Northern Nevada Water Planning Commission

STAFF REPORT

DATE: May 25, 2016

TO: Chairman and Members, Northern Nevada Water Planning Commission ("NNWPC")

FROM: Jim Smitherman, NNWPC Water Resources Program Manager

SUBJECT: Presentation of comments received on the chapter entitled "Population Forecast and Projections of Water Demand, Peak Day Requirements and Wastewater Flow" chapter for the 2016 Regional Water Management Plan ("RWMP") update; discussion and possible direction to staff

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SUMMARY

On May 6, 2015, staff reported that every section of this chapter would require revisions. Progress to date includes revisions to the introductory sections, Section 6.1and Section 6.2, including redline edits and shaded text where revisions are anticipated using data not yet available. Coordination with the Truckee Meadows Water Authority ("TMWA"), the Truckee Meadows Regional Planning Agency ("TMRPA"), and Stantec is ongoing and expected to yield data and analyses on which to base further revisions.

A list of sections and subsections including notes on anticipated revisions appears below:

Purpose and Scope: Revisions to date are shown as red-line edits.

Summary and Findings: Revisions to date are shown as red-line edits; gray shading indicates further revisions are necessary.

Introduction: Revisions to date are shown as red-line edits.

6.1 Comparison of the Consensus Population Forecast and the Estimated Population that can be Supported by the Sustainable Water Resources in the Planning Area

- ***6.1.1 Consensus Population Forecast:*** Revisions to date are shown as red-line edits.
- ***6.1.2 Water Resources:*** Revisions to date are shown as red-line edits.
- ***6.1.3 Water Demand and Population Projections:*** Revisions to date are shown as red-line edits.
- ***6.1.4 Conclusions:*** Revisions to date are shown as red-line edits.

6.2 Projections of Water Demand, Peak Day Requirements and Wastewater Flow for Service Areas

- ***6.2.1 Projections by Planning Area:*** Revisions to date are shown as red-line edits.
- ***6.2.2 Water Demand Projections:*** Revisions to date are shown as red-line edits. The peak day requirements section is shown in gray shading pending updated data.
- ***6.2.3 Wastewater Flow Projections:*** Revisions to date are shown as red-line edits. Revisions use data from the TMWA 2035 Water Resource Plan, Reno, Sparks and Washoe County wastewater service providers, and TMRPA population and employment modeling results. Additional revisions will be necessary.

Table of Contents

List of Tables

List of Figures

Chapter 6 – Population Forecast and Projections of Water Demand, Peak Day Requirements and Wastewater Flow

Purpose and Scope

This chapter uses the *Washoe County Consensus Population Forecast* (Truckee Meadows Regional Planning Agency ("TMRPA")~~Washoe County~~, 201~~0~~6)~~,~~ , the Truckee Meadows Water Authority ("TMWA") 2035 Water Resource Plan ("WRP"), and the TMRPA Population and Employment Model ("PEM") as the basis for estimating the future needs of the Planning Area with respect to water demands including peak day requirements, wastewater flows and treatment capacity, effluent disposal and reclaimed water capacity. The chapter relies on data presented in preceding chapters and develops a water budget showing ~~present and~~ future water supplies available to public purveyors, wastewater flows by service provider in addition to capacities to dispose of effluent and use reclaimed water.

Summary and Findings

On April 9, 2010, the Western Regional Water Commission ("WRWC") determined and made a finding that the draft Washoe County Consensus Population Forecast for 2030 ("Consensus Forecast") is less than the estimated population that can be supported by the sustainable water resources identified in the *Regional Water Plan*. The finding was transmitted to the Truckee Meadows Regional Planning Agency ("TMRPA"), Reno, Sparks and Washoe County in May 2010**.**

The Washoe County Consensus Forecast is in close agreement with TMWA's 20-year population forecast. Disaggregation of the Consensus Forecast using the parcel-based PEM provides a good tool for ~~adequate for~~ 20-year growth projections~~,~~ at a ~~-~~county-wide scale and for ~~population projections, but it is not adequate for facility planning as performed by public purveyors and other water-related utilities or for disaggregation to~~ utility service areas.

A Regional Water Balance Flow Diagram has been developed covering five planning areas (Figure 6-1), which is a graphical representation of ~~the existing conditions (Figure 6-2) and the~~ projected 203~~0~~5 future conditions (Figure 6-3) for ~~the~~ water supply, wastewater treatment, reclaimed water and wastewater disposal requirements. The following conclusions can be drawn from this evaluation:

Water Resources

Overall, the region has available water resources to meet the projected 2030 increase in demand. These water resources include the *Truckee River Operating Agreement* ("*TROA*") water supplies, the Fish Springs Water Importation Project, local basin groundwater supplies, and local tributary creeks including Galena, Thomas, Whites, Brown's and Steamboat Creeks. In addition to these water resources, the region has reclaimed water resources available for multiple uses from the Truckee Meadows Water Reclamation Facility ("TMWRF"), South Truckee Meadows Water Reclamation Facility ("STMWRF"), Reno Stead Water Reclamation Facility ("RSWRF") and Cold Springs Water Reclamation Facility ("CSWRF").

In several planning areas, however, there are water supply imbalances that will need to be addressed over the long term. In particular, the demands from domestic wells and permitted municipal groundwater pumping in Cold Springs Valley, Lemmon Valley and Spanish Springs

Valley exceed the respective State Engineer estimates of perennial yield of each basin. This is an issue that affects both existing and future water users, and exists under both current and projected 2030 conditions.

The Truckee Meadows, Sparks and South Truckee Meadows planning areas do not have water supply imbalances.

There will continue to be local area impacts within portions of these planning areas where mitigation of groundwater level declines and impacts to shallow domestic wells will continue to be necessary. The Mt. Rose fan area is an example of this situation.

Wastewater

Long term disposal and reuse of treated effluent will be a challenge throughout the different planning areas. Cold Springs and Lemmon Valley generally have sufficient disposal capacity to meet the projected needs until 2030. However, future disposal options will need to be identified to accommodate planned development beyond the 2030 time horizon.

In the Central Truckee Meadows, Sparks and Spanish Springs planning areas, discharge to the Truckee River through TMWRF may be limited in the future by several constraints. Roughly 7,700 acre feet ("af") of additional disposal capacity will be required.

In the South Truckee Meadows planning area, 100 percent of the reclaimed water is used for irrigation. Based on the 2030 flow projections, approximately 5,700 af of additional water reclamation or disposal capacity will be required.

Introduction

This chapter presents a summary of the process that was followed to determine whether the forecasted population for the year 2035~~0~~ can be supported by the sustainable water resources potentially available within Washoe County. Furthermore, more detailed projections of future water demands~~,~~ including peak day capacity requirements, wastewater flow and wastewater treatment plant capacity needs have been compiled for the primary service areas within the region.

An analysis as to whether the forecasted population can be supported by the sustainable water resources was done in response to 2008 Washoe County Ballot Question No. 3 ("WC-3") and January 2010 amendments to the *Truckee Meadows Regional Plan* ("Regional Plan") ~~(Truckee Meadows Regional Planning Agency, 2002) amendments adopted by the Regional Planning Governing Board ("RPGB") in January 2010~~. The amendments, adopted in response to WC-3, provide for a comparison between the draft Consensus Forecast and the estimated population that can be supported by the sustainable water resources as identified in this Plan. As discussed in more detail in Section 2.2.1.1, amendments to the Regional Planning Governing Board ("RPGB")'s Regulations on Procedure identify~~designate~~ the Northern Nevada Water Planning Commission ("NNWPC") and the WRWC as the entities to perform the comparison, and the WRWC as the body to make a determination and finding as to the results of the comparison. Section 6.1 deals exclusively with the comparison described in the 2010 Regional Plan amendments.

The remainder of the chapter focuses on~~For the *Regional Water Plan*, an~~ estimates of future water demands and wastewater flows at the treatment plants consistent with the Consensus

Forecast population projection ~~has been compiled~~ for the primary service areas within the planning area. The service areas are consistent with the planning areas established for the *City of Reno and Washoe County TMSA/FSA Water Wastewater and Flood Management Facility Plan* (ECO:LOGIC, 2007) and the *City of Sparks TMSA/FSA Conceptual Facility Master Plan* (Stantec, 2008), which are based primarily on wastewater service areas and political boundaries. The planning areas are identified as Cold Springs, Stead/Lemmon Valley, the Washoe County portion of Spanish Springs, Sparks, Sun Valley General Improvement District ("SVGID"), Truckee Meadows and South Truckee Meadows. A Regional Water Balance Flow Diagram has also been developed, which is a graphical representation of ~~existing and~~ future conditions for the water supply, wastewater treatment, reclaimed water and wastewater disposal requirements. The Regional Water Balance Flow Diagram is useful to answer the following questions:

- How much potable water will be~~is~~ used in the future~~today~~, and in what locations?
- From which sources will~~does~~ the potable water originate, and once used, where will~~does~~ it go for wastewater treatment?
- Following treatment, how much of the water will be~~is~~ reused, and where will~~is~~ the balance be disposed?
- Are there future imbalances in water supply, wastewater disposal or reclaimed water usage, and if so, in which planning areas?
- Are there planning areas with adequate capacity to address imbalances?

6.1 Comparison of the Consensus Population Forecast and the Estimated Population that can be Supported by the Sustainable Water Resources in the Planning Area

As described in Section 2.2.1.1, the RPGB identified~~designated~~ the NNWPC and the WRWC as the entities to perform a comparison of the draft Consensus Forecast with the estimated population that can be supported by the sustainable water resources as set forth in this Plan prior to the adoption of the Consensus Forecast.

6.1.1 Consensus Population Forecast

TMRPA compiles the Washoe County ~~Department of Community Development provided the draft~~ Consensus Forecast ~~in February 2010. The population was compiled~~ every two years using data from the Truckee Meadows Water Authority ("TMWA"), Global Insight, Woods and Poole, and the State Demographer. In 2010, the Consensus Forecast projected a population of approximately 590,500 for the year 2030 and ~~,~~ the 2012 version projected a 2032 population of 560,772. The most recent version, the ~~The draft~~ 2014 Consensus Forecast projected that the total population in Washoe County will grow from 442,123 in 2014 to 563,779 in 2034~~population for 2030 is approximately 590,500, which is 29,823 less than the 2008 Consensus Forecast population for 2030~~.

The TMWA 2035 WRP sets forth its current population estimate for 2035 to be 545,000 persons, which estimate is consistent with the draft 2016 Consensus Forecast of approximately 548,000 persons for the year 2036.

6.1.2 Water Resources

Table 2-1, Water Resources Baseline, provides long-range planning-level estimates for sustainable water resources using the best available information. The table identifies selected hydrographic basins within the Planning Area ~~region~~ and quantifies surface water and groundwater in two ways. Appropriations (water rights), including decreed rights and rights permitted or certificated by the State Engineer for municipal and industrial ("M&I") use and those that may be converted to M&I use, are quantified separately from those that cannot be converted to M&I use.

The Water Resources Baseline ~~Table (Table 2-1)~~ acknowledges *TROA*'s effect on the availability and sustainability of Truckee River water. *TROA* is designed to provide long-term sustainable water operations for the multiple stakeholders on the Truckee River system through the continued use of water rights converted from irrigation to M&I use. The Truckee Meadows community ~~is~~ benefits greatly from *TROA* implementation in that it provides for ~~fortunate in having s~~significant ~~capacity for~~ storage capacity in upstream reservoirs~~, including Lake Tahoe, that can be~~to integrated with other water resources to maximize the yield of the Truckee River. ~~*TROA* further enhances the ability to maximize storage for drought supplies.~~

~~TMWA has over 142,900 af of decreed, groundwater, storage, and irrigation rights sufficient to generate water to serve approximately 101,000 af of commitments as of June 2009. As shown in Table 3 of TMWA's *2030 Water Resource Plan*, over 50,000 af of Truckee River mainstem rights are potentially available for dedication to TMWA or Washoe County Department of Water Resources ("WCDWR") to support future will-serve commitments. It should be noted, however, that Truckee River mainstem irrigation water rights available for conversion to M&I use over the long term continues to decrease, and "availability" is not necessarily an indication of the willingness of a party to sell.~~

The Water Resources Baseline ~~Table~~ also shows the quantity of groundwater in each basin consistent with the State Engineer's estimates of perennial yield. In basins where appropriations for M&I use (or those that may be converted to M&I use), are less than the perennial yield estimate, only those water rights actually appropriated are considered to be sustainable. The table includes basins that may provide M&I water supplies within a 20-year planning timeframe. This assumes importation of groundwater from hydrographic basins in Washoe County that are not presently providing water for M&I use.

The Water Resources Baseline in the 2011 Regional Water Plan estimated sustainable water resources potentially available in Washoe County to be approximately 183,200 AF/yr. The estimate is slightly increased in the 2016 update to approximately 190,500 af/yr, based on a review of State Engineer records.

6.1.3 Water Demand and Population Projections

In 2010, TMWA developed a long-range water demand projection for the entire County that yielded an annual demand of approximately 142,000 af to support a population of approximately 590,500 persons as projected for the year 2030 by the 2010 Consensus Forecast. In response to WC-3 and the Regional Plan amendments, the projections were extended to estimate the population that could be supported by the sustainable water resources of 183,200 af/yr, yielding a build-out population of about 741,000. ~~TMWA has developed a three-step process to produce a long-range water demand projection for all of Washoe County. The first step was to develop a population projection model based on fitting a logistic curve model to past population, and then~~

~~create a projection of that population to the year 2050. The second step was to develop a countywide inventory of buildings, and then create a projection of new residential dwelling units and commercial buildings as a function of population. The third step was to estimate water demand as a function of building inventories and historic water use coefficients.~~

~~The results of steps one and two show that the models fit the historic data well and that the projected values follow a reasonable trend. The projected trend for persons per dwelling unit and persons per developed acre show that the projection will meet the land and building needs of the projected population.~~ TMWA's methodology is published in detail in its *2030 Water Resource Plan, Appendix I*.

~~TMWA assisted the NNWPC and the WRWC by re-running its model using the draft Consensus Forecast population and producing a building inventory and water demand projection. The building inventory and water demand projection estimates the increase in both single family and multi family dwelling units, including residential units served by domestic wells, and commercial buildings. A projection of metered irrigation usage is also presented.~~

6.1.4 Conclusions

The WRWC determined in 2010 that the sustainable water resources identified in the 2011 Regional Water Plan were adequate to serve the 2030 population estimate provided in the Consensus Forecast. In 2012 and 2014, the WRWC reasoned that the sustainable water resources identified in 2010 were adequate to serve the Consensus Forecast 20-year population projections in each of those years. The downward trend in 20-year populations while holding available resources constant meets the expectations of WC-3 and the Regional Plan amendments.~~The model projects a water demand of approximately 142,000 af to support a population of approximately 590,500 as projected for the year 2030 by the draft Consensus Forecast. Therefore, the estimated sustainable water resources of approximately 183,200 af per year as shown in the Water Resources Baseline Table are more than adequate to serve the draft Consensus Forecast population for 2030. On April 9, 2010, the WRWC approved a finding that the forecasted population can be supported by the sustainable water resources as set forth in this Plan.~~

~~The model was also used to project beyond the 2030 population estimate using the same planning assumptions, purely as a planning exercise, to estimate the maximum population that could be supported by the sustainable water resources. That exercise calculated a population of approximately 741,000. It is imperative to understand that this population calculation is the result of a mathematical model and has no basis in, or correlation to, the Consensus Forecast or any other population forecast.~~

6.2 Projections of Water Demand, Peak Day Requirements and Wastewater Flow for Service Areas

~~The preceding sections present a summary of the process that was followed to determine whether the forecasted population can be supported by the sustainable water resources available within Washoe County.~~ Given that sustainable water resources are potentially available to meet future growth in the Planning Area through 203~~0~~5, more detailed projections of future water demands, including peak day capacity requirements, wastewater flow, ~~and~~ wastewater treatment plant capacity ~~needs~~and effluent management needs are required to estimate future infrastructure requirements and costs.

The TMWA 2035 WRP projects water demand through the year 2035 to ensure that the utility will have the necessary water resources and facilities to serve its service area population. Projected water demand is based on projected population and water service connections through the planning period. Projected water demand has four main components: (1) Residential demand, (2) Commercial demand, (3) Irrigation demand, and (4) System losses. Each of these components is projected using established historic water demand factors. The projections include estimates of land use consumption, growth in dwelling units and commercial buildings, and were developed in a four-step modeling process as follows:

- Future population is projected for Washoe County.
- The number of single-family buildings, multi-family dwelling units, and commercial buildings are projected as a function of the population projection.
- A relationship between active water services and buildings is developed to project the number of new active water services, including water use coefficients which are estimated for each customer class using historic billed water use.
- Combine the building projections with the water services and water use coefficients to create the total water demand projection.

The total demand for water is dependent on three general demands or uses: (1) residential consumption of water for internal household purposes; (2) commercial consumption of water as an input to producing goods and services in the local economy (i.e., each business has a demand for water that is dependent of the type of business and the building that it occupies); and (3) residential and commercial consumption of water for irrigation purposes. TMWA's population forecast and water demand projection methodologies are described in Chapter 4 of its 2035 WRP.

~~Estimates of future water demands and wastewater flows consistent with the Consensus Forecast population projection have been disaggregated for seven primary planning areas within the region. The intent of this projection is to more closely approximate water and wastewater infrastructure needs by service provider; it is not intended in any way to supplant or be in conflict with the Regional Planning Commission's adoption of the Consensus Forecast or the provisions of the Regional Plan.~~

6.2.1 Projections by Planning Area

TMWA's County-wide projection is disaggregated into the sub-areas listed below.

Utility Service Areas	
ID Code	Name
TR	TMWA Retail Area
SV	TMWA Wholesale (Sun Valley)
WC	Washoe County (Non-TMWA)

Hydrographic Basins	
ID Code	Name
083	Tracy Segment
085	Spanish Springs
086	Sun Valley
087	Truckee Meadows
088E	Pleasant Valley East
088W	Pleasant Valley West
089	Washoe Valley
091	Truckee Canyon
092	Lemon Valley
000	All Other Basins in County

(Add reference map)

Sub-area projections are derived from the County total projection using a ratio share analysis ensuring that in any projection year the sum of the sub-areas will always equal the County total.

The seven planning areas are consistent with the planning areas established for the *City of Reno and Washoe County TMSA/FSA Water Wastewater and Flood Management Facility Plan* (ECO:LOGIC, 2007) and the *City of Sparks TMSA/FSA Conceptual Facility Master Plan* (Stantec, 2008). The planning areas are based primarily on wastewater service areas and political boundaries, and are identified as Cold Springs, Stead/Lemmon Valley, the Washoe County portion of Spanish Springs, Sparks, SVGID, Truckee Meadows and South Truckee Meadows.

6.2.1.1 Calibrated Consensus Forecast

The water demand model developed by TMWA for its 2030 Water Resource Plan was used to disaggregate projected water demands. To apply the model to this Plan, the following adaptations were made:

- Population data includes 2009 population estimates.
- Consensus Forecast is calibrated to 2009 population estimate.
- Planning area boundaries are changes to hydrographic basins and wastewater service areas.
- A new building model was re-estimated using 2009 property data.

A full description of the model is published in *TMWA's 2030 Water Resource Plan, Chapter 4, Appendix H, and Appendix I.*

The water demand model depends on four components; a population projection, building inventories, water service counts and annual water use per service. The historic population is used with the annual building inventories to estimate the relationship between population, new homes, new multi-family units, and commercial buildings. The statistical relationship between the historic population and building growth is used to project the growth of new buildings as a function of the projected population.

The Consensus Forecast was used for this water demand projection. To satisfy model requirements, the Consensus Forecast is calibrated to 2009. The annual building inventory is estimated from the County Assessor's parcel and building tables. Using the construction year for each building on each parcel, a tabulation of building by type and year is created. This annual inventory is used to compute the statistical relationship between population and buildings. This model is used with the population projections to project the following classes of buildings and water services:

- Single family homes on wells
- Single family homes on municipal water
- Multi-family dwelling units
- Commercial buildings using general metered water service
- Metered irrigation water services

Total projected water service counts are converted to water demand using the following annual water use per service factors:

- Single family homes on wells: 325,851 gallons
- Single family homes on municipal: 166,610 gallons
- Multi-family service: 435,009 gallons or 42,522 gallons per dwelling unit

- ~~Commercial water service: 707,220 gallons~~
- ~~Metered irrigation service: 1,018,000 gallons~~

~~To disaggregate the total demand into the smaller planning areas, the historic percentage of each class of buildings is projected for each area and building type. The total number of water services and water demand in each planning area is summed and forced to equal the county total in all years.~~

6.2.2 Water Demand Projections

Following this methodology, projected 201~~0~~5 ~~and~~through 203~~0~~5 average day water demands for each of the planning areas were developed, which are presented in Table 6-1. The 203~~5~~0 total TMWA wholesale and retail potable water demand projection is 94,843~~of 116,400~~ af ~~is less than TMWA's *2030 Water Resource Plan* projection of 142,000 af~~. This Plan considers the area where municipal services are to be provided within the Truckee Meadows Services Area, which is a subset of the larger area of Washoe County. The ~~evaluated in TMWA's *2030 Water Resource Plan.*~~TMRPA PEM predicts no growth in the Spring Mtn. or Warm Springs TMSA by 2035.

Table 4-6 presents the projected water production within the TRA and non-TRA by hydrographic basin. The system loss is calculated using an estimate of 6 percent of the total demand. TMWA projects its peak day requirements to be (insert data).

Table 6-1. Projected Water Use Through 2035 by Hydrographic Basin

	TRA						non-TRA				
	Spanish Springs	Sun Valley	Truckee Meadows	Pleasant Valley-West	Lemmon Valley	Subtotal	Tracy Segment	Pleasant Valley-East	Washoe Valley	Subtotal	TOTAL
	85	86	87	88	92A & 92B		83	88	89		
	a	b	c	d	e	f	g	h	i	j	k
2015	8,917	221	62,115	1,020	4,294	76,567	26	55	136	217	76,784
2016	9,115	225	63,161	1,044	4,378	77,923	26	56	140	222	78,145
2017	9,298	229	64,180	1,065	4,452	79,224	27	56	144	227	79,450
2018	9,460	236	65,241	1,083	4,526	80,546	28	57	146	230	80,776
2019	9,605	239	66,136	1,101	4,590	81,671	28	58	148	234	81,905
2020	9,740	242	66,879	1,117	4,650	82,628	29	59	150	238	82,866
2021	9,864	244	67,536	1,133	4,699	83,476	29	60	152	240	83,716
2022	9,994	247	68,201	1,148	4,753	84,343	29	61	154	244	84,587
2023	10,131	251	68,993	1,163	4,811	85,349	30	62	155	247	85,595
2024	10,272	254	69,837	1,180	4,874	86,417	30	63	157	250	86,667
2025	10,392	257	70,572	1,194	4,926	87,340	30	64	160	254	87,594
2026	10,495	259	71,227	1,206	4,976	88,163	31	64	162	256	88,420
2027	10,601	261	71,785	1,219	5,017	88,884	31	65	162	258	89,142
2028	10,703	264	72,333	1,232	5,059	89,590	31	65	164	260	89,850
2029	10,824	267	72,976	1,244	5,107	90,418	32	66	165	263	90,681
2030	10,934	269	73,640	1,259	5,158	91,260	32	67	169	268	91,528
2031	11,039	272	74,294	1,271	5,207	92,083	32	68	171	271	92,354
2032	11,134	274	74,890	1,281	5,248	92,826	32	68	173	273	93,099
2033	11,219	275	75,354	1,291	5,283	93,422	33	69	174	275	93,697
2034	11,295	277	75,797	1,300	5,318	93,988	33	69	175	277	94,264
2035	11,377	279	76,243	1,310	5,354	94,563	33	70	176	279	94,843

~~**Table 6-1 Water Demand Summary**~~

	~~2010 Water Demand (AFA)~~	~~2030 Water Demand (AFA)~~
~~Planning Area~~	~~Total Potable Water Demand[1]~~	~~Total Potable Water Demand[1]~~
~~Stead / Lemmon Valley~~	~~4,300~~	~~6,200~~
~~Cold Springs~~	~~1,400~~	~~2,400~~
~~Spanish Springs~~	~~2,800~~	~~4,200~~
~~Sparks~~	~~19,200~~	~~28,000~~
~~South Truckee Meadows~~	~~8,500~~	~~15,900~~
~~Sun Valley~~	~~1,500~~	~~2,000~~
~~Truckee Meadows~~	~~43,500~~	~~57,700~~
~~**Total**~~	~~**81,200**~~	~~**116,400**~~

~~[1] Demand numbers include an estimated 6 percent water loss factor.~~

6.2.2.1 Section Deleted, covered in 6.2.2~~Peak Day Requirements~~

~~**The projection of future water facility requirements that may be needed by 2030, as presented in Chapter 9, is based largely upon the following estimate of the peak day water demand developed for each planning area. Peaking factors, the ratio between average day demands and maximum day demands, were obtained from the most current water facility plans from TMWA and WCDWR. The 2010 and 2030 average day and maximum day water demands are presented in Tables 6-2 and 6-3.**~~

Table 6-2 2010 Average & Maximum Day Potable Water Consumption

Planning Area	Water Demand (GPD)		
	Total Potable Water Demand[1]	Maximum Day Demand (MDD) / Average Day Demand (ADD) Ratio	MDD Demand
Stead / Lemmon Valley	3,814,000	2.40	9,154,000[2]
Cold Springs	1,286,000	2.40	3,086,000[3]
Spanish Springs	2,470,000	2.75	6,793,000[2]
Sparks	17,114,000	1.90	32,517,000[4]
South Truckee Meadows	7,572,000	2.20	16,658,000[2]
Sun Valley	1,330,000	2.10	2,793,000[4]
Truckee Meadows	38,854,000	2.00	77,708,000[5]
Total	72,440,000		148,709,000

[1] Demand numbers include an estimated 6 percent water loss factor.

Ratio Sources are as follows:

[2] WCDWR 2009-2028 Draft Water Facility Plan for Lemmon Valley and Spanish Springs Valley

[3] Estimated to be equal to Stead/Lemmon Valley

[4] ~~TMWA 2005-2025 Water Facility Plan Appendix B~~

[5] ~~TMWA 2005-2025 Water Facility Plan~~

Table 6-3 2030 Average & Maximum Day Potable Water Consumption

Planning Area	Water Demand (GPD) Total Potable Water Demand[1]	Maximum Day Demand (MDD) / Average Day Demand (ADD) Ratio	MDD Demand
Stead / Lemmon Valley	5,558,000	2.40	13,339,000[2]
Cold Springs	2,133,000	2.40	5,119,000[3]
Spanish Springs	3,726,000	2.60	9,688,000[2]
Sparks	24,961,000	1.90	47,426,000[4]
South Truckee Meadows	14,236,000	2.12	30,180,0002[2]
Sun Valley	1,814,000	2.10	3,809,000[4]
Truckee Meadows	51,538,000	2.00	103,076,000[5]
Total	**103,966,000**		**212,637,000**

[1] Demand numbers include an estimated 6 percent water loss factor.

Ratio Sources are as follows:

[2] WCDWR 2009-2028 Draft Water Facility Plan for Lemmon Valley and Spanish Springs Valley
[3] Estimated to be equal to Stead/Lemmon Valley
[4] TMWA 2005-2025 Water Facility Plan Appendix B
[5] TMWA 2005-2025 Water Facility Plan

6.2.3 Wastewater Flow Projections

Similar to the previous section, a projection of future wastewater flows for each major wastewater service area planning area was developed to estimate the2035 wastewater treatment capacity and effluent management that may be neededs by 2030. The wastewater flow estimates were developed by TMRPA using a parcel-based spatial allocation of the Consensus Forecast for population and employment. The process is summarized below.

- Translate time-series population projections to spatial allocation of housing units and employment
- Aggregate to sub-areas, i.e. hydrographic basins and wastewater service areas
- Select appropriate TMWA water use coefficients to estimate indoor water use for residential and non-residential customer classes
- Develop residential and non-residential average water use factors
- Calculate wastewater flows by wastewater service area, compare to 2015 average day annual flows observed at each water reclamation facility and develop weighted factors for best fit
- Calculate 2035 wastewater flow projections for wastewater service areas and facilities

TMRPA staff used indoor water usage coefficients provided by TMWA to estimate wastewater generation by parcel for the Truckee Meadows Service Area. The coefficients were based on the averages for each service as shown in Table 6-2. MMWS is categorized as multi-family units, while RMWS represents single family residential units and GMWS represents non-residential. Residential calculations were relatively straightforward since TMRPA's parcel level data projects annual housing units. The MMWS and RMWS can be applied directly to those annual housing unit estimates to calculate wastewater generation over the 20-year planning horizon. A weighted approach was used when possible to reflect the effect of more dwellings units per area has on the overall average wastewater generation projection. Non-residential wastewater projections were not a straightforward because TMRPA's parcel level data projects employees, while TMWA's coefficient for non-residential water use (indoor) is based on each metered service (GMWS). To apply TMRPA projections to the GMWS coefficient it was necessary to create a relationship between employees and metered service. Since TMRPA has GMWS data by parcel number and business point data for 2015, it was possible to find the number of existing meters per parcel and the number of businesses per parcel and calculate a ratio of meters per business. Furthermore, business point data reveals the number of employees per business allowing the creation of a second ratio. Both ratios were applied to the GMWS coefficient using a weighted average of businesses per employee and meters per business, giving more weight to a parcel with more businesses and more meters. Table 6-3 shows the weighted wastewater generation factors.

(Add additional text to describe the wastewater flow projection process more completely)

Table 6-2 TMWA Indoor Water Use Coefficients

Indoor Water Usage (1,000 gal)							
Hydro-basin	Annual Indoor Usage						
	GMWS	GMWS Meters	MMWS (per customer)	MMWS (per unit)*	Multi-Family Units	RMWS	Single-Family Units
83	170.4	-	-	-	3		213
85	265.8	206	325.1	32.5	944	51.5	17407
86	201.9	19	193.5	19.4	234	64.4	6079
87	481.5	5646	356.5	35.7	49501	55.4	78137
088E	-	-	-	-	8	36.0	2093
088W	116.2	-	-	-	8	30.5	2093
89	101.6	-	-	-	33	24.0	1898
92	397.5	270	415.8	41.6	1231	55.3	11710
Average	247.8	-	322.7	32.3	-	45.3	-
Weighted Average	469.67	-	-	35.7	-	54.0	-

*Assumes an average of 10 units per service

Table 6-3 Weighted Wastewater Generation Factors

Dwelling Unit Type	Dwelling Units	(Dwelling Units×Coefficient×Gallons)÷365days	Total Wastewater Generation (GPD)
Single Family (weighted)	1	(1×53.992×1000)÷365 =	148
Multi-Family (weighted)	1	(1×35.661×1000)÷365 =	98
Non-Residential (employee- weighted)	1 Employee	(1employee×0.075×0.49)(469.67×1000) ÷365 =	47 Gallons Per Employee

Table 6-4 Comparison of Calculated Residential and Non-residential Wastewater Flows to 2015 Average Day Annual Flows Observed at Water Reclamation Facilities

Water Reclamation Facility	Residential (weighted)	Non-Residential (employee-weighted)	Calculated Total Wastewater Generation (GPD)	Observed 2015 Average Day Annual Flow (GPD)	Comparison Percentage of ADAF
TMWRF	17,308,352	9,479,288	26,787,640	26,330,000	101.74%
STMWRF	2,191,808	1,147,593	3,339,401	3,000,000	111.31%
RSWRF	1,104,804	354,498	1,459,302	1,400,000	104.24%
CSWRF	305,661	19,418	325,080	297,000	109.45%
LVWRF	123,916	59,005	182,921	260,000	70.35%

Table 6-5 Regional Results

Water Reclamation Facility (method)	**Total Wastewater Generation - Employee Factors Weighted (GPD)**	**Observed 2015 Average Day Annual Flow (ADAF) (GPD)**
TMWRF	26,787,640	26,330,000
STMWRF	3,339,401	3,000,000
RSWRF	1,459,302	1,400,000
CSWRF	325,080	297,000
LVWRF	182,921	260,000
Totals	**32,094,344**	**31,287,000**
		Percentage of ADAF 102.58%

Table 6-6 Projected Wastewater Flow by Water Reclamation Facility in 5-year Increments

	Predicted Wastewater Generation (GPD)			
WRF	**2020**	**2025**	**2030**	**2035**
TMWRF	944,552	1,879,823	2,908,777	3,837,390
STMWRF	379,340	785,214	1,122,785	1,509,522
RSWRF	197,356	430,932	681,712	863,068
LVWRF	61,352	191,631	294,188	368,182
CSWRF	34,276	73,576	191,203	458,883
Totals	1,616,876	3,361,176	5,198,666	7,037,046

TMWA provided water use coefficients by hydrographic basin derived from 2009 – 2015 water use records. To estimate indoor water use, data from single-family, multi-family and general metered (commercial/industrial) customer classes for winter months (December – March) were used. ~~are based on generally accepted equivalent dwelling unit ("EDU") flow factors for each area, and an estimate of commercial/industrial flows per service account.~~

~~The commercial/industrial flow per service account is estimated to be 1,500 gallons per day ("gpd"). This estimate is based on an analysis of winter water usage for 178 active commercial / industrial accounts within seven sample areas throughout Reno and Sparks. WCDWR also performed a similar analysis for their service area in South Truckee Meadows. The 2010 and 2030 wastewater flow projections are presented in Tables 6-4 and 6-5~~.

Table 6-4 2010 Projected Water Demand and Wastewater Generation Summary

Planning Area	Water Demand & Wastewater Flow (GPD)			Estimated Flow to Each Wastewater Treatment Facility (MGD)			
	Potable Water Demand[1]	Wastewater Generation	Ratio	Cold Springs	Stead / Lemmon Valley	STMWRF	TMWRF
Stead / Lemmon Valley	3,814,000	1,702,000	0.45		1.70		
Cold Springs	1,286,000	586,000	0.46	0.59			
Spanish Springs	2,470,000	1,165,000	0.47				1.17
Sparks	17,114,000	7,610,000	0.44				7.61
South Truckee Meadows	7,572,000	3,618,000	0.48			3.62	
Sun Valley	1,330,000	533,000	0.40				0.53
Truckee Meadows	38,854,000	19,755,000	0.51				19.76
Total	**72,440,000**	**34,969,000**	**0.48**	**0.59**	**1.70**	**3.62**	**29.07**

[1] Demand numbers include an estimated 6 percent water loss factor.

Table 6-5 2030 Projected Water Demand and Wastewater Generation Summary

Planning Area	Water Demand & Wastewater Flow (GPD)			Estimated Flow to Each Wastewater Treatment Facility (MGD)			
	Potable Water Demand[1]	Wastewater Generation	Ratio	Cold Springs	Stead / Lemmon Valley	STMWRF	TMWRF
Stead / Lemmon Valley	5,558,000	2,472,000	0.44		2.47		
Cold Springs	2,133,000	984,000	0.46	0.98			
Spanish Springs	3,726,000	1,788,000	0.48				1.79
Sparks	24,961,000	10,963,000	0.44				10.96
South Truckee Meadows	14,236,000	6,700,000	0.47			6.70	
Sun Valley	1,814,000	728,000	0.40				0.73
Truckee Meadows	51,538,000	25,386,000	0.49				25.39
Total	**103,966,000**	**49,021,000**	**0.47**	**0.98**	**2.47**	**6.70**	**38.87**

[1] Demand numbers include an estimated 6 percent water loss factor.

This methodology ~~of using accepted EDU flow factors for new residential development and 1,500 gpd per new commercial /industrial account moderately~~slightly over-estimates ~~the~~regional ~~2010~~ wastewater flow~~s to each treatment plant~~ compared to 20~~09~~15 observed ~~historical~~ flow~~s records~~. ~~This over-estimation of 2010 flows is reasonable given that the methodology does not account for the current local economic conditions, the "flat" construction trend and the observed reduction in residential and commercial building occupancy. These factors have led to both a decrease in potable water demand and wastewater flow throughout the region.~~

The 2035~~0~~ wastewater flow projections are reasonable for the intended purpose of projecting future flows at each of the ~~four~~ regional wastewater reclamation facilities. ~~The ratio of projected wastewater flow to water demand varies from 0.40 to 0.51, which approximates historical trends and supports this conclusion.~~

The 2030~~0~~5 wastewater flow projections represent the "average annual daily flow" that can be expected at the ~~four~~ regional wastewater reclamation facilities. Some variability should be anticipated in the actual capacity and process improvements that will be necessary in the future at each individual facility, as wastewater treatment is a complex combination of physical, biological and hydraulic processes. This is in addition to the inherent uncertainty of when and where future development will occur over the next 20 years.

Design of each process must take into account not only significant variations in flow, but variability in loading, or strength, of numerous constituents such as biological oxygen demand ("BOD"), suspended solids, dissolved solids and nutrients. When future improvements are required at the regional wastewater reclamation facilities, a detailed facility plan or engineering design report will be prepared that defines the specific process improvements and capacity requirements. This detailed information will take precedence over the "planning level" flow and capacity projections presented in this Plan.

6.3 Water Balance Model

A Regional Water Balance Flow Diagram has been developed, which is a graphical representation of the existing conditions and the projected 2030 future conditions for the water supply, wastewater treatment, reclaimed water and wastewater disposal requirements. The Regional Water Balance Flow Diagram is useful to answer the following questions:

- How much potable water is used today, and in what locations?
- From which sources does the potable water originate, and once used, where does it go for wastewater treatment?
- Following treatment, how much of the water is reused, and where is the balance disposed?
- Are there future imbalances in water supply, wastewater disposal or reclaimed water usage, and if so, in which planning areas?
- Are there planning areas with adequate capacity to address imbalances?

The existing condition Regional Water Balance relies on the historical water demands and wastewater flows from the *City of Reno and Washoe County TMSA/FSA Water Wastewater and Flood Management Facility Plan* (ECO:LOGIC, 2007) and the *City of Sparks TMSA/FSA Conceptual Facility Master Plan* (Stantec, 2008), and were used to reconcile the water balance calculations. The future conditions Water Balance is based on the 2030 projections presented

in Sections 6.1 and 6.2. Following is a general overview of the data presented in the Water Balance:

- All numbers are shown in acre feet annually ("afa").
- The planning areas are consistent with the *City of Reno and Washoe County TMSA/FSA Water Wastewater and Flood Management Facility Plan* (ECO:LOGIC, 2007) and the *City of Sparks TMSA/FSA Conceptual Facility Master Plan* (Stantec, 2008) planning area boundaries as shown in Figure 6-1 (page 6-20). These areas are representative of the sewer service boundaries of the regional wastewater treatment facilities.
- The potential conversion of domestic wells to the municipal water system is shown as a water demand.
- The potential conversion of individual septic systems to the municipal sewer is shown as a wastewater flow.
- Local groundwater supplies are shown equal to the perennial yield of the respective basin, consistent with the Water Baseline Table presented in Chapter 2.
- Water supplies, wastewater treatment capacity and disposal constraints are identified for each planning area.
- Current groundwater recharge quantities are shown as a demand on the municipal water system.
- Undetermined Water Supply is called out if there are insufficient water resources identified in the planning area to meet the projected 2030 water demands.
- Undetermined Disposal is called out if there is insufficient disposal capacity, i.e. discharge to the Truckee River, rapid infiltration basins, and/or reclaimed water irrigation demands to meet the projected 2030 wastewater flows.
- Future reclaimed water demands are shown based on 2009 flow records. If new reclaimed water facilities and customers are added, this will decrease the quantity shown in Undetermined Disposal.

The Existing Regional Water Balance and the 2030 Regional Water Balance are presented in Figures 6-2 and 6-3, (pages 6-21 and 6-22) respectively. Table 6-6 presents the conclusions drawn from this evaluation.

Table 6-6 Regional Water Balance Key Findings

Planning Area	Water Balance	Wastewater Balance
Cold Springs	Existing municipal groundwater pumping (Utilities Inc.) of 1,417 af, 500 af identified perennial yield	Future septic tank conversion potential of 310 af
	Future domestic well conversion potential of 247 af	Future undetermined disposal capacity of 70 af
	Future 2030 water supply deficit of 2,147 af	
Reno Stead/Lemmon Valley	Existing municipal groundwater pumping of 2,028 af, 1,300 af identified perennial yield	Future septic tank conversion 560 af
	Existing 379 af well recharge	Future undetermined disposal capacity of 103 af, using maximum permitted disposal capacity to Swan Lake
	Future domestic well conversion potential of 2,177 af	
	8,000 af Fish Springs water supply available	
	Future 2030 surplus of 4,559 af, but 2,905 af of 8,000 is needed to meet deficit from perennial yield and domestic well conversion	
Sparks/Spanish Springs	Existing municipal groundwater pumping of 2,435 af, 1,000 af identified perennial yield	Future septic tank conversion 440 af
	Existing 229 af well recharge	Share of future undetermined TMWRF disposal capacity of 7,698 af
	Future domestic well conversion potential of 24 af	
	Future 2030 estimated *TROA* water supply surplus of 7,189 af, but 1,459 af is needed to meet deficit from perennial yield and domestic well conversion	

Central Truckee Meadows	Existing 1,308 af well recharge	Future septic tank conversion 960 af
	Future domestic well conversion potential of 1,634 af	Share of future undetermined TMWRF disposal capacity of 7,698 af
	Future 2030 estimated *TROA* water supply surplus of 12,905 af	
	Support creek exchange water supply to South Truckee Meadows	
South Truckee Meadows	No groundwater recharge at present, managed municipal groundwater pumping of 6,795 af	Future septic tank conversion 850 af
	Future domestic well conversion potential of 1,598 af	Future undetermined STMWRF disposal capacity of 5,690 af
	Future 2030 estimated water supply surplus of 346 af, based on use of local groundwater, creek exchange and Truckee Meadows wholesale supplies	
	Receives 5,958 af of creek exchange water supply from Central Truckee Meadows	

6.3.1 Water Supplies

Overall, the region has available water resources to meet the projected increase in demand. These water resources include the *TROA* water supplies, the Fish Springs Water Importation Project, local basin groundwater supplies, and local tributary creeks including Galena, Thomas, Whites, Brown's and Steamboat Creeks. In addition to these water resources, the region also has reclaimed water resources that are available for multiple uses from the TMWRF, STMWRF, RSWRF and CSWRF.

In several planning areas, however, there are water supply imbalances that will need to be addressed over the long term. In particular, the combined demand from domestic wells and permitted municipal groundwater pumping exceeds the perennial yield of the basins in Cold Springs, Lemmon Valley and Spanish Springs Valley. This is an issue that affects both existing and future water users, and exists under both current and projected 2030 conditions.

Water resource management options are available to help mitigate the potential negative impacts due to this imbalance. For instance, in Cold Springs, a portion of the supply from the Fish Springs Water Importation Project could be used to augment the available water resources. Other management options include conversion of domestic wells to the municipal water system, (municipal water systems are able to utilize and manage the groundwater resources more efficiently) and expanded groundwater recharge utilizing available water resources from basins with surplus water.

The Truckee Meadows, Sparks and South Truckee Meadows planning areas do not have a water supply imbalance. Water resource management practices by TMWA and WCDWR limit groundwater pumping and surface water resource utilization to sustainable levels. It should be noted that there will continue to be local area impacts within portions of these planning areas where mitigation of groundwater level declines and impacts to shallow domestic wells will continue to be necessary. The Mt. Rose fan area is an example of this situation. The available groundwater resource is not over-utilized; however, relatively shallow domestic wells that penetrate only the upper portion of the aquifer will continue to be affected by regional water level declines as a result of the combined pumping of both municipal and domestic wells.

The long term water supply imbalances that exist in the different planning areas are not a water resource availability issue, but rather an issue of how best to efficiently mitigate impacts resulting from use of the resource, and who shares in the cost of mitigation.

6.3.2 Wastewater Treatment and Disposal

Long-term disposal and reuse of treated effluent will be a challenge throughout the different planning areas. Cold Springs and Lemmon Valley generally have sufficient disposal capacity to meet the projected needs until 2030. However, future disposal options will need to be identified to accommodate planned development beyond the 2030 time horizon. Several options are available, such as disposal of a portion of the treated effluent to White Lake. This could create a wetland amenity similar to the Swan Lake Nature Study Area in Lemmon Valley. Other options include expanded use of reclaimed water for irrigation, and/or high level treatment of a portion of the effluent to help recharge the local groundwater basins.

In the Central Truckee Meadows, Sparks and Spanish Springs planning areas, discharge to the Truckee River through TMWRF may be limited in the future by several constraints, such as the total maximum daily load ("TMDL") wasteload allocations ("WLA") for nitrogen, phosphorus and

total dissolved solids ("TDS") as presented in Chapter 4. Based on the 2030 flow projections, with approximately 33,600 af discharged annually to the river and 4,000 af of reclaimed water use for irrigation, roughly 7,700 af of additional disposal capacity will be required.

Management options to address the need for additional disposal capacity include:

- Work with state and federal regulatory authorities, in coordination with the Pyramid Lake Paiute Tribe ("PLPT")'s water quality and quantity goals, to demonstrate that additional discharge to the Truckee River is an environmentally sound practice
- Connect additional reclaimed water users to the existing systems in Sparks and Reno. Reclaimed water irrigation use reduces the amount of water discharged to the Truckee River. However, this is a seasonal use and other options may be needed during limited irrigation periods, particularly during the months of May and October.
- Investigate the merits of supplying reclaimed water for year round industrial uses, such as the proposed Patrick technology park. Year-round use of reclaimed water improves TMWRF's ability to meet the Total Nitrogen discharge limits to the Truckee River. As presented in Chapter 4, the Patrick project proponent is considering delivery of a minimum of 4,000 afa of TMWRF reclaimed water via a new pipeline to be developed to the project site.
- Continue to investigate the feasibility and public acceptance issues associated with implementing a groundwater recharge program using high quality reclaimed water. Groundwater recharge can provide an efficient and productive use of the reclaimed water resources, and can be one component to help mitigate the identified water supply imbalances in several planning areas.

In the South Truckee Meadows planning area, 100 percent of the reclaimed water is used for irrigation. Based on the 2030 flow projections, approximately 5,700 af of additional disposal capacity will be required. This represents an increase of over two times the current level of reclaimed water use. Management options available to Washoe County to address the need for additional disposal capacity are similar to TMWRF, with the exception of discharging to the Truckee River. WCDWR has ongoing efforts to continue to expand the reclaimed water system for irrigation; to pilot test the feasibility of using up to 1,000 af of reclaimed water annually for cooling Ormat's Steamboat geothermal power plant; and to investigate the feasibility and public acceptance issues associated with implementing a groundwater recharge program using high quality reclaimed water.

INSERT

Figure 6-1 Regional Water Balance Planning Areas

Figure 6-2 Existing Regional Water Balance

Figure 6-3 2030 Regional Water Balance

References Cited

ECO:LOGIC, 2009, *Draft South Truckee Meadows Water Facility Plan Update,* prepared for Washoe County Department of Water Resources.

ECO:LOGIC, 2009, *2009-2028 Draft North Valleys Water Facility Plan,* prepared for WCDWR.

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Stantec Consulting Engineers, 2008*, City of Sparks TMSA/FSA Conceptual Facility Master Plan.*

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Truckee Meadows Water Authority, 2009, *2010 - 2030 Water Resource Plan.*

Truckee Meadows Water Authority, 2004, *2005 - 2025 Water Facility Plan.*

Truckee River Operating Agreement, 2008, http://www.usbr.gov/mp/troa/final/troa_final_09-08_full.pdf.

Washoe County, 2010, *Washoe County Consensus Forecast 2010-2030*, adopted by the Truckee Meadows Regional Planning Commission July 2010, revised November 2010.

6.3 ***Water Balance Model:*** Update using data from prior sections and Stantec technical assistance.

RECOMMENDATION

Staff recommends that the NNWPC accept the review notes on Chapter 6 of the 2011 RWMP, with or without changes, and provide direction to staff as appropriate concerning this chapter as part of the development of the 2016 RWMP update.

JS:jd

Attachment: RWMP Chapter 6 Population Forecast and Projections of Water Demand, Peak Day Requirements and Wastewater Flow showing recommended revisions.