Northern Nevada
Water Planning Commission

STAFF REPORT

DATE: June 29, 2016

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

FROM: Chris Wessel, Water Management Planner
Jim Smitherman, NNWPC Water Resources Program Manager

SUBJECT: Presentation of comments received on the "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.

SUMMARY

Since the last presentation of this chapter to the NNWPC at the June 1, 2016 meeting, staff has focused on Section 6.2 Projections of Water Demand, Peak Day Requirements and Wastewater Flow for Service Areas. The Truckee Meadows Water Authority ("TMWA") water demand projections and methodology are summarized and the pertinent chapter of the TWMA 2035 Water Resource Plan is referenced. Following this is the methodology used by the Truckee Meadows Regional Planning Agency to project wastewater flows using its population and employment model and TMWA's indoor water use coefficients. Sections highlighted in gray are pending updates. Text highlighted in yellow is for staff purposes. Staff is requesting any additional comments for this chapter from the Commission.

RECOMMENDATION

Staff recommends that the NNWPC accept the report on comments received and proposed revisions to the "Population Forecast and Projections of Water Demand, Peak Day Requirements and Wastewater Flow" chapter for the 2016 RWMP update, and, if acceptable, approve the changes and provide direction to staff as appropriate.

JS:js

Attachment: Chapter 6, Section 6.2

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

Given that sustainable water resources are potentially available to meet future growth in the Planning Area through 2035, more detailed projections of future water demands, including peak day capacity requirements, wastewater flow, wastewater treatment plant capacity 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.

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
(Add reference map)	000	All Other Basins in County

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.

6.2.2 Water Demand Projections

Following this methodology, projected 2015 through 2035 average day water demands were developed, which are presented in Table 6-1. The 2035 total TMWA wholesale and retail potable water demand projection is 94,843 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, but extends beyond TMWA's wholesale and retail areas to include parts of Washoe County served by private water purveyors and domestic wells (see chapter 3).

Table 6-1 presents the projected water use within the TRA, non-TRA and non-TMWA areas. System loss is calculated using an estimate of 6 percent of the total demand. TMWA's projections for peak day production requirements appear in Table 6-2.

Table 6-1. Projected Water Use Through 2035 (AF per year)

Year	TMWA			nonTMWA	
	TRA	nonTRA	subtotal		total
2015	76,567	217	76,784	4,951	81,735
2020	82,628	238	82,866	5,388	88,254
2025	87,340	254	87,594	5,789	93,383
2030	91,260	268	91,528	6,175	97,703
2035	94,563	280	94,843	6,555	101,398

Table 6-2 TMWA Peak Day Production Requirements

Year	Estimated Production	Non-Drought Year Peak Day Consumption	Drought Year, Peak Day Consumption
	Acre-Feet	MGD	MGD
2020	82,866	133.2	119.9
2025	87,594	140.8	126.7
2030	91,528	147.1	131.2
2035	94,843	152.4	137.2

6.2.3 Wastewater Flow Projections

Similar to the previous section, a projection of future wastewater flows for each major wastewater service area was developed to estimate 2035 wastewater treatment capacity and effluent management needs. 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

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. TMRPA staff used the 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. Abbreviations for service type are:

MMWS - multi-family residential units
RMWS - single family residential units
GMWS - non-residential (commercial/industrial).

Residential calculations were relatively straightforward since TMRPA's parcel level data projects annual housing units. The MMWS and RMWS factors can be applied directly to those annual housing unit estimates to calculate wastewater generation over the 20-year planning horizon. However, non-residential wastewater projections were not as straightforward because TMRPA's parcel level data projects employees, while TMWA's coefficient for non-residential (indoor) water use 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 for each of the three service types.

Table 6-3 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

The equation that converts employee projections by parcel to meters per parcel is: $(Employees)\times(Businesses/Employee)\times(Meters/Businesses)=Meters$. Using an estimated number of meters per parcel TMRPA applied the 469.67 weighted usage coefficient and estimated wastewater generation per unit (Table 6-4).

Table 6-4 Weighted Wastewater Generation Factors

Dwelling Unit Type	Unit	(Units×Coefficient×Gallons)÷365days	Total Wastewater Generation (GPD)
Single Family (weighted)	1 Dwelling Unit	(1×53.992×1000)÷365 =	148
Multi-Family (weighted)	1 Dwelling Unit	(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

Wastewater flows were then calculated for 2015 using parcel level data and this approach and compared to observed flows at each of the five publically owned water reclamation facilities for calibration purposes. The methodology slightly over-estimates regional wastewater flows compared to total 2015 observed flows. Estimated flows are similarly slightly high for individual facilities, except for the Lemmon Valley facility, as shown in Table 6-5

Table 6-5 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 (ADAF) (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%
Totals			**32,094,344**	**31,287,000**	**102.58%**

Finally, parcel level data were used to project future flows and summed by year out to 2035. Projections are summarized into 5-year aggregates by facility, shown in Table 6-6

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

The 2035 wastewater flow projections are reasonable for the intended purpose of projecting future flows at each of the regional wastewater reclamation facilities.

The 2035 wastewater flow projections represent the “average annual daily flow” that can be expected at the 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.