TECHNICAL MEMORANDUM

SUBJECT: **Green River Basin Plan II**
Basin Water Use Profile-Domestic

DATE: 5/28/2009

PREPARED BY: WWC Engineering

Introduction

This Technical Memorandum has drawn heavily on the work done as part of the 2001 Green River Plan. The major effort in this technical memorandum was to update where necessary the work completed by Purcell Consulting and reported in the "Technical Memorandum Green River Basin Plan - Basin Water Use Profile- Domestic".

The purpose of this technical memorandum is to provide information regarding domestic water use in the Green River Basin. For purposes of this memorandum, domestic water is defined as the water supply for rural homes, subdivisions, commercial establishments, parks, campgrounds, and other smaller water uses. Subdivisions or public water supplies that obtain water from municipalities or joint powers boards are not included in this category, as their water use is addressed in the technical memorandum relating to existing municipal water use in the Green River Basin. Most of the remote industries in the basin use a portion of their supplies for domestic use. However, as this water use is included in the estimated industrial water use for the basin, this water use is not considered domestic water use in this technical memorandum.

Domestic water use is typically supplied from groundwater wells. The typical domestic water user cannot afford to divert, pipe and treat surface water.

Methodology

Existing county populations within the Green River Basin are used as the basis for estimating domestic water use. As county populations, provided by the Wyoming Department of Administration and Information, include the service areas of the municipal water suppliers, it is necessary to subtract the populations of the municipal service areas to obtain the rural populations or domestic water users.

As previously noted, this memorandum considers domestic water use to include individual homes and ranches as well as subdivisions, commercial establishments, parks, campgrounds, and other smaller water uses not included in the basin profiles for municipal and industrial water use in the Green River Basin. A listing of public water supply systems, obtained from the Environmental Protection Agency (EPA), was used to estimate the percentage of domestic use for subdivisions, commercial establishments, parks, campgrounds, and other

smaller water uses (EPA, 2008). The EPA list includes all public water supply systems from the large, Green River, Rock Springs, Sweetwater County Joint Powers Board (GR/RS/SC JPB) system, to small systems such as the Boulder Store. The large municipal systems had to be removed from the list to estimate the rural independently supplied public water supply systems.

Water rights for domestic wells were tabulated and are also discussed.

Analysis Results

A. Rural Population

Rural population is the best indicator of domestic use. Table 1 depicts the existing populations in the study area by county as calculated by WWC Engineering, Inc., in the technical memorandum entitled, "Green River Basin Plan, Population Projections – (WWC, 2008). Estimates of county population were made based on U.S. Census Bureau (USCB) information and information obtained from the Wyoming Department of Administration and Information (WDAI).

The populations of the service areas of the municipal water suppliers were determined using the Wyoming Water Development Commission (WWDC) 2007 Survey and contact with the GR/RS/SC JPB (Bracken, 2008). The service area populations are deducted from the county populations in order to estimate the independently served rural populations by county within the Green River Basin.

These estimates are based on the 2005 estimated population of the Green River Basin (WWC, 2008), the Municipal Water survey conducted under the direction of the WWDC (WWDC, 2007), and the populations of Census Designated Places from United States Department of Agriculture (USDA) Rural Development data (MHI Results, 2003). The 2005 estimated population is based on Census Bureau estimates of population of states and counties. The WWDC Survey is a combination of information received during the 2004 survey and information received during the 2007 survey. The information received from USDA Rural Development is 2003 estimates but is broken down into populations of Census Designated Places. This is the finest break down that was found at this time. The decennial census is the most accurate population information, however, the last one completed was for 2000. In an effort to come up with a more current estimate for the unincorporated areas of the Green River Basin, a combination of the three sources discussed here was used.

The estimated existing population of the areas outside of the service areas of municipal water suppliers is 12,066. For purposes of this estimate, it is assumed that this is the population that is served by domestic groundwater wells or independent public water supply systems. If it is assumed that this population consumes between 150 and 300 gallons per capita per day, the resulting estimated total domestic water use would range between 2,026 and 4,053 acre-feet per year.

Table 1 - 2005 Service Area Populations-Green River Basin

County/Municipality	Service Area Population
Carbon	1,106
Baggs	354
Dixon	81
Rural Population	671
Lincoln	7,781
Kemmerer./Diamondville JPB	3,950
LaBarge	421
Opal	99
Rural Population	3,311
Sublette	6,541
Big Piney	455
Marbleton	811
Pinedale	1,800
Rural Population	3,475
Sweetwater	38,015
Bairoil	96
Granger	146
GR/RS/SC JPB*	35,000
Superior	239
Wamsutter	265
Rural Population	2,269
Uinta	6,840
Bridger Valley JPB	4,500
Rural Population	2,340
Total Basin Population 2005	**60,283**
Total Population - Municipal Service Areas	**48,217**
Total Population - Rural	**12,066**

Source: WDA&I Economic Analysis Division 2005 estimates of city and county pop.
WWDC Water System Survey 2007
USDA Rural Development MHI Results for 2003
Green River, Rock Springs, Sweetwater County Joint Powers Board

B. Existing Public Water Supply Systems

The Environmental Protection Agency (EPA) and the State of Wyoming considers all systems which have at least fifteen (15) service connections or regularly serves at least twenty-five (25) individuals to be a "public water supply". These populations of 25 individuals or more do not necessarily equate to a permanent population. For example, convenience stores, restaurants and bars that serve more than 25 customers are considered

public water supplies. Public water supply systems must comply with the federal safe drinking water standards and other federal mandates.

A printout of the public water supply systems in Wyoming was obtained from the EPA database. The following table depicts the number of public water supply systems within the Green River Basin by county. The systems included in the municipal and industrial water use categories are subtracted from the total number of public water supply systems to estimate the systems within the study area that have their own independent water supplies:

Table 2 - GRB Public Water Supply Systems

County	Public Water Supply Systems	Independent Supply Systems
Carbon	3	1
Lincoln	6	3
Sublette	21	18
Sweetwater	42	30
Uinta	8	3
Total	**80**	**55**

Source: EPA list of public water supply systems

The above table indicates that eighty (80) EPA-designated public water supply systems are within the Green River Basin. There are forty-two (42) public water supply systems in Sweetwater County. Of the 42 public water supply systems in Sweetwater County, thirteen (13) are served by the Green River/Rock Springs/ Sweetwater County Joint Powers Board. The Bridger Valley Joint Powers Board serves six (6) of the eight (8) public water supply systems in the Uinta County portion of the basin. The Kemmerer-Diamondville Joint Powers Board serves two (2) of the six (6) public water supply systems in the Lincoln County portion of the basin. There are eleven (11) municipalities that are independent water suppliers serving basically their own needs.

The objective in this analysis is to determine the number of independently supplied public water supply systems. After the municipally supplied systems are removed from the list there are fifty-five (55) independently supplied systems. This is the same number as was indicated in the 2001 Green River Basin Plan (Purcell, 2001). The fifty-five (55) independent public water supply systems, in all likelihood, obtain their water from groundwater wells. The water rights for this purpose are issued for "miscellaneous" use rather than domestic use.

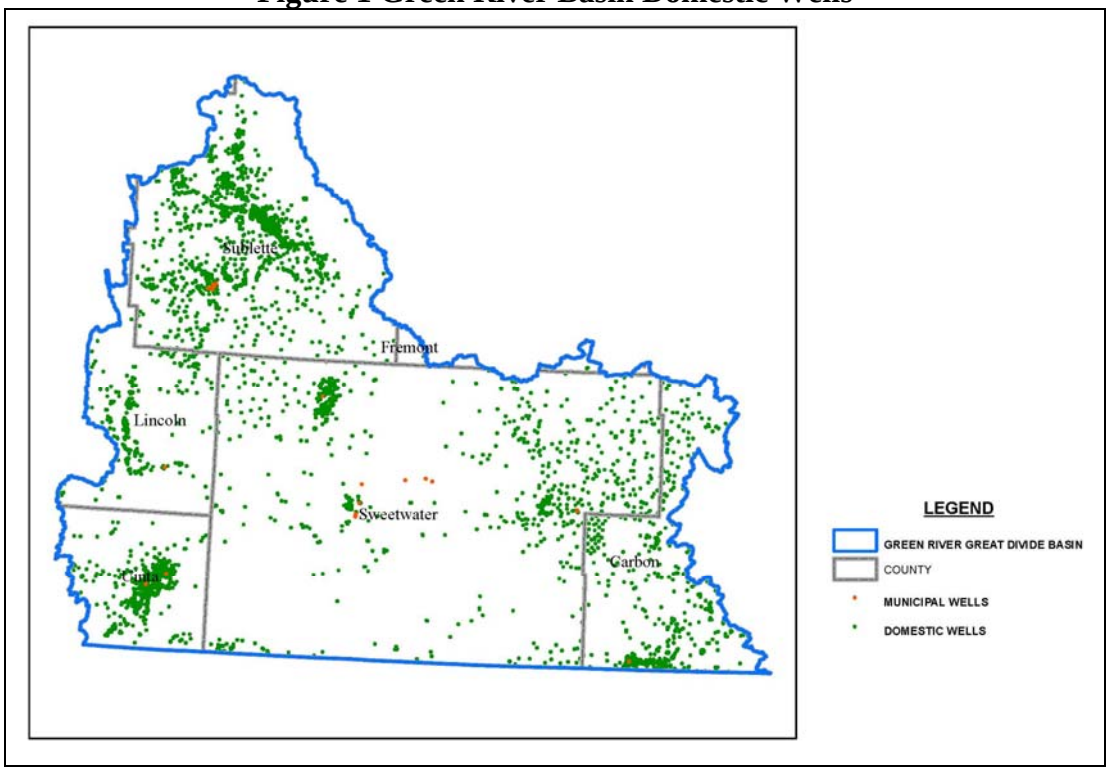
While the EPA designation suggests a minimum population of 25, as previously noted, this population may not be permanent, as customers are considered in the designation. In EPA's database they report an estimated population for each public water supply system. The average population for the 55 independently supplied public water supply systems is 286 (EPA, 2008). To adjust for the non-permanent nature of this population, it is assumed that each of these public water supply systems serve an equivalent permanent population of 40. The result is that 2,200 people of the total estimated rural population of 12,066 are served by independent public water supply systems. If it is assumed that this population consumes

between 150 and 300 gallons per capita per day, the resulting estimated domestic water use in these independent public water supply systems would range between 370 and 740 acre-feet per year.

C. Water Rights

Domestic water rights for the Green River Basin study area were tabulated for the Wyoming Framework Water Plan. In addition, the permitted capacities of the water rights were totaled. All water rights which include domestic use as a permitted purpose are included. There were 6,108 water rights in the basin that included domestic use as a permit purpose and are shown on Figure 1 (Framework 2007). Many water rights include domestic use as a permitted use even though that is not the primary use of the water right. For example, water rights for stock wells are typically issued for stock and domestic purposes. The total permitted capacities of the water rights, that include domestic use as a permitted purpose, is 85,398 gallons per minute (gpm).

Figure 1 Green River Basin Domestic Wells



Source: Wyoming Framework Water Plan, 2007

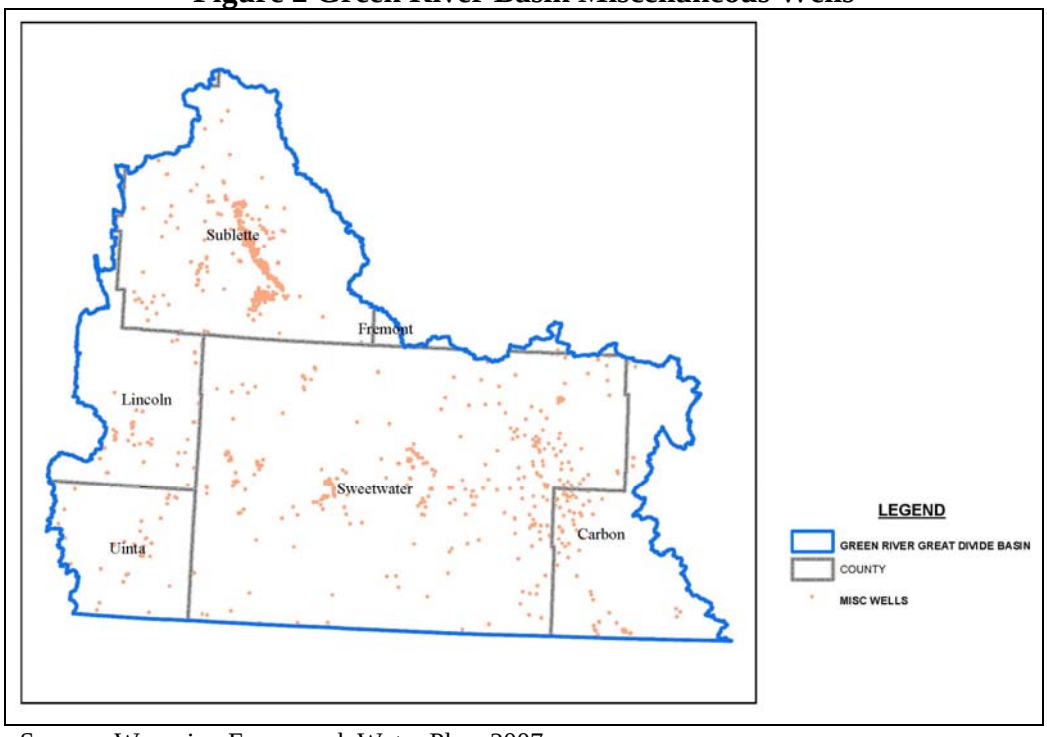
The 85,398 gpm permitted capacity of domestic wells equates to approximately 137,747 acre-feet/year. Obviously, these numbers should not be used as an estimate of domestic water use as the existence of water rights does not necessarily relate to water use. On a statewide basis, it is a reasonable assumption that fifty percent (50%) of the water rights are active (Purcell, Domestic Use, 2001). If this is the case relative to domestic water rights in the Green River Basin, the total permitted capacity of active domestic water rights would be 68,874 acre-feet per year.

The permitted capacity establishes the allowable pumping rate. The resulting volumetric limit from continuous pumping is not particularly meaningful. For example, the typical permitted capacity for a domestic well is 25 gpm, which if pumped continuously for 24 hours, would be 36,000 gallons per day. A family of four would typically use between 600 and 1,200 gallons per day or approximately 2-4% of the volumetric permitted capacity of the typical domestic well.

Using the estimated rural population being served by wells permitted for domestic use is a more reasonable approach to estimate use. As previously noted, water rights for public water supply systems are designated miscellaneous use. Therefore, to estimate the population served by domestic wells, it is necessary to subtract the estimated population of those served by the independent public water supply systems (2,200) from the total estimated rural population (12,066). This would indicate that a population of 9,866 is served by wells permitted for domestic use. If it is assumed that this population consumes between 150 and 300 gallons per capita per day, the resulting estimated domestic water use from these domestic wells would range between 1,658 and 3, 316 acre-feet per year.

Miscellaneous water rights, water rights used for the independently supplied public water supply systems, for the Green River Basin study area were tabulated for the Wyoming Framework Water Plan. In addition, the permitted capacities of the water rights were totaled. All water rights which include miscellaneous use as a permitted purpose are included. There were 1,254 water rights in the basin that included miscellaneous use as a permit purpose and are shown on Figure 2 (Framework 2007) (SEO Database, 2006).

Figure 2 Green River Basin Miscellaneous Wells



Source: Wyoming Framework Water Plan, 2007

D. Summary

For purposes of this technical memorandum, domestic water use includes the use of rural homes served by groundwater wells permitted for domestic use and public water supply systems that serve rural subdivisions, commercial establishments, parks, campgrounds and other smaller uses that have water supplies independent of municipal and industrial water supply systems. Table 3 summarizes the estimated domestic water use in the Green River Basin based on the above described data and assumptions:

Table 3 - 2005 Estimated Existing Domestic Use - Green River Basin (AF/YR)

Supplies	Population	Estimated Use
Rural Public Water Supply Systems	2,200	370 - 740
Individual Domestic Wells	9,866	1,658 - 3,316
Total Domestic Use	**12,066**	**2,028 - 4,056**

References

Environmental Protection Agency, "Public Water Supply Systems-Wyoming", database, 2006, by e-mail from John Gillis, EPA, Region 8, April 8, 2008.

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