

## Master Table of Contents

<b>CHAPTER 1 REGIONAL WATER PLANNING POLICIES AND CRITERIA</b> .....	<b>1-1</b>
<b>Goal 1 Plan for the Development of Sustainable Water Supplies</b> .....	<b>1-1</b>
Objective 1.1 Promote Efficient Use of Resources .....	1-1
Policy 1.1.a Geographic Use of Truckee River Water .....	1-1
Policy 1.1.b Water Conservation .....	1-2
Policy 1.1.c Reduction in the Use of Truckee River Water Resulting from DMPs .....	1-3
Policy 1.1.d Evaluation of the Unexercised Portion of Committed Water Supplies.....	1-4
Objective 1.2 Provide for a Sustainable Water Supply and an Acceptable Level of Service to the Community .....	1-4
Policy 1.2.a Conjunctive Management of Surface Water and Groundwater Supplies to Withstand an 8-year Drought Cycle .....	1-4
Policy 1.2.b Water Resource Investigations .....	1-5
Policy 1.2.c Emergency Water Supply Standard.....	1-6
Policy 1.2.d Protection and Enhancement of Groundwater Recharge.....	1-7
Policy 1.2.e New Water Resources/Importation .....	1-8
Policy 1.2.f Water Resources and Land Use .....	1-9
Policy 1.2.g Water Resource Commitments .....	1-9
Policy 1.2.h New Water Purveyors .....	1-11
Objective 1.3 Implement Measures to Protect and Enhance Water Quality for a Sustainable Water Supply .....	1-11
Policy 1.3.a Treated Water Supplies to Meet Safe Drinking Water Act Requirements.....	1-11
Policy 1.3.b Wellhead Protection.....	1-11
Policy 1.3.c Groundwater Resource Development and Water Quality .....	1-12
Policy 1.3.d Corrective Action for Remediation of Groundwater.....	1-13
<b>Goal 2 Plan for Regional Wastewater Treatment and Disposal Requirements ....</b>	<b>1-13</b>
Objective 2.1 Promote Efficient Use of Resources .....	1-13
Policy 2.1.a Effluent Reuse - Efficient Use of Water Resources and Water Rights .....	1-13
Policy 2.1.b Reduction of Non-Point Source Pollution for TMWRF Pollutant Credit .....	1-14
Objective 2.2 Manage Wastewater for Protection and Enhancement of Water Quality .....	1-15
Policy 2.2.a Septic Tank Density and Groundwater Pollution.....	1-15
<b>Goal 3 Plan for the Protection of Human Health, Property, Water Quality and the     Environment through Regional Flood Plain and Storm Water Management...</b> .....	<b>1-15</b>
Objective 3.1 Effective and Integrated Watershed Management.....	1-15
Policy 3.1.a Regional Flood Plain Management Plan for the Truckee River.....	1-15
Policy 3.1.b Flood Plain Storage Within the Truckee River Watershed.....	1-16
Policy 3.1.c Flood Plain Storage Outside of the Truckee River Watershed.....	1-17

Policy 3.1.d	Truckee River Restoration .....	1-17
Policy 3.1.e	Watershed Protection.....	1-18
Policy 3.1.f	Adoption of Storm Water Quality Programs .....	1-18
Policy 3.1.g	Management Strategies for Slopes Greater than 15 Percent.....	1-19
Policy 3.1.h	Adoption of Storm Water Drainage Guidelines .....	1-19
Policy 3.1.i	Flood Plain Management / Flood Control Projects Subject to NNWPC Review .....	1-20
<b>Goal 4</b>	<b>Support the Implementation of the Truckee Meadows Regional Plan .....</b>	<b>1-20</b>
Objective 4.1	Coordinated Infrastructure Planning .....	1-20
Policy 4.1.a	Facility Plans – Conformance with Regional Water Plan .....	1-20
Policy 4.1.b	Timing and Sizing of Facilities.....	1-22
Policy 4.1.c	NNWPC Programs and Policies to Reinforce Goals of the Regional Plan.....	1-22
Policy 4.1.d	Inclusion of Non-Economic Criteria in Evaluation of Alternatives .....	1-22
Policy 4.1.e	Economic Decision-Making Criteria .....	1-23
Policy 4.1.f	Examination of Long-Term Impact on Availability of Water Resources .....	1-23
Objective 4.2	Clarification of the Role of the WRWC and the NNWPC .....	1-23
Policy 4.2.a	Role of NNWPC in Water Related Issues .....	1-23
Policy 4.2.b	Role of WRWC in Water Related Issues.....	1-26
<b>CHAPTER 2</b>	<b>WATER RESOURCES .....</b>	<b>2-1</b>
<b>2.1</b>	<b>Sources of Water .....</b>	<b>2-2</b>
2.1.1	Surface Water.....	2-2
2.1.2	Groundwater .....	2-3
2.1.3	Reclaimed Water .....	2-6
2.1.4	Water Resources Baseline .....	2-6
<b>2.2</b>	<b>Factors Affecting Water Resource Sustainability .....</b>	<b>2-9</b>
2.2.1	Sustainability .....	2-9
2.2.1.1	Water Resources Sustainability and Population Forecasts .....	2-10
2.2.2	Availability of Truckee River Water Rights.....	2-11
2.2.3	Laws, Regulations, Decrees and Agreements.....	2-11
2.2.3.1	State Water Law .....	2-11
2.2.3.2	Orr Ditch Decree .....	2-14
2.2.3.3	Water Quality Settlement Agreement .....	2-14
2.2.3.4	Truckee River Settlement and the Truckee River Operating Agreement .....	2-15
2.2.4	Source Water Reliability .....	2-17
2.2.4.1	Weather .....	2-17
2.2.4.2	Groundwater Recharge.....	2-27
2.2.4.3	Aquifer Storage and Recovery.....	2-27
2.2.4.4	Reclaimed Water .....	2-31
2.2.5	Source Water Quality.....	2-31
2.2.5.1	Truckee River Water Quality .....	2-31
2.2.5.2	Tributary Water Quality .....	2-34
2.2.5.3	Groundwater Quality .....	2-35
2.2.5.4	Reclaimed Water Quality .....	2-39

<b>CHAPTER 3</b>	<b>WATER PURVEYORS AND OTHER WATER PROVIDERS</b>	<b>3-1</b>
<b>3.1</b>	<b>Public Water Purveyors</b>	<b>3-2</b>
3.1.1	Truckee Meadows Water Authority	3-4
3.1.2	Sun Valley General Improvement District	3-11
<b>3.2</b>	<b>Other Non-Public Water Purveyors</b>	<b>3-11</b>
3.2.1	Utilities Inc. of Nevada	3-12
3.2.2	Sky Ranch Water Service Corp.	3-12
3.2.3	Steamboat Springs Water Works, Inc.	3-12
<b>3.3</b>	<b>Other PUCN Regulated Water Systems</b>	<b>3-12</b>
<b>3.4</b>	<b>Domestic Wells</b>	<b>3-14</b>
<b>3.5</b>	<b>Reclaimed Water Purveyors (Reno, Sparks and Washoe County)</b>	<b>3-14</b>
3.5.1	TMWRF Reclaimed Water	3-16
3.5.2	Sparks Reclaimed Water Facilities	3-19
3.5.3	Reno Reclaimed Water Facilities	3-19
3.5.4	Washoe County Reclaimed Water Facilities	3-21
<b>3.6</b>	<b>Water Rights Requirements</b>	<b>3-23</b>
3.6.1	Water Rights Dedication Requirements for Municipal Service	3-23
3.6.2	Reclaimed Water Rights Requirements	3-24
<b>CHAPTER 4</b>	<b>WASTEWATER AND WATERSHED-BASED WATER QUALITY PLANNING</b>	<b>4-1</b>
<b>4.1</b>	<b>Wastewater Service Providers</b>	<b>4-3</b>
<b>4.2</b>	<b>Water Reclamation Facilities</b>	<b>4-6</b>
4.2.1	Truckee Meadows Water Reclamation Facility	4-6
4.2.2	South Truckee Meadows Water Reclamation Facility	4-9
4.2.3	Reno-Stead Water Reclamation Facility	4-9
4.2.4	Lemmon Valley Water Reclamation Facility	4-10
4.2.5	Cold Springs Water Reclamation Facility	4-10
<b>4.3</b>	<b>Regional Effluent Management Planning</b>	<b>4-10</b>
<b>4.4</b>	<b>Septic Systems</b>	<b>4-15</b>
4.4.1	Golden Valley	4-19
4.4.2	Spanish Springs	4-19
4.4.3	Warm Springs	4-20
4.4.4	Washoe Valley	4-20
<b>4.5</b>	<b>Watershed Management Programs to Protect the Availability and Quality of Water Resources</b>	<b>4-20</b>
4.5.1	Regulatory Considerations	4-21
4.5.2	Truckee River Total Maximum Daily Loads	4-22
4.5.3	Truckee River Water Quality Modeling	4-24
4.5.4	PLPT Water Quality Control Plan, Triennial Review and Water Quality Standards Revisions	4-27
4.5.5	Truckee Meadows Regional Storm Water Quality Management Program	4-28
4.5.6	Truckee River Coordinated Monitoring Program	4-37
4.5.7	Truckee River Information Gateway	4-37
4.5.8	Truckee River Water Quality Monitoring Data	4-37
4.5.9	River and Stream Restoration	4-40
4.5.10	Watershed Management and Protection in the Truckee Meadows	4-44
4.5.11	Watershed Management and Protection Projects	4-49
4.5.12	Other Programs	4-51
4.5.13	Public Outreach Programs	4-52

<b>CHAPTER 5</b>	<b>FLOOD MANAGEMENT AND STORM WATER DRAINAGE.....</b>	<b>5-1</b>
<b>5.1</b>	<b>Flood Damage.....</b>	<b>5-3</b>
5.1.1	Consequences of Flooding.....	5-3
<b>5.2</b>	<b>Flood History and Regional Setting.....</b>	<b>5-6</b>
5.2.1	History of Flooding in the Planning Area .....	5-6
5.2.2	The Flood of January 1, 1997.....	5-7
5.2.3	Alluvial Fan Flooding in the Planning Area .....	5-7
5.2.4	Flooding from December 31, 2005 through March 2006 .....	5-9
<b>5.3</b>	<b>Federal Legislation and Programs to Address Flood Issues.....</b>	<b>5-9</b>
5.3.1	National Flood Insurance Act/Flood Disaster Protection Act .....	5-9
5.3.2	National Flood Insurance Program .....	5-10
5.3.3	Federal Emergency Management Agency .....	5-11
5.3.4	U.S. Army Corps of Engineers.....	5-11
5.3.5	Natural Resources Conservation Service .....	5-12
<b>5.4</b>	<b>State Legislation.....</b>	<b>5-12</b>
<b>5.5</b>	<b>History of Truckee River Flood Control Efforts.....</b>	<b>5-13</b>
<b>5.6</b>	<b>Truckee River Flood Management Project.....</b>	<b>5-14</b>
5.6.1	Flood Project Oversight .....	5-14
5.6.2	Flood Project Goals .....	5-15
5.6.3	Flood Project Elements.....	5-15
5.6.4	Flood Project Cost and Funding .....	5-20
5.6.5	Federal Support for the Flood Project.....	5-21
5.6.6	Flood Warning System and Emergency Management .....	5-22
<b>5.7</b>	<b>Local Government Flood Control and Storm Water Drainage Programs .</b>	<b>5-22</b>
5.7.1	Flood Plain Storage and Critical Flood Pools .....	5-22
5.7.2	Drainage Facilities .....	5-25
5.7.3	Flood Plain Management.....	5-27
5.7.4	Truckee Meadows Regional Drainage Manual.....	5-29
5.7.5	Draft Washoe County Regional Flood Control Master Plan .....	5-29
5.7.6	Flood Plain Storage Outside the Truckee River Watershed .....	5-29
<b>5.8</b>	<b>Flood Control and Drainage Overview by Hydrographic Basin.....</b>	<b>5-30</b>
5.8.1	Spanish Springs Valley Hydrographic Basin .....	5-30
5.8.2	Truckee Canyon Hydrographic Basin (Verdi) .....	5-31
5.8.3	Lemmon Valley Hydrographic Basins.....	5-31
5.8.4	Pleasant Valley Basin .....	5-32
5.8.5	Warm Springs Valley Hydrographic Basin .....	5-32
5.8.6	Sun Valley Hydrographic Basin .....	5-32
5.8.7	Washoe Valley Hydrographic Basin .....	5-32
5.8.8	Antelope Valley Hydrographic Basin .....	5-33
5.8.9	Bedell Flat Hydrographic Basin .....	5-33
5.8.10	Dry Valley Hydrographic Basin .....	5-33
5.8.11	Red Rock Valley Hydrographic Basin.....	5-33
5.8.12	Cold Springs Valley Hydrographic Basin .....	5-33

<b>CHAPTER 6</b>	<b>POPULATION FORECAST AND PROJECTIONS OF WATER DEMAND, PEAK DAY REQUIREMENTS AND WASTEWATER FLOW</b>	<b>6-1</b>
6.1	<b>Comparison of the Consensus Population Forecast and the Estimated Population that can be Supported by the Sustainable Water Resources in the Planning Area</b>	<b>6-4</b>
6.1.1	Consensus Population Forecast	6-4
6.1.2	Water Resources	6-4
6.1.3	Water Demand and Population Projections	6-5
6.1.4	Conclusions	6-5
6.2	<b>Projections of Water Demand, Peak Day Requirements and Wastewater Flow for Service Areas</b>	<b>6-5</b>
6.2.1	Water Demand Projections	6-6
6.2.2	Wastewater Flow Projections	6-7
6.3	<b>Water Balance Model</b>	<b>6-9</b>
6.3.1	Water Supplies	6-13
6.3.2	Wastewater Treatment and Disposal	6-13
<b>CHAPTER 7</b>	<b>WATER CONSERVATION PLAN - EFFICIENT USE OF WATER</b>	<b>7-1</b>
7.1	<b>Regional Benefits of Conservation</b>	<b>7-4</b>
7.2	<b>Overview of Progress</b>	<b>7-5</b>
7.3	<b>Measuring Progress</b>	<b>7-6</b>
7.4	<b>Laws, Ordinances, Agreements and Plans Facilitating Conservation</b>	<b>7-8</b>
7.4.1	Federal Laws National Energy Policy Act	7-8
7.4.2	Local Government Ordinances and Water Purveyor Rules	7-9
7.4.3	State of Nevada Conservation Objectives	7-9
7.5	<b>Ongoing Measures to Conserve Water</b>	<b>7-13</b>
7.5.1	Assigned-Day Watering	7-13
7.5.2	Truckee Meadows Community Forestry Coalition	7-14
7.5.3	Water Meters	7-14
7.5.4	Ultra Low Flow Toilet Installation and Retrofit	7-15
7.5.5	Use of Other Water-Conserving Fixtures	7-15
7.5.6	Leaks and System Repairs	7-15
7.5.7	Local Ordinances and Water Purveyor Rules	7-16
7.5.8	Water Usage Review Program (Water Audits)	7-16
7.5.9	Rate Design	7-17
7.5.10	Public Education	7-17
7.5.11	New Irrigation Technology	7-19
7.5.12	Use of Non-Potable and Reclaimed Water	7-21
7.6	<b>Future Water Conservation Initiatives</b>	<b>7-22</b>
7.7	<b>Drought</b>	<b>7-30</b>
7.7.1	Drought Response Plan	7-31

<b>CHAPTER 8</b>	<b>COST AND FINANCING</b> .....	<b>8-1</b>
<b>8.1</b>	<b>Financial Summary</b> .....	<b>8-3</b>
8.1.1	Costs Included in the Financial Summary .....	8-3
8.1.2	The Truckee River Flood Project.....	8-7
8.1.3	CIP Needs 2021-2035 .....	8-8
8.1.4	Funding Alternatives .....	8-12
<b>8.2</b>	<b>Potential Impacts to Existing User Rates and Developer Fees</b> .....	<b>8-13</b>
8.2.1	Estimated Incremental Changes to Rates (Existing User Fees).....	8-14
8.2.2	Estimated Incremental Changes to Connection Fees (New User Fees paid by Development).....	8-15
<b>CHAPTER 9</b>	<b>ISSUES AND ACTION PLAN</b> .....	<b>9-1</b>
<b>9.1</b>	<b>Municipal Water Resources</b> .....	<b>9-1</b>
9.1.1	Creation of New Water Systems.....	9-4
9.1.2	South Truckee Meadows .....	9-5
9.1.3	Stead/Lemmon Valley.....	9-7
9.1.4	Cold Springs .....	9-7
9.1.5	Spanish Springs.....	9-9
9.1.6	Tracy Segment (Lower Truckee River).....	9-11
9.1.7	Truckee Canyon (Verdi).....	9-12
9.1.8	Groundwater Resource Development and Impact to Domestic Wells	9-14
<b>9.2</b>	<b>Water Conservation</b> .....	<b>9-16</b>
<b>9.3</b>	<b>Wastewater Management</b> .....	<b>9-18</b>
9.3.1	Central Truckee Meadows.....	9-18
9.3.2	South Truckee Meadows .....	9-20
9.3.3	Stead/Lemmon Valley.....	9-22
9.3.4	Cold Springs .....	9-24
9.3.5	Tracy Segment (Lower Truckee River).....	9-26
9.3.6	Septic Systems and Water Quality .....	9-27
<b>9.4</b>	<b>Truckee Meadows NPDES Storm Water Discharge Permit</b> .....	<b>9-29</b>
<b>9.5</b>	<b>Integrated Use of Water Rights</b> .....	<b>9-30</b>
<b>9.6</b>	<b>Water Resources and Land Use Planning</b> .....	<b>9-32</b>
<b>9.7</b>	<b>Local Government Drainage Programs</b> .....	<b>9-34</b>
<b>9.8</b>	<b>Regional Flood Plain Management and Flood Control</b> .....	<b>9-35</b>
<b>9.9</b>	<b>Groundwater Quality Protection and Remediation</b> .....	<b>9-36</b>
9.9.1	Groundwater Remediation.....	9-36
9.9.2	Groundwater Protection.....	9-37

## List of Tables

Table 2-1	Water Resource Baseline Table for Washoe County .....	2-7
Table 2-2	Manner of Use and Conversion to M&I .....	2-13
Table 2-3	Floriston Rates (cubic feet per second ["cfs"])	2-14
Table 2-4	Loss of Floriston Rate and Use of POSW During Drought Periods Since 1980 ...	2-23
Table 2-5	Typical Mineral Concentrations of Surface Water .....	2-31
Table 3-1	2015 Public Purveyor Capacities .....	3-2
Table 3-2	Summary of TMWA's Customers, Resources and Usage in TRA and non-TRA Planning Basins.....	3-5
Table 3-3	Summary of Satellite Systems Resources and Customers .....	3-6
Table 3-4	Production Well Statistics .....	3-9
Table 3-5	2014 Private Purveyor Capacities .....	3-11
Table 3-6	Public Water Systems in Washoe County .....	3-13
Table 3-7	2015 Reclaimed Water Usage.....	3-16
Table 3-8	2015 TMWRF Reclaimed Water Balance.....	3-16
Table 3-9	2015 RSWRF Water Balance.....	3-19
Table 3-10	2015 STMWRF Reclaimed Water Balance .....	3-21
Table 3-11	2015 CSWRF Water Balance.....	3-23
Table 3-12	2015 LVWRF Water Balance .....	3-23
Table 4-1	Wastewater Treatment Facilities .....	4-6
Table 4-2	Summary of Truckee River Total Maximum Daily Loads, Waste Load Allocations and Load Allocations .....	4-23
Table 4-3	Northern Carson, Verdi, and Peavine Creeks .....	4-47
Table 4-4	Southwest Truckee Meadows Creeks .....	4-48
Table 4-5	North Truckee Drain .....	4-49
Table 5-1	Estimated Peak Flows – Truckee River at Reno .....	5-2
Table 5-2	Description of Flood Project Plan (Local Rate Plan) Elements .....	5-16
Table 5-3	Drainage Code References for Reno, Sparks, and Washoe County .....	5-26
Table 6-1	Projected Water Use Through 2035 (AF per year).....	6-6
Table 6-2	TMWA Peak Day Production Requirements .....	6-6
Table 6-3	TMWA Indoor Water Use Coefficients.....	6-8
Table 6-4	Weighted Wastewater Generation Factors.....	6-8
Table 6-5	Comparison of Calculated Residential and Non-residential Wastewater Flows to 2015 Average Day Annual Flows Observed at Water Reclamation Facilities ....	6-9
Table 6-6	Projected Wastewater Flow by Water Reclamation Facility in Five-Year Increments .....	6-9
Table 6-7	Regional Water Balance Key Findings .....	6-12
Table 7-1	Base Case, Ongoing, Future and Drought Conservation Measures .....	7-2
Table 7-2	Base Case Progress since the 1995–2015 Regional Water Plan .....	7-6
Table 7-3	Shift in Lot Sizes.....	7-8
Table 7-4	TMWA Customer Water Audits 2003 - 2014 .....	7-17
Table 7-5	TMWA's Drought Situation Classification System .....	7-33
Table 7-6	TMWA's Enhanced Demand Management Programs by Drought Situation ....	7-33
Table 7-7	Existing Measures and Actions for Future Consideration.....	7-35
Table 8-1	2016-2020 CIP for Reno .....	8-4
Table 8-2	2016-2020 CIP for Sparks .....	8-5
Table 8-3	2016-2020 CIP for Washoe County .....	8-5
Table 8-4	2016-2020 CIP for SVGID .....	8-5
Table 8-5	2016-2020 CIP for TMWA .....	8-6
Table 8-6	2016-2020 Projected Five-Year CIPs for the Region .....	8-6

Table 8-7	Comparison of 2011 and 2016 Five-Year CIP Funding Sources .....	8-7
Table 8-8	Summary of Long-Term CIPs (2021-2035) .....	8-11
Table 8-9	Annual Depreciation by Agency .....	8-12
Table 9-1	Verdi Backbone Water Facility Requirements .....	9-14
Table 9-2	WRWC/NNWPC Proposed Action Plan .....	9-39
Table 9-3	Issues and Proposed Action Items .....	9-41

### List of Figures

Figure 2-1	Surface Truckee River System with Highest, Lowest and Average Recorded Flows (TMWA, 2010) .....	2-3
Figure 2-2	Surface Water Tributary to Steamboat Creek .....	2-4
Figure 2.3	Hydrographics Basins in the Water Baseline Table .....	2-5
Figure 2-4	Annual Snowpack Percent vs Average and Annual Truckee River Flow at Floriston .....	2-18
Figure 2-5	Location of Tree-ring Chronologies Used in the 2015 Report .....	2-20
Figure 2-6	30-year Historic Snowpack for the Truckee River Basin (TMWA 2016-2035 WRP) .....	2-22
Figure 2-7	Lake Tahoe Elevations During Drought Periods .....	2-24
Figure 2-8	Areas of Good Potential Recharge .....	2-29
Figure 2-9	Production and Recharge Wells and Areas of Water Quality Concern .....	2-36
Figure 3-1	Water Systems and Service Areas .....	3-3
Figure 3-2	Domestic Wells .....	3-15
Figure 3-3	Effluent Reuse System TMWRF – City of Sparks Sites .....	3-17
Figure 3-4	Effluent Reuse System TMWRF – City of Reno Sites .....	3-18
Figure 3-5	Effluent Reuse System Reno – Stead WRF .....	3-20
Figure 3-6	Effluent Reuse System STMWRF – Washoe County Sites .....	3-22
Figure 4-1	Water Reclamation Facilities with Approximate Service Areas .....	4-5
Figure 4-2	Parcels Served by Septic Systems .....	4-16
Figure 4-3	Total Dissolved Solids on the Truckee River .....	4-38
Figure 4-4	Total Nitrogen on the Truckee River .....	4-39
Figure 4-5	Total Phosphorus on the Truckee River .....	4-39
Figure 4-6	Tributary Creeks in the Truckee Meadows Area .....	4-46
Figure 5-1	1997 Flood Area Inundated Relative to the FEMA 100-Year Flood Zone .....	5-8
Figure 5-2	Critical Flood Zone Areas .....	5-24
Figure 6-1	2035 Regional Water Balance .....	6-2
Figure 7-1	Average Monthly Residential Water Use and Total Production (2003 to 2014) .....	7-7
Figure 7-2	Monthly ET Rates .....	7-26
Figure 7-3	Drought Situation and Demand-side Management Response Flowchart .....	7-34
Figure 8-1	Employment and Building Permits 2010-2015 .....	8-3
Figure 8-2	Wastewater Analysis Zones by Jurisdiction and Treatment Facility Service Area .....	8-9
Figure 8-3	Comparison of Monthly Bills .....	8-15