Report on Red River Valley Water Supply Project Needs and Options

Industrial Needs Assessment: Future Red River Valley Commercial Water Demands

Final Report

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INTRODUCTION

An analysis of the relationship between population growth and the growth of various commercial sectors in the Red River Valley was completed as part of the Report on Red River Valley Water Supply Project Needs and Options: Assessment of Commercial Needs, Future Business and Industrial Activity in the Red River Valley (Draft Report, 2004). The 2004 Draft report indicated that the use of per capita water use rates combined with population projections is a reasonable methodology for estimating future water needs for some sectors. The sectors identified as being significantly correlated with changes in population were retail, wholesale, and construction in the more urbanized areas. The agricultural services and non-classified sectors had no historical trend of growth or decline, so the use of per capita water use rates would not result in underestimating future water demands. The services sector and finance sector both had growth rates approximately 15% higher than the population growth rate. The change in manufacturing and transportation sector activity was not correlated with population growth and was much higher in urbanized areas than population growth. Therefore, the use of per capita water use rates combined with population projections would likely result in a systematic underestimation of future water demand by the service, finance, manufacturing, and transportation sectors.

METHOD USED TO ESTIMATE COMMERCIAL WATER DEMAND

Future commercial water demands presented in this analysis are based on population growth for those sectors identified as correlated with population change in the 2004 Draft report. Population growth estimates are based on the results presented in the Bureau of Reclamation Report on Red River Valley Water Supply Project Needs and Options, Current and Future Population of the Red River Valley Region 2000 to 2050 (2003). Those sectors that are correlated with population but grow at a rate consistently higher than population alone are adjusted to account for that growth. For the purposes of this analysis, manufacturing growth is projected in the major urban areas to be the same as in the three city comparison analysis in the 2004 Bureau of Reclamation report "Assessment of Commercial Needs, Future Business and Industrial Activity in the Red River Valley." Manufacturing growth in all the other counties areas are projected to continue growing at the historical trend rate. It should be noted that the manufacturing sector in this analysis does not include agricultural processing activity.

PROJECTED FUTURE COMMERCIAL AND INDUSTRIAL WATER DEMAND

Per capita water use estimates used for evaluating water demands generally include a commercial/industrial component in addition to domestic and public use. Therefore, combining per capita water use estimates with population projections will implicitly account for some future growth in commercial activity. However, using these per capita rates alone assumes the current proportion of commercial water use as a percentage of total use will remain the same in the future and the rate of commercial water use growth will be the same as the rate of population growth.

The rate of commercial/industrial water use growth is likely to be different than the rate of population growth for many sectors. To account for this difference, the results of the commercial/industrial trend analysis for the Red River Valley area and the city comparison analysis are combined with Red River Valley population projections to adjust water use estimates using per capita water demand and population estimates alone. These adjustments are needed to account for any commercial sector growth in excess of population growth.

Description of How Additional Water Demands Were Estimated

The first step is to estimate total projected water use based on population growth projections and per capita use. The second step is to estimate commercial/industrial water use using the results from the trend analysis and city comparison in the draft 2004 report on future commercial activity. Water use is estimated by sector, including services, retail, wholesale, and manufacturing.

The maximum annual water demand for municipal systems in North Dakota and Minnesota and rural North Dakota systems for the year 2050 based on the "best" estimate presented in the Bureau of Reclamation 2003 report "Current and Future Population of the Red River Valley Region 2000 through 2050" and per capita water demands. The 2050 share of water demand was attributed to various sectors based on the following percentages of maximum annual water demand: manufacturing demand equals 10%, retail demand equals 10%, services demand equals 10%, and wholesale trade equals 5%. This application of per capita water use rates to population projections assumes growth of the manufacturing, retail, services, and wholesale trade sectors are the same as population growth. As discussed in the 2004 Bureau of Reclamation draft report "Assessment of Commercial Needs, Future Business and Industrial Activity in the Red River Valley," this is not a reasonable assumption for all of these sectors.

High Demand Scenario

Manufacturing is one sector that does not follow population growth closely. A manufacturing growth rate of 1.75% was used for the urban areas of Barnes, Cass, Grand Forks, Richland, and Walsh Counties in North Dakota and Clay County in Minnesota. This rate of manufacturing growth was presented in the 2004 draft Bureau of Reclamation report as a midpoint rate of growth for non-agricultural manufacturing activities in the three city comparison analysis. This rate of growth is similar to the annual rates of growth experienced in these counties from 1977 to 1997 (Barnes County = 1.74%, Cass County = 1.44%, Grand Forks County = 1.63%, Richland County = 1.74%, and Walsh County = 2.23%). The one exception is Clay County, which did not have statistically significant growth over the 1977 to 1997 period. However, since Fargo and Moorhead are so closely tied together, the same 1.75% manufacturing growth rate was applied to Clay County. It should be noted that this manufacturing growth demand does not include agricultural processing activities.

In those counties/cities where manufacturing growth of 1.75% exceeds the projected growth rate to the year 2050, additional manufacturing demand was calculated. This additional demand is estimated to equal the difference in growth that would occur by the year 2050. In other words, if two different growth rates are applied to a base level of activity over 50 years, the difference in

the level of activity will grow over time and that difference in the year 2050 represents the additional manufacturing demand estimated for the urban areas.

The services sector was identified in the 2004 draft Bureau of Reclamation report as a sector growing at a rate higher than population growth alone. An additional 15% of population growth was used as an adjustment to the projected population growth. Additional service sector water demand was estimated by multiplying projected population growth rates by 1.15 for those areas with a positive growth rate. No adjustment was made for those areas with a zero or negative projected growth rate.

The retail sector followed population very closely in the Red River Valley as presented in the 2004 draft Bureau of Reclamation report. However, results of the three-city comparison indicated retail growth could be similar to services sector growth. Therefore, retail growth for the high demand scenario was calculated the same as for the services sector. Growth in the wholesale trade sector also tracked closely with population changes in the 2004 draft Bureau of Reclamation analysis, while the three-city comparison indicated retail growth could be 10% greater than population growth. Therefore, wholesale trade growth for the high demand scenario was calculated at 1.1 times population growth for those areas with positive population growth. Future water demands for other sectors of commercial/industrial activity are shown in Table 1.

Low Demand Scenario

Manufacturing demand was calculated for the low demand scenario in the same way as for the high demand scenario. Services sector growth was estimated to be about 15% greater than population growth for both the historical trend analysis and the three-city comparison analysis. Therefore, additional service sector water demand was estimated for the low demand scenario by multiplying projected population growth rates by 1.15 for those areas with a positive growth rate. The retail sector has historically followed population growth very closely in the Red River Valley, so the low demand scenario is based on the assumption that population growth and retail sector growth will be the same. Wholesale trade has also historically tracked closely with population in the Red River Valley. Therefore, wholesale trade for the low demand scenario is also assumed to grow at the same rate as population growth and no additional wholesale water demands are projected. Additional low demand scenario water demands are shown in table 2.

RESULTS

The total additional future commercial and industrial water demand is projected to be at 2,619 ac-ft per year under the high demand scenario and 1,836 ac-ft per year under the low demand scenario. Under the high demand scenario this includes 1,215 ac-ft for manufacturing, 589 ac-ft for retail, 621 ac-ft for services, and 194 ac-ft for wholesale water demands. Under the low demand scenario this includes 1,215 ac-ft for manufacturing and 621 ac-ft for services. These projections do not include water demand projections for future agricultural processing in the Red River Valley.

Table 1 – Industrial and Commercial Water Demands through 2050, High Estimates

Water System	2000 Population Estimate	Reclamation 2050 Population Projection	Annual % Population Growth Rate	Manufacturing Growth Rate – excluding Ag processing (%)	Additional Manufacturing Water Demand, excluding Ag processing (ac-ft)	Additional Retail Water Demand (ac-ft)	Additional Services Water Demand (ac-ft)	Additional Wholesale Water Demand (ac-ft)	Total Additional Water Demand (ac-ft)
ND Municipal Systems									
Drayton	913	920	0.015%	0%	0	0.03	11.02	0.01	11.1
Enderlin	947	860	-0.193%	0%	0	0	0	0	0
Fargo	90,599	204,300	1.640%	1.75%	169.41	386.14	386.14	126.93	1,068.6
Grafton	4,516	4,130	-0.179%	1.75%	52.25	0	0	0	52.3
Grand Forks	49,321	83,800	1.066%	1.75%	437.27	93.44	93.44	30.87	655.0
Gwinner	717	1,170	0.984%	0%	0	2.48	2.48	0.82	5.8
Langdon	2,101	2,100	-0.001%	0%	0	0	0	0	0
Larimore	1,433	1,190	-0.371%	1.75%	10.35	0	0	0	10.4
Lisbon	2,292	2,530	0.198%	0%	0	0.29	5.85	0.10	6.2
Park River	1,535	1,540	0.007%	1.75%	13.32	0.01	4.73	0	18.1
Valley City	6,826	5,840	-0.312%	1.75%	48.28	0	0	0	48.3
Wahpeton	8,586	12,140	0.695%	1.75%	67.28	5.65	5.66	1.87	80.5
West Fargo	14,940	33,900	1.652%	1.75%	16.18	42.09	42.09	13.83	114.2
MN Municipal Systems									
Breckenridge	3,559	2,540	-0.672%	0%	0	0	0	0	0
East Grand Forks	7,501	9,800	0.536%	0%	0	4.55	12.08	1.51	18.1
Moorhead	32,177	50,211	0.894%	1.75%	243.42	33.71	33.71	11.15	322.0
Rural Water System									
Agassiz Water Users	4,181	5,355	0.496%	0%	0	1.61	5.54	0.53	7.7
Barnes Rural Water	3,742	2,266	-0.998%	0%	0	0	0	0	0
Cass Rural Water	11,587	16,244	0.678%	1.75%	69.52	5.59	5.59	1.85	82.6
Dakota Water Users	2,450	3,421	0.670%	0%	0	1.27	1.27	0.42	3.0
Grand Forks Traill Water Users	8,940	12,176	0.620%	1.75%	87.63	6.04	6.04	2.00	101.7
Langdon Rural Water	2,100	1,568	-0.583%	0%	0	0	0	0	0
North Valley Water Users	7,600	5,101	-0.794%	0%	0	0	0	0	0
Ransom-Sargent Rural Water Users	1,963	1,036	-1.270%	0%	0	0	0	0	0
Southeast Water Users	5,224	7,273	0.664%	0%	0	2.55	2.55	0.85	5.9
Traill County Water Users	2,800	4,527	0.966%	0%	0	3.27	3.27	1.08	7.6
Tri-County Water Users	2,800	2,185	-0.495%	0%	0	0	0	0	0.0
Walsh Water Users	3,160	1,129	-2.037%	0%	0	0	0	0	0
Totals					1,215	589	621	194	2,619

Table 2 – Industrial and Commercial Water Demands through 2050, Low Estimates

Water System	2000 Population Estimate	Reclamation 2050 Population Projection	Annual % Population Growth Rate	Manufacturing Growth Rate excluding Ag processing (%)	Additional Manufacturing Water Demand excluding Ag processing (ac-ft)	Additional Retail Water Demand (ac-ft)	Additional Services Water Demand (ac-ft)	Additional Wholesale Water Demand (ac-ft)	Total Additional Water Demand (ac-ft)
ND Municipal Systems									
Drayton	913	920	0.015%	0%	0	0	11.02	0	11.0
Enderlin	947	860	-0.193%	0%	0	0	0	0	0
Fargo	90,599	204,300	1.640%	1.75%	169.41	0	386.14	0	555.6
Grafton	4,516	4,130	-0.179%	1.75%	52.25	0	0	0	52.3
Grand Forks	49,321	83,800	1.066%	1.75%	437.27	0	93.44	0	530.7
Gwinner	717	1,170	0.984%	0%	0	0	2.48	0	2.5
Langdon	2,101	2,100	-0.001%	0%	0	0	0	0	0
Larimore	1,433	1,190	-0.371%	1.75%	10.35	0	0	0	10.4
Lisbon	2,292	2,530	0.198%	0%	0	0	5.85	0	5.8
Park River	1,535	1,540	0.007%	1.75%	13.32	0	4.73	0	18.0
Valley City	6,826	5,840	-0.312%	1.75%	48.28	0	0	0	48.3
Wahpeton	8,586	12,140	0.695%	1.75%	67.28	0	5.66	0	72.9
West Fargo	14,940	33,900	1.652%	1.75%	16.18	0	42.09	0	58.3
MN Municipal Systems									
Breckenridge	3,559	2,540	-0.672%	0%	0	0	0	0	0
East Grand Forks	7,501	9,800	0.536%	0%	0	0	12.08	0	12.1
Moorhead	32,177	50,211	0.894%	1.75%	243.42	0	33.71	0	277.1
Rural Water System									
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Southeast Water Users	5,224	7,273	0.664%	0%	0	0	2.55	0	2.6
Traill County Water Users	2,800	4,527	0.966%	0%	0	0	3.27	0	3.3
Tri-County Water Users	2,800	2,185	-0.495%	0%	0	0	0	0	0
Walsh Water Users	3,160	1,129	-2.037%	0%	0	0	0	0	0
Totals					1,215	0	621	0	1,836