

(c) 22,363 AF of potentially available water resources are identified for the Truckee Meadows TMSA. A portion of this supply will also be needed to serve the projected demands within the Stead, Sun Valley, Spanish Springs, Sparks and South Truckee Meadows TMSA.

(d) 30,743 AF of potentially available water resources are identified in the Truckee Meadows and South Truckee Meadows TMSA. This supply will be relied upon to meet a portion of the 59,042 AF projected demand in the Truckee Meadows, Sun Valley, Spanish Springs, Sparks and South Truckee Meadows TMSAs. Based on current policies, water resources are not reserved or allocated to one planning area versus another.

(e) Data from City of Sparks TMSA/FSA Conceptual Facility Master Plan, January 2008.

Projected wastewater flows and treatment capacity for each of the TMSA planning areas is summarized in Table 2. Expanded uses of reclaimed water could play a significant role to help meet future water resource requirements. With regional coordination and cooperation, the possible uses for reclaimed water could be expanded to include uses such as residential landscape irrigation and groundwater recharge. The use of high quality reclaimed water for these purposes would provide additional means of beneficially utilizing the reclaimed water, while at the same time extend the region's limited water supplies.

Table 2 - TMSA Wastewater Flow Projections

Wastewater Service Area	2030 Capacity (MGD)
Combined Spring Mountain WRFs	3.5
Sage WRF	0.7
Future Warm Springs WWTP	0.4
Reno Stead WRF (including Lemmon Valley WWTP)	7.2
Cold Springs WRF	4.5
TMWRF	54.4
Truckee Meadows TMSA	41.5 (a)
Sun Valley TMSA	2.0
Spanish Springs TMSA	3.0
Sparks TMSA (b)	7.9
STMWRF	10.8
Sparks Priority Service Area 2 (b)	4.8
Reno Bedell Flat FSA	10.1
Washoe County FSA	6.8
Sparks Priority Service Area 6 (b)	2.1

(a) Includes 0.3 MGD from Stead / Lemmon Valley TMSA for Golden Valley.

(b) Data from City of Sparks TMSA/FSA Conceptual Facility Master Plan, January 2008.

The City of Reno and Washoe County TMSA/FSA Facility Plan and the City of Sparks Conceptual Facility Master Plan identifies and maps the proposed flood management

improvements previously identified within the planning areas. The plans also delineate watersheds and develop locations and costs for proposed flood control infrastructure within the Reno, Sparks and Washoe County FSA planning areas. A summary of the projected water, wastewater and flood management facility costs for each planning area is presented in Table 3. The total estimated cost is approximately $2.5 billion (in current dollars).

Table 3 - TMSA Water, Wastewater and Stormwater Facility Costs

Area	Water ($M)	Wastewater ($M)	Flood Management ($M)	Total ($M)
Spring Mountain (a)	$64.4	$157.8		$222.2
Sage	$19.6	$63.7		$83.3
Warm Springs	$11.7	$36.9		$48.6
Cold Springs (b)	$98.1	$103.7	$14.9	$216.7
Stead / Lemmon Valley (c)	$171.5	$251.2	$107.9	$530.6
Spanish Springs (d)	$39.5	$78.2	$6.9	$124.6
Sun Valley (d)	$5.9	$22.2	$10.2	$38.3
Truckee Meadows (d)	$150.3	$223.9	$102.7	$476.9
South Truckee Meadows	$154.0	$192.3	$71.5	$417.8
Sparks Priority Areas 1-4 (e)	$182.0	$148.5	$5.8	$336.1
Total	$897.0	$1,278.4	$319.9	$2,495.3

(a) Imported water and on-site water supply and treatment costs are unknown at this time

(b) Water supply costs are unknown at this time. Cold Springs will likely receive an undetermined allocation of capacity from the $100M Fish Springs project, and the $22M Intermountain project. A $40M water supply cost is allocated to Cold Springs.

(c) Water supply facility costs are based upon $100M for Fish Springs, $22M for Intermountain and $8.168M for North Virginia capacity, less $40M allocated to Cold Springs

(d) Wastewater costs do not address long term reuse and disposal requirements

(e) Data from City of Sparks TMSA/FSA Conceptual Facility Master Plan, January 2008. Does not include TMWA water distribution costs.

It should be noted that several significant cost components are not included in Table 3, such as the cost of implementation of future water importation projects to meet projected water demands, water rights, long term reclaimed water and effluent management requirements, and the Truckee River Flood Control Project. Insufficient information is available to estimate these costs at this time.

The Sun Valley General Improvement District completed three detailed master plan updates that have been incorporated into the TMSA Facility Plans, including: Water System Master Plan Update, July 2003, Wastewater System Master Plan, April 2004 and Sun Valley West Basin Water System Improvements, November 2004, each by Shaw Engineering. Sun Valley's master plan updates are comprehensive documents; therefore, little additional detailed planning was necessary for the TMSA Facility Plan within SVGID's service territory.

5. The Water Baseline Table summarizes information on water rights, yield, municipal, industrial and domestic commitments for developed (and developing) basins in the region. The table also indicates where water resources may be available for conversion to municipal-industrial uses and where existing commitments may exceed resource availability. The table is intended to supplement the Water Resources Baseline shown in Appendix D of the 2004 – 2025 Regional Water Plan.

6. The revised Water Conservation chapter replaces "Chapter 8 Water Conservation" of the 2004 – 2025 Regional Water Plan. Revisions include updated and new descriptions of RWPC and water purveyor water conservation programs, projects and activities, and recommendations for ongoing and future possible activities.

7. A summary of recent progress by the Truckee River Flood Project is included to supplement Section 4.7.1 "Truckee River Flood Management Project" of the 2004 – 2025 Regional Water Plan. Progress includes the creation of the Flood Project Coordinating Committee and early-start projects such as early land acquisition and "TRACTION" projects.

8. The current version of the Washoe County 208 Water Quality Management Plan was developed by the Truckee Meadows Regional Planning Agency, adopted by the Regional Planning Governing Board in May 2007, certified by the Nevada Division of Environmental Protection in October 2007 and approved by the U.S. Environmental Protection Agency, Region 9 also in October 2007. The 208 Plan complies with the requirements of the federal Clean Water Act and Nevada Revised Statutes.

9. Reclaimed water provides both local and regional benefits. Reclaimed water is presently supplied to numerous customers throughout Reno, Sparks and Washoe County from the Truckee Meadows, Reno Stead and South Truckee Meadows Water Reclamation Facilities. As the region grows according to its land use plans, reclaimed water use allows growth to be accommodated while remaining within discharge permit limits. The reuse and disposal of reclaimed water from the various water reclamation facilities may eventually be constrained by a number of factors if they continue to be operated as independent systems. With regional coordination and cooperation, the possible uses for reclaimed water could be expanded to include uses such as residential landscape irrigation and groundwater recharge, thereby extending the region's limited water supplies.

Much work is needed to quantify the potential benefits of a regionally integrated reclaimed water system. A thorough planning and facilities study of regionally integrated reclaimed water systems and management strategies has the potential to develop economic and environmentally prudent alternatives. To quantify the potential benefits of a regionally integrated reclaimed water system, policy, regulatory, technical and financial considerations should be fully investigated at the community level. Close work and cooperation with the Nevada Division of Environmental Protection, the Washoe County District Health Department and the local water purveyors will also be required to ensure that expanded uses of reclaimed water are protective of public health and the environment.

Policy 4.1.a: Facility Plans and Infrastructure Studies – Conformance with Regional Water Plan

Pursuant to NRS 540A.230, facility plans and infrastructure studies of such a kind or size that affect the working of the Regional Water Plan, including water supply and storage, wastewater collection and treatment, storm water, and flood control, shall be reviewed by the RWPC for conformance with the Regional Water Plan.

Criteria to implement policy:

- The RWPC shall review facility plans and infrastructure studies of such a kind or size that affect the working of the Regional Water Plan to make a determination that the facility or study conforms to the policies and criteria included in the Regional Water Plan;
- Proposed facilities and infrastructure shall:
    - be consistent or coordinate with existing facility plans or master plans, or demonstrate how they will address any differences with or changes to existing facility plans or master plans, and
    - coordinate to avoid unnecessary duplication of facilities
- An evaluation may be provided of the project's impacts on other water-related issues (e.g. a proposed water project must indicate the potential impacts it would have on wastewater treatment.)
- Any plan or study that is funded in whole or in part by the Regional Water Management Fund shall be subject to conformance review.

Discussion: The RWPC and local governments provide ongoing planning for the community's water, wastewater, storm water and flood control needs. Identification and review of potential impacts to existing or planned infrastructure, and needs for new or improved facilities, should provide for integrated planning and management of the region's water resources and cost-effective infrastructure development and improvements.

Facilities are designed and constructed by water purveyors, wastewater treatment providers, and local governments as part of their respective Capital Improvement Programs (CIPs). CIPs are updated annually, at a minimum. When entities update and approve their CIPs, the RWPC shall review them and recommend that pertinent facilities be found in conformance with the Regional Water Plan pursuant to NRS 540A, , this policy, and RWPC administrative policies and procedures.

As the RWPC, local governments, wastewater treatment providers, and water purveyors update their respective facility and resource plans, they analyze alternatives for financing and funding proposed facilities, sources or other requirements, and the effects of the funding alternatives on other facilities included in the Regional Water Plan. These plans are then presented to the RWPC for either conformance review or informational purposes, as appropriate under the NRS 540A, this policy, and RWPC administrative policies and procedures. Presentation of these plans to the RWPC provides Commissioners the opportunity to raise questions regarding linkages and comprehensive regional planning for water resources, with the result that overall resource issues can be addressed or additional work can be undertaken, as needed. Lists of such plans that are relevant to regional resource planning are contained at the

end of various chapters, and again at the end of this plan. These plans also contain detailed alternatives for financing and funding the respective facilities or sources and should be consulted for such detail.

NRS 540A excludes certain facility plans from conformance review, including plans for facilities intended to be constructed in response to an emergency, those included in the adopted Regional Water Plan and those intended to provide normal service to customers. The RWPC administrative policies and procedures contain a detailed process by which the RWPC and its staff determine whether a facility plan needs a conformance review. A facility included in the Regional Plan is considered to be in conformance and a review is not necessary. Review criteria are applied to determine whether a facility not included in the Regional Water Plan is of such a kind or size that would affect the working of the Plan, which would require a conformance review, as distinct from facilities providing normal service to customers, which would not.

Facility plans reviewed and found in conformance with the Regional Water Plan are added to a list of projects maintained by the RWPC staff (See Appendix J). Pursuant to the RWPC administrative policies and procedures, the list is submitted as appropriate to the Board of County Commissioners for approval and is included in periodic updates of the Regional Water Plan.

The RWPC recognizes that not all facilities required to implement the Regional Water Plan are listed due to unforeseeable circumstances and/or the frequent necessity to alter facilities once final design and construction proceed. Consequently the RWPC will review facilities that are not in the current edition of the Regional Water Plan if such facilities are of such a kind or size that affect the working of the Regional Water Plan.

Water Baseline Table for Selected Basins
As of 2006

Basin #	Basin	Water Rights: Decreed, State Engineer permitted, and/or certificated rights*	Estimated Yield by Hydrobasin	Notes	Imported/ (exported) Supplies	Estimated M&I Commitments	Comments	Estimated Existing Domestic Well Allocation (9)	Notes
		(AFA)**	(AFA)**		(AFA)**	(AFA)**		(AFA)**	
---a---	----b----	----c----	----d----		----e----	----f----		----g----	----h----
83	TRACY SEGMENT								
	Perennial Groundwater	8090	11500	(1)		160	C-1	190	State Engineer Ruling 5747 (early 2007) increasing recharge estimate from 6000 afa to 11500 afa under appeal by Pyramid Lake Paiute Tribe. Irrigation (670 afa) and Industrial (1,730 afa) water right conversion subject to reduction. Mining and Milling water rights (770 afa) may not be available for conversion.
84	WARM SPRINGS V.								
	Perennial Groundwater	7090	3000	(1)		0	C-1	2040	Irrigation water rights (6,210 afa) are subject to conversion reduction. Environmental water rights (610 afa) are not available for conversion.
85	SPANISH SPRINGS V.								
	Perennial Groundwater	6450	1000	(1)		5370	C-1	850	Water rights and domestic well allocations exceed perennial yield. Irrigation water rights (1,350 afa) subject to conversion reduction. Mining and Milling water rights (122 afa) may not be available for conversion. Construction water rights (200 afa) are not available for conversion.
	Truckee River Importation†			(2)	3920	3920			
	TMWRF Reclaim†			(10)	1160	1160			
86	SUN V.								
	Perennial Groundwater	21	25	(1)		0	C-1	180	Water rights and domestic well allocations exceed perennial yield. Irrigation water rights (14 afa) are subject to conversion reduction.
	Truckee River Importation†			(2)	2380	2380			
87/88	TRUCKEE MEADOWS/PLEASANT V								
	Perennial Groundwater	77270	32000	(3)		23530	C-1	4900	Irrigation (9,810 afa) and Industrial (23,390 afa) water right conversion subject to reduction. Environmental water rights (2,460 afa) are not available for conversion. Water rights issued for Wildlife (2490afa) and Other (2400 afa) may have significant encumbrances making them unavailable for conversion to M&I or subject to conversion reduction. Per TROA operations, estimated Truckee River surface supply will produce 119,000 afa which includes 15,950 afa groundwater; currently about 103,050 afa. Washoe County tributary surface water currently used to supplement reuse demand short-fall in STMWRF service area.
	Truckee River†	***	103000	(4)	-10650	76450			
	Truckee River-Tributary	***	4680	(5)					
	STMWRF/TMWRF Reclaim†		14380	(10)	-1160	4140			
89	WASHOE V.								
	Perennial Groundwater	10780	5000	(1)		840	C-1	3490	Irrigation water rights (6230 afa) subject to conversion reduction. Mining and Milling water rights (770 afa) may not be available for conversion. Environmental water rights (20 afa) are not available for conversion. Water rights issued for Wildlife and Other-(830 afa) may have significant encumbrances making them unavailable for conversion to M&I or subject to conversion reduction.
91	TRUCKEE CANYON SEGMENT								
	Perennial Groundwater	4190	2000	(1)		10		1070	Irrigation water rights (70 afa) subject to conversion reduction. Environmental water rights (30 afa) are not available for conversion. Water rights issued for Other (20 afa) may have significant encumbrances making them unavailable for conversion to M&I or subject to conversion reduction.
92A/92B	LEMMON V. (WEST & EAST)								
	Perennial Groundwater	3130	1300	(6)		840	C-1	4330	Water rights and domestic well allocations exceed perennial yield. Irrigation and Industrial water rights (10 afa) conversion subject to reduction. Mining and Milling water rights (25 afa) may not be available for conversion.
	Truckee River Importation†			(2)	4350	4350			
	Honey Lake Importation†	16070		(7)	8000	0	C-2		
	RSWRF/LVWRF Reclaim†		1320	(11)		470			
93	ANTELOPE V.								
	Perennial Groundwater	60	150	(1)		0	C-1	410	Water rights and domestic well allocations exceed perennial yield. Mining and Milling water rights (5 afa) may not be available for conversion.
94	BEDELL FLAT								
	Perennial Groundwater	80	550	(1)		0	C-1	140	Water rights issued for Wildlife (1 afa) may have significant encumbrances making them unavailable for conversion to M&I or subject to conversion reduction.
95	DRY V.								
	Perennial Groundwater	3020	1000	(1)		0	C-1	20	Irrigation water rights (25 afa) subject to conversion reduction.
97	HONEY LAKE V.								
	Perennial Groundwater†	16070	13000	(1)	-8000	0	C-1	50	Irrigation water rights (15,410 afa) are subject to conversion reduction. Construction water rights (280 afa) are not available for conversion.
99	RED ROCK V.								
	Perennial Groundwater	1610	1000	(1)		0	C-1	750	Irrigation water rights (1,590 afa) are subject to conversion reduction.
100/100A	COLD SPRING V./LONG V. SUB AREA								
	Perennial Groundwater	5300	500	(8)		2400	C-3	460	Water rights and domestic well allocations exceed perennial yield.
	CSWRF Reclaim†		290	(11)		0			

NOTES:

* Water rights are inclusive of temporary rights, supplemental rights, nonconvertible rights and rights subject to reduction upon conversion based on State Engineer's policy.
** Water right values rounded to nearest ten acre-feet
*** Orr Ditch rights total approx. 225,000 af of main stem and tributary rights excluding Claims 3 & 4.
† Exports of water resources not limited to specified hydrobasins and are subject to change based on future needs.
(1) Groundwater availability based on State Engineer's estimate of Perennial Yield subject to final determination (Tracy Segment ruling currently under appeal)
(2) Imported allocation of TMWA's resources.
(3) Groundwater availability for the Truckee Meadows and Pleasant Valley Hydrobasins combined based on State Engineer's estimate of Perennial yield
(4) Portion of TMWA's water supply dedicated to supply demand in the Truckee Meadows; excluding the 15,950 AFA of groundwater production permitted by the State Engineer's Office.
(5) Based on ECO:LOGIC's *Browns Creek and Steamboat Creek Analysis* estimates of sustainable low-flow available supply for M&I conversion.
(6) Combined State Engineer's estimate of perennial yield for Lemmon Valley West and East.
(7) Importation of groundwater from Honey Lake hydrobasin. Water not available as of December 2006.
(8) Combined State Engineer's estimate of perennial yield for Cold Spring Valley and Long Valley Sub basin area.
(9) Based on Washoe County Department of Water Resource GIS database count inclusive of Washoe County Assessor's records and State Engineer's Well-Log database times 2 afa.
(10) 2006 TMWRF, Sparks and Reno data records (ECO:LOGIC)
(11) 2006 Reclaim data from RSWRF, and Washoe County DWR Wastewater Influent records for STMWRF, CSWRF and LVWRF (Washoe County, DWR0

COMMENTS:

C-1 Groundwater dedications/duty by Washoe County to serve commitments as reported in the January 24, 2007, Fourth Quarter 2006 report to the State Engineer's Office. Not amended to account for supplemental rights.
C-2 Groundwater commitments not yet established. Washoe County to use available uncommitted water to serve existing customers in Lemon Valley. Not amended to account for supplemental rights.
C-3 Based on State Engineer's office Manor of Use Records for 2006 and Utilities Inc. water budget for Cold Springs. Not amended to account for supplemental rights.

Article 412
LANDSCAPING

Sections:

Section 110.412.00 Purpose. The purpose of this article, Article 412, Landscaping, is to establish regulations for the development, installation and maintenance of landscaped areas within Washoe County, without inhibiting creative landscape design. The intent of these regulations is to protect the public health, safety and welfare by:

(a) Increasing compatibility between residential, commercial and industrial land uses;

(b) Enhancing the economic viability of the County and the quality of living for residents and visitors by creating an attractive appearance of development along streets and highways;

(c) Reducing heat, glare, noise, erosion, pollutants and dust by increasing the amount of vegetation;

(d) Preserving significant ecological communities, and desirable existing trees and vegetation best suited for the local microclimate; and

(e) Maximizing water conservation through established conservation principles and practices, and through proper landscape and irrigation planning, design and management.

[This Section added by Ord. 867, provisions eff. 5/27/93.]

Section 110.412.05 Applicability. The provisions set forth in this article shall apply as follows:

(a) New Development. This article applies to new development that requires permitting or review by the County.

(b) Expanding Development. This article applies to expansion of floor area of existing development, except as otherwise provided below:

(1) If the expansion is less than fifty (50) percent, this article shall apply to the developable lot area associated with the proposed expansion only and the remainder of the use or structure shall be governed by regulations in force at the time of the original approval; and

(2) If the expansion or subsequent expansions cumulatively results in a fifty (50) percent or greater increase, the entire development shall be required to comply with this article, unless the Director of Community Development waives this requirement, in whole or in part, prior to the expansion.

(c) Duplicate Ordinances. If the provisions of this article are in conflict with other ordinances or regulations, the more stringent limitation or requirement shall prevail to the extent of the conflict. The provisions of this article may be waived by the Director of Community Development for development in areas under the jurisdiction of the Tahoe Regional Planning Agency (TRPA) if the proposed landscaping and impervious surface coverage violates a TRPA Ordinance or Procedure.

(d) Review of Extenuating Circumstances. The applicant may appeal to the Director of Community Development for special review resulting from extenuating circumstances or physical conditions on the proposed project site.

[This Section added by Ord. 867, provisions eff. 5/27/93.]

Section 110.412.10 Exemptions. The following uses are exempt from the provisions of this article:

(a) Residential Use Types. The required front, side or rear yard areas of existing and new detached single family residential lots, unless front yard landscaping is required under any article found in Division Two, Area Plan Regulations, of the Washoe County Development Code.

(b) Civic Use Types. Uses classified under the parks and recreation use type are exempt, except for parking and loading areas associated with these uses.

(c) Commercial Use Types. Uses classified under the commercial recreation: outdoor sports club use type and nursery sales use type are exempt, except for parking and loading areas associated with these uses.

(d) Industrial Use Types. No uses are exempt. However, the provisions of this article may be waived during the approval process for use types classified under energy production, mining operations, and petroleum gas extraction.

(e) Agricultural Use Types. Uses classified under the animal production, crop production, forest products, game farms, and produce sales use types are exempt, except for parking and loading areas associated with these uses.

(f) Open Space Regulatory Zones. Uses classified under the Open Space regulatory zone are exempt.

[This Section added by Ord. 867, provisions eff. 5/27/93.]

Section 110.412.15 Required Plans. A site plan, planting plan and an irrigation plan are required, and a soil analysis is strongly encouraged for all non-exempt development. These plans shall be prepared by a licensed landscape architect or other persons permitted to prepare landscaping and irrigation plans pursuant to Nevada Revised Statues Chapter 623A and submitted to, and approved by, the Director of Community Development.

(a) Site Plan. A site plan is required to ensure that the proposed landscape improvements are in conformance with the standards and requirements of this article. A copy of the approved site plan shall be kept on the project site until the project is inspected and accepted by the County. A site plan, drawn at a scale appropriate to the proposed project, including dimensions and distances, shall include at a minimum:

(1) Location and configuration of proposed and existing buildings, and site improvements on a base map with existing and proposed topography; and

(2) Location and amount of proposed and existing parking spaces and other paved areas, public rights-of-way and impervious surfaces.

(b) Planting Plan. A planting plan is required to ensure that the proposed plantings are in conformance with the standards and requirements of this article. The planting plan must include all necessary information to satisfy Section 110.412.60, Planting Standards, of this article. A planting plan shall include at a minimum:

(1) Location, spacing, size, and genus and/or species of proposed plantings, and identification of existing plants;

(2) Existing vegetation, natural features and site improvements on adjoining properties within ten (10) feet of the property line; and

(3) Plant list which includes the following: quantity of proposed plants; existing plants to remain; number of proposed trees; number of existing trees to be preserved; amount of paved area; and the amount of turf.

(c) Irrigation Plan. An irrigation plan is required to ensure sufficient and timely watering necessary for the survival of newly installed plants. A copy of the approved irrigation plan shall be kept on the project site until the project is inspected and accepted by the County. The irrigation plan must include all necessary information to satisfy Section 110.412.65, Irrigation Standards, of this article. An irrigation plan, drawn at a scale identical to the required site plan, shall include at a minimum:

(1) Location, size and specifications of water source(s), water mains, meter(s), valves and the controller;

(2) Temporary or permanent water irrigation systems;

(3) Specifications of irrigation equipment identified by manufacturer's name and equipment identification number; and

(4) An approved backflow prevention device is required on all landscape irrigation systems.

(d) Soil Analysis. A horticultural suitability analysis with appropriate recommendations is strongly encouraged to assist in proper selection of plant materials and soil amendment as necessary to enhance the health and growing capabilities of the plants.

[This Section added by Ord. 867, provisions eff. 5/27/93.]

Section 110.412.20 Water Conservation. To promote resource-efficient landscaping for the conservation of water and other natural resources, the following principles and practices are encouraged:

(a) Practical turf areas;

(b) The use of water-conserving plant material;

(c) The grouping of plants with similar water requirements;

(d) An irrigation system designed to meet plant needs;

(e) The installation of permeable hard surfaces to encourage groundwater recharge and re-use, and to discourage run-off;

(f) The use of water harvesting techniques;

(g) The use of mulches;

(h) The use of soil amendments based on soil analysis; and

(i) The use of reclaimed water. When reclaimed water is available and when a distribution master plan indicating the availability of reclaimed water in the future has been adopted by either the County or a special district, the applicant shall incorporate the use of reclaimed water into the project design, except in the vicinity of any location where food is served or consumed.

[This Section added by Ord. 867, provisions eff. 5/27/93.]

Section 110.412.25 Existing Vegetation. Existing vegetation within the total developed land area, as generally depicted in Figure 110.412.25.1, shall be preserved as set forth in this section and may contribute toward all landscaping required by this article, including:

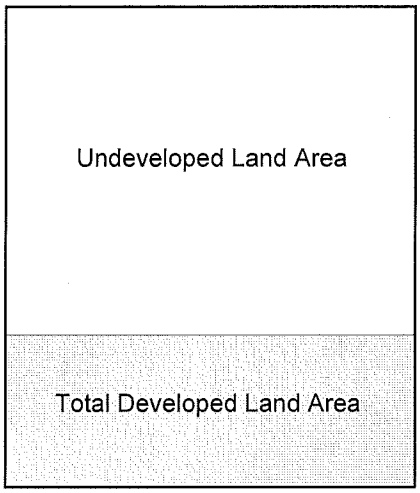
(a) Existing Vegetation. Existing vegetation and ecological communities shall be protected and preserved where appropriate and as feasible;

(b) Preservation of Protected and Endangered Vegetation. Protected and endangered vegetation as defined in the Conservation Element of the Washoe County Comprehensive Plan; and

(c) Preservation of Significant Trees. Existing trees with a caliper greater than six (6) inches, as measured fifty-four (54) inches from grade, shall be preserved if feasible. Protection measures, including non-disturbance around the drip-line and/or root zone, shall be incorporated into the landscaping plan.

Figure 110.412.25.1

TOTAL DEVELOPED LAND AREA



Note: Area used in calculating the amount of required landscaping and screening.

Source: Sedway Cooke Associates.

[This Section added by Ord. 867, provisions eff. 5/27/93.]

Section 110.412.30 Public Safety. All provisions of this article shall comply with the public safety requirements set forth in this section.

(a) General. Landscaping shall meet the following safety requirements:

(1) Landscaping elements shall not be permitted if they pose a public health or safety threat; and

(2) The height, spread and growth habit of all plants shall not interfere with or obstruct ease of movement or impede a public right-of-way.

(b) Special Areas. The use of thorny plants is prohibited along public bicycle and pedestrian paths, and the use of poisonous and/or thorny plants is prohibited on properties used primarily by children such as schools, day care centers and nurseries.

(c) Intersection Visibility. As illustrated in Figure 110.412.30.1, all trees shall be pruned such that no branches extend lower than six (6) feet above curb level and other plants shall not exceed eighteen (18) inches in height above any street curb under the following conditions:

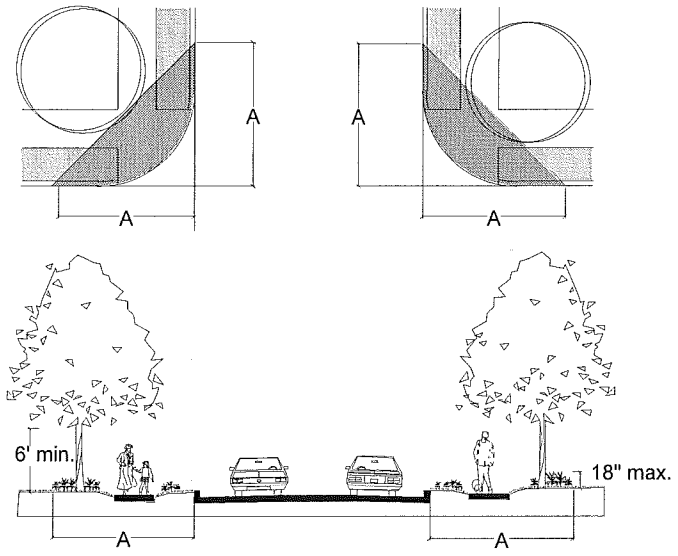
(1) Street Intersection: Within a thirty (30) foot visibility triangle.

(2) Commercial Driveway or Alleyway: Within a fifteen (15) foot visibility triangle.

(3) Residential Driveway: Within a ten (10) foot visibility triangle.

Figure 110.412.30.1

INTERSECTION VISIBILITY



Note: A = Distance measured from street curb as set forth in Section 110.412.30 (c)(1), (c)(2), and (c)(3).

Source: Sedway Cooke Associates.

[This Section added by Ord. 867, provisions eff. 5/27/93.]

Section 110.412.35 Residential Use Types. The following landscaping requirements shall apply to residential uses including duplex and multiplex residential subdivision lots and multi-family developments, except those exempted by Section 110.412.10, Exemptions. Any landscaping required in this section may contribute toward the minimum requirements.

(a) Coverage. A minimum twenty (20) percent of the total developed land area shall be landscaped.

(b) Required Yards Adjoining Streets. All required front, rear or side yards which adjoin a public street shall be landscaped and shall include at least one (1) tree for every fifty (50) linear feet of street frontage, or fraction thereof.

(c) Subdivision Perimeters. New residential subdivisions, regardless of the number of dwelling units per parcel, shall provide at least one (1) tree for every fifty (50) linear feet of perimeter frontage adjoining an arterial or collector identified in the Washoe County Comprehensive Plan Streets and Highways System Plan map.

(d) Model Homes. Model homes for all residential subdivisions shall install landscaping that demonstrates appropriate landscape techniques suitable for the local micro-climate and soil conditions.

[This Section added by Ord. 867, provisions eff. 5/27/93.]

Section 110.412.40 Civic and Commercial Use Types. The following minimum landscaping requirements shall apply to the total developed land area for civic and commercial uses, except those exempted by Section 110.412.10, Exemptions. The total developed land area is illustrated in Figure 110.412.25.1. Any landscaping required in this section may contribute toward the minimum requirements, including a mixture of building and buffer landscaping. These requirements are generally depicted in Figure 110.412.40.1.

(a) Coverage. A minimum twenty (20) percent of the total developed land area shall be landscaped. Any disturbance to undeveloped portions of a site shall be mitigated.

(b) Required Yards Adjoining Streets. All required yards which adjoin a public street shall be landscaped and shall include at least one (1) tree for every fifty (50) linear feet of street frontage, or fraction thereof.

(c) Landscaped Buffers Adjoining Residential Uses. When a civic or commercial use adjoins a residential use, a landscaped buffer is required as follows:

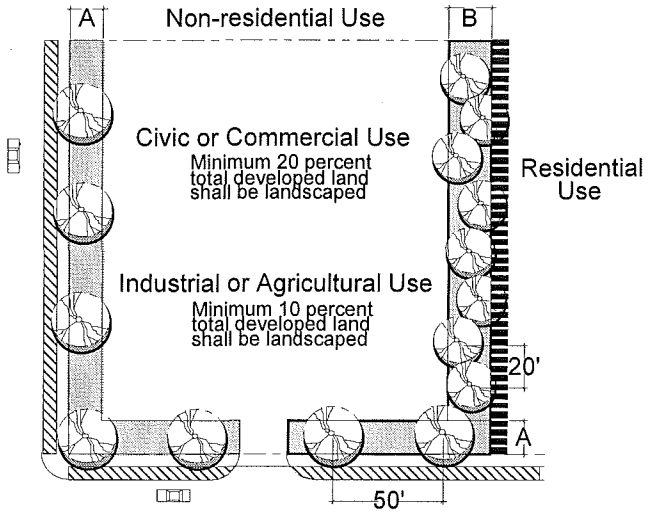
(1) The buffer shall be the width of the required front, side or rear yard for the entire length of the adjoining common property line; and

(2) The buffer shall include at least one (1) tree every twenty (20) linear feet of property frontage, or fraction thereof, planted in off-set rows or groupings to achieve maximum screening.

(d) Screening Adjoining Residential Uses. When a civic or commercial use adjoins a residential use, a solid decorative wall or fence shall be erected along the entire length of the common property line. This wall or fence shall be at least six (6) feet but not more than seven (7) feet in height.

Figure 110.412.40.1

LANDSCAPING AND SCREENING FOR CIVIC, COMMERCIAL, INDUSTRIAL AND AGRICULTURAL USE TYPES



Notes: A = Landscaping in required yard adjoining a street.
B = Landscaped buffer adjoining a residential use.
▮▮▮▮ = Screening adjoining a residential use.

Source: Sedway Cooke Associates.

[This Section added by Ord. 867, provisions eff. 5/27/93.]

Section 110.412.45 Industrial and Agricultural Use Types. The following minimum landscaping requirements shall apply to the total developed land area for industrial and agricultural uses, except those exempted by Section 110.412.10, Exemptions. The total developed land area is illustrated in Figure 110.412.25.1. Any landscaping required in this section may contribute toward the minimum requirements, including a mixture of building and buffer landscaping. These requirements are generally depicted in Figure 110.412.40.1.

(a) Coverage. A minimum ten (10) percent of the total developed land area shall be landscaped. Any disturbance to undeveloped portions of a site shall be mitigated.

(b) Required Yards Adjoining Streets. All required yards which adjoin a street shall be landscaped and shall include at least one (1) tree for every fifty (50) linear feet, or fraction thereof.

(c) Landscaped Buffers Adjoining Residential Uses. When an industrial or agricultural use adjoins a residential use, a landscaped buffer is required as follows:

(1) The buffer shall be the width of the required yard for the entire length of the adjoining common property line; and

(2) The buffer shall include at least one (1) tree every twenty (20) linear feet of property frontage, or fraction thereof, planted in off-set rows or other methods to achieve maximum buffering.

(d) Screening Adjoining Residential Uses. When any industrial or agricultural use adjoins a residential use, a solid decorative wall or solid decorative fence shall be erected along the entire length of the common property line. This wall or fence shall be at least six (6) feet but not more than seven (7) feet in height.

[This Section added by Ord. 867, provisions eff. 5/27/93.]

Section 110.412.50 Parking and Loading Areas. In addition to other required landscaping, all parking and loading areas shall provide minimum landscaping as set forth in this section. Any trees required in Sections 110.412.35 through 110.412.45 may contribute toward the minimum coverage requirement.

(a) Coverage. At least one (1) tree shall be provided for every ten (10) parking spaces, provided the distance between required trees does not exceed twelve (12) spaces in a row and the trees are evenly distributed throughout the paved area, as generally depicted in Figure 110.412.50.1.

(b) Required Yards Adjoining Streets. When a parking or loading area adjoins a street, a landscaped berm and/or decorative wall or fence shall be provided within all required yards adjacent to the parking or loading area, not to exceed three (3) feet.

(c) Landscaped Buffers Adjoining Residential Uses. As generally depicted in Figure 110.412.50.2, when a parking or loading area adjoins a residential use, a landscaped buffer is required as follows:

(1) The buffer shall be the width of the required yard for the entire length of the adjoining common property line; and

(2) The buffer shall include at least one (1) tree every twenty (20) linear feet, or fraction thereof, planted in off-set rows.

(d) Screening Adjoining Residential Uses. As generally depicted in Figure 110.412.50.2, when a parking or loading area adjoins a rear or non-street side yard of a residential use, a solid decorative wall or fence shall be erected along the entire length of the property line. This wall or fence shall be at least six (6) feet but not more than seven (7) feet in height.

(e) Existing Parking and Loading Areas. When a parking or loading area existing prior to the effective date of this article is enlarged by one or more expansions in area greater than fifty (50) percent, the minimum landscaping requirements of this article shall be met for the total (existing and enlarged) area.

(f) Standards. The following standards shall apply within parking and loading areas:

(1) Planted areas shall be protected by curb, wheel stops or other appropriate means, to prevent injury to plants from pedestrian or vehicle traffic; and

(2) Planting areas which abut the side of parking stalls shall include a minimum eighteen (18) inch wide paved strip to allow access to and from vehicles.

(g) Exceptions. Required landscaping shall not apply where parking and loading areas are:

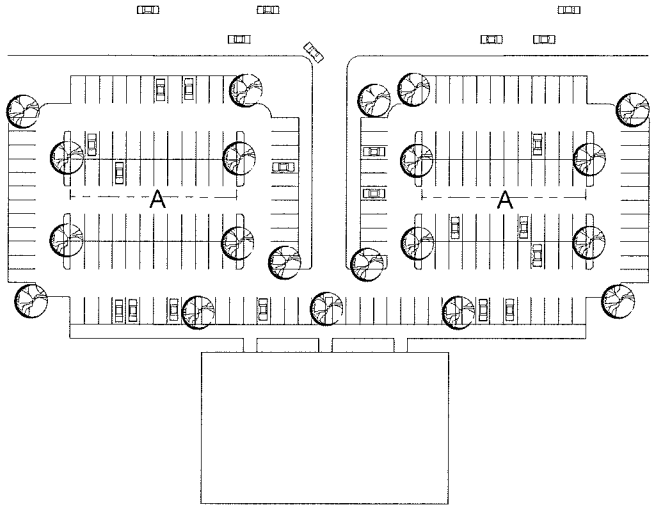
(1) Completely screened from surrounding properties by intervening buildings or structures;

(2) Located under, on or within buildings; or

(3) Devoted to display parking for automobile dealerships.

Figure 110.412.50.1

REQUIRED TREES WITHIN PARKING AND LOADING AREAS

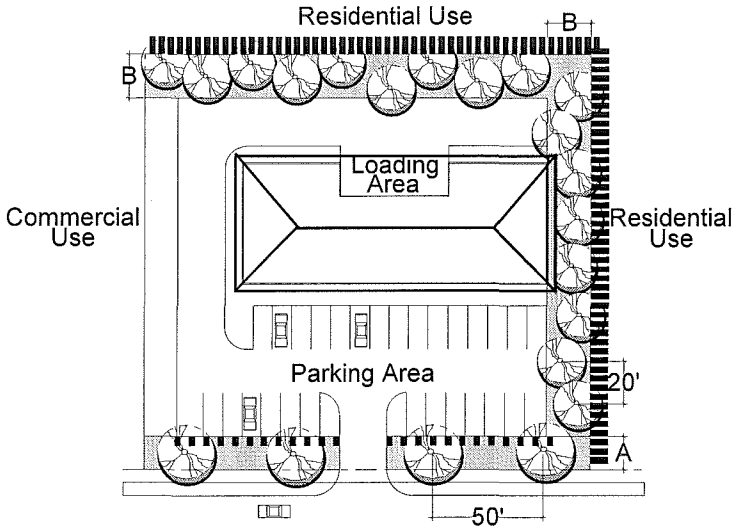


Notes: A = Maximum 12 parking spaces between trees.
Provide at least one tree for every 10 parking spaces (i.e. if 200 parking spaces are provided, then 20 trees are required.

Source: Sedway Cooke Associates.

Figure 110.412.50.2

LANDSCAPING AND SCREENING FOR PARKING AND LOADING AREAS



Notes:
A = Landscaping in required yard adjoining a street.
B = Landscaped buffer adjoining a residential use.
▮▮▮▮▮▮▮▮ = Screening adjoining a residential use.
▪ ▪ ▪ ▪ ▪ = Screening of a parking area adjoining a street.

Source: Sedway Cooke Associates.

[This Section added by Ord. 867, provisions eff. 5/27/93.]

Section 110.412.55 Other Screening Requirements. In addition to screening requirements established in Sections 110.412.35 through 110.412.50, screens shall comply with the minimum requirements of this section.

(a) Open Storage Areas. The following screens are required for open storage areas:

(1) Open storage areas shall be enclosed by a screen at least six (6) feet but not more than seven (7) feet in height;

(2) Items stored within one hundred (100) feet of a street or residential use shall not be stacked higher than the required screen;

(3) Screens to enclose storage areas between adjoining side or rear yards may be deleted by mutual agreement of the property owners involved;

(4) Exterior electrical cage enclosures and storage tanks shall be screened from view from an adjacent street and residential use; and

(5) The location of trash enclosures, as specified on the site plan, shall be subject to the approval of the Director of Community Development. Such enclosures and gates shall be of solid construction and shall be in accordance with County standards and the *Uniform Fire Code*.

(b) Manufactured Home Parks. A decorative wall or fence shall be erected along the entire length of the property line of a manufactured home park as follows:

(1) The wall or fence shall be at least six (6) feet but not more than seven (7) feet in height along property lines not adjoining a street.

(c) Commercial Campground Facilities. In Tourist Commercial designated areas, a decorative wall or fence shall be erected along the entire length of the property line of commercial campground facilities and recreational vehicle parks as follows:

(1) When a recreational vehicle park adjoins a street, the wall or fence shall be four (4) feet or more in height; and

(2) The wall or fence shall be at least six (6) feet but not more than seven (7) feet in height along property lines not adjoining a street.

(d) Mechanical Equipment. All mechanical equipment, tanks, ventilating fans or similar equipment, whether located on a roof or on the ground, shall be screened from view from adjoining properties and streets. Screens shall be integrated into the overall architectural style of the associated building and shall be measured from the highest point of the object being screened.

(e) Swimming Pools. Barriers shall be erected for swimming pools, spas and hot tubs in accordance with the current edition of the adopted Washoe County Building Code as referenced in Chapter 100.

(f) Materials. Screens shall include the installation and maintenance of at least one (1) or a combination of the following elements:

(1) Dense plants, such as hedges;

(2) Chain link fencing, except along streets, with inserts of wood, metal or other acceptable material;

(3) Decorative fences constructed to maintain an opaque condition. Alternating slats are encouraged to accommodate windy extremes; or

(4) Decorative walls consisting of either brick, rock or block, and maintaining a width of at least eight (8) inches.

(g) Opaqueness. Plants used for screens shall be:

(1) Of a type which will provide a year-round barrier at the prescribed height;

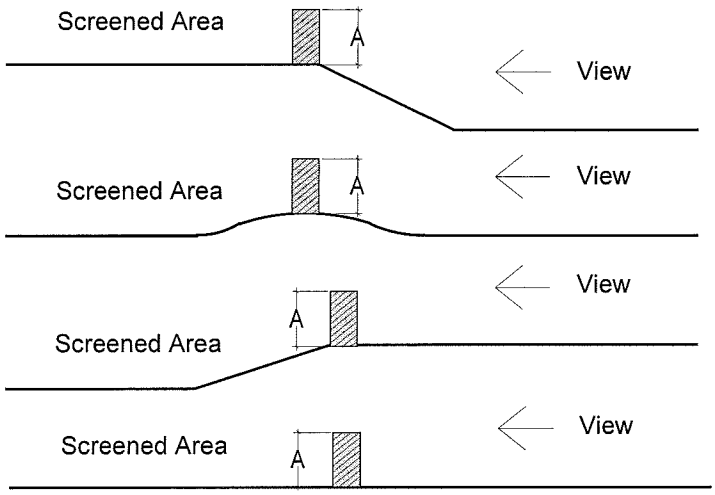
(2) Planted at a spacing necessary to achieve one hundred (100) percent opacity within five (5) years; and

(3) Supplemented or replaced with other dense landscaping or an appropriate fence of wall, if it fails to retain such opaqueness any time after the initial two (2) year period.

(h) Height Measurements. Screening materials shall be located to maximize the benefit of the screen, and prescribed heights shall be measured from finished grade, as illustrated in Figure 110.412.55.1.

Figure 110.412.55.1

PLACEMENT AND MEASUREMENT TECHNIQUES FOR SCREENING MATERIAL



Note: A = Screen height measured from finished grade.

Source: Sedway Cooke Associates.

[This Section added by Ord. 867, provisions eff. 5/27/93; Ord. 1178, provisions eff. 12/6/02.]

Section 110.412.60 Planting Standards. All required landscaping, including parking and loading areas, shall comply with the minimum standards established in this section.

(a) Composition. The use of climatic adaptive planting material is encouraged. A suggested climatic adaptive plant list is available from the Washoe County Cooperative Extension, or any other sources approved by the Director of Community Development.

(b) Compatibility. Development shall relate harmoniously to the surrounding topography and provide for the preservation of natural features such as water courses, wooded areas and rough terrain.

(c) Compatible Water Use Zones. Trees and plants having similar climatic, water, soil and maintenance requirements shall be organized in distinct and compatible planting zones as defined below:

(1) High water use zones include plants which require moist soils and supplemental water in addition to natural rainfall to survive at maturity;

(2) Moderate water use zones include plants which survive on natural rainfall with supplemental water during seasonal dry periods at maturity; and

(3) Low water use zones include plants which survive on natural rainfall without supplemental water at maturity.

(d) Nursery Standards. Plants shall meet the standards for sizes and grades of plant materials as listed in the latest edition of the American Standard for Nursery Stock released by the American Association of Nurserymen.

(e) Non-Interference. The location of trees and vegetation shall not adversely affect utility easements, service lines or solar access of neighboring sites. If necessary, the width of the planting areas shall be increased so that the tree locations do not interfere with utilities or solar access.

(f) Public Rights-of-Way. Any tree planted within five (5) feet of publicly maintained curbing, pavement or sidewalks shall install a root control barrier as prescribed by the County. Landscaping for a private development may be placed in a public right-of-way subject to the issuance of a valid encroachment permit.

(g) General. The following general standards shall apply to all new planting areas:

(1) Planting areas with trees within parking and loading areas shall be at least eight (8) feet wide at the base of the tree in all directions;

(2) Planting areas without trees within parking and loading areas shall be at least five (5) feet wide;

(3) Ground cover or mulch shall be used in all planting areas. Turf is not allowed in parking lot tree planters; and

(4) Planted areas shall be protected by curb, wheel stops or other appropriate means to prevent injury to plants from pedestrian or vehicle traffic.

(h) Trees. New trees shall meet the following standards:

(1) The composition of trees shall represent a mixture of deciduous and coniferous varieties;

(2) At least one-half (1/2) of all evergreen trees shall be at least seven (7) feet in height, and the remainder must be at least five (5) feet in height at the time of planting; and

(3) At least one-half (1/2) of the required number of the deciduous trees shall be at least two (2) inch caliper per American Nursery Standards at the time of planting. The remaining number of required deciduous trees shall be at least one (1) inch caliper at the time of planting.

(i) Shrubs and Hedges. New shrubs and hedges shall meet the following standards:

(1) Shrubs shall be comprised of a mixture of sizes, but not less than number one (1) size containers.

(j) Ground Cover. New ground cover shall meet the following standards:

(1) Living ground cover shall be planted to achieve a minimum planting area coverage of fifty (50) percent within one (1) year of installation and shall achieve one hundred (100) percent coverage within three (3) years of installation;

(2) Wood chips, bark, decorative rock or other appropriate inert materials may also be used provided it does not exceed fifty (50) percent of the total planting area; and

(3) Plastic, steel or other appropriate edging material shall be provided around ground cover areas to retain loose materials.

(k) Turf. Turf, when used appropriately, offers aesthetic appeal, environmental cooling, oxygen production and a safe activity surface for a variety of recreational uses. Areas with turf shall meet the following standards:

(1) Irrigation for turf areas shall minimize runoff and inadvertent watering of non-turf areas;

(2) Use of turf shall be consolidated to those areas that receive significant pedestrian traffic, provide for recreational uses, assist in soil erosion control such as on slopes or in swales, and other functional use areas;

(3) Turf areas shall be dethatched and aerated as needed to promote effective water infiltration into the soil, to minimize water runoff and to promote deep, healthy roots;

(4) In multi-family residential use types, turf areas shall be provided at a minimum of fifty (50) percent of the required landscaping area in a practical configuration for recreational uses and shall be balanced with other landscaping materials;

(5) In commercial and industrial use types, turf areas shall be balanced with other landscaping materials;

(6) Turf shall be comprised of drought-resistant and hardy varieties which, when properly installed and maintained, are capable of surviving under conditions of restricted water use;

(7) Any turf area must be capable of being watered with minimum overspray or runoff; and

(8) Where turf is used in areas subject to erosion or in swales, it shall be sodded rather than seeded.

(l) Earth Berms. Earth berms shall comply with the following standards:

(1) An earth berm may contribute toward the prescribed height of any planting, fencing or wall;

(2) Mounds of earth used for planting shall not exceed horizontal to vertical slopes of two to one (2:1); and

(3) Turf planted slopes shall not exceed horizontal to vertical slopes of four to one (4:1).

(m) Soil Preparation. Soil shall comply with the following standards:

(1) Required landscaping shall be installed using a planting soil mix comprised of a type appropriate to the individual proposed plants and the native soil found on the site;

(2) Where necessary, soil amendments such as manure, straw, peat moss or compost shall be used to improve water drainage, moisture penetration and water holding capacity as recommended in the soil analysis report pursuant to Section 110.412.15, Required Plans; and

(3) Deep ripping and tilling of landscape areas is encouraged to facilitate deep water penetration and soil oxygenation.

(n) Mulch. Permanent mulch shall be applied to and maintained in all planting areas to assist soils in retaining moisture, reducing weed growth and minimizing erosion as follows:

(1) A minimum three (3) inch layer of organic mulch material shall be installed in all planting areas except turf areas and meadow planted areas;

(2) Mulch may consist of wood products, stone and other non-toxic recyclable materials;

(3) Non-porous materials, such as plastic sheets, shall not be placed under the mulch; and

(4) The use of woven types of geofabric weed barriers is required in all planter areas not devoted to turf or meadow planted areas.

(o) Height Measurements. Prescribed heights shall be measured from finished grade at the base of the plant material.

[This Section added by Ord. 867, provisions eff. 5/27/93.]

Section 110.412.65 Irrigation Standards. Required irrigation shall comply with the minimum standards established in this section.

(a) Separate Water Meter. All irrigation systems required for landscaping of all non-exempt development shall be connected to a water meter installed on the main line of the irrigation system upstream of the control valves to measure water delivery separate from water delivered for other forms of interior or exterior consumptive use.

(b) Compatible Water Use Zones. Irrigation systems shall be designed to correlate with the composition of trees and plants and their related water use. High water use zones shall be provided with central automatic irrigation systems.

(c) Coverage Requirements. Coverage requirements apply to all temporary and permanent irrigation systems as follows:

(1) Spray irrigation systems shall be designed for head-to-head coverage;

(2) Sprinkler heads must have matched precipitation rates within each control valve circuit; and

(3) Drip systems shall be designed to be expandable to adequately water the mature plants.

(d) Control Systems. The following requirements apply to all irrigation control systems:

(1) Controlled irrigation systems shall be operated by an irrigation controller capable of irrigating high water demand areas on a different schedule from low water demand areas;

(2) Controllers must have multiple cycle start capacity and a flexible calendar program above to be set to comply with local or water management district restrictions; and

(3) Moisture sensor and/or rain shut-off equipment is encouraged to avoid irrigation during periods of sufficient rainfall. Such equipment shall have the capability to override the irrigation cycle of the sprinkler system when adequate rainfall has occurred.

(e) Cross Connection Devices. All non-exempt development shall have either a pressure vacuum breaker or a reduced pressure principle backflow preventer device installed on the main line of the irrigation system upstream of the control valves.

(f) Size of Irrigation Lines. Irrigation lines shall be classified as follows:

(1) Schedule 40 P.V.C. is required for all pressure lines and as sleeving under all paved areas;

(2) Lateral line piping shall be installed at least twelve (12) inches underground for non-pressurized irrigation lines;

(3) Mainline piping shall be installed at least eighteen (18) inches underground for constant pressure irrigation lines; and

(4) Manual and automatic drains shall be used to prevent freeze damage.

(g) Water Application Schedules. Irrigation system schedules should include the following standards:

(1) Turf shall be irrigated on separate irrigation schedules; and

(2) Sprinkler systems with spray heads should not operate during times of high wind or high temperatures.

(h) Maintenance. Irrigation systems shall be maintained as follows:

(1) Irrigation systems shall be maintained regularly to eliminate the waste of water due to loss from damaged, missing or improperly operating portions of the system;

(2) Controllers shall be adjusted to allow for the seasonal water requirements of the plants; and

(3) Systems shall be winterized to prevent freeze damage, including draining lines and backflow prevention devices as necessary.

[This Section added by Ord. 867, provisions eff. 5/27/93.]

Section 110.412.70 General Requirements. All landscaping and screening shall meet the general requirements of this section.

(a) Bonding Value. Landscaping, irrigation and screening shall be completely installed prior to issuance of a Certificate of Occupancy unless the applicant posts a bond of three (3) dollars per square foot of landscaping at base year value of 1993, or other appropriate financial assurances.

(b) Deferrals. Request for deferrals shall be submitted in writing to the Director of Community Development and shall include the bond amount or other appropriate financial assurances. The request must explain the need for such deferral and the estimated time for completion.

(c) Dust Control. The following dust control measures shall be used:

(1) For temporary coverage to control dust for less than one (1) year: hydroseed with fast-growing temporary grasses; apply mulch or weed prevention netting; apply other slope stabilization materials; and install temporary irrigation system, if required, subject to the approval of the Director of Community Development; and

(2) For coverage to control dust for more than one (1) year: land clearing shall be minimized and permanent planting as required by this article shall apply.

(d) Erosion Control. Erosion shall be controlled by slowing stormwater runoff and assisting in groundwater recharge as follows:

(1) To minimize erosion during construction, straw or other appropriate material shall be applied to slopes susceptible to water runoff; and

(2) Erosion shall be controlled on all graded sites which remain vacant prior to building construction.

(e) Stormwater Runoff. Stormwater runoff shall be minimized in landscaped areas as follows:

(1) Stormwater detention/retention basins not integrated with paved areas shall be landscaped to enhance the natural configuration of the basin and plants located within the lower one-third (1/3) portion of the basin must withstand periodic submersion;

(2) Where appropriate, grading and landscaping shall incorporate on-site stormwater runoff for supplemental on-site irrigation;

(3) Where water is dispersed to natural ground or channels, appropriate energy dissipators shall be installed to prevent erosion at the point of discharge;

(4) Runoff from disturbed areas shall be detained or filtered by earth berms, planting strips, catch basins or other appropriate methods to prevent sedimentation from the disturbed area from obstructing natural or artificial channels or deposition on paved areas; and

(5) No earth, organic or construction material shall be deposited in or placed where it may be directly carried into a stream, lake or wetlands area.

[This Section added by Ord. 867, provisions eff. 5/27/93.]

Section 110.412.75 Maintenance. All landscaping, irrigation and screening shall be maintained at all times to conform to the regulations established in this article.

(a) Responsibilities. Landscaping and related equipment including, but not limited to, plants, screens, walkways, benches, fountains and irrigation systems shall be maintained by the applicant or subsequent owner of the property.

(b) Agreement. Prior to the issuance of a Certificate of Occupancy, the applicant shall file a Maintenance Agreement or access easement to enter and maintain the property, subject to the approval of the County District Attorney. Such a document shall ensure that if the property owner fails to maintain the requirements set forth in this article, the County will be able to file an appropriate lien(s) against the property in order to achieve the required maintenance.

(c) Plants. Required plants shall be maintained in healthy, vigorous, and disease and pest-free conditions so as to present a neat and healthy appearance free of refuse, debris and weeds. Plants shall be fertilized, cultivated and pruned on a regular basis and sound horticultural principles shall be practiced.

(d) Staking. Plants shall be staked, tied or otherwise supported as necessary. Supports shall be regularly monitored to avoid damage to plants and removed when appropriate.

(e) Pruning. Pruning shall be accomplished in accordance with accepted arboriculture standards.

(f) Turf Edge Trimming. Roadways, curbs and sidewalks shall be edged to prevent encroachment from the adjacent turfed areas. Line trimmers shall not be used to trim turf abutting trees or other plants. All turf within a twenty-four (24) inch radius of any tree trunk shall be removed.

(g) Replacement. Landscaping which is not maintained in a manner consistent with this article shall be replaced as follows:

(1) Replacement includes, but is not limited to, replacing plants damaged by insects, disease, vehicular traffic, vandalism, storm damage and natural disaster or occurrence;

(2) If the required landscaping is not living within one (1) year of a Certificate of Occupancy, it shall be replaced with equivalent vegetation;

(3) If the existing landscaping which was preserved is not living within two (2) years of a Certificate of Occupancy, it shall be replaced with equivalent new landscaping; and

(4) Replacement landscaping shall be installed within thirty (30) days following notification by the Director of Community Development that a violation of this article has occurred.

[This Section added by Ord. 867, provisions eff. 5/27/93.]

Section 110.412.80 Guarantee of Completion. To ensure proper installation and compliance with approved plans required in Section 110.412.15, Required Plans, the person responsible for preparation of the required plans, or a qualified designated representative of the individual or firm which prepared the plans, shall conduct a final field inspection prior to issuance of a Certificate of Occupancy. It shall be unlawful to occupy the premises unless the required landscaping, irrigation and screening is installed in accordance with these regulations, or a faithful performance bond or other satisfactory guarantee of completion insuring the faithful performance of all work, is accepted by the Director of Community Development. If any person fails to complete any improvement as specified in the approved plans, and as agreed within the time specified, the Board of County Commissioners may cause the bond to be forfeited in the amount necessary to finish the uncompleted portion of the work.

[This Section added by Ord. 867, provisions eff. 5/27/93.]

Agenda
Conservation (Efficiency) Program Integration

1. What do we want to accomplish with conservation – energy efficiency, sustainability, resilience, expanded water supply…?
2. Identify the conservation measures, ordinances, policies and programs currently in place.
3. What conservation measures would we like to implement in the future?

Chapter 8

Water Conservation

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Purpose and Scope

NRS 540A.130 requires the Regional Water Plan to describe programs to achieve conservation of water. The goal of this updated water conservation plan, written by the Regional Water Planning Commission's (RWPC's) Advisory Committee on Conservation (ACC), is to assist the County, Cities, residents, businesses, and other entities in using only the water that is needed to achieve a desirable and sustainable quality of life. The conservation plan describes:

- Water conservation programs and ordinances presently in effect in the region
- Programs that have been implemented since adoption of the initial Regional Water Plan
- Pending proposals for water conservation, both indoor and outdoor

Recommended water conservation actions that may be implemented or considered for implementation in the future are also presented.

Introduction

Water conservation is a vital part of an integrated water management plan. Water conservation can positively affect customer utility bills, the need for future facilities or timing of their construction, drought protection for the community, and the rate at which new water resources are needed. The region has a limited supply of water resources, and it should be used as efficiently as possible.

Since its formation in 1995, the RWPC has set water conservation goals for the Region, and developed and implemented programs and plans to reach those goals. The 1995-2015 Regional Water Plan presented three sets of potable water demand projections through 2015 based on differing conservation assumptions. The mid-range projection was termed the Base Case demand and was determined to be achievable if certain conservation measures were implemented. Seven of the eleven conservation measures analyzed in 1995 were selected for implementation during the five years following adoption of the Regional Water Plan. Those seven conservation measures have come to be known informally as Base Case Conservation. Although potable water demand projections have been revised using recent data and no longer consist of low-, mid- and high-range projections, the RWPC finds that the pursuit of Base Case Conservation is desirable and beneficial to the Region.

In addition to monitoring the progress of water conservation, the RWPC will continue to evaluate whether existing conservation programs are effective and practicable, and whether programs should be added or deleted. During drought or emergencies additional conservation measures may be needed to achieve a greater reduction in water use.

The ACC recommends the following water conservation policy for the RWPC in evaluating current and future conservation measures:

> ***Policy 1.1.b: Water Conservation:***
>
> *Water conservation measures that promote smart management of the region's water resources will be implemented for the benefit of the community. Additionally, the community will be expected to conserve more water during drought.*

Summary of Findings

General conclusions drawn from this chapter include:

- Truckee River Operating Agreement (TROA) will become effective in the near future. (See Sections 7.4.3 and 8.4.1 for more on TROA).
- Water conservation ordinances will be retained by each of the jurisdictions in the Region.
- All purveyors in the Region will be fully metered by 2011.
- There will be sufficient water for essential public health and safety needs, even during the worst drought years or during an emergency event.
- Increased use of reclaimed water and other non-potable water sources may be implemented subject to federal, state, local and health department regulations, and to the extent supplies are available from Truckee Meadows Waste Reclamation Facility (TMWRF), Reno Stead Water Reclamation Facility (RSWRF) and South Truckee Meadows Water Reclamation Facility (STMWRF).
- Additional conservation actions during droughts will be required when Floriston rates cannot be met during the irrigation season.

Based on the discussion of future possible conservation measures in Section 8.5, the Advisory Committee on Conservation (ACC) has listed actions for future consideration summarized in Table 8-1, in addition to the Base Case and other conservation measures already underway. While these future actions may be implemented, the ACC believes it is important to continue successful existing conservation programs in the region while implementing new ones.

Table 8-1
Base Case, Ongoing, Future and Drought Conservation Measures

BASE CASE

Retrofit Water Meters on all Municipal Water Services
Toilet Retrofit
Increase Block Rates Region-wide
Landscape Efficiency Conversion
New Building Codes
Showerhead Retrofit
Good Earthkeeping

ONGOING MEASURES

Water Usage Review / Water Audits
Public Education
New Irrigation Technology
Non-Potable and Reclaimed Water Service

FUTURE MEASURES

RWPC Sponsored Education: Soil Preparation, Irrigation Efficiency
Best Management Practices (BMPs)
Grade to Retain 50% on New Lots (Low Impact Development Practices)
Commercial Faucet Retrofits
Enhanced enforcement of Landscape and Runoff Ordinances
Landscape Water Budgets
Sprinkler System Devices
Dual Water Delivery Systems
Customer Leak-Repair Assistance
Promotion of New Ideas
Research Studies
Good Earthkeeping

DROUGHT MEASURES

Increased public education
Increased enforcement of water waste rules
Once a week lawn watering
Implementation of landscape water budgets for irrigation customers
Prohibit planting new lawns
Restaurants implement mandatory no-water-served-unless-asked policy
Hotels and motels implement mandatory Good Earthkeeping

8.1 Regional Benefits of Conservation

Currently, water conserved by existing customers is not allocated to future growth. Instead, water not diverted as a result of conservation is: (1) left in the river, (2) stored in upstream reservoirs for use during droughts or for fish/wildlife purposes, or (3) treated and stored as part of the groundwater recharge program during the winter. Local government ordinances require that water rights be deeded to Washoe County or TMWA as a condition for receiving a building permit. The resulting will-serve letter becomes permanently affixed to that particular subdivision or property. If the subdivision uses less water than the dedicated water rights, the unused water cannot be transferred to another property unless two or more properties are owned by the same person or entity.

In evaluating the cost and benefit of water conservation efforts, it is necessary to understand and appreciate the integrated nature of the issue. Given the many benefits of water conservation, the fact that water conserved may not be equivalent to a new water supply does not negate its value. If water conservation is evaluated only for the savings it generates in reducing the cost of supplying potable water, cost-benefit ratios and payback periods might look unattractive. Other benefits have to be taken into consideration such as energy savings, environmental impacts, and postponement or avoidance of building new infrastructure. The major benefits of water conservation in the region are summarized below:

1. **Extending drought or emergency water supplies.** Periodic droughts are a fact of life in Washoe County's high-desert environment. Because timing of droughts cannot be predicted and their duration only estimated, it is prudent to maintain reserves to provide for demands during droughts. After the Negotiated Settlement has been implemented, the Cities and County will be able to store more water in upstream reservoirs for use during drought as well as for water quality purposes. To the extent that conserving water supply helps the community to minimize the impact of a drought, conservation is a very valuable tool.

2. **Delaying construction of new water treatment and wastewater treatment facilities.** A major benefit of conservation has been delaying the need for expanding or constructing new water and wastewater facilities. Because the treatment facilities must have the capacity to handle peak demand, lowering the peak is helpful in postponing expansion. The assigned day watering restriction reduces peak demands caused by many customers watering during crucial high-demand periods. Recent studies conducted in Colorado and reported by the AWWA suggest that up to a 30% decrease in consumption is realized by assigned day watering. While expansions may be delayed as a direct result of water conservation, future expansions of the water and wastewater treatment facilities will still be necessary to meet the needs of growth.

3. **Lowering cost of water and wastewater treatment operations.** Lower water use means lower supply and operational costs for both water and wastewater treatment in cost components such as chemicals and power. Water conservation benefits, however, may be constrained by TMWRF discharge limitations. As conservation does not reduce the total pounds of pollutants in the waste stream, the influent and reclaimed water TDS concentrations at TMWRF are anticipated to increase as a result of conservation. Careful reuse management and a possible discharge permit revision are expected to avoid a violation of discharge limitations.

4. **Reducing energy costs.** For the consumer, lower water use in facilities and appliances that heat or pump water equates to lower utility costs. For the utilities, lower demands result in less pumping to distribute water through its system, and less energy required at the treatment plants.

5. **Minimizing pollution in the watershed.** Water conservation results in less yard and agricultural runoff and sediments that contribute to pollution in the watershed, affecting both surface and groundwater. The USGS studied the quality of shallow groundwater in the Truckee Meadows and identified a problem probably caused by excessive application of pesticides on landscapes. Another conclusion was that there are a greater variety of pollutants in urban-area groundwater compared to agricultural areas (USGS, 1998). Water conservation practices, careful control of pollutant sources including fertilizers and storm water BMPs can help minimize run-off and infiltration of polluted water and prevent pollutants from entering surface water and groundwater.

6. **Improving fisheries and habitat.** Under TROA, less water used for municipal purposes allows more water to be stored in upstream reservoirs. This water builds a credit of drought reserves that in non-drought years is released for fishery purposes.

7. **Improving water quality.** Future management of river resources will provide enhanced opportunities to increase the amount of water available for fish recovery and wildlife needs, particularly in the lower portion of the Truckee River.

8. **Protection of public health.** Minimizing standing water that accumulates in both rural and urban settings may be a health-related aspect of conservation that guards against breeding and reproduction of mosquitoes and other vectors. These activities include landscaping runoff, emptying swimming pools and spas, storm water containment, and car washing.

8.2 Overview of Progress

All major water purveyors in the region have implemented water conservation plans as required by NRS 540.121-151. Aside from those purveyors who have updated their conservation plans, most of the plans have been in effect since 1992, when they were required to be submitted to the Nevada Department of Conservation and Natural Resources for approval. 2005 amendments to NRS 540.131 require conservation plans to be updated every five years. (See Section 8.3 for detailed discussion of conservation plans.)

Since the 1987-1994 drought, the RWPC has endorsed, and Reno, Sparks, and Washoe County have adopted, national plumbing codes and local ordinances designed to minimize water waste. These include assigned day outdoor watering restrictions, installation of water-efficient plumbing fixtures in new construction, use of water-saving landscape design, the installation of water meters, and retrofit of existing toilets and other devices, i.e., showerheads with low-flow models. Success in bringing about adoption of additional water-saving measures, such as further amendments to the plumbing code, has been limited by institutional and political constraints. Progress on these and other Base Case Conservation measures are summarized in Table 8-2.

This conservation effort will continue to reduce peak demand on the system, reducing the quantity of water that must be treated for residential use and delaying construction of new and

expensive treatment facilities. The scope of the conservation program is region-wide, except for water meter retrofits, which is a TMWA sponsored project within its service area.

Table 8-2 Base Case Progress since the 1995–2015 Regional Water Plan	
Retrofit Water Meters on all Municipal Water Services	TMWA (previously SPPCo) has been implementing a meter retrofit program since 1995. In March 2002 TMWA began installing meters whenever a single-family residence changes tenants. TMWA estimates having a fully metered system by 2009. WCDWR (including STMGID) connections are fully metered as of January 1, 2003. Both purveyors encourage flat rate customers to convert to metered rates.
Toilet Retrofit	The RWPC sponsored the Pilot ULFT rebate program, in effect from September 2001 through March 2003. 5,761 ULFTs were installed. A subsequent effort, the Toilet Installation Program, initiated in July 2003 and active through December 2004,replaced an additional 9,336 toilets. More than 15,000 toilets were retrofit under this program.
Increasing Block Rates for Municipal Water Services Region-wide	Both TMWA and WCDWR currently use inverted block rate structures. WCDWR adjusts its rates annually. In October 2003 TMWA implemented its first rate adjustment since adopting SPPCo's water rate structure that was set in 1998, including a third tier for metered customers.
Assigned Day Watering (Yard Fitness)	TMWA continues it's assigned day watering program; an advertising campaign promoting lawn watering by customers on two days of a week and its Water Watcher program.
Water Use Review/Water Audits	TMWA offers residential and commercial customers on-site water use reviews and water audits. 2,566 audits have been performed.
Landscape Efficiency Conversion	TMWA's Landscape Retrofit Program, part of the Water Conservation Agreement, seeks to promote conversion to water efficient landscaping, primarily through education. TMWA has hired professional landscape services to remove non-functional turf areas at select school district sites. Over 288,000 square-feet of turf have been replaced with low water use plants, materials and hardscapes. In 2006 TMWA concluded a pilot Evapotranspiration (ET) controller program for its large commercial irrigation services.
New Building Codes	An initial engineering feasibility analysis for hot water pipe size reduction, insulation and pressure regulators was completed in 1998. The RWPC made recommendations to local building departments. As a result, Washoe County adopted plumbing code amendments consistent with the recommendations. TMWA is also encouraging landscape designs that make sense in the region's high desert environment.
Showerhead Retrofit	TMWA continues distribution of low-flow showerheads in free kits available on request and at special events. Low-flow showerheads were also distributed free to homes inspected for verification of ULFT installation during the toilet rebate program.
Good Earthkeeping	Concept is to work with local hotels/motels to promote reduced laundry requirements.

Note: There is no priority in the order these actions are listed with the exception of water meter retrofit.

The results of water conservation measures are only quantifiable with a metered system. In the absence of precise data, the level of conservation achieved historically may be shown by the following measures of usage: (1) per connection, (2) by land-use category in relationship to growth in number of service connections within each category, and (3) per capita per day.

8.3 Measuring Progress

Total municipal and industrial (M&I) water use including irrigation in the region is influenced by the number of users on municipal water supply systems, number of users with private wells, types of industries moving into the region, demographics of the region, and weather. As a result, water use varies from year to year and declines significantly during droughts. One method that can be used to compare water use between years is to represent water use on a per-connection basis and use a base period of time with which to compare current usage.

Figure 8-1 shows that over the past five years TMWA customers have reduced consumption per connection to approximately 85 percent of their 1985-1987 average water use. During the drought period of the late 1980s to the mid-1990s, use per connection decreased by almost 25% from the previous years' average usage, demonstrating significant consumer response to drought measures. The region has experienced two droughts since 1985: an 8-year drought from 1987 to 1994 and 5-year drought from 2000 to 2005. During and subsequent to these droughts, use per connection has stabilized while total connections to the TMWA system have increased. Approximately 80% of the total regional population is served by TMWA.

Figure 8-1
TMWA Service Territory Use per Connection 1985-2007

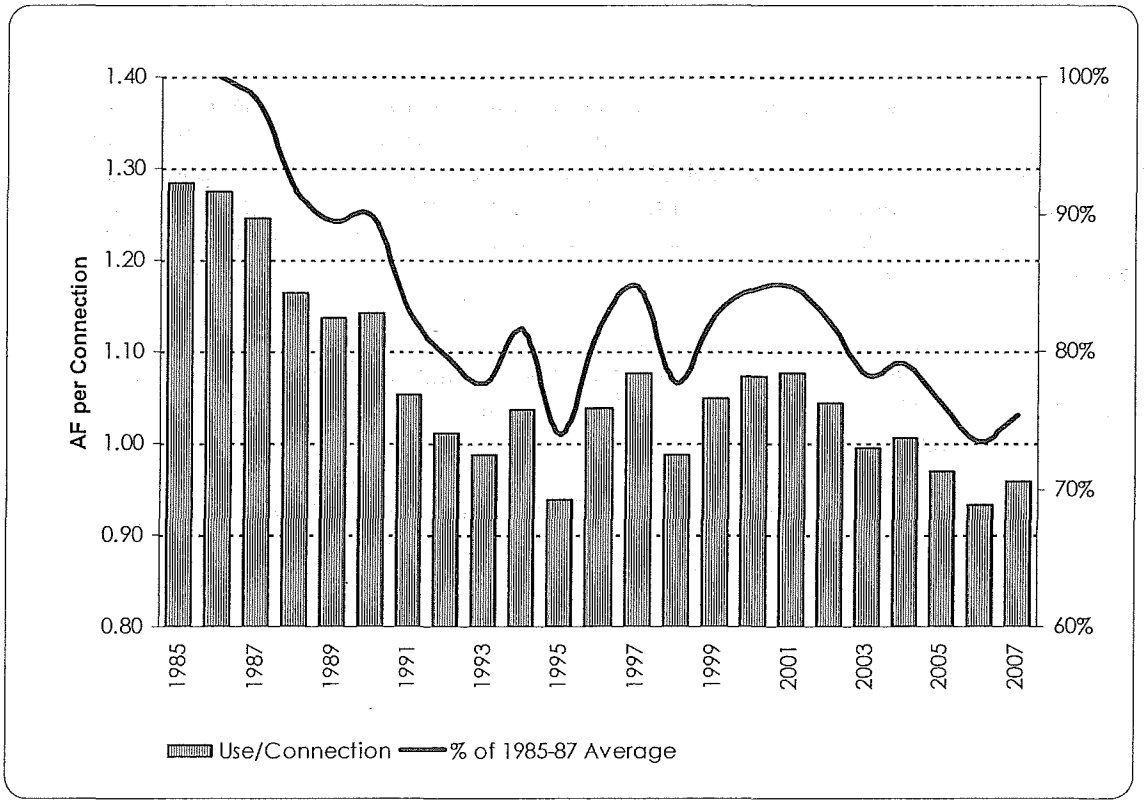
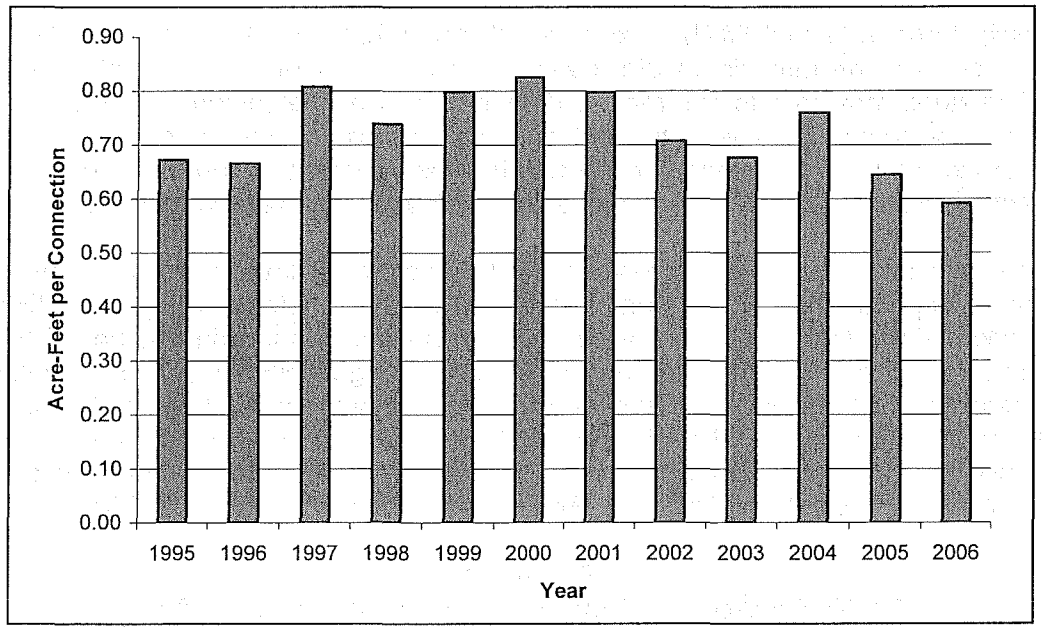


Figure 8-2 shows a similarly stable use-per-connection trend for WCDWR customers over the last 8 years. A comparison of pre-drought and post-drought use is not available for this update.

Figure 8-2
Washoe County Dept. of Water Resources Use per Connection 1995-2006



Part of the reason for the declining use per connection is that during the past ten years there has been a gradual shift from non-metered to metered water use by residential customers. All homes built since 1988 have water meters, and the resulting difference in water use is dramatic. For example, an average flat-rate home in the most common lot size range (5,000-10,000 square feet) uses approximately 0.68 af/yr, whereas a metered home of the same lot size uses approximately 0.44 af/yr.

Many factors influence water usage in homes: age of the home, number of occupants, age and lifestyle of the occupants, pipe size and appliance leaks, and efficiency of appliances and irrigation systems. New homes are much more water-efficient than old homes due to the plumbing code requirements and use of newer, more efficient water using devices. In addition, over the past 15 years there has been a shift in the region toward use of smaller lots for new home construction, particularly in the 5,000 to 7,000 square foot lot size, causing less irrigation demand at the new home. Table 8-3 shows that, in 1990, lots ranging in size from 5,000 to 7,000 square feet made up 18% of the total number of lots developed that year, whereas in 2006, 5,000 to 7,000 square foot lots made up 26% of the total, an 8% increase.

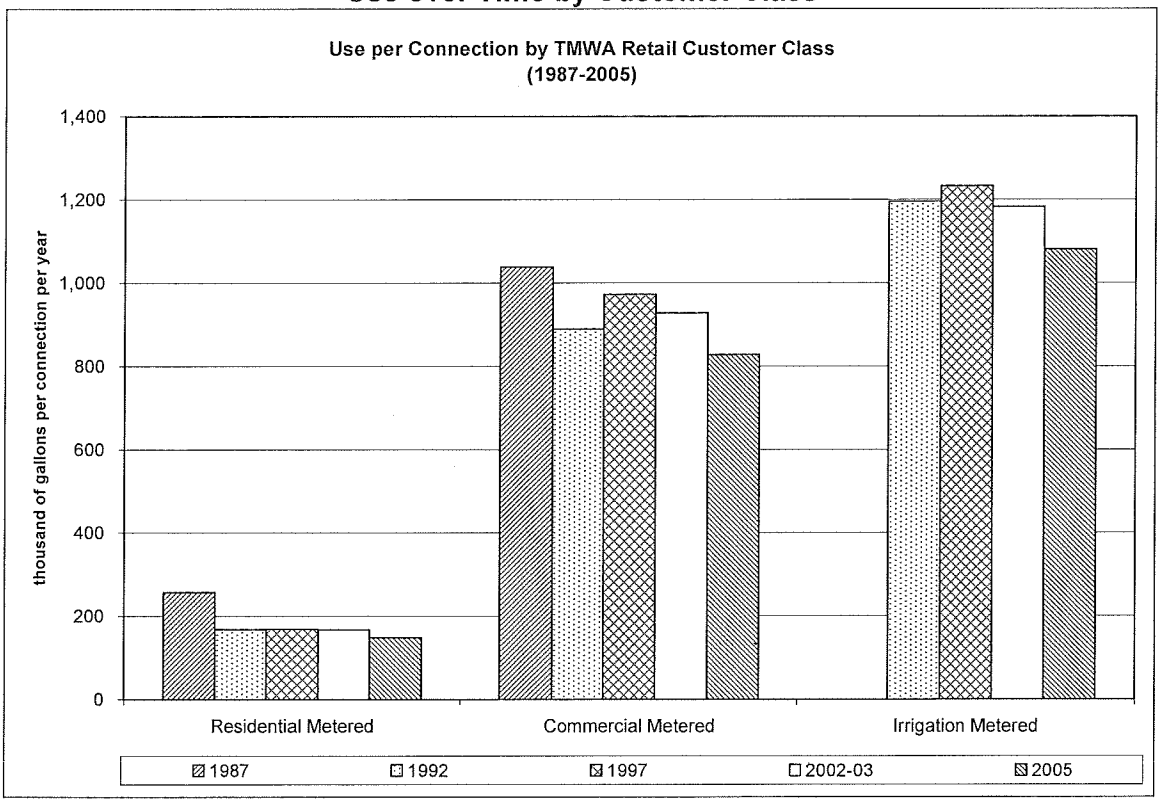
Table 8-3
Shift in Lot Sizes of New Homes

Lot Size (square feet)	1990 Share of Total Lots	1995 Share of Total Lots	1999 Share of Total Lots	2005 Share of Total Lots	2006 Share of Total Lots
<1,000	20%	8%	5%	1%	0%
1,000 to 3,999	8%	7%	6%	6%	7%
4,000 to 4,999	6%	5%	5%	7%	7%
5,000 to 5,999	7%	8%	8%	9%	8%
6,000 to 6,999	11%	16%	20%	18%	18%
7,000 to 7,999	9%	13%	15%	14%	14%
8,000 to 8,999	6%	8%	9%	10%	10%
9,000 to 9,999	3%	6%	6%	7%	8%
10,000 to 11,999	5%	6%	7%	9%	9%
12,000 to 15,999	7%	7%	7%	9%	9%
16,000 to 20,000	4%	4%	3%	3%	3%
>20,000	16%	13%	9%	8%	6%
TOTAL	100%	100%	100%	100%	100%

Source: TMWA

As a second measure of water conservation achievement, water use can be compared by customer class over time. Figure 8-3 shows how water use per connection has changed by customer class in TMWA's retail service territory since 1987. Residential metered water use has reduced slightly per connection (there were very few metered residential customers in 1987). The flat-rate residential customer water use per connection has increased because lower water use flat-rate services have converted to meters first, leaving the larger water use flat-rate services in the sample data. Commercial metered water use per connection has declined slightly since 1987 and remained fairly stable since the last drought. Commercial irrigation use per connection has also remained stable since the last drought. Use per connection in 1997 was greater than in 1992 due to the water-conserving efforts of customers during the 1987-1994 drought period.

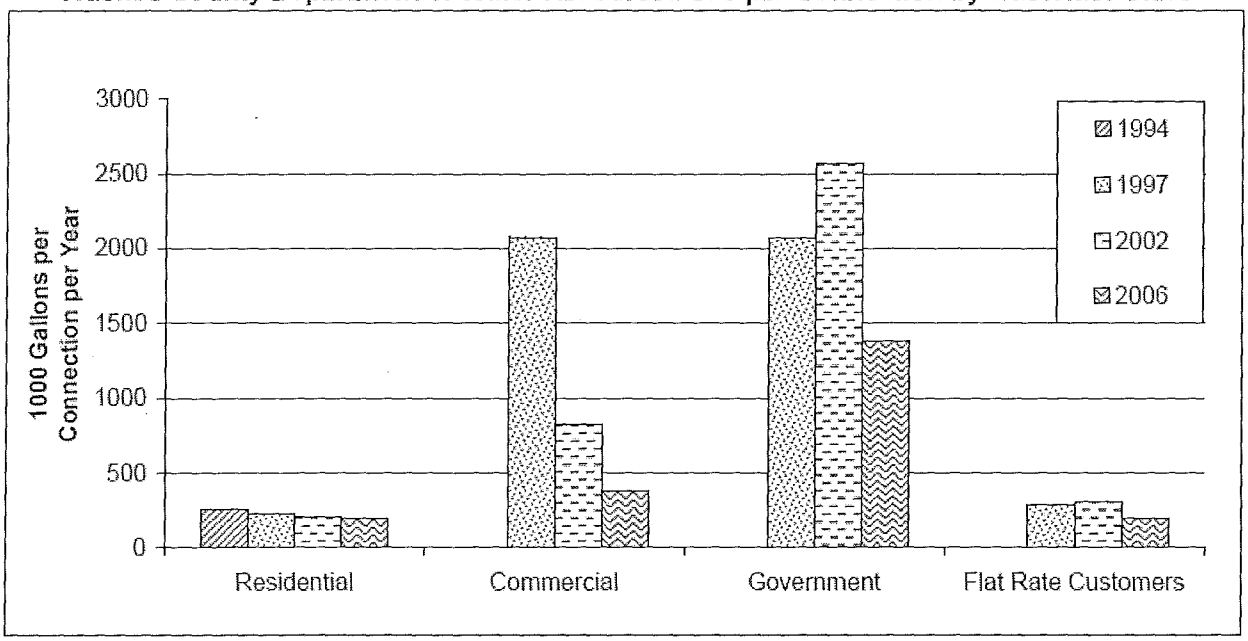
Figure 8-3
Use over Time by Customer Class



Notes: Commercial metered connections customers are businesses including casinos, small offices, warehouses, and manufacturers. Commercial irrigation connections include public parks, homeowner association maintained areas, and other irrigated commercial sites. Commercial irrigation use data is not available for 1987 as meters were installed on irrigation accounts between 1990 and 1992. The 2002-2003 period reflects the fiscal year July 02 through June 03.

Figure 8-4 shows that water use by WCDWR residential customer class has remained stable from 1994 to the present.

Figure 8-4
Washoe County Department of Water Resources Use per Connection by Customer Class



8.4 8.4 Laws, Ordinances, Agreements and Plans Facilitating Conservation

8.4.1 Federal Laws: Truckee River Operating Agreement (TROA) Conservation Objectives

TMWA has assumed responsibilities along with Reno, Sparks and Washoe County to implement the water conservation element of TROA. The TROA Water Conservation Agreement (WCA) fulfills the Preliminary Settlement Agreement (PSA) requirement Section 29(c) and stipulates that as a result of the Agreement, the signatories will not make further determination whether such design criteria (10%) is met in ensuing drought years. The Agreement requires TMWA to spend $50,000 per year for public education and $100,000 per year escalated at 3.5% per year (currently $140,000) for implementation of landscape efficiency programs, and $100,000 per year for the "Water Watcher Program" with distribution of water saving devices and materials regarding water saving measures. The latter two measures are required until such time as TMWA's system is 90 percent metered. The RWPC has in the past and continues to support TROA and the WCA as reflected by the following policy.

Policy 1.1.c: Management of Conserved Truckee River Water

Conserved water originating from the Truckee River shall be managed consistent with agreements among local entities and parties of interest to the Truckee River.

8.4.2 Local Government Ordinances and Water Purveyor Rules

Developed by water planners, local governments, and the Nevada Landscape Association (NLA), local ordinances have been enacted that encourage the use of water efficient

landscaping for new developments and set grading standards to avoid excessive runoff and water pooling. In addition, Reno, Sparks and Washoe County have supported the 1996 Water Conservation Agreement by enacting local ordinances prohibiting water waste. Enforcement of the codes has been minimal. During 2002 TMWA was granted the authority to enforce the water waste ordinances in their service area with limited success. Purveyors with systems that are at least 90% metered do not have to adhere to all of the watering restrictions within the ordinances; however, almost all the purveyors are subject to the same emergency water situation restrictions. In 2003, the TMWA Board approved changes to Rule 2, giving TMWA authority to place water waste penalty charges on a customer's water bill. For a customer with successive violations within a calendar year, the following penalty charges apply:

1st Violation	2nd Violation	3rd Violation or more
$0.00	$25.00	$75.00

Failure to pay the penalty may result in the termination of water delivery to the customer. A meter will also be installed for billing purposes on any flat-rate service that reaches a third violation.

8.4.3 State of Nevada Conservation Objectives

In order to meet the requirements of NRS 540.131 through NRS 540.151, all purveyors of water for municipal, industrial, or domestic purposes, with the exception of certain smaller purveyors, filed water conservation plans, most in 1992, with the Nevada Department of Conservation and Natural Resources for approval and adoption by the State. 2005 amendments to NRS 540.131 require conservation plans to be updated every five years.

In 1993, the State Department of Conservation and Natural Resources imposed minimum standards for plumbing fixtures in new construction and expansions in residential, industrial, commercial and public buildings, mobile homes, and manufactured homes and buildings. These standards include maximum acceptable water use by toilets, urinals, and showers; banning timing devices that cause fixtures to flush periodically, irrespective of demand; limiting the flow rate of faucets in kitchens and lavatories; and prohibiting multiple faucets activated from a single point. These standards supersede the conservation plans described below. Portions of the conservation plans outlined below were also superseded by local ordinances adopted by Reno, Sparks and Washoe County in support of the Water Conservation Agreement discussed in the previous section.

The following water purveyors' conservation plans are on file with the State Department of Conservation and Natural Resources: TMWA, WCDWR, Sun Valley GID, STMGID, Lemmon Valley Mobile Village, Oasis Mobile Estates, Panther Valley Water Users Association, Sierra Spring Water Company, Silver Knolls Mutual Water Company, and Verdi Mutual Water Company.

Because TMWA's plan affects the largest number of people, it is summarized first under each element, followed by WCDWR, Sun Valley GID, South Truckee Meadows GID and the remaining purveyors.

SECTION 1: Elements of Water Conservation

Purveyors' programs are discussed in detail in Section 8.4, Ongoing Measures to Conserve Water.

Element 1.A: Public Education. To increase public awareness of the limited supply of water in this state and general strategies for conserving it:

TMWA
TMWA's public education element is comprised of a multi-media approach including distribution of water-saving kits, seasonal water conservation consultants, distribution of teacher materials, the landscape retrofit program and the residential water audit program. In addition, TMWA hosts landscaping workshops and certification programs, tends booths at events, sponsors TV and radio advertisements, produces a video set that is aired on public television, and distributes literature via its water conservation consultants. TMWA also implements an annual advertising effort to promote the assigned-day watering program. Advertisements promoting assigned-day watering are placed on TV, radio, and in local newspapers. Additionally, printed material with tips on how to keep a healthy landscape are provided in monthly bill stuffers, direct advertising, and web postings at www.tmh2o.com.

WCDWR
Promotes water conservation through newsletters, public access television and its website, www.washoecounty.us/water/. The Department also works with the University of Nevada Cooperative Extension (UNCE) in promoting water efficient landscaping and distributing various water conservation literature. In addition, the WCDWR cooperates with the RWPC in conservation projects and programs.

Sun Valley GID
Provides brochures and videos on water conservation and leak detection for customers.

Other Purveyors
The remaining water purveyors outlined various plans for distributing informational brochures at least yearly; encouraging the use of water efficient landscaping; suggesting ways to conserve water both in the house and outside; and recommending retrofit of toilets, showerheads, and other appliances.

Element 1.B: Other Means of Conservation. To educate the public about specific measures required to meet the needs of the service area, including, but not limited to, conservation measures required by law.

TMWA
In 2002 TMWA prepared a Water Management Program for the Washoe County School District (WCSD), one of TMWA's largest municipal customers, to reduce water use on its numerous sites, thereby lowering WCSD's water bills and reducing peak-day demand for TMWA. Similar programs will be explored with other local agencies. Additionally, a three-year Evapotranspiration (ET) Controller study was initiated in 2003 to better understand potential water use reductions gained through using ET Controllers. In addition to documenting significant water savings, for example 22.9 million gallons over three years for one 10-property study group, the study confirmed that all the individual commercial sites that used the ET Controllers as intended benefited from water savings during the study period. TMWA also works with local agencies to require landscape designs that make sense in the Region's high desert environment.

WCDWR
WCDWR's 1992 Conservation Plan has been augmented with a tiered rate structure, which is now in place.

Sun Valley GID
Customers are encouraged to water lawns according to a voluntary assigned day schedule. Where negligent or wasteful use of water exists on or from a customer's premises, the GID may discontinue water service if such practices are not remedied within 48 hours after notice of violation is given to customer.

STMGID
The metering policy of STMGID requires that a warning letter be sent to any flat-rate customer who uses more than 75,000 gallons per month. If the 75,000-gallon limit is exceeded a second time, the connection is switched permanently to the metered billing rate.

Other Purveyors
The smaller water purveyors listed enforcing outdoor watering restrictions, specifically banning watering during windy conditions, requiring the owner to install water meters on all new connections, and fining or billing tariff surcharges, including a possible tiered-rate formula, due to over-watering.

Element 1.C: System Management. To identify and reduce leakage in water supplies, inaccuracies in water meters, excessively high water pressure, and increase the use of reclaimed water.

TMWA
System management programs include the water-meter retrofit program, replacement of large and non-functioning water meters, annual meter replacement based meter life-cycle, coordination of reclaimed water service with local agencies, identifying increased use of non-potable water sources, leaks and system repairs, maintaining system pressure standards, and monitoring and stopping unauthorized use of treated water.

WCDWR
Performs system improvements, leakage audits of systems, computer modeling of system demands and pressures, weekly pressure testing and calibration tests on wells, well-head meter testing, reclaimed water use, and encourages flat-rate customers to convert to metered rates by showing probable cost savings.

Sun Valley GID
Monitors and repairs water supply leakage and meter inaccuracy, and requires customers or developers to remedy high-pressure situations.

Other Purveyors
The remaining purveyors mentioned a mix of quarterly monitoring of the static water level in their wells to establish a continuous data log on the aquifer, having an on-site manager available to help repair fixture and leak problems within dwellings, maintaining and monitoring water systems daily to ensure integrity of the supply lines, and asking customers to report leaks.

Element 1.D: Drought Plan. All purveyors were required to submit a drought plan that ensures a supply of potable water. Discussion of drought and drought planning is presented in Section 8.6.

Element 1.E: Implementation Schedule. Conservation measures are in effect for all purveyors. NRS 540.131 requires conservation plans to be updated every five years.

Element 1.F: Plan Monitoring. Plans are monitored for effectiveness by the individual purveyors.

SECTION 2: Analysis of Feasibility of Charging Variable Rates to Encourage Water Conservation

TMWA
All metered customers pay according to an increasing tiered structure. Rate structure is continually examined for reasonableness, equity among customer classes, ease of implementation, and encouragement of efficient use of water. TMWA will continue to use a tiered rate structure for metered customers. Not only are tiered water rates a part of the Negotiated Settlement but increasing tiered rates provide greater incentive to high volume water users to conserve.

WCDWR
Customers pay according to a tiered rate structure by customer class.

STMGID
Customers pay according to a tiered rate structure by to customer class.

Other Purveyors
Several other purveyors mentioned they would study the feasibility of designing rate structures and other charges, such as a penalty for excessive use, to encourage conservation.

SECTION 3: Retrofit Existing Structures with Plumbing Fixtures Designed to Conserve Water

TMWA
Publicizes the benefits of retrofitting existing plumbing fixtures by means of its water conservation consultants, publications, bill inserts and its website.

WCDWR
Participates in regional water-conserving plumbing fixture retrofit programs and implements the metered rate upon request.

Sun Valley GID
In addition to the toilet installation program, promotes retrofit of other fixtures and appliances that waste water.

Other Purveyors
Several other purveyors mentioned encouraging retrofit of toilets and other water-efficient plumbing fixtures as consistent with Washoe County Building Code.

SECTION 4: Encourage Installation of Landscaping that Uses Minimal Water

TMWA
Worked with horticulturists, the NLA and University of Nevada Cooperative Extension (UNCE) on public education regarding water efficient landscaping, proper watering techniques, and other landscape practices that can reduce water consumption. TMWA participates with the Washoe County School District, Reno and Sparks to explore opportunities to reduce or eliminate ineffective turf areas and implement non-potable irrigation where appropriate.

TMWA's landscape retrofit program encompasses promotion of water efficient landscaping in the Truckee Meadows primarily through education. TMWA provides a guide to water-efficient landscaping with ideas for yard designs, irrigation layout, plant selection, and maintenance. TMWA launched an interactive guide on its website hosting this guide, and it is one of the most visited pages on the website.

WCDWR
Worked with the NLA and Sedway Cooke Associates in the early 1990s to prepare a landscaping ordinance, a version of which was adopted by Washoe County. WCDWR also works closely with UNCE, which provides pamphlets about lawn watering, water efficient landscaping, and other landscape water reduction methods.

Sun Valley GID
Encourages installation of smaller lawns, irrigated landscapes, and low water-use plants.

Other Purveyors
Several of the remaining purveyors mentioned they also encourage the use of water efficient plants and small turf areas in landscaping, avoiding small, narrow strips of turf that are difficult to water, and watering landscaping properly.

8.5 Ongoing Measures to Conserve Water

In the terminology of water conservation, a *measure* is usually a device that conserves water, such as low-flow showerheads or low-flow toilets. The primary objective in conservation planning is to identify and develop water conservation measures that are likely to be accepted by customers while producing significant system benefits. Over the years, the measures offered by many local purveyors have included water-saving kits, toilet tank displacement bags, automatic hose timers, and leak-detection tablets.

In addition to assigned day watering, the following ongoing programs have proved effective in encouraging water conservation in this area. Where applicable, modification and expansion of these programs to meet new objectives are included in this section.

8.5.1 Water Meters

The RWPC confirms the priority it has placed on metering by adopting the following policy:

Policy 1.1.e: Water Meters

Water purveyors within the region shall meter to the extent practicable, all uses or sales of water within their respective service areas.

WCDWR provides water service to approximately 16,300 accounts in 21 service areas. Customer classes include residential, commercial, government connections, fire protection, standby, irrigation or Golden Valley recharge connections. All of the County's connections are metered. Many metered customers in the Lemmon Valley and STMGID service areas; however, pay a flat rate. The flat rate is calculated by dividing the actual cost of service among the number of flat rate customers in the service area, ensuring that the utility's costs are covered.

Once a year WCDWR calculates a summary of each flat-rate customer's yearly charges compared to the amount they would have paid on a metered rate. Those customers who would have paid less on the metered rate are mailed a letter explaining the comparison and encouraging them to switch. As customers convert to metered rates, the flat rate is recalculated (increased), forcing a smaller pool of customers to pay the allocated costs.

STMGID has a metering policy that requires a warning letter to be sent to any flat-rate customer who uses more than 75,000 gallons per month. If the 75,000-gallon limit is exceeded a second time, the connection is switched permanently to the metered rate.

Being fully metered, Sun Valley GID (SVGID) can pinpoint water waste by comparing pumping numbers versus usage numbers. SVGID decreases such waste by reducing water supply leakage, correcting meter inaccuracy, and adjusting high-pressure situations. SVGID customers are exempt from the assigned day watering restriction because all customers are metered.

TMWA assumed the meter retrofit financing plan responsibilities and the program that SPPCo initiated in 1995 as part of TROA implementation. In March 2002, as a result of a November 28, 2001 Board action, TMWA began installing meters and billing on the metered rate whenever a single-family residence changed tenants. Based on current financing made available through developer-paid meter retrofit fees of approximately $2 million annually, the system will be fully

metered within 2 to 3 years. The following table summarizes total meters installed as of June 2007.

Table 8-4
Summary of TMWA Meter Retrofit Progress

	Number of Services
Flat Rate Services Requiring a Meter	4,187
Flat Rate Services with Non-Billing Meters	11,146
Total Flat Rate Services	15,333
Total Metered Residential Services	66,821
Total Flat Rate and Metered Services	82,154

Note: When the meter retrofit program began in 1995, 44,651 flat-rate services required a meter.

In addition to the progress made by local purveyors to meter the use of water, the 2007 Nevada Legislature took steps to require the owner of a domestic well to install a water meter if an accessory dwelling unit of a single family dwelling unit is to be served by the domestic well. Senate Bill 275 made these and other additions affecting domestic wells to NRS 534.

8.5.2 ULF Toilet Installation and Retrofit

In 2001 the RWPC initiated a Pilot Toilet Retrofit Rebate Program financed by the Regional Water Management Fund and contributions from the Cities of Reno and Sparks, through TMWRF. Toilets account for more than 26 percent of all indoor water usage. The program goal was to replace 10,000 high-flush toilets (3.5 gallons or greater per flush) with ultra low-flow (ULF) toilets (1.6 gallons per flush) by offering cash rebates to owners of qualifying dwelling units. Original program estimates included a possible 114,000 pre-1995 homes in the region that have high-flow toilets: 60,600 single-family homes and 53,400 multi-family dwellings. It was assumed that if 75% of high-flow toilet owners participated, 85,000 dwelling units would be retrofitted, saving approximately 4,339 af/yr. A contract to administer the Pilot Toilet Retrofit Rebate Program was awarded to a consulting firm experienced with similar programs in other states. The program was active from July 2001 until March 2003. A follow up effort, a toilet installation program administered by SVGID, was started in July 2003 and ended in December 2004. The two programs replaced a total of 15,097 toilets, providing for an estimated annual savings of 528 acre feet of water. TROA assumptions, used to evaluate the program, estimated annual water savings of 35 af per thousand toilets retrofitted. Water saved by this measure will be credit stored under TROA for release to increase flows in the river to improve water quality.

8.5.3 Use of Other Water-Conserving Fixtures

The ACC believes that the mandated installation of ULF toilets, showerheads, and similar devices in all new and remodeled residences since 1993 has resulted in the water conservation second only to the installation of water meters in the region. Low-flow showerheads and similar devices also facilitate water conservation by the homeowner. Low-flow (2.5 gallons per minute) showerheads have been available for more than 15 years; and due to natural replacement of worn fixtures, the average flow rate of existing showerheads in homes and hotels has been

steadily declining. Installation of low-flow devices is required in new homes and remodels in the region. TMWA distributes low-flow devices such as showerheads, hose timers, and self-closing nozzles on a limited basis each year.

8.5.4 Leaks and System Repairs

Maintaining the integrity of water systems is an important water conservation measure because even the smallest drip from a worn washer can waste 50 gallons of water or more per day. Water metering can help detect major leaks, and the Water Usage Review Program (described below) can pinpoint smaller leaks. Water purveyors repair detected and reported water breaks and leaks as soon as is practicable. In the case of a leaking poly-butylene pipe, TMWA's crews will usually replace the entire service, as this type of pipe has proven particularly prone to leaks.

8.5.5 Local Ordinances and Water Purveyor Rules

The RWPC is working with local government entities in an effort to change the residential plumbing code to reduce hot water pipe size where applicable. For example, building codes would specify smaller-diameter pipes for distribution of hot water in homes, thereby reducing the amount of water wasted waiting for hot water to reach the tap. The estimated savings from such a measure is approximately 28.6 gallons per household per day for single-family homes and 4.1 gallons per household per day for apartments and town homes (CES, 1998).

The Uniform Plumbing Code requires pressure reducer devices to keep water pressure no higher than 80 psi. The proposed changes by the ACC to the local residential plumbing codes include reducing the Uniform Plumbing Code requirement of 80 psi to 65 psi. Higher water pressure may increase the possibility of main breaks or accelerate the development of leaks on both the water purveyor and customer facilities. Excessive pressure results in more water delivered through the tap than necessary since flow rate is proportional to pressure. This can result in such forms of water waste as sprinkler overspray, faucet splashing, and higher leakage flow rates.

The Cities of Reno and Sparks, and Washoe County (April 2002, July 2002, and March 2002 respectively) have enhanced ordinances that support TMWA's conservation efforts and allow enforcement of penalties to water wasters. The ordinances also give TMWA Board of Directors authority to recommend to the local governments that a water emergency be declared with associated watering restrictions. TMWA's Rule 2 allows for penalty charges for water waste to be put on the water bill and a water meter to be installed on flat-rate repeat offenders.

In 2004, TMWA's Technical Advisory Committee formed a Landscape Subcommittee to address increasing customer complaints about landscape standards approved by the local governments and the lack of consistent enforcement of the water conservation elements of the ordinances. The subcommittee, comprised of three voting members representing Reno, Sparks and Washoe County, developed findings and recommendations regarding landscape ordinances (see Appendix K). The ACC participated in the development of the recommendations. After reporting to the TAC and the TMWA Board, staff presented the final report to the Reno City Council, Sparks City Council and Washoe County Board of Commissioners at a joint meeting in 2005. At that meeting, the governing boards directed their respective staffs to prepare code amendments to address the findings and recommendations.

8.5.6 Water Usage Review Program (Water Audits)

In 2002, the RWPC approved a funding recommendation from the ACC for TMWA to implement a pilot residential water audit program during summer 2003. The purpose of the pilot program

was to help the RWPC further its water conservation goals and measure the viability of such a program by establishing appropriate levels of staffing, cost recovery, attainable audit goals, and quantify water savings. A residential water audit consists of complete indoor and outdoor water surveys, retrofit of simple water saving devices such as showerheads and faucet aerators, and complete recommendations for water saving measures. Auditors used laptop computers and specialized software to make water saving recommendations and provide the customer a printed report at conclusion of the audit.

The 2003 pilot program was met with extremely positive customer response and had considerable success in expanding water conservation awareness through personal customer education and retrofitting of simple water saving devices. The RWPC renewed funding for the program in subsequent years and the scope of the program was broadened in 2005 to add commercial water audits. Expanding the program to commercial properties proved successful and the program was again made available to residential and commercial customers in 2006 and 2007. The program title was changed from Water Audit to Water Usage Review in 2007. The 2007 program made use of new meter technology installed by TMWA in the Wingfield Springs area of northeast Sparks. The newly installed meters include a data logger that allows for a more detailed analysis of daily water use. TMWA is targeting high volume residential water users in this area to participate in the water usage review program. Upon reviewing the daily data log from the participant's meter and speaking with the resident, staff can better assess when water usage is occurring and recommend appropriate changes based on the type of use. The information on the data log can also help pinpoint if a leak is occurring. Additionally, the data loggers allow staff to review water usage after the audit to assess whether the resident made changes in their water use. Results for the audit program for calendar years 2003 through 2006 are shown below.

	Total	Commercial	Residential	Reno	Sparks	Washoe County
2003	444	42	402	275	149	20
2004	497	66	431	324	135	38
2005	894	123	771	538	281	75
2006	731	70	661	469	238	24
2007	1,853	208	1,645	1,175	593	85

Customer response to the service continues to be extremely positive. In general, participating customers are more conscientious than the average customer and are receptive to the education and auditor's recommendations. General findings from the program include:

- A main source of inefficiency is inappropriate settings on irrigation clocks
- Water auditors generally recommend reduced watering times for lawns and landscaping
- Commercial properties have different issues; mostly leaks within their irrigation systems
- The majority of recommendations for water conservation are for outdoors
- Customers with older model dishwashers and clothes washers said they would look for Energy Star models when they replace their machines
- The program continues to be very popular with senior citizens.

8.5.7 Rate Design

TMWA, WCDWR and STMGID rely on water rates so that customers are charged, to the extent practical, the cost of service for their customer class. This is done by using different base rates

for each customer class and various price-tier structures. Each above purveyor employs a multi-tiered block-rate structure in which the price per 1,000 gallons increases as more water is used.

8.5.8 Public Education

There are many ways water conservation is promoted in the region.

Outdoor Watering

UNCE, the NLA and others have cooperated extensively with the RWPC in developing research, statistical data, and implementation of programs regarding outdoor watering. (See Appendix G for discussion of regional landscaping problems and suggested solutions by ACC member and NLA Past President, Harry Fahnestock.)

TMWA and Washoe County's Department of Regional Parks and Open Space jointly offer ongoing water conservation workshops at Rancho San Rafael Regional Park, where the May Arboretum has an extensive display of water efficient and native plants. Workshops have included guided tours of the Arboretum, seminars on designing water efficient landscapes and winterizing irrigation systems. TMWA utilizes every opportunity to promote wise water use, attending public events and distributing information. Organizations can request that TMWA present conservation advice to a specific audience. An on-line residential indoor and outdoor guide provides water savings tips for households, as well as some general usage information about TMWA customers and how to read a water meter (www.tmh2o.com/conservation).

Water Efficient Landscaping

Landscaping with water efficient plants only conserves water if the landscape is irrigated correctly. The plants will use more water than needed if over-watered. Educating those in charge of setting the watering schedule as to the proper amount needed by each type of plant is crucial.

The UNCE is a resource in helping define irrigation technology for water efficient landscaping. At the Washoe ET Project website, www.washoeet.dri.edu, UNCE offers comprehensive information about water conservation measures appropriate for this area. The Final Report of the Washoe Evapotranspiration Project also can be accessed from the Desert Research Institute.

TMWA published a new edition of "Water-Efficient Landscaping in the Truckee Meadows," with ideas for yard designs, irrigation layout, plant selection and maintenance. In 2003 TMWA launched an interactive landscaping guide on its website that enables customers to obtain individualized information easily, www.tmh2o.com/conservation/retrofit_plan.

Over the last two years, the RWPC's Advisory Committee on Conservation has identified landscape irrigation efficiency as one of its primary areas of focus. Landscape irrigation systems installed and maintained by certified technicians is one way to increase irrigation efficiency.

Landscape Irrigation Training and Management

In February 2002, TMWA, in cooperation with the NLA, initiated a two-day training and certification program for local landscape industry professionals leading to certification as a Landscape Irrigation Auditor. A one-day class in Spanish was also held, and Landscape Irrigation Auditor certificates were awarded in English and Spanish. Due to the success of the classes, the RWPC funded the class in April 2003, with TMWA hosting the event.

The Nevada Landscape Association (NLA) brought the Certified Landscape Technician (CLT) exam to the region in 2003, through its association with the Professional Landscape Network (formerly Associated Landscape Contractors of America), as a way to raise the standard of the local landscape industry. The multi-module, practical exam is administered internationally and in a number of states and is widely accepted by the local industry.

Non-Functional Turf Conversion

Older homes, schools, and parks that have inefficient watering systems might be candidates for such a program. However, the conversion from turf to hardscape as a water conservation measure is a potential program that is very costly. Homeowners are seldom willing to convert 1,000 square feet of turf to an alternative landscape/hardscape design unless there are other motivating factors, such as a cash incentive. Another problem with landscape conversions is there is no guarantee the area will remain hardscaped if the property is sold. In addition, the major problem with turf conversion is that, although a portion of the lawn is removed; owners seldom make regular seasonal watering adjustments to meet only the plant's requirements. Therefore, the conversion seldom produces the maximum potential water savings.

TMWA is working with the Washoe County School District and city parks departments to conserve water. Beginning in 2002, TMWA has hired professional landscape services to remove large non-functional turf areas at select school district sites. So far, a total of 288,000 square-feet of turf has been removed and replaced with low water use plants, materials, and hardscapes. Similar services may be offered to other local agencies in the future.

Managing Turf Quality

Turf grass is often a central component in landscape designs because of its attractiveness, versatility, durability and ability to adapt to extremes. Although turf grass is often perceived as a high water user, recent studies show that many trees and shrubs used in landscapes can require higher amounts of water. Additionally, local professional turf growers are using lower water use turf varieties in their products. Turf use and management in the Region is dependent on species selection, type of use, cultural and maintenance practices and, most importantly, soil conditions and irrigation. In fact, recent research indicates that 80% of all plant problems are associated with poor soil preparation. Appendix G discusses soil preparation in more detail. Turf quality and turf maintenance may mean different things to different people. Low maintenance turf does not mean no maintenance, but it may mean less water, less frequent mowing, and lower levels of fertilization and pest control. Improper turf management can result in poor density, lack of color, increased susceptibility to heat and cold stress, disease and pests, and difficulty repairing wear. Conversely, a deep green, lush lawn in the middle of summer may not be a healthy lawn either, and may indicate improper management practices such as over watering and excessive fertilization. National Gardening Association research indicates that the average homeowner over irrigates their landscape. In times of drought or severe watering

restrictions, a brown lawn should be acceptable. Cool season grasses such as Kentucky bluegrass will go dormant during such times and recover with irrigation. BMPs available from the NLA, UNCE and TMWA promote appropriate horticultural management practices, including irrigation management, planting, soil preparation, fertilization and pest control.

Teacher Materials – TMWA Academy for Teachers

TMWA currently provides an assortment of teaching materials for elementary schools via the Internet site www.tmh2o.com. TMWA has developed a series of modules that meet the Nevada standards for science curriculum, and released the first set of materials in August 2003. Work to be completed includes tailoring the modules to the region's climate and water use for the various grades. Teachers are able to either download the materials directly from the Internet, or order the materials from TMWA.

8.5.9 New Irrigation Technology

Washoe Evapotranspiration Project

Evapotranspiration is a combination of the words evaporation and transpiration. Evaporation is the amount of water lost from the soil while transpiration is the amount of water lost through the plant leaves.

The Washoe Evapotranspiration Project was initiated in 1999 with the installation of three weather stations at different locations in the region to record local evapotranspiration rates (Eto). ET rates are used for irrigation scheduling and budgeting and to determine the potential water needs of plants. The stations were installed at Wolf Run Golf Course, UNR Valley Road Experiment Station and Sierra Sage Golf Course. Weather stations collect daily weather data using sensors and data loggers to record solar radiation, wind speed, precipitation, vapor pressure, relative humidity, minimum and maximum temperatures and soil temperatures. Water managers who use Eto can reduce their water use during an irrigation season by up to 40%. Conventional irrigation controllers can be scheduled using irrigation runtimes posted during the irrigation season on the project website at www.washoeet.dri.edu. Others that may benefit from the project include flood control managers, fire protection agencies, weather service agencies, health departments, golf courses, commercial water users, local landscape management companies, homeowners and water purveyors.

The stations comply with California Irrigation Management Information System (CIMIS) network criteria. The freestanding stations consist of Campbell sensors and are placed in a grassy area, as suggested by CIMIS. A data logger, using the modified Penman equation, as suggested by CIMIS, performs data interrogations. This program is supported by the RWPC, maintained by DRI and is monitored daily by UNCE.

ET Controllers

An ET irrigation controller adjusts the duration and timing of the outdoor watering schedule using ET rates computed from weather data and programmed into the controller. The ET controller may not generate schedules consistent with local watering rules, therefore a user of an ET controller may need a variance from the assigned day watering ordinance. If purveyors decide to issue variances, the community would need to be educated about why owners of ET controllers are not bound by the assigned day watering restrictions. Several ET Controller pilot projects have been conducted in the region.

During 2001 and 2002 the RWPC co-funded an ET controller project with UNCE. The purpose of the study was to determine the efficiency of the new satellite ET controller (Weather TRAK) on residential and commercial landscapes. The ET controller was compared to three other irrigation treatments; a control (intuitive irrigation), a trained UNCE technician, and trained landscape professionals. Results indicate the Weather TRAK controller applied up to approximately 50% less water when compared to landscapes that were irrigated by other irrigation treatments. In addition, the data also suggests that although the ET controller irrigated six days a week, it applied the same or less water to the landscape than the other treatments. The use of the ET controller also resulted in very little or no stress to the turf when compared to the other treatments.

In 2003 TMWA launched an ET controller project on commercial properties in cooperation with landscape professionals. The objective of the study was to measure the water saving potential from using the ET controller technology versus historical water applications. A total of 46 controllers were programmed, installed, and locked onsite to prevent tampering. Each of the controllers use 10 years of historical data and a temperature sensor to schedule watering according to local climatic variables. The meters are read weekly and run times of each of the stations recorded. The project was concluded in 2006.

Results indicate that ET controllers can be an effective tool to reduce application of water on commercial property landscapes. Critical to the performance of ET controllers is the condition of the irrigation system. It is recommended that irrigation system audits be conducted prior to installation of such a new device. ET controllers only work properly when the entire system is functioning optimally. The system audit should check for leaks, malfunctioning equipment, water pressure, site coverage and other related issues that can impact the efficiency of the entire system, allowing the ET controller to maximize its effectiveness. Problems with irrigation systems were frequently documented during the program, in some instances causing removal of the meter information from the study, since large leak problems invalidate the water use recordings for purposes of the study.

The challenge with increased use of ET controllers in Washoe County is allowing their use with the assigned day watering schedule. To comply with local law, only ET controllers that can be programmed to account for local watering restrictions could be permitted, causing an enforcement issue; alternatively all sites using ET controllers could be exempted (receive a variance) to water off-schedule (TMWA, 2007, 2003 – 2006 Pilot Evapotranspiration Controller Study.)

In summary, ET controllers in combination with efficient sprinkler-head technology and installation, proper soil preparation and good management practices can provide significant irrigation water savings for homeowners and commercial property owners.

8.5.10 Use of Non-Potable and Reclaimed Water

TMWA provides Non-Potable Service (NPS) to sites that can use partially treated or untreated Truckee River water, or poor quality groundwater. The water is generally for use on construction and large-scale irrigation sites. NPS is available at a lower rate than treated water, providing incentive for qualified customers to switch to this service. Reclaimed water for construction is available from STMWRF at a limited number of truck-fill sites in the south Truckee Meadows, from TMWRF in Spanish Springs Valley, and from RSWRF in Stead. Permanent south Truckee Meadows sites are planned at Fieldcreek and in the Damonte Ranch – Double Diamond Ranch area. WCDWR also provides non-potable well water for construction

at the Mira Loma truck-fill site in the southeast Truckee Meadows. Customers pay a charge to set up a card-lock account and also pay a metered rate for the water. Both sources are charged at rates lower than potable water service.

Reno, Sparks and Washoe County provide reclaimed water (highly treated wastewater effluent) from TMWRF, RSWRF and STMWRF to irrigation sites and industry where feasible, again reducing the demand for potable water. Supplying irrigation sites and industry with reclaimed water or other non-potable sources leaves capacity for new municipal demand that requires potable water, enabling the water resources to go further. Another advantage of reclaimed water use is to alleviate demand on aquifers to produce water in areas that rely solely on groundwater pumping.

There are limitations on the use of reclaimed water. The following factors must be considered in applying reclaimed water to any site: health factors, seasonal and annual variations in quantity and quality, soil related factors, irrigation factors, water conservation, cost, plant factors, risk of cross-connection, nutrient content and the chemical properties of the water. For sites determined to be suitable for application of reclaimed water, reclaimed water can be high in nutrients and used efficiently by turf grass and other plants. This is usually quite beneficial in turf grass management programs (UNCE, 1988).

The benefits of using reclaimed water are limited in other ways. A portion of Truckee River water used for municipal purposes is returned to the river through TMWRF. As downstream water rights rely on these return flows, water rights must be dedicated to make up the amount of reclaimed water used for irrigation or industry and therefore not returned to the river. The entities have agreed to replace reclaimed water that originates from Truckee River water when that reclaimed water is not discharged back to the river. The potential result is a reduced availability of water rights for other future uses.

Gray water is wastewater generated and distributed on-site; such as from bathroom sinks, bathtubs, washing machines, etc. A properly designed and maintained gray water system can achieve significant water savings but a poorly designed and maintained gray water system can cause health concerns. The Washoe County District Health Department strictly regulates the use of gray water.

8.6 Evolving/Emerging Water Conservation Initiatives

In addition to future savings from continuation of the ongoing programs described in the previous section, the following water conservation initiatives are discussed for consideration and possible implementation in the future through dynamic and evolving initiatives.

Soil Preparation

The ACC recommends that prior to planting a new lawn, the soil should be prepared by tilling in at least two inches, preferably four inches, of organic material to the top six to eight inches of soil (Beard, 1973). Organic material includes well-rotted manure, mushroom compost, bark humus and any other organic by-product. Soil modification will improve the water-holding capacity of the soil, promote deeper roots and reduce or prevent runoff. Appendix G Also discusses soil preparation.

Irrigation Efficiency

Efficiency refers to the uniformity of sprinkler coverage, which can be measured and corrected when an area is over-watered or under-watered. The higher the efficiency, the more uniform the sprinkler coverage reducing over-application on areas of landscape to compensate for lower application rate on other areas of the landscape. The ACC's goal for the area is to achieve at least 65% efficiency. Consumers can learn more about irrigation efficiency by visiting www.washoeet.dri.edu/.

Best Management Practices (BMPs)

BMPs are guidelines for the landscape industry, which include proper application of hardware, plants, turf, and maintenance based on conditions specific to the site. The use of BMPs could be promoted within the landscape industry through NLA certification. For BMPs to be useful tools for the RWPC, they must be developed and agreed upon by the stakeholders, including water agencies, landscape professionals, and the RWPC. Irrigation efficiency is an example of a BMP that the RWPC can pursue with water purveyor support. Similar to landscape ordinances, BMPs must be enforceable to be successful. As discussed above in this chapter, until this issue is addressed, BMPs are unlikely to be successful in this region.

In 2003 the NLA developed landscape performance standards that could be useful in this campaign and which will be evaluated by the ACC.

Low Impact Development (LID)

The region's Storm Water Quality Management Program is developing a Low Impact Development (LID) Program that incorporates numerous water conserving practices. LID is an innovative storm water management approach that promotes the management of runoff from rainfall and urban water use at or near the source using uniformly distributed, decentralized micro-scale controls. LID's goal is to mimic a site's predevelopment hydrology by using design practices and techniques that effectively capture, filter, store, evaporate, detain and infiltrate runoff close to its source. This can be accomplished by creating site design features that direct runoff to vegetated areas with engineered soils, protecting native vegetation and open space, and reducing the amount of hard surfaces and compaction of soil. LID practices are based on the premise that storm water management should not be seen as merely storm water disposal. Instead of conveying the majority of runoff in underground pipes and managing and treating storm water in large, costly end-of-pipe facilities located at the bottom of drainage areas, LID addresses storm water through small, cost-effective landscape features located at the lot level. Almost all components of the urban environment have the potential to serve as LID practices. This includes open space, rooftops, streetscapes, parking lots, sidewalks, and medians. LID is a versatile approach that can be applied equally well to new development, urban retrofits, redevelopment, and revitalization projects. Examples of LID best management practices include design and implementation of:

- Bioretention Areas
- Swales and Buffer Strips
- Porous Paving Systems
- Porous Concrete and Asphalt
- Permeable Pavers

LID practices may be incorporated into:

- Parking Lot Design
- Street and Road Design
- Driveway Design
- Sidewalks and Bike Paths
- Impervious Surface Reduction and Disconnection
- Soil Amendments
- Roof Rainwater Collection Systems
- Roof Leader Disconnection

Additional areas for consideration of LID practices include:

- Pollution Prevention and Good Housekeeping
- Storm Water Education
- Related Structural Controls
- Extended Detention Basins
- Infiltration Trenches and Basins
  Storm Water Ponds and Wetlands

Enforce Landscape and Run-off Ordinances

Each of the three local government entities has landscape ordinances that are intended to only allow responsible development and water management of modified landscapes. For example, the City of Sparks municipal code Chapter 20.32 describes all landscaping requirements in the context of "Resource-efficient" landscaping. Washoe County municipal code Division 4, Article 412 has specifications that plants should be grouped in compatible water-use zones, and that turf areas should minimize runoff and inadvertent watering of non-turf areas. The City of Reno municipal code Title 18, Chapter 18.06.700 general provisions promote the use of xeriscape design principals utilizing drought-tolerant or native plants and the efficient use of water. Despite good intentions, the benefits of the landscaping ordinances are limited without adequate enforcement and follow-through in the field.

The ACC considers enforcement of the entities' landscaping ordinances to be a major objective in the future. In addition it would be worthwhile to consider the feasibility of applying landscaping ordinances to individual residential properties, incorporating the water efficiency and environmental merits of different placement of sidewalks, addition of bio-retention areas, and other design features. The ACC wants to encourage and work with the local entities and water purveyors on updating their landscaping ordinances.

Landscape Water Budgets

A landscape water budget is the amount of water required to irrigate a landscape to maintain the health of the plants without wasting water. It is calculated according to commonly accepted principles of horticulture and irrigation design. Several California water utilities have incorporated landscape water budgets in their conservation programs to fulfill a commitment to BMPs. Most utilities apply the water budgets only to separately metered irrigation accounts, on either a voluntary or mandatory basis. The concept of an irrigation efficiency rebate is sometimes rolled into the program, such as that employed by the City of Santa Rosa. If the irrigation account meets, or is less than, the target water application for a billing period, a rebate is applied to that account.

Implementing landscape water budgets requires investment in technology, possibly services of outside firms to provide satellite imagery, and requires changes to the billing system so that bills can show the water budget information and associated rebates and/or penalties. The cost of setting up such a service may prove more costly than the benefit of the water saved, particularly in a region where outdoor watering is applied for only half the year. Nevertheless, this idea warrants exploration for large irrigated sites.

Sprinkler System Devices

There are various devices to help minimize water waste caused by rain, wind and frost. These include improved sprinkler nozzles, flow sensors and moisture sensors. Manufacturers offer various sprinkler nozzle designs that deliver water in improved stream patterns and trajectories that are more efficient and less susceptible to wind drift.

Sensors turn off the power to the valves, not the controller, so the controller settings are not affected. Use of the sensors will be more successful in some areas of the region than others and their full potential may be hampered by the assigned day watering schedule. For example, in extremely windy areas, use of wind sensors in addition to the restriction of watering only on certain days, may limit the opportunities for watering to the point that the plants' watering requirements can't be met. Following is a short description of each type of sensor and how they work.

Rain Sensors – A small device can be attached to the sprinkler system that will stop the sprinklers during periods of rain, automatically compensating for the amount of rainfall that occurred. The sensor interrupts the circuit from the controller to the solenoid valves shutting off the water. Once dry, the power is resumed.

Wind Sensors - A wind sensor shuts off irrigation systems during periods of high wind, and then automatically resets the system when conditions are more favorable.

Freeze Sensors – These sensors prevent irrigation systems from activating by automatically stopping the flow of water when the outdoor temperature drops to a near freezing level. When the temperature rises above the freezing point, the system is reset to its regular cycle. A freeze sensor can save the life of plants and reduce falling or slipping hazards on hard surfaces.

Flow Sensors – When a ruptured pipe or broken sprinkler is left undetected it can result in a substantial amount of water waste and damage. Plants and groundcover can be flooded, a slope can be eroded and solid surfaces, such as sidewalks or driveways, can be undercut. The flow sensor is set to activate at a specified level of flow. Once that level is exceeded, the electrical circuit is broken and the valves are shut off. As a result, water lost in the event of high external leakage would be substantially reduced.

Moisture Sensors – These sensors conserve water by automatically disabling the sprinkler system operation when the soil moisture content is high. When the soil probes detect soil saturation, the sensor will automatically bypass watering cycles to ensure that landscaping is never over-watered due to rain or excessive irrigation cycles. Once the moisture level drops below the user adjustable setting, the watering cycles automatically resume.

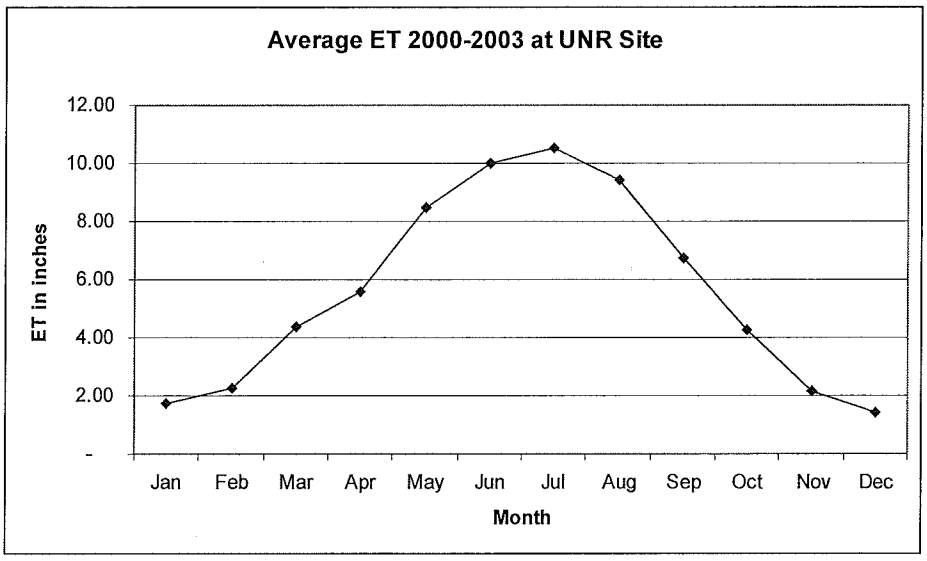
RWPC Sponsored Public Education Program

The ACC recommends implementation of a year-round Public Education Program (PEP) with the assistance of the UNCE and NLA, to educate newcomers and reinforce what seasoned consumers have already learned about outdoor watering. In addition, the program should publicize the proper way to deal with brown spots in the lawn, the most common complaint of water consumers in this area. Most brown spots are the result of poor irrigation system efficiency. Efficiency refers to the uniformity of sprinkler coverage, as mentioned above. The most common response to brown spots is to increase watering times, which will over-water most of the lawn area. The proper approach is to hand-water the brown spots until system efficiency can be tested and corrected.

Use of Local ET Rates – Figure 8-8 shows that the amount of water that should be applied varies according to the season. Educating the public about this should be a major component of a PEP. The graph below shows that consumers generally need to water the same amount in April and October, more in May and September, even more in June and August, and the most in July. (ET rates are available at www.washoeet.dri.edu/)

Partnerships with Local Organizations - Opportunities exist for the RWPC to work with local government entities and water purveyors to provide demonstration gardens and displays of water-saving devices and new technologies. There are continually more opportunities to partner with other local organizations, such as the UNCE on brochures describing new water saving techniques, and the NLA on training programs.

Figure 8-8
Monthly ET Rates



Use of Media - A spring campaign could be launched in February to remind water users to make sure their watering devices are in proper working condition before the watering season begins. Making sure the water system is working properly prevents under- or over-watering. The campaign should educate owners that they do not have to turn their sprinklers on during the first warm days of spring. Simply announcing in September that everyone should reduce watering to half of their summer schedule amount might be the most effective fall campaign. TMWA

stresses the same concept with irrigators who tend to over-water in the fall. A good website illustrating ways in which to conserve water for homeowners can be found at www.h2ouse.org.

Landscape Award Programs
NLA and TMWA offer landscape awards for efficient commercial and residential landscape designs. TMWA also conducts an annual water conservation poster competition.

Education on Water-Saving Appliances - This strategy can be effective in both the existing and new-housing market. Such a program would require cooperation and joint funding between TMWA, electricity and gas purveyors, and Washoe County. Many energy-saving appliances are also water-saving appliances, such as washing machines and dishwashers. One idea to explore is the development of a label showing the water-efficiency rating of the appliance to accompany the energy star label. Along with sufficient education, a water-saving appliance rebate may also prove effective in promoting water-efficient appliances.

Dual Water Delivery Systems

Dual water distribution systems, one providing potable water for indoor use and another for non-potable water used outdoors, could help achieve more efficient water use. Delivery of reclaimed water for irrigation of parks, golf courses and common areas, as described above, is a variation of this concept in use today. Gray water systems are another variation. It has been generally thought, however, that the cost of expanding the reclaimed water distribution system to serve individual residential lots would exceed the benefits. This assumption is being tested with the design of dual water systems at a small number of new small-lot subdivisions where indoor water demands will be served by a potable water system and outdoor irrigation needs will be met by a separate reclaimed water system. Health concerns exist wherever potable water and non-potable water, such as reclaimed or gray water, are used on the same parcel or lot. Prevention of cross connections and backflow must be addressed first and extensive public education undertaken. TMWA and SVGID distribute brochures promoting cross-connection safety.

Customer Leak-Repair Assistance

Water purveyors routinely audit their systems for leaky pipes and facilities to minimize waste of municipal supplies and reduce costs of treated water. Unaccounted for water typically averages about 10 percent of total production in urban areas (AWWA). Sources of unaccounted for water use include fire hydrant use, main flushing, and unauthorized uses. The remaining unaccounted for water is lost through leaks in the distribution system, evaporation, poor meter calibration, and unknown sources.

System-wide audits can only be conducted in metered systems and can only measure water waste to the customer's connection. Leaks of customer's facilities can also constitute considerable water waste. Many customers are unaware of leaks until they pay a metered rate. For some customers the cost of repairing the leak may be large. A leak-repair program that can help those customers needing to repair leaky pipes, particularly customers on low or fixed incomes, may be a cost-effective way to reduce water waste. The ACC has discussed the possibility of assisting customers on low or fixed incomes as one way to help the meter retrofit program, and may continue to pursue this type of program in coordination with the water purveyors if it proves financially feasible and socially desirable.

Commercial Faucet Retrofit in Restaurants

The California Urban Water Conservation Council recently received a $2.2 million grant from the California Public Utilities Commission to replace 16,900 pre-rinse spray valves in restaurants and other food service businesses. The pre-rinse spray valves are used to remove the majority of food waste from dishes and utensils prior to placing them in the dishwasher. Called "Rinse and Save", the program will market free spray valves directly to food service facilities, and provide free installation of the valves upon request. The project will run through December 2003. The Council estimates that each replaced spray valve will save an average of 200 gallons per day. More information on this project is available at www.cuwcc.org.

Given that the entertainment sector is prominent in Washoe County, with an associated large number of dining establishments, a similar project should be explored in this area.

Good Earthkeeping

Though this program was included as an action item in the 1995 Base Case for conservation, it has not yet been vigorously pursued with the local hotel and motel industry. The ACC agrees that there are potential water savings to be gained from this program and the feasibility of implementation needs to be explored. Good Earthkeeping reduces hotel/motel laundry requirements by educating guests regarding the need to conserve water and asking them to indicate whether linens and towels may be changed every other day, rather than daily.

Promotion of New, Creative Ideas

There are several ideas for water conservation that are being tested and implemented across the country. This section discusses some of these ideas and their applicability to our region.

Waterless Urinals - There are a few companies supplying waterless urinals that claim to save approximately 40,000 gallons of water per urinal per year. The urinals work by using a filter system and liquid sealant, which helps block odors. The urinals cut sewer and water costs and are generally less expensive to maintain than flushing urinals. Water utilities that are working with these urinals include East Bay Municipal Utility District and Los Angeles Department of Water and Power in California. Typical customers include large theaters, sports complexes, school districts, arenas and stadiums.

Water Harvesting Techniques - While the idea of harvesting rain for water conservation purposes makes sense, and is gaining momentum across the United State, it may have limited applications in an area of the country that only receives an average of seven inches of rain each year. Effectiveness of rainwater harvesting is dependent on soil type and reinforcing the need for good soil preparation to effectively hold and utilize water. Additionally, health officials have expressed concerns regarding the creation of breeding habitat for mosquitoes and other vectors.

Storm Water Run-off Collection Under Parking Areas - It is possible to collect storm water runoff from hard surfaces, in particular parking areas, by installing technologies such as infiltration basins that allow polluted runoff to percolate into the ground rather than flow into the street, and trenches that trap oil, grease and hydrocarbons leaving filtered water to flow into the storm drain system. Even more advanced systems can process the storm water back to potable water.

These potential but costly programs realistically could only occur during new construction, and may be regulated through BMPs.

Rain Barrels, Cisterns and Rain Gardens - Rain barrels and/or cisterns can be placed outside homes to catch rainfall from the roof, which is stored for use in the garden or the home. Advantages of using rain barrels and/or cisterns include lower water costs over time and possible reduction of surface and groundwater use. Cisterns are greatly utilized in arid states such as Arizona, New Mexico and Texas and in countries such as Yemen and Mexico. Health departments keep a close watch on maintaining vector control in areas utilizing these outside rainfall collection devices.

Rain gardens were initially designed to reduce storm water runoff, but also have implications for water conservation. Rain gardens are pond-like recesses shaped like a saucer that collect rainwater from driveways, walkways, decks, and roofs. Pollutants from storm water are filtered in the rain garden rather than making their way directly to rivers and lakes, and the water is used by trees, shrubs, and other landscape plants.

Alternatives to Typical Water-using Devices

In addition, there are small-scale home water-saving opportunities such as:

- Obtaining hot water from a composting greenhouse
- Composting toilets
- Constructed wetlands for wastewater treatment

These measures are unlikely to be adopted widely but are relatively inexpensive alternatives that may be more appealing in rural areas of Washoe County.

Research Studies

The RWPC should continue to support local research studies on new landscape industry technologies and watering practices. It may also prove beneficial to hire consultants to provide updates on emerging trends and policies of other water utilities in the Western United States.

8.7 Drought

Impact to Surface Water Supplies

Water stored in upstream reservoirs is used to maintain Floriston rates and to carry over water supplies from plentiful water producing years for use in years when precipitation is low. Floriston rates (the court-ordered flow rates of the Truckee River at the California-Nevada border) dictate minimum stream flow at which traditional users (irrigators, power producers, and municipal and industrial purveyors), meet their water requirements. If adequate storage is not available to augment low-flows, downstream users must curtail their water use. The summer low-flow period, which coincides with the peak-use period, requires water stored in Boca Reservoir and Lake Tahoe to be released into the Truckee River in order to maintain Floriston rates. TMWA has privately owned water reserves held in Donner and Independence Lakes, and not accountable to Floriston rates, for use during drought periods.

The most critical period for water supply in the region is summer and early autumn. If a drought exists, it is during these months that the Truckee River will have low flows, and water supplies will have to be augmented with groundwater and privately owned stored water. In a severe drought, low flows may occur during the early summer.

Impact to Groundwater Supplies

Unlike surface water, groundwater moves very slowly. Years may pass before a particular year's snowmelt recharges an aquifer and reaches a water well on the valley floor. Consequently, a drought-related decline in the water table may have been caused by a drought many years earlier. The impacts on the groundwater system from a drought are difficult to determine accurately and are even more difficult to predict; however, long-term monitoring of precipitation, stream flow and water table elevations has shown that drought-related impacts are measurable and significant. For example, in 2003 the State Engineer found that in the Mt. Rose Fan aquifer, drought conditions resulted in 10 feet of water table decline over the prior 3 years (State Engineer, 2003, written communication to Washoe County Department of Water Resources).

Every resident of the region using water for domestic purposes relies on groundwater supplies to some degree. TMWA wells typically supply between 15 and 20 percent of annual, net water production. Those wells provide water to meet summer peak demands. During extremely dry years when Truckee River water is not plentiful between June and October, TMWA relies even more heavily on its wells to meet summer and fall peak demands. In addition to its retail customers, TMWA provides wholesale water to WCDWR, which relies primarily on groundwater to meet demands, and to SVGID, whose only source of water is TMWA. Other water purveyors in the region rely exclusively on groundwater to meet customer demands. All domestic well owners are solely dependent on groundwater to meet their domestic water needs. While a drought may not affect groundwater levels immediately, common sense says that conservation is necessary at all times in order to help lessen the effects from the reduced recharge during drought years.

With this in mind, every water user in the region should place equal importance on using their water wisely and eliminating waste, not only during times of drought, but every day. Prolonged periods of drought may call for more stringent conservation measures. During these relatively rare occurrences, increased conservation will help stretch surface water supplies and maximize our storage underground.

Drought Issues Facing Private Domestic Well Owners

Domestic well owners are encouraged to conserve even though they aren't metered. Although domestic well owners are limited to no more than two acre feet per year by state statute, without meters this limitation cannot be enforced. State law currently does not require domestic wells to be metered.

Some domestic wells are particularly vulnerable to the effects of drought, especially shallow wells, those located in marginal portions of aquifers and those influenced significantly by municipal supply wells or a large number of other domestic wells. The Washoe County Groundwater Task Force found in 2003 that existing domestic wells are failing in certain portions of the region because of declining water table elevations. The task force further found

that there are many causes for water table declines, which are not easily separable and with continued development localized water table declines are expected to continue.

8.7.1 Drought Response Plan

During a drought affecting the Truckee River watersheds the community is expected to reduce potable water use. During drought periods with successive drought years it becomes critical to further reduce potable water use. The Drought Response Plan (DRP) primarily applies to those purveyors relying on the Truckee River and its tributaries as sources of supply. Those purveyors affected include TMWA and its wholesale purveyors. A cooperative effort is critical to reduce potable water use by those that rely on the Truckee River. The conservation effort includes a collaborative approach with the RWPC, TMWA, the Cities of Reno and Sparks, and Washoe County. Depending upon the severity of the drought, a conservation plan will be mandated. As a result of conservation, there exists a potential for substantial water savings, potentially 15% to 20% as demonstrated during the 1987 to 1994 drought years. Such water savings is necessary since the number of services relying on the management of Truckee River reserves continues to grow.

TMWA's drought frequency analysis (TMWA, 2003) briefly discussed in Chapter 2, established that an appropriate drought design criterion should reflect conditions that impact TMWA's ability to divert water from the Truckee River. Inability to divert sufficient quantities of water from the Truckee River only happens during consecutive dry summer months in a low-precipitation year. It follows that water conservation efforts in response to drought should be triggered region-wide by the same conditions, that is, when Truckee River flows are inadequate to meet Floriston rates for one or more consecutive summer months between June through September, the prime months of the irrigation season. Under these conditions, TMWA is required to use privately owned stored water (POSW) or other available drought reserves. When surface flows are inadequate, groundwater reserves are also put under additional stress.

Currently, under the terms of the Water Conservation Agreement (WCA), assigned day watering is enforced until TMWA's system is fully metered. The DRP for this planning process reflects current operating practices and conditions for water supply and purveyors in the region. The recommended level of response under this DRP, which measures are to be implemented regionally, will be phased according to the flows and the number of drought months during the irrigation season, between June and October, when Floriston rates will not be met as predicted by the Federal Water Master.

Additionally, drought response measures should be those proven to reduce summer demands. The RWPC recommends revising the stages and responses that are codified by local governments. Based on current predictive capabilities and water/river forecasts, the RWPC proposes phasing certain measures earlier in the year to potentially extend water availability and thereby limiting the need for severe water conservation activities. The DRP uses a drought rating similar to that of Southern Nevada Water Authority (SNWA) that includes the following levels of drought declaration:

- No Drought
- Drought Watch
- Drought Alert
- Drought Emergency

During years in which the Federal Water Master predicts one or more months' loss of Floriston rates, a Drought Watch, Drought Alert, or Drought Emergency may be declared. The water purveyors dependent on Truckee River water as the main source of supply begin planning for the irrigation season prior to the April snowpack findings, with a communication plan for each of the following drought-ratings in the event that such a declaration is made. The drought rating for a season may be stepped up or down depending on actual river flows during the summer with the appropriate conservation measures enacted.

The condition defining each of these ratings and some of the conservation measures that may be undertaken with each rating or condition is described below.

No Drought

Condition: Floriston rates are predicted to be maintained from June through September.

Response:
Assigned day watering and other conservation measures typically implemented by local water purveyors are in effect.

Drought Watch

Condition: Predicted loss of Floriston rates beginning in the month of September.

Response:

- Assigned day watering; no watering between 1:00 p.m. and 5:00 p.m.
- Increased public education
- Increased enforcement of water waste rules
- Implementation of landscape water budgets for irrigation customers. Assumes an amount of water use associated with various lot sizes. Exceedance of average water use by lot size would result in recommended audits
- Voluntary restaurant implementation of "no-water-served-unless-asked" policy
- Voluntary hotel/motel implementation of Good Earthkeeping activities

Drought Alert

Condition: Predicted loss of Floriston rates beginning in August.

Response:

- In addition to those actions listed under Drought Watch, these actions may be implemented:
  - Expand no watering time from 1:00 p.m. to 5:00 p.m. to 10:00 a.m. to 7:00 p.m.
  - Public education encouraging Spring or Fall plantings of new lawns
  - Exceedance of water/irrigation budgets results in mandatory audits
  - Mandatory "no-water-served-unless-asked" policy
  - Mandatory hotel/motel implementation of Good Earthkeeping activities

Drought Emergency

Condition: Predicted loss of Floriston rates any month(s) prior to the month of August .

Response:

- In addition to those actions listed under Drought Watch and Drought Alert, any of these actions may be taken:
  - New lawn plantings prohibited during the months of lost Floriston rates
  - Once-a-week watering possibly beginning during first month of lost Floriston rates
  - Outdoor watering is limited to non-turf landscaping such as trees, shrubs and flower and vegetable gardens for the duration of the drought emergency. Consideration will be given to public irrigated recreation areas such as parks and schools as the water supply condition permits.

8.8 Recommendations for Future Action

This chapter summarizes progress made since 1995, describes conservation programs currently in place, including base case programs, and programs to consider for future implementation. Action items for future consideration are listed below in Table 8-5. (Appendix H shows action items listed by category (base case, indoor, outdoor, infrastructure and general) and relative priority based on ACC consensus.

Table 8-5
Existing Measures and Actions for Future Consideration

Base Case Measures (see Section 8.2)	
Water Meter Retrofit	Accelerate meter retrofit program. Explore potential for financial assistance to low or fixed income customers for repairs of broken or leaky water lines in conjunction with meter retrofit program. Utility responsible for financial obligation.
Toilet retrofit	Continue, extend or accelerate ULF toilet retrofit. Develop cost estimate to retrofit remaining toilets. Use meter data to verify actual water savings.
New Building Codes	Continue working with building departments to draft and implement building code changes related to pressure reduction valves, reduction of hot water pipe size, hot water pipe insulation. RWPC responsible for financial obligation
Increase Block Rates Region-wide	Continue support of block rates. Utility responsible for financial obligation.
Landscape Efficiency Conversion	Continue outdoor water education programs on landscape efficiencies, soil preparation, plant selection, irrigation design and ET equipment. Develop a summary of BMPs for home use related to landscaping and outdoor irrigation and the education program to promote it. Develop and educate public about outdoor water budgets to promote efficient landscape design, irrigation retrofit and ET watering practices. Utility responsible for financial obligation.
Showerhead Retrofit	Continue low flow showerhead retrofits where needed. Utility responsible for financial obligation.
Good Earthkeeping	Hotel/motel implementation of Good Earthkeeping voluntary under Drought Watch and mandatory under Drought Alert. Hotel/motel responsible for financial obligation.

Table 8-5 - Continued Existing Measures and Actions for Future Consideration	
Ongoing Measures in Addition to Base Case (see Section 8.4)	
Leak/System Repair	Encourage water purveyors to correct system water losses by upgrading system integrity. Explore potential for financial assistance to low or fixed income for repairs of broken or leaky water lines in conjunction with water purveyors—possible use of water waste fines. Utility responsible for financial obligation.
Water Audits	Pilot Residential Water Audit Program was started in April 2003 and was considered to be successful in its first year. Continue this indoor and outdoor audit program into its second and subsequent years. In future years, consider using a web-based self-administering indoor audit. TMWA and RWPC share cost of program. RWPC responsible for financial obligation of approximately $43,000 per year for ongoing water audit program.
Public Education	Continue to encourage water purveyors and other agencies to promote wise water use. Continue irrigation training for landscape maintenance professionals. Determine frequency of program and consider combining with NLA "certification" program. Continue outdoor water education programs for landscape efficiencies, soil preparation, plant selection, irrigation design and ET equipment. Develop a summary of BMPs for home use related to landscaping and outdoor irrigation and the education program to promote it. Develop and educate public about outdoor water budgets to promote efficient landscape design, irrigation retrofit and ET watering practices. RWPC responsible for financial obligation, approximately $3,000 per year for ongoing Washoe ET Project maintenance.
New Irrigation Technology	Continue with pilot studies to evaluate potential water savings from new irrigation technologies. RWPC responsible for financial obligation.
Non-Potable and Reclaimed Water	Expand use of non-potable and reclaimed water within limits of TROA and treatment facilities. Utility responsible for financial obligation.

Table 8-5 - Continued Existing Measures and Actions for Future Consideration	
Measures for Future Consideration (see Section 8.5)	
Soil Preparation	Addition of organic material to soil prior to planting a new lawn. Work with community development departments to prepare code amendments requiring soil preparation. RWPC responsible for financial obligation.
Irrigation Efficiency	Pursue goal to achieve at least 65% irrigation efficiency (uniformity of sprinkler coverage)
RWPC Sponsored Education	Coordinate a long-term educational campaign in partnership with water purveyors. Use media effectively. In particular, promote use of ET rates, soil preparation techniques and irrigation efficiency. Provide information on water-saving appliances.
Best Management Practices (BMPs)	Develop water conservation BMPs for the region Develop a summary of BMPs for home use related to landscaping and outdoor irrigation and the education program to promote it.
Low Impact Development (LID) Practices	Support and promote LID, especially landscape practices that retain water on-site and prevent runoff. May be more effectively enforced by Storm Water BMPs. See the Watershed Management chapter of this Plan.
Commercial Faucet Retrofits	Investigate and develop a commercial faucet retrofit program for replacement of restaurant pre-rinse spray valves with more water-efficient models
Enforce Landscape and Runoff Ordinances	Encourage stricter enforcement of existing ordinances and efficiencies. Require review of landscape plans. Require review and oversight on installations of large public/commercial irrigation projects. Assist local governments in updating landscape ordinances for water conservation. Provide slope and runoff education. Parks and public agencies to set good watering practices. Provide general public education and training for landscape designers and maintenance people.
Landscape Water Budgets	Develop water budgets for irrigation accounts to promote efficient irrigation design, retrofit, and ET watering practices
Sprinkler System Devices	Research / possible promotion of water-saving devices attached to sprinkler system clocks, i.e. rain sensors, wind sensors, flow sensors
Dual Water Delivery Systems	Promote use of treated water source for potable and other health needs, and reclaimed water or untreated water source for non-potable needs Explore concepts related to dual water delivery systems in new commercial/public, and residential construction
Customer Leak-Repair Assistance	Financial assistance to low-income and fixed-income customers for repair of their water lines in conjunction with water purveyors
Promotion of New Ideas	Provide information on new or innovative ideas, such as water harvesting and treatment, and non-water-using devices Explore opportunities for waterless urinals
Alternatives to Typical Water Using Devices	Hot water from a composting greenhouse, composting toilets, constructed wetlands for wastewater treatment
Research Studies	Support local research studies on new landscape industry technologies and watering practices. Hire consultants to keep ACC updated on emerging trends and policies of other water utilities in the Western U.S.
Good Earthkeeping	Conduct further research on its feasibility in the region. Review successes of Good Earthkeeping in other communities (San Francisco, Santa Fe) to determine if such a program would work in this region.

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Appendix K

TMWA TECHNICAL ADVISORY COMMITTEE LANDSCAPE SUBCOMMITTEE
Findings and Recommendations
5/11/05

INTRODUCTION

The following document presents the findings and recommendations for potential local government action concluded by the Truckee Meadows Water Authority ("TMWA") Technical Advisory Committee ("TAC") Landscape Subcommittee. This subcommittee was appointed by the TAC at the August 31, 2004 public meeting to address the following issues which were raised by TMWA staff:

1. Increasing customer complaints regarding standards of landscaping approved by the local governments.

2. Lack of consistency in enforcement of the water conservation elements of the ordinances.

The subcommittee first convened September 21, and held an additional 4 meetings with the final meeting taking place December 7, 2004. The subcommittee voting members were:

Jim Smitherman, Washoe County
Fred Turnier, City of Reno
Neil Krutz, City of Sparks

The following staff members and their consultants provided valuable input during the course of these meetings:

Terri Svetich, City of Reno
Donald Naquin, City of Reno
Chris Conway, Kennedy-Jenks
Trevor Lloyd, Washoe County
Gregg Finkler, Washoe County

Appendix K

TMWA TECHNICAL ADVISORY COMMITTEE LANDSCAPE SUBCOMMITTEE
Findings and Recommendations
5/11/05

FINDINGS

- The greatest impact for water efficiency is to concentrate on the landscape/irrigation design plan. Landscape design issues that influence water efficiency such as buffering and drainage (runoff management) are best coordinated with the regional stormwater quality management program.

- Only a cursory review is performed for landscape/irrigation design plans when they are submitted to the local governments. Local governments rely on the professionals in the private sector to accurately design irrigation systems.

- There is no thorough checklist of water-efficient landscape/irrigation design principles followed during irrigation plan review.

- The term 'encouraged' in the codes is not enforceable. Many of the water-efficient principles are only 'encouraged'.

- Local governments trust that the letter of completion certified by the plan preparer satisfies the code requirements.

- Water users will be more favorably inclined to make water efficient changes if there is economic incentive to make changes.

- Facilities that are dedicated to local governments, such as parks, do have to conform to rigorous design standards as set by the agency, typically the parks department.

- Typically, maintenance sections of the codes are enforced when a complaint is filed. Due to resource constraints, these sections are not routinely pursued.

- Ordinances are directed at new development and place few, if any, efficiency or maintenance requirements on existing customers.

- Enforcement is not sufficient to ensure that irrigation equipment is adequate to efficiently irrigate small areas of turf.

- Many existing water users have inefficient irrigation systems. There are limited resources to improve efficiency (such as enforced maintenance requirements or retrofit assistance).

TMWA TECHNICAL ADVISORY COMMITTEE LANDSCAPE SUBCOMMITTEE
Findings and Recommendations
5/11/05

RECOMMENDATIONS and ROLE OF RESPONSIBILITY

- New development requirements to be handled by local government ordinances. Items that require ongoing management to be defined as either handled by local government or the water purveyor in their rules.

- Funding mechanisms needed. For new development new fees can be collected through additional inspection or other plan/permit fees. For water purveyor additional work, the most likely source of new funds would be customer rates.

New Landscaping

- Local governments need dedicated staff for irrigation plan check and water efficiency requirements per code. To conduct job effectively, remove term 'encouraged' in current ordinances. Alternatively, hire professional firms to perform work.

- For landscaping with separate irrigation meters, require an annual outdoor water budget by watering zone as part of the submitted Irrigation Plan.

- Require an irrigation efficiency standard that is agreed upon by local experts (such as Cooperative Extension). Addition of an irrigation efficiency requirement and water budget to each of the agency codes would provide consistency of work among landscape architects and across jurisdictions. Calculations for irrigation efficiency and water budget to be submitted by Landscape Architect.

- Require buffer areas at the base of slopes next to impervious materials (for example next to sidewalks, asphalt areas etc) to allow runoff to drain into the soils.

- Inspection of irrigation system to be performed by a Certified Landscape Irrigation Auditor to ensure that the system is performing as designed with the required irrigation efficiency standard set forth in the code. This certification would be submitted by the Landscape Irrigation Auditor as part of the final checklist along with the documentation submitted by the preparer of the plans that the final landscaping meets landscaping code requirements.

- Small turf areas should be limited to a minimum width of 8 feet; 10 feet is preferred.

- **Established Landscaping**

- Ongoing maintenance should be required for existing customers with regular irrigation audits, education, and a tracking procedure. For new development, follow-up audits should be required periodically (perhaps every 5 years) as accountability for long-term maintenance of irrigation system or landscaping (by property owner) is inconsistently enforced.

- Coordinate rigorous irrigation checks for large water-using sites (commercial sites with separate metered irrigation).

- Information to customers, including new developments, on responsibility of areas to be maintained and bill payment.

Applicable to both new and established landscaping is the need for more professional education in the green industry, including landscape architects. In particular, public outreach must accompany any change in standards with revisions to the landscape ordinances.

Truckee River Flood Project Update

In March 2006 the Truckee River Flood Project's Community Coalition agreed on the locally preferred flood management plan. The "Living River Plan" is the result of the Coalition's six-year effort involving more than 500 meetings and 20,000 volunteer hours. The Living River Plan includes a variety of flood protection measures, such as a river parkway with graded benches and terraces designed to slow flood waters, levees and flood walls that protect buildings adjacent to the river, realigning the North Truckee Drain, and acquiring open space and a detention pond. The Truckee River Flood Project presented this plan to the US Army Corps of Engineers with the intent that this plan is ultimately authorized and funded by Congress.

Key elements of the plan include:

- Creation of a terraced river parkway
- Restoration or replacement of the bridges and flood walls in downtown Reno
- Replacement of the Sparks industrial area levee and construction of a setback levee from Highway 395 to McCarran Blvd. on the south side of the river
- Creation of a detention pond at Huffaker Narrows
- Terracing the river channel at Vista Blvd. to reduce flood levels
- Construction of a raised walkway at Rainbow Bend to contain increased downstream flows
- Restoration of the Truckee River at 12 sites between Vista Blvd. and Wadsworth to create a healthier river, improving water quality and channel stability

In April of 2005 the cities of Reno and Sparks, along with the University of Nevada and Washoe County entered into a cooperative agreement that created a multi-jurisdictional committee to oversee the implementation of the Truckee River Flood Project. Each of these entities appointed two voting members and one alternate, representing the needs and concerns of citizens affected by flooding issues. The committee also includes more than a dozen non-voting members who are citizens representing the community at large, municipal offices and staff who provide technical expertise, advice and support. The members represent districts that were severely impacted when the Truckee River flowed over its banks and into the surrounding communities during the floods of New Year's Day 1997 and New Year's Eve 2005.

At an estimated $800 million, the Truckee River Flood Project is the largest public works project ever undertaken in northern Nevada. The Army Corps of Engineers is expected to contribute over half of the project cost. This means that the community will need to contribute approximately $400 million, $100 million of which will come from a fund generated by a 1/8-cent fraction of the local sales tax. Additional local financing is being studied in an analysis of runoff into the Truckee River to determine who benefits from the Flood Project and who contributes to the flooding.

Recent activities include continuing coordination with the Army Corps of Engineers on a draft Chief's Report, the final analysis of the Flood Project, which is expected to be completed by Fall 2008.

On-going land purchases are part of the Flood Project Coordinating Committee's "Early Land Acquisition Plan" for the Truckee River Flood Project. To date, the Flood Project has acquired a total of 12 parcels totaling 139 acres at a cost of $46 million. The acquired parcels will become a part of the river parkway segment of the Flood Project that will provide flood storage and additional recreational opportunities for the community.

Other early-start projects include "TRACTION Projects," listed below by location, title/ brief description and funding committed so far.

- Reno-Sparks Indian Colony – Levee along the south bank of the Truckee River between Highway 395 and Glendale Avenue – $1.7 million.
- Sparks – North Truckee Drain Realignment south of Interstate 80 with outfall to the Truckee River east of Sparks industrial area – $790,000
- Reno – Downtown bridge public visioning process – $600,000
- Washoe County – Hidden Valley Project levee and floodwall phase 1 design – $225,000
- Washoe County – Lockwood area river restoration project – $150,000.

3.8 Reclaimed Water Programs

Reclaimed water provides both local and regional benefits. Using reclaimed water provides a more predictable way to ensure pollutant removal when compared with river discharge and may help meet WLAs, but likewise competes with water needs for in-stream flows. Water that is transferred out of basin (water that does not return to TMWRF) usually requires that an additional 50% be dedicated to provide for that depletion. The NDEP establishes reclaimed water quality standards for reuse which delineate reclaimed water quality requirements, buffer zones, signage, run-off capture, and other requirements.

Diversion of reclaimed water away from the Truckee River provides a mechanism to help meet water quality improvement discharge limitations for the TMWRF. For other wastewater facilities, reclaimed water use provides a sound method of disposal and beneficial use through irrigation and other uses. As the region grows according to its land use plans, reclaimed water use allows the growth to be accommodated while remaining within TMWRF discharge permit limits. Reno, Sparks, and Washoe County are working to improve the river ecosystem. The benefits are intended to improve the nutrient assimilative capacity of the river, which will allow more flexibility in meeting the TMWRF discharge permit. The main local benefit in the use of reclaimed water is that it provides a drought-resistant water source, even in times of restriction and conservation.

3.8.1 TMWRF Reclaimed Water

Existing Reclaimed Water Uses

TMWRF currently supplies reclaimed water to numerous sites in the City of Sparks, Spanish Springs, the City of Reno Mira Loma Park, and to the University of Nevada, Reno (UNR) Farms property. The reclaimed water is sampled and monitored at the end of the chlorination process to ensure the water meets or exceeds regulatory requirements. The reclaimed water delivery system consists of two separate pump stations located at TMWRF and two transmission lines.

One pump station and pipeline serves UNR Farms property and Mira Loma Park. The second pump station and pipeline serves the users in the City of Sparks and Spanish Springs. The locations of these sites are depicted on Figures 3-5 and 3-6. Two more City of Reno sites, the Hidden Valley Golf Course, and Rosewood Lakes Golf Course, are connected to the system, but do not currently use reclaimed water.

The 2006 TMWRF reclaimed water balance is shown in Table 3-3.

Table 3-3
2006 TMWRF Reclaimed Water Balance

2006	MGD	af/yr
Reclaimed Water Generated		
TMWRF Reclaimed water	29.3	32,759
Total Reclaimed Water Generated		**32,759**
Reclaimed Water Used		
Reno TMWRF Reclaimed Water System Use		1,198
Sparks TMWRF Reclaimed Water System Use		1,954
Total Reclaimed Water Used		**3,152**
(Reclaimed Water Generated)-(Reclaimed Water Used)		**29,607**

Potential Reclaimed Water Uses

Figures 3-5 and 3-6 indicate the locations of future potential reclaimed water sites and infrastructure that have been investigated by the Cities of Reno and Sparks under their respective reclaimed water programs. Updated master plans for both of these systems are currently under development. The City of Sparks system (Figure 3-5) extends north from TMWRF generally along Sparks Blvd., and into the north central part of the Spanish Springs Valley. In the next three to five years, the Sparks system is expected to expand into the West Pyramid area. The extent of construction of the new distribution system depends on development conditions.

The City of Reno system is planned to be extended south and west from TMWRF into the central Truckee Meadows area (Figure 3-6). In the next three to five years, the Reno system is planned to expand down the Spring Drive-Peckham corridor to serve the Neil Road Complex, Pine Middle School and Jamaica Park. The Mill St. alignment may also be constructed. An intertie between TMWRF and STMWRF is also proposed, and is discussed in Section 3.8.5.

Beyond the five year time frame, reclaimed water use will continue to be expanded in Reno and Sparks where it makes sense to do so. Construction costs, water rights considerations, instream flows and TMWRF discharge permit compliance are some of the factors that must be taken into consideration when expanding reclaimed water uses supplied from TMWRF. Estimates of potential reclaimed water usage have been provided for Reno and Sparks for the 2030 timeframe. Based on these estimates, the projected 2030 TMWRF water balance is shown in Table 3-4.

Table 3-4
2030 TMWRF Reclaimed Water Balance

2030	MGD	af/yr
Reclaimed Water Generated		
TMWRF Reclaimed Water	45.9	51,319
Total Reclaimed Water Generated		**51,319**
Reclaimed Water Used (a)		
Reno TMWRF Reclaimed Water System Use (b)		6,550
Sparks TMWRF Reclaimed Water System Use (c)		3,050
Total Reclaimed Water Used		**9,600**
(Reclaimed Water Generated)-(Reclaimed Water Used)		**41,719**

(a) Reclaimed water use is currently limited to 6,700 af/yr without dedication of water rights for make-up return flows.

(b) From TRC Solutions Master Plan Update, in progress

(c) From TEC Engineering Master Plan Update, in progress

Approximately 9,600 acre-feet per year (af/yr) of reclaimed water may be used from the TMWRF system. These potential demands only represent uses that would be allowed under current NDEP regulations and policy. These projections do not include other potential uses that have been contemplated, such as residential 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. These other potential uses would require regional coordination and cooperation between local governments, water purveyors and regulatory entities.

3.8.2 STMWRF Reclaimed Water

Existing Reclaimed Water Uses

The South Truckee Meadows Water Reclamation Facility (STMWRF) is one of the few water reclamation facilities in the United States that operates a zero discharge system with 100% reuse. Reclaimed water produced at STMWRF is used for community irrigation of parks, schools, golf courses, commercial landscapes, and thoroughfare median landscapes. Specific reuse areas include the South Meadows Industrial Park, Double Diamond and Damonte Ranch residential areas, the ArrowCreek and Wolf Run Golf Courses, the Washoe County South Valley Regional Park, and Manogue High School, among others. Irrigation with reclaimed water for all of these areas conserves potable water that would otherwise be used for irrigation.

Under current operation, surface water from Whites Creek and Thomas Creek is combined with reclaimed water and pumped to Huffaker Reservoir to supplement the reclaimed water supply as needed. Reclaimed water and creek diversions stored in Huffaker Reservoir are then filtered

and disinfected prior to reuse providing a high quality irrigation water to meet regulatory and end-user requirements.

Seepage losses from Huffaker Reservoir have placed additional demand on STMWRF reclaimed water supplies in past years but will diminish in the future. Huffaker Reservoir was constructed in 1988 and has a storage capacity of approximately 4,000 af. This reservoir was initially constructed with a compacted soil liner but has been loosing significant quantities of stored water to seepage. In order to conserve water and to mitigate concerns over groundwater quality impacts from reservoir seepage, construction of the first membrane liner project began in October 2007 and will line the reservoir up to an elevation of 4,482 ft. A second membrane lining project is planned for 2012 to line the remainder of the reservoir up to an elevation of 4,552 ft. Following completion of these lining projects, the need for supplemental water to compensate for seepage losses will diminish.

The 2006 STMWRF reclaimed water balance is shown in Table 3-5. The STMWRF reclaimed water, creek diversions, and reclaimed water use volumes are all metered values, while the reservoir seepage and net evaporation loss is estimated from the reservoir mass balance. Since the reservoir net evaporation loss is estimated to be in the range of 50 af/yr at current reservoir operating levels, the majority of the 2,375 af/yr loss is attributed to reservoir seepage.

Table 3-5
2006 STMWRF Reclaimed Water Balance

2006	**MGD**	**af/yr**
Reclaimed Water Generated		
STMWRF Reclaimed Water	2.47	2,770
Total Reclaimed Water Generated		**2,770**
Reclaimed Water Used		
STMWRF Reclaimed Water System Use		2,143
Huffaker Reservoir Seepage and Net Evaporation Loss		2,375
Total Reclaimed Water Used		**4,518**
(Reclaimed Water Generated)-(Reclaimed Water Used)		**-1748**

In 2006, the 1,748 af/yr deficit in reclaimed water supply was satisfied by creek diversions from Whites Creek and Thomas Creek. This supplemental water demand could have been satisfied using reclaimed water from other regional sources if an interconnection between TMWRF and STMWRF had been available. In the future, the reclaimed water supply deficit will diminish with the lining of Huffaker Reservoir and with the growth in STMWRF reclaimed water flows.

Potential Reclaimed Water Uses

As the area near STMWRF continues to develop, plans for extending the reclaimed water system to the south up the Mt. Rose Highway are being investigated to serve other potential uses. Future potential reuse sites and estimated demands are depicted in Figure 3-7. Potential reclaimed water demands for the next five years are listed in Table 3-6. Table 3-7 presents the projected annual average reclaimed water demand for all potential reclaimed water use sites identified for connection.

Table 3-6
Future STMWRF Reclaimed Water Demands (In 3-5 years)

Demand	af/yr
ArrowCreek Open Space	22
Bella Vista Ranch	213
Callamont	174
Damonte Ranch Parks/OS	314
McCauley Ranch Estates Common Area	19
Montreux GC & Common Area	452
St. Mary's Complex	2
Steamboat Geothermal	1,000
Total	**2,197**

Table 3-7
Future STMWRF Reclaimed Water Demands (>5 years)

Demand	af/yr
Common Area Irrig Mt Rose Fan	114
Damonte Commercial	71
Elizabeth Lenz School	9
Galena Forest Est Common Area	54
Galena High School	21
Galena Open Space	12
Geiger Grade Commercial	4
Geiger Grade Open Space	17
Harry Callahan Park	48
Marvin Picollo School	14
Matera Ridge Park Site	46
Mt Rose Estates Common Area	106
Mt Rose Hwy Commercial	9
Redfield Regional Center East	62
Redfield Regional Center West	34
So Meadows Commercial	74
So Meadows Open Space	69
So Meadows Parks	9
St. James's Common Area	276
St. James's Resort	287
Steamboat Commercial East	20
Steamboat Commercial West	34
Thomas Creek Estates Park	11
UNR Satellite Campus	9
Total	**1,411**

The Steamboat geothermal facility is currently an air cooled facility. The air cooled operation works well during the winter months but as the outside air temperatures increase becomes less efficient. Particularly during the summer months, the plants' energy production becomes less efficient but could be substantially improved if it were water cooled. Consideration should be given to converting the facility to a water cooled operation or to add a seasonally activated water cooled operation.

Potential reclaimed water demands identified in Table 3-7 only represent uses that would be allowed under current NDEP regulations and policy. They do not include other potential uses that have been identified, such as discharge to wetlands in the Double Diamond and Damonte Ranch areas, residential front yard irrigation, or groundwater recharge, which will require additional NDEP coordination. Discharge to a wetlands may require a NPDES permit if the wetland drains to a river or creek. A NPDES permit would be subject to the areas 208 Water Quality Plan.

The 2030 STMWRF water balance is shown in Table 3-8.

Table 3-8
2030 STMWRF Reclaimed Water Balance

2030	**MGD**	**Low af/yr**	**High af/yr**
Reclaimed Water Generated			
STMWRF Reclaimed Water (a)	7.58	8,486	8,486
Total Reclaimed Water Generated	**7.58**	**8,486**	**8,486**
Reclaimed Water Used			
Existing STMWRF Reclaimed Water Uses (b)		2,600	2,600
Potential STMWRF Reclaimed Water Uses (c)		2,727	5,726
Huffaker Reservoir Seepage and Net Evaporation Loss (d)		160	160
Total Reclaimed Water Used		**5,487**	**8,486**
(Reclaimed Water Generated)-(Reclaimed Water Used)		**2,999**	**0**

(a) From CH2M HILL projections developed in 2007.

(b) Although the metered reclaimed water use in 2006 was 2,143 af/yr, 2006 was an exceptionally wet year with lower than average irrigation demands. An estimated average current reclaimed water demand is approximately 2,600 af/yr.

(c) From CH2M HILL projections developed in 2007. Low estimates represent the potential reclaimed water uses that have been identified for development through 2030. High estimates include the additional unspecified demands from discharge to wetlands in the Double Diamond and Damonte Ranch areas, residential front yard irrigation, or groundwater recharge, which will require additional NDEP coordination.

(d) Based on reservoir water budget assuming membrane liner is extended up to elevation 4,452 ft in 2012.

Using the future wastewater flow and reclaimed water use projections and the water balance for Huffaker Reservoir, the creek diversions currently being used to supplement the STMWRF reclaimed water supply may no longer be required for irrigation of existing sites after sometime between 2008 and 2015. By 2030, it is projected that the reclaimed water surplus from

STMWRF could be in the range of 3,000 af/yr. Consequently, additional potential reuse demands need to be identified for use of water produced by STMWRF. The "High" reclaimed water use estimates in Table 3-7 assume that additional demands are identified and developed for reuse of all reclaimed water produced by STMWRF.

3.8.3 RSWRF Reclaimed Water

Existing Reclaimed Water Uses

The Reno Stead Water Reclamation Facility (RSWRF) has an annual average capacity of 2 MGD. In 2030 the projected wastewater flow is 7.2 MGD. During the winter and when reclaimed water flows are in excess of irrigation demands, the reclaimed water is discharged into a natural drainage channel that flows to the nearby Swan Lake playa. This is the primary disposal site for RSWRF, which is permitted to discharge an average of 2.35 MGD (2,627 af/yr) to the playa. A minimum of 159 million gallons per year (490 af/yr) is sent to the Swan Lake playa per an agreement to sustain the existing wetlands. Under present operation, the RSWRF reuses an average of 0.70 MGD, or about 50% of its total flow for irrigation from March through October. All of the reclaimed water is discharged to the Swan Lake playa from November to February. Figure 3-8 depicts the existing and proposed reclaimed water infrastructure and reuse sites in the Stead area.

The current RSWRF reclaimed water demands are approximately 674 af/yr. Uses include the Sierra Sage Golf Course, the North Valleys Sports Complex, Mayors Park and a truck fill at the treatment plant, which is utilized heavily for construction water and dust control. The RSWRF reclaimed water balance for 2006 is shown in Table 3-9. In addition to the reclaimed water generated from the Reno Stead facility, Washoe County owns and operates the Lemmon Valley Wastewater Treatment Plant. Presently, the water from this treatment plant is evaporated from on-site ponds, but with additional treatment, it could be available to help meet future reclaimed water demands.

Table 3-9
2006 RSWRF Water Balance

2006	**MGD**	**af/yr**
Reclaimed Water Generated		
RSWRF Reclaimed Water	1.4	1,565
LVWWTP Reclaimed Water	0.25	280
Total Reclaimed Water Generated	**1.65**	**1,845**
Reclaimed Water Used		
Swan Lake Wetlands		891
LVWWTP Evaporation Ponds	0.25	280
Reclaimed Water Use		674
Total Reclaimed Water Used		**1,845**
(Reclaimed Water Generated)-(Reclaimed Water Used)		-

Potential Reclaimed Water Uses

In the next three to five years, the reclaimed water distribution system is planned to be expanded to include the commercial and industrial irrigation demands listed in Table 3-10.

Table 3-10
Future RSWRF Reclaimed Water Demands (In 3-5 years)

Demand	Annual Average Demand (af/yr)
Hidden Valley Ranch	19.4
RR Donnelley	10.9
O'Brien Middle School	28.8
JC Penney	20.2
Stonefield Industrial Park	4.3
Freightliner	1.7
Cooper B-Line	2.0
Total Firm Demands	**87.3**

Beyond five years, the reclaimed water system may be further expanded to include commercial and industrial irrigation demands along Lear Boulevard and Lemmon Drive. Potentially, the North Valleys High School and landscape medians within the NVIG properties would also be irrigated with reclaimed water. These future projected demands are 384 af/yr.

Table 3-11
Future RSWRF Reclaimed Water Demands (In >5 years)

Demand	Annual Average Demand (af/yr)
Kinplex	0.9
Veka West	0.5
De Nemours E I Dupont & Co	1.0
NVIG Unit 2	9.2
NVIG Unit 4	73.2
NVIG Unit 6	22.6
North Valley High School	87.8
Difrancesco	3.0
Hernandez	0.7
Penny J C Prop. Inc	1.1
QGR Real Estate Invest Co LLC	1.1
Winner Properties LLC	0.2
MCD Investment Group LLC	0.6
Spirotlite Corp.	1.0

Demand	Annual Average Demand (af/yr)
DP Industrial LLC	5.4
EP Silver Lake 1 LLC	0.3
Kos Partners Vi Partnership	0.1
Schering Sales Management Inc	0.7
Prologis Land LLC	0.7
Brenes	0.3
Berkowitz	2.4
Brenes	1.1
Hernandez	1.2
DP Stead LLC	1.4
Prologis Land LLC	3.1
Prologis Land LLC	2.6
Prologis Land LLC	2.5
DP Stead LLC	4.0
DP Stead LLC	3.2
Silver Peak And Military Rd	8.1
Lemmon Dr. Misc	2.9
Peavine Estates Assoc.	9.1
Silver Lake Elementary School	22.4
Proposed High School	87.8
Silver Lake Park	12.2
Prologis NA3 LLC	2.8
Gadsden Coffee Company LLC	1.6
Morrissey	3.6
Sally Beauty Company Inc	1.6
Total	**384**

The projected RSWRF reclaimed water balance for 2030 is shown in Table 3-12. These potential demands only represent uses that would be allowed under current NDEP regulations and policy. Based on these projected reclaimed water demands, approximately 4,600 acre feet of reclaimed water would be available to help meet other potential uses, such as residential 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. These other potential uses would require regional coordination and cooperation between local governments, water purveyors and regulatory entities.

Table 3-12
2030 RSWRF Water Balance

2030	MGD	af/yr
Reclaimed Water Generated		
RSWRF/ LVWWTP Reclaimed Water	7.8	8,721
Total Reclaimed Water Generated		**8,721**
Reclaimed Water Used		
Swan Lake Wetlands	2.35	2,627
LVWWTP Pond Disposal	0.25	280
Commercial/ Industrial Demand		1,146
Total Reclaimed Water Used		**4,053**
(Reclaimed Water Generated)-(Reclaimed Water Used)		**4,668**

3.8.4 CSWRF Reclaimed Water Uses

Existing Reclaimed Water Uses

The Cold Springs WRF currently disposes all treated reclaimed water to rapid infiltration basins, and does not reclaim water for irrigation purposes. The 2006 reclaimed water balance for Cold Springs is presented in Table 3-13.

Table 3-13
2006 CSWRF Water Balance

2006	MGD	af/yr
Reclaimed Water Generated		
CSWRF Reclaimed Water	0.26	291
Total Reclaimed Water Generated		**291**
Reclaimed Water Used		
RIBs		291
Total Reclaimed Water Used		**291**
(Reclaimed Water Generated)-(Reclaimed Water Used)		**0**

Potential Reclaimed Water Uses

In the next 3 to 5 years, it is not anticipated that reclaimed water will be produced from the Cold Springs WRF for irrigation purposes. However, in Cold Springs, water resources are not readily available within the basin. Water importation projects are being contemplated to help meet the anticipated demands. Beyond 5 years, water reclamation for irrigation is recommended to

provide additional water resources to help fulfill the development potential within the Reno and Washoe County TMSA. A reclaimed water system could be constructed throughout the Cold Springs area for landscape irrigation where it is reasonable. A higher level of treatment would be required at the reclamation facility that would allow for unrestricted irrigation.

Reclaimed water is under consideration for water features and landscape median irrigation within several planned developments in the area. Residential landscape irrigation is also under consideration, which would require regional coordination and cooperation between local governments, water purveyors and regulatory entities. The projected CSWRF reclaimed water balances for 2030 is shown in 3-14. The projected residential irrigation demand listed reflects a range of demand representative of front yard only irrigation, to front and back yard irrigation. From the water balance, it is clear that residential landscape irrigation could play a significant role in future water reclamation practices.

Table 3-14
2030 CSWRF Water Balance

2030	MGD	Low af/yr	High af/yr
Reclaimed Water Generated			
CSWRF Reclaimed Water	4.43	4,953	4,953
Total Reclaimed Water Generated		**4,953**	**4,953**
Reclaimed Water Used			
Residential Irrigation Range (a)		1,946	3,891
RIBs		1.2	1,342
Total Reclaimed Water Used		**1,947**	**5,233**
(Reclaimed Water Generated)-(Reclaimed Water Used)		**3,006**	**(280)**

(a) Based on 12,320 residential dwelling units, City of Reno and Washoe County TMSA/FSA Water, Wastewater and Flood Management Facility Plan, November, 2007.

3.8.5 Regionalization of Reclaimed Water Systems

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. These factors include, but are not limited to, water quality standards, TMDLs and discharges permit limitations to the Truckee River; possible constraints on use of water originating from outside the Truckee River watershed; the need for additional water rights in locations where a return flow to the Truckee River is required; and the sub-regional imbalance between systems of reclaimed water supply, storage and demand.

With regional coordination and cooperation, the possible uses for reclaimed water could be expanded to include uses such as residential landscape irrigation and 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.

In addition to existing water reclamation facilities, there may be opportunities to implement new satellite treatment facilities that divert a portion of the flow from major sewer interceptors for reclamation in the immediate area of use. Generally, membrane type processes are used to treat a portion of the diverted flow, with residual solids returned to the interceptor for treatment at the regional facility. For instance, northwest Reno could potentially benefit from such a facility, since costly extension of existing pipeline facilities from TMWRF would be needed to provide reclaimed water service to the area.

The following section describes some of the potential benefits that could be derived from a regionally interconnected reclaimed water system. Numerous potential benefits for interconnecting the systems are apparent, including extending the region's limited water supplies, providing greater flexibility to comply with water quality standards, potential flow augmentation for the Truckee River, wetland enhancement, and cost savings to the community. Figure 3-9 presents the existing reclaimed water systems. Figure 3-10 presents an overview of several facility improvements that merit further evaluation to determine the benefits of a regional reclaimed water system.

Interconnection of Reno Stead WRF to Cold Springs WRF

Because of their similarities concerning water supply and wastewater disposal, a coordinated regional water reclamation effort for the Stead, Lemmon Valley and the Cold Springs areas is recommended. Insufficient water resources are locally available to satisfy the water demands of these northern valleys, which are relying on imported water resources to meet their planned development objectives. Expanded use of reclaimed water, such as front and back yard residential landscape watering, should be evaluated where reasonable to extend available water supplies and help fulfill the development potential within the Reno and Washoe County TMSA.

Regional water reclamation facilities currently under investigation that could benefit both the Reno Stead and Cold Springs WRFs include an effluent reservoir for non-irrigation seasonal storage, land disposal to the White Lake playa, and export to other areas such as Bedell Flat, Warm Springs and Long Valley Creek. Disposal of reclaimed water to White Lake has the potential to create beneficial year-round wetlands, similar to what has been developed as a park and wildlife viewing area at Swan Lake in Lemmon Valley. Bedell Flat and Warm Springs are areas that are deserving of further investigation to determine their suitability for long-term aquifer storage and recovery of the reclaimed water. With appropriate treatment and regulatory oversight, aquifer storage and recovery (ASR) of reclaimed water can be an environmentally sound practice that would extend the region's water supplies for future beneficial use. Disposal of reclaimed water to Long Valley Creek may also support local wetlands, and could provide an outlet during periods when not all of the reclaimed water generated in the area can be placed to another beneficial use, particularly during the non-irrigation season.

In addition to providing irrigation supplies in the Stead and Cold Springs areas, surplus reclaimed water could also be used to help supply irrigation demands in the Truckee Meadows. One such alternative that has been contemplated is extension of the reclaimed water system to Spanish Springs, Rancho San Rafael Park and the surrounding areas.

Interconnection of Reno Stead WRF to Spanish Springs

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 2,330 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, 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, including Rancho San Rafael Park. 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, the proposed intertie pipeline between RSWRF and Spanish Springs 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, and could provide additional reclaimed water for aquifer storage and recovery in Bedell Flat or Warm Springs.

Interconnection of TMWRF to STMWRF

A reclaimed water intertie pipeline, which would interconnect TMWRF and STMWRF via Huffaker Reservoir, is another alternative that has the potential to provide multiple 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. TMWRF could potentially expand to approximately 46 MGD while the discharge permit limit remains at 40 MGD. 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.

TMWRF to Sparks Future Service Area

In addition to providing reclaimed water to the greater Reno Sparks area, the potential also exists to extend reclaimed water service east along the Truckee River corridor toward Tracy. In addition to the Tahoe Reno Industrial Center in Storey County, substantial residential, commercial and industrial development is planned on the north side of the Truckee River in the

Sparks Future Service Area. Extending reclaimed water service would expand the limited water supplies and help fulfill the development potential of this area.

Regional Reclaimed Water Implementation Issues

Much work is needed to quantify the potential benefits of a regionally integrated reclaimed water system. Numerous questions must be addressed at the community level, including policy, regulatory, technical and financial matters. For instance, does it make sense to require the use of reclaimed water for new developments? What are the water quality differences between the different systems, and what improvements would be needed to facilitate integration? Is there adequate coordination between water purveyors, reclaimed water providers and regulators? How would the upfront costs to develop a regional reclaimed water system be paid for? How would the existing differences in rates, connection fees and water rights dedication requirements between entities be accounted for? Are NDEP and the general public on board with the concept, or are regulatory, public education and outreach efforts required to overcome water quality or public health perceptions?

In addition to these implementation issues, the potential facility costs to interconnect the systems into a regionally integrated system are significant, ranging from $3.4 million to over $40 million. Table 3-15 presents planning level costs for several of the pipeline alternatives presented in the previous section. These costs are not all inclusive; however, not all of the regional pipeline facility elements need to be constructed to begin to realize many of the benefits of an integrated system.

Table 3-15
Regional Reclaimed Water Costs

Regional Facility	**Diameter (in)**	**Length (ft)**	**Cost ($M)** (a)
Interconnection of Reno Stead WRF to Cold Springs WRF (b)	-	-	40.4
Reno Stead WRF to Bedell Flat Recharge Area	18	78,350	23.7
Reno Stead WRF to Warm Springs Recharge Area (c)	18	66,500	20.2
Interconnection of Reno Stead WRF to Truckee Meadows WRF, Spanish Springs, Alt. 1	18	60,100	18.2
Interconnection of Reno Stead WRF to Truckee Meadows WRF, Rancho San Rafael, Alt. 2 (d)	18	70,500	21.2
Interconnection of TMWRF to STMWRF	18	11,100	3.4
TMWRF to Sparks Future Service Area	18	60,100	18.2

(a) 20 Cities ENRCCI = 8,089 Dec. 2007.

(b) Includes storage reservoir, 71,500 ft of 24-inch pipe, 1,800 ft of 16-inch pipe and a pump station. Cost based on City of Reno and Washoe County TMSA/FSA Water, Wastewater and Flood Management Facility Plan (November 2007), Appendix C for Stead and adjusted to the Dec 2007 ENR.

(c) Pipeline from intersection with RSWRF/TMWRF Interconnection 1 to Warm Springs.

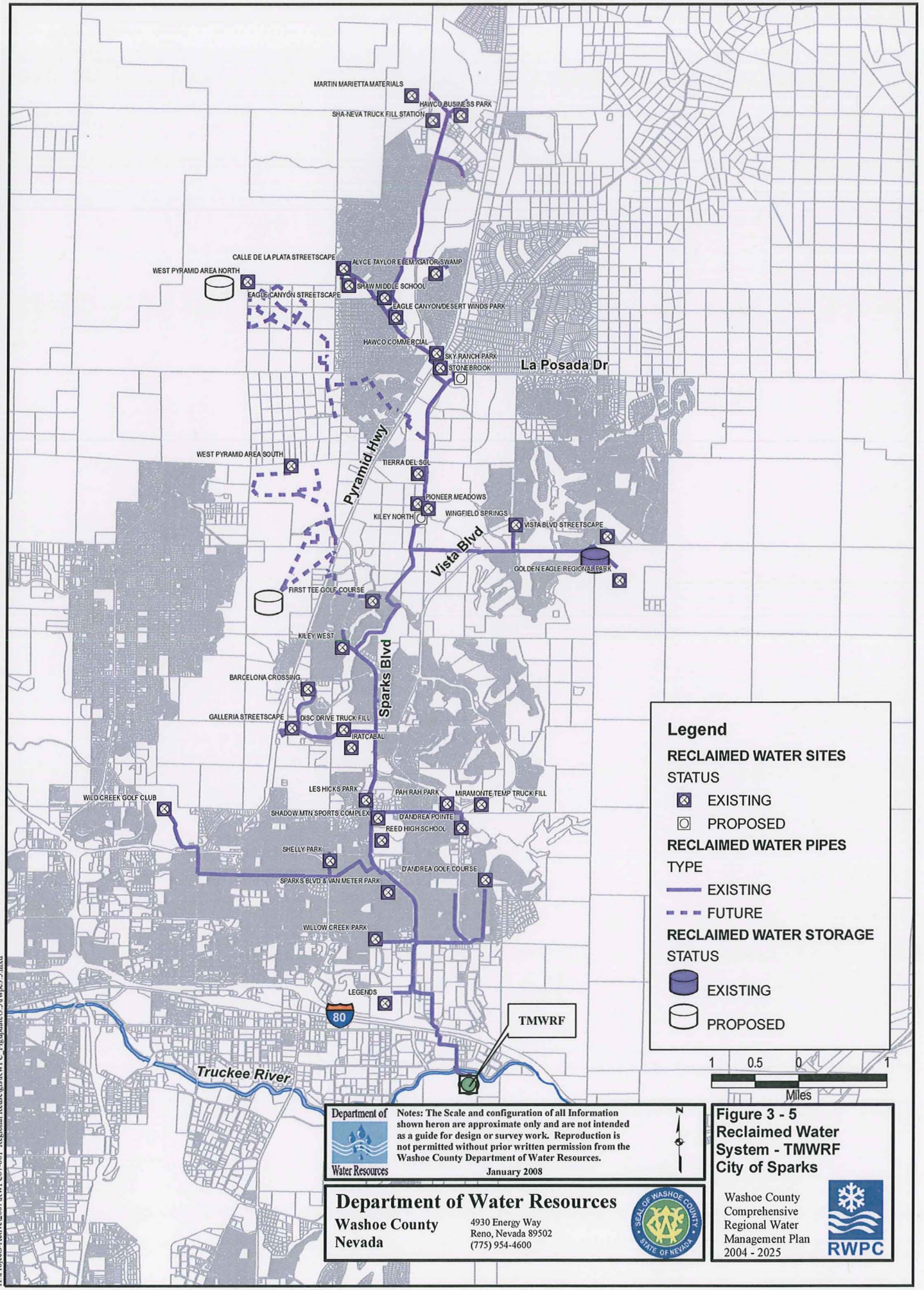
(d) Includes pipeline to Rancho San Rafael Park

Recommendations for Further Work

A thorough planning and facilities study of regionally integrated reclaimed water systems and management strategies has the potential to develop economic and environmentally prudent alternatives that cannot be realized with separate, independent systems. To quantify the potential benefits of a regionally integrated reclaimed water system, policy, regulatory, technical and financial considerations should be fully investigated at the community level.

Close work and cooperation with the Nevada Division of Environmental Protection, the Washoe County District Health Department and the local water purveyors will be required to ensure that expanded uses of reclaimed water are protective of public health and the environment. Reclaimed water purveyors will be relied upon to demonstrate compliance with the regulations through proper design and construction, and ensuring compliance through ongoing operations and maintenance practices. Certain regulations may need to be amended where existing regulations do not adequately address current issues or proposed uses. For example, certain regulations do not accurately reflect the quality of reclaimed water, and new regulations will be required if residential landscape watering is to be implemented. The community may want to look to neighboring states that have implemented similar reclaimed water programs to help guide appropriate regulatory requirements.

The regionally integrated reclaimed water system hydraulic model needs to be refined. Currently, the existing regional model integrates each individual system model (i.e. RSWRF, TMWRF-Sparks, TMWRF-Reno, and STMWRF). However, each of these individual models has been developed independently with different assumptions for demand projections, demand patterns and operating scenarios. A consistent set of modeling criterion and assumptions should be developed jointly by the City of Sparks, City of Reno and Washoe County to refine the existing model so that it can be readily applied to evaluate system integration alternatives.


MARTIN MARIETTA MATERIALS
HAWCO BUSINESS PARK
SHA-NEVA TRUCK FILL STATION
CALLE DE LA PLATA STREETSCAPE
ALYCE TAYLOR ELEM./GATOR SWAMP
WEST PYRAMID AREA NORTH
SHAW MIDDLE SCHOOL
EAGLE CANYON STREETSCAPE
EAGLE CANYON/DESERT WINDS PARK
HAWCO COMMERCIAL
SKY RANCH PARK
STONEBROOK
La Posada Dr
Pyramid Hwy
WEST PYRAMID AREA SOUTH
TIERRA DEL SOL
PIONEER MEADOWS
KILEY NORTH
WINGFIELD SPRINGS
VISTA BLVD STREETSCAPE
Vista Blvd
GOLDEN EAGLE REGIONAL PARK
FIRST TEE GOLF COURSE
KILEY WEST
Sparks Blvd
BARCELONA CROSSING
GALLERIA STREETSCAPE
DISC DRIVE TRUCK FILL
IRATCABAL
LES HICKS PARK
PAH RAH PARK
MIRAMONTE TEMP TRUCK FILL
WILD CREEK GOLF CLUB
SHADOW MTN SPORTS COMPLEX
D'ANDREA POINTE
REED HIGH SCHOOL
SHELLY PARK
D'ANDREA GOLF COURSE
SPARKS BLVD & VAN METER PARK
WILLOW CREEK PARK
LEGENDS
80
TMWRF
Truckee River
Legend
RECLAIMED WATER SITES
STATUS
EXISTING
PROPOSED
RECLAIMED WATER PIPES
TYPE
EXISTING
FUTURE
RECLAIMED WATER STORAGE
STATUS
EXISTING
PROPOSED
1 0.5 0 1
Miles
Department of Water Resources
Notes: The Scale and configuration of all Information shown heron are approximate only and are not intended as a guide for design or survey work. Reproduction is not permitted without prior written permission from the Washoe County Department of Water Resources.
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N
Figure 3 - 5
Reclaimed Water System - TMWRF
City of Sparks
Department of Water Resources
Washoe County
Nevada
4930 Energy Way
Reno, Nevada 89502
(775) 954-4600
Washoe County Comprehensive Regional Water Management Plan 2004 - 2025
RWPC
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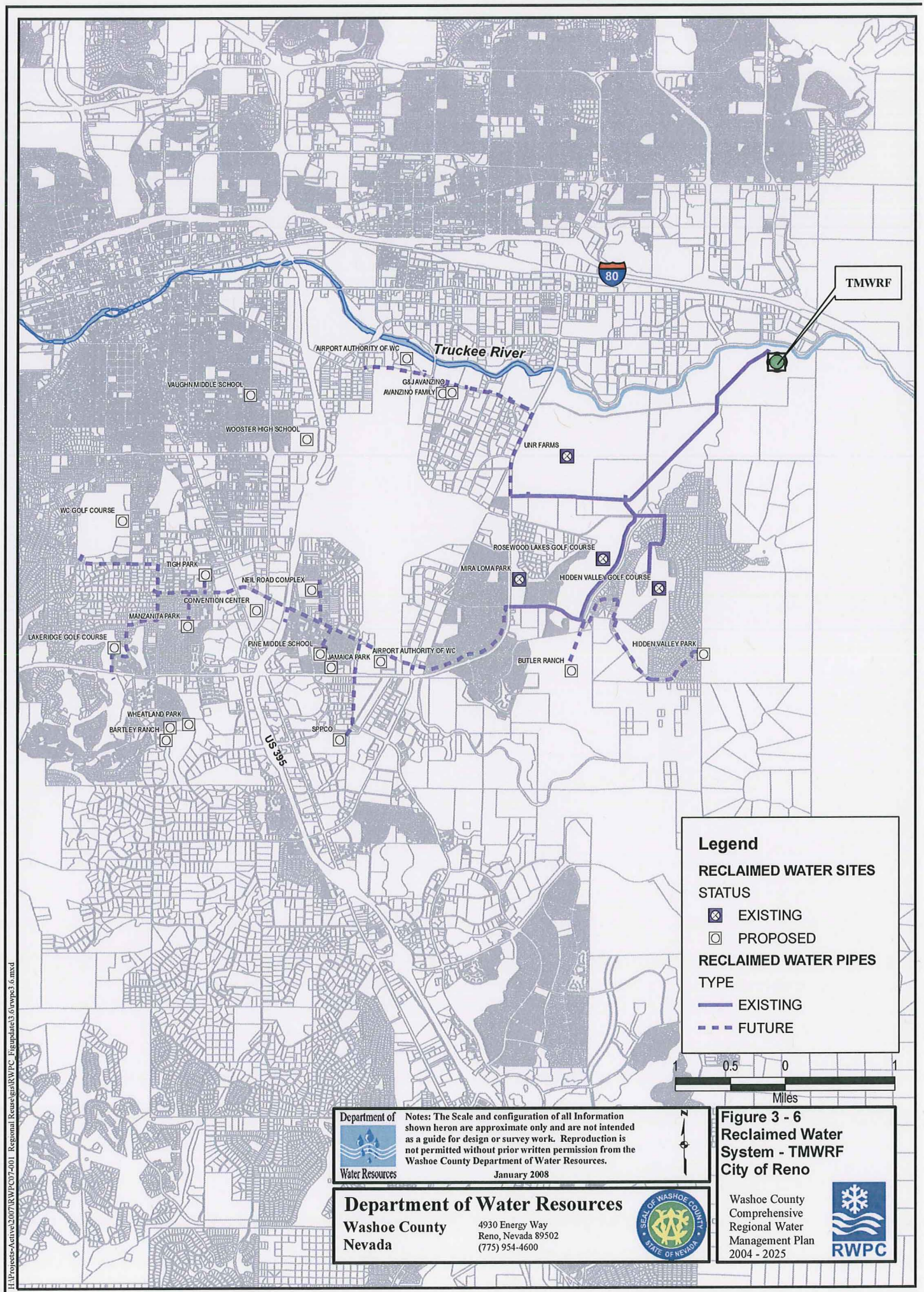

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Figure 3 - 6
Reclaimed Water System - TMWRF
City of Reno

Department of Water Resources
Washoe County
Nevada
4930 Energy Way
Reno, Nevada 89502
(775) 954-4600

Washoe County Comprehensive Regional Water Management Plan 2004 - 2025

RWPC

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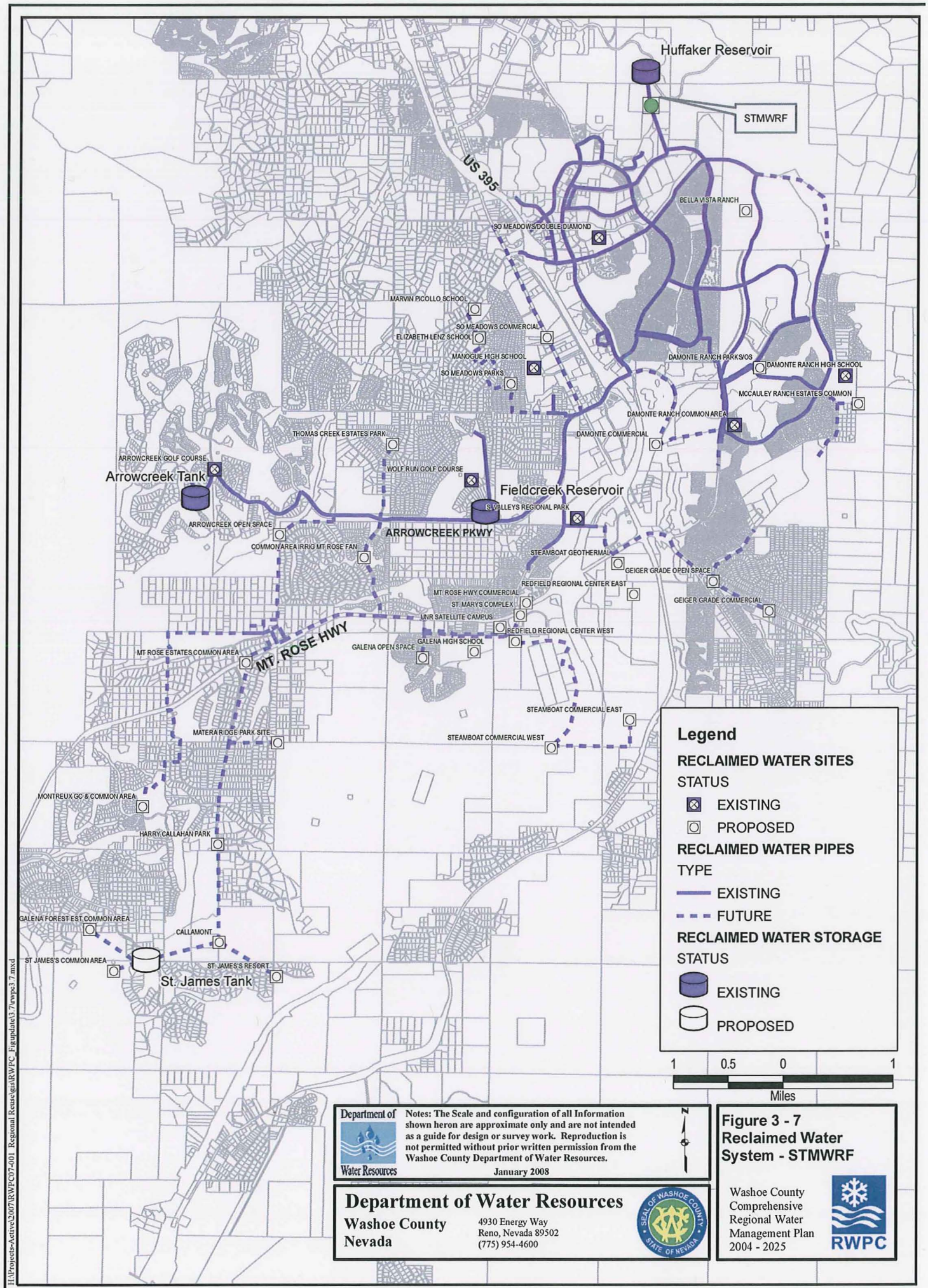
Huffaker Reservoir
STMWRF
US 395
BELLA VISTA RANCH
SO MEADOWS/DOUBLE DIAMOND
MARVIN PICOLLO SCHOOL
SO MEADOWS COMMERCIAL
ELIZABETH LENZ SCHOOL
MANOGUE HIGH SCHOOL
SO MEADOWS PARKS
DAMONTE RANCH PARKS/OS
DAMONTE RANCH HIGH SCHOOL
MCCAULEY RANCH ESTATES COMMON
DAMONTE RANCH COMMON AREA
DAMONTE COMMERCIAL
THOMAS CREEK ESTATES PARK
ARROWCREEK GOLF COURSE
Arrowcreek Tank
WOLF RUN GOLF COURSE
Fieldcreek Reservoir
S. VALLEYS REGIONAL PARK
ARROWCREEK OPEN SPACE
ARROWCREEK PKWY
COMMON AREA IRRIG MT ROSE FAN
STEAMBOAT GEOTHERMAL
GEIGER GRADE OPEN SPACE
REDFIELD REGIONAL CENTER EAST
MT. ROSE HWY COMMERCIAL
ST. MARYS COMPLEX
GEIGER GRADE COMMERCIAL
UNR SATELLITE CAMPUS
REDFIELD REGIONAL CENTER WEST
MT. ROSE HWY
GALENA OPEN SPACE
GALENA HIGH SCHOOL
MT ROSE ESTATES COMMON AREA
STEAMBOAT COMMERCIAL EAST
MATERA RIDGE PARK SITE
STEAMBOAT COMMERCIAL WEST
MONTREUX GC & COMMON AREA
HARRY CALLAHAN PARK
GALENA FOREST EST COMMON AREA
CALLAMONT
ST JAMES'S COMMON AREA
ST. JAMES'S RESORT
St. James Tank
Legend
RECLAIMED WATER SITES
STATUS
EXISTING
PROPOSED
RECLAIMED WATER PIPES
TYPE
EXISTING
FUTURE
RECLAIMED WATER STORAGE
STATUS
EXISTING
PROPOSED
1 0.5 0 1
Miles
N
Department of Water Resources
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Washoe County
Nevada
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Reno, Nevada 89502
(775) 954-4600
Figure 3 - 7
Reclaimed Water System - STMWRF
Washoe County Comprehensive Regional Water Management Plan 2004 - 2025
RWPC
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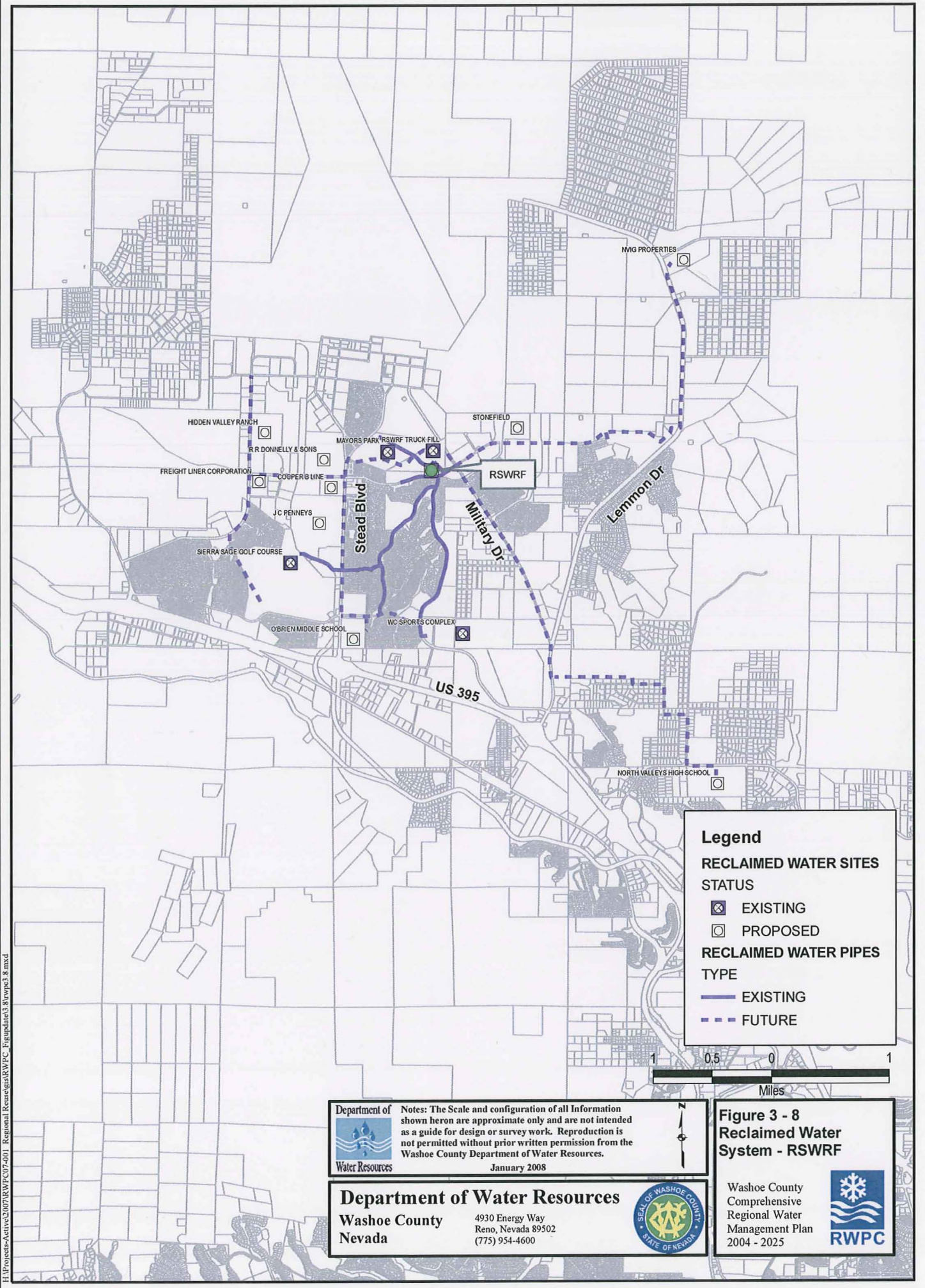

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Figure 3 - 8
Reclaimed Water System - RSWRF

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Washoe County
Nevada
4930 Energy Way
Reno, Nevada 89502
(775) 954-4600

Washoe County Comprehensive Regional Water Management Plan 2004 - 2025

RWPC

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CSWRF

RSWRF
PUMP STATION
(RELIABLE CAPACITY= 1,320 GPM)

RSWRF

SPANISH SPRINGS
PUMP STATION
(RELIABLE CAPACITY=
6,600 GPM)

SPANISH SPRINGS
TANK
(3.25 MG)

TMWRF

TMWRF
PUMP STATION
(RELIABLE CAPACITY=
20,000 GPM)

HUFFAKER RESERVOIR

STMWRF
PUMP STATION
(RELIABLE CAPACITY=
8,400 GPM)

STMWRF

FIELD CREEK RESERVOIR
5 MG

ARROWCREEK
TANK
(2 MG)

FIELD CREEK#1
PUMP STATION
(RELIABLE CAPACITY=
2,800 GPM)

WHITE LAKE PKWY
RED ROCK RD
U.S. 395
U.S. 395
STEAD BLVD
LEMMON DR
BUCK DR
E GOLDEN VALLEY RD
W GOLDEN VALLEY RD
N. VIRGINIA ST.
W 7TH AVE
SUN VALLEY BLVD
CLEAR ACRE LN
N MC CARRAN BLVD
BARING BLVD
VISTA BLVD
US 395
ODDIE BLVD
PRATER WAY
E PRATER WAY
ROCK BLVD
KEYSTONE AVE
N SIERRA ST
N VIRGINIA ST
N WELLS AVE
GLENDALE AVE
E GLENDALE AVE
GREG ST
E GREG ST
W 4TH ST
SR 425
KIETZKE LN
S ROCK BLVD
W PLUMB LN
E PLUMB LN
PLUMAS ST
W MOANA LN
PEMBROKE DR
S MC CARRAN BLVD
LONGLEY LN
NEIL RD
DOUBLE R BLVD
LAKESIDE DR
W HUFFAKER LN
HOLCOMB RANCH LN
SOUTH MEADOWS PKWY
S VIRGINIA ST
DAMONTE RANCH PKWY
ARROWCREEK PKWY
WEDGE PKWY
SR 431
WESTERN SKIES DR
US 395
SR 341
TOLL RD
JOY LAKE RD

PIPE DIAMETER (IN)
8
10
12
14
16
18
20
24
30

FACILITY LEGEND

- EXISTING RESERVOIR
- EXISTING TANK
- EXISTING WATER RECLAMATION FACILITY
- EXISTING PUMP STATION

5,000' 2,500' 0 5,000'
Scale Feet
1"= 5,000'

BAR IS ONE INCH AT FULL SCALE
0 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

Department of Water Resources

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Washoe County Nevada

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Figure 3 - 9
Reclaimed Water Systems- Existing

Washoe County Comprehensive Regional Water Management Plan 2004 - 2025

RWPC

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Jan 15, 2008 - 10:33am

TO POTENTIAL BEDELL FLAT RECHARGE AREA

TO POTENTIAL WARM SPRINGS RECHARGE AREA

CSWRF/RSWRF INTERTIE

RESERVOIR

CSWRF

TO POTENTIAL LONG VALLEY CREEK DISCHARGE

POTENTIAL WHITE LAKE DISCHARGE

WHITE LAKE PKWY

U.S. 395

RED ROCK RD

RSWRF/TMWRF INTERTIE (1)

POTENTIAL SPANISH SPRINGS RECHARGE AREA

RSWRF PUMP STATION (RELIABLE CAPACITY REUSE = 2,650 GPM EXPORT= 5,500 GPM)

RSWRF

PYRAMID WEST NORTH TANK (0.75 MG)

PYRAMID WEST NORTH PUMP STATION (RELIABLE CAPACITY= 1500 GPM)

TRANSFER PUMP STATION (RELIABLE CAPACITY= 4,200 GPM)

LEMMON DR

STEAD BLVD

U.S. 395

PYRAMID WEST SOUTH PUMP STATION (RELIABLE CAPACITY= 600 GPM)

PYRAMID WEST SOUTH TANK (1 MG)

SPANISH SPRINGS PUMP STATION (RELIABLE CAPACITY= 6,600 GPM)

SPANISH SPRINGS TANK (3.25 MG)

BUCK DR

E GOLDEN VALLEY RD

W GOLDEN VALLEY RD

W 7TH AVE

N. VIRGINIA ST.

RSWRF/TMWRF INTERTIE (2)

SUN VALLEY BLVD

CLEAR ACRE LN

N MC CARRAN BLVD

BARING BLVD

VISTA BLVD

US 395

ODDIE BLVD

PRATER WAY

E PRATER WAY

KEYSTONE AVE

N SIERRA ST

N VIRGINIA ST

N WELLS AVE

ROCK BLVD

GLENDALE AVE

E GLENDALE AVE

GREG ST

E GREG ST

SR 425

W 4TH ST

TMWRF

TMWRF PUMP STATION (RELIABLE CAPACITY= 20,000 GPM)

POTENTIAL INDUSTRIAL WATER TO SPARKS FSA

KIETZKE LN

S ROCK BLVD

W PLUMB LN

E PLUMB LN

PLUMAS ST

PEMBROKE DR

W MOANA LN

S MC CARRAN BLVD

LONGLEY LN

HUFFAKER RESERVOIR

TMWRF/STMWRF INTERTIE

NEIL RD

STMWRF PUMP STATION (RELIABLE CAPACITY= 8,400 GPM)

STMWRF

DOUBLE R BLVD

LAKESIDE DR

W HUFFAKER LN

HOLCOMB RANCH LN

SOUTH MEADOWS PKWY

S VIRGINIA ST

DAMONTE RANCH PKWY

ARROWCREEK TANK (2 MG)

FIELD CREEK RESERVOIR 6 MG

ARROWCREEK PKWY

MONTREUX PUMP STATION (RELIABLE CAPACITY= 1,400 GPM)

WEDGE PKWY

SR 431

WESTERN SKIES DR

SR 341

US 395

TOLL RD

FIELD CREEK#1 PUMP STATION (RELIABLE CAPACITY= 4,200 GPM)

MT. ROSE PUMP STATION (RELIABLE CAPACITY= 1,600 GPM)

ST. JAMES PUMP STATION (RELIABLE CAPACITY= 2,600 GPM)

ST. JAMES TANK (6 MG)

JOY LAKE RD

PIPE DIAMETER (IN)
8
10
12
14
16
18
20
24
30

FACILITY LEGEND

- EXISTING RESERVOIR
- EXISTING TANK
- EXISTING WATER RECLAMATION FACILITY
- EXISTING PUMP STATION
- PROPOSED RESERVOIR
- PROPOSED TANK
- PROPOSED PUMP STATION

5,000' 2,500' 0 5,000'
Scale Feet
1"= 5,000'

BAR IS ONE INCH AT FULL SCALE
0 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

Department of Water Resources

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Washoe County Nevada

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Figure 3 - 10
Conceptual Regional Reclaimed Water Systems- Future

Washoe County Comprehensive Regional Water Management Plan 2004 - 2025

RWPC