

5. EXISTING PUBLIC WATER SYSTEMS

Public water systems, private wells, stock ponds and hauled water presently furnish water for the human and livestock populations of the area. This chapter describes existing public water systems in the region. As presented in Chapter 3, the 1990 population within the public water systems of the project area was 16,017 or nearly 2/3 of the total regional population of 24,829 (Table 3-5). The source of water (Missouri River and wells) and water treatment facilities are topics addressed in this chapter.

5.1 Public Water System Housing and Service Connections

Table 5-1 re-summarizes (from Chapter 3) the census designated places in the project area beginning with Bainville and ending with Wolf Point. Named communities that are not places are also listed beginning with Whitetail and ending with St. Marie.¹ The purpose of this re-presentation is to compare the 1990 housing statistics with community records of residential and commercial service connections as will be discussed below.

The 1990 census provided the population served by public water systems for each of the named places totaling 16,017 persons. The public water systems serve a larger population than resides within the boundaries of the named places. The 1990 population was 13,865 persons when limited to the places. There are an additional 208 persons in public water systems in communities that are non-places. Population and housing data for non-places were taken from census block group data where those communities are reasonably identifiable from the boundaries shown on Figure 3-1.

The 1990 census provided the total housing in public water systems but did not provide a distinction between occupied and vacant housing. The total housing in census designated places was 7,659 units. Total housing in communities not designated as places was 1,333. Most of the total houses in communities not designated as places are in St. Marie where housing (1,223 units) for the former Glasgow Air Force Base is mostly vacant.

Persons per occupied house by place (or block group) were used to estimate the occupied housing in the public water systems from the 1990 census. Population and occupied housing data were available for each place. These data permitted the computation of persons per occupied housing unit in the public water systems. The computation was extrapolated from the places and non-places to the

¹As in Chapter 3, this chapter distinguishes between named communities that are defined as *places* (incorporated and unincorporated communities) by the Census and those communities or public water systems that are named but are not defined as *places* by the Census. The reason for the distinction is that the Census provides population and other statistics for *places*, but those communities that are not places do not have census boundaries that isolate them from larger census block groups. These communities are referred to as *non-places* for ease of designation in the chapter.

TABLE 5-1

PUBLIC WATER SYSTEM POPULATION, HOUSING AND SERVICE CONNECTIONS

| Place/Rural | Census PWS Population | Census PWS Total Housing | Estimated Occupied Housing | Census Persons Per Occupied House | 1999 Reported Service Connections | | | | | "Census" Minus "Reported" Difference | Sanitary Survey Report |
|-------------------|-----------------------------|-----------------------------------|----------------------------------|---|-----------------------------------|-----|--------|----|----------------------|--|------------------------------|
| | | | | | 3/4" | 1" | 1 1/2" | 2" | Total Equivalents | | |
| Place | | | | | | | | | | | |
| Bainville | 166 | 109 | 79 | 2.40 | -- | -- | -- | -- | -- | -- | -- |
| Brockton | 507 | 142 | 123 | 3.75 | -- | -- | -- | -- | -- | -- | -- |
| Culbertson | 784 | 363 | 309 | 2.58 | 388 | | 7 | | 395 | 416 | -79 |
| Flaxville | 0 | 0 | 0 | 2.41 | -- | -- | -- | -- | -- | -- | -- |
| Frazer | 422 | 139 | 114 | 4.00 | -- | -- | -- | -- | -- | -- | -- |
| Froid | 253 | 157 | 125 | 2.23 | 145 | 0 | 1 | 1 | 147 | 156 | -20 |
| Glasgow | 3,662 | 1,852 | 1,633 | 2.41 | 1,393 | 135 | 19 | 13 | 1,560 | 1,801 | 105 |
| Medicine Lake | 381 | 202 | 144 | 2.57 | 165 | 7 | 1 | 6 | 179 | 224 | -28 |
| Nashua | 379 | 226 | 171 | 2.26 | 130 | 64 | 1 | 2 | 197 | 262 | -23 |
| Opheim | 144 | 99 | 72 | 2.17 | -- | -- | -- | -- | -- | -- | -- |
| Outlook | 143 | 67 | 49 | 2.87 | 0 | 51 | 0 | 1 | 52 | 98 | -2 |
| Plentywood | 2,119 | 1,100 | 893 | 2.36 | 878 | 70 | 11 | 15 | 974 | 1,153 | -55 |
| Poplar | 2,114 | 904 | 814 | 3.48 | -- | -- | -- | -- | -- | -- | -- |
| Scobey | 1,160 | 632 | 488 | 2.40 | 672 | 12 | 0 | 7 | 691 | 743 | -196 |
| Westby | 265 | 132 | 107 | 2.45 | 86 | 14 | 2 | 0 | 102 | 119 | 7 |
| Wolf Point | 3,518 | 1,535 | 1,350 | 2.83 | -- | -- | -- | -- | -- | -- | -- |
| | 16,017 | 7,659 | 6,472 | 2.69 | 3,857 | 353 | 42 | 45 | 4,297 | 4,973 | -291 |
| Not Place | | | | | | | | | | | |
| Whitetail | 112 | 61 | 46 | 2.41 | -- | -- | -- | -- | -- | -- | -- |
| Peerless | 17 | 10 | 6 | 2.62 | -- | -- | -- | -- | -- | -- | -- |
| Oswego | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Fort Kipp | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Raymond | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Antelope | 79 | 39 | 30 | 2.63 | 0 | 30 | 0 | 0 | 30 | 53 | 0 |
| St. Marie | 58 | 1,223 | 22 | 2.64 | 114 | 0 | 0 | 0 | 114 | 114 | -92 |
| | 266 | 1,333 | 105 | -- | 114 | 30 | 0 | 0 | 144 | 167 | -92 |
| Total | 16,283 | 8,992 | 6,577 | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Reporting S | 9,283 | 5,993 | 3,971 | -- | 3,971 | 383 | 42 | 45 | 4,441 | 5,140 | -383 |

public water systems. The places have an estimated 6,472 occupied housing units, and the non-places have an estimated 105 occupied housing units. These estimates were considered a reasonable basis for comparison with the service connection data provided by the communities.

In 1999 requests were made of each community in the project area to provide a list of service connections in each public water system. The results are presented in Table 5-1 by size of connection ranging from 3/4" to 2" in diameter. The 3/4" and 1" service connections were assumed residential connections, and the larger service connections were assumed commercial connections. Not all communities reported, but many did. Plentywood, for example, reported 974 service connections of which 948 were one inch diameter or less, assumed residential. This was 55 residential connections greater than the estimated 1990 occupied housing in Plentywood (893 housing units) but well under the 1,100 *total* housing units identified within the public water system by the 1990 census (Table 5-1). The reporting by the City was considered accurate and consistent with the 1990 census, although nearly a decade later.

Of the total communities reporting (last line of Table 5-1), a net increase of 383 housing units was reported, or slightly less than 10% of the estimated 3,971 occupied housing units in 1990 from the census. Glasgow reported fewer service connections (105 connections) that could be classed as residential than estimated from the 1990 census, and Scobey reported more service connections (196 connections). While the two sources of data (1990 census and 1999 community reports) are reasonably consistent, the 2000 Census (see section 3-5) suggests an average 8.46% decline in population in the census places between 1990 and 2000. Without 2000 housing data by place, not available at the time of this writing, it is not known if the decline represents younger members of the population leaving the region with less impact on number of occupied housing units because they are not heads of households.

Unpublished Sanitary Survey reports were inspected in the Helena offices of the Department of Environmental Quality to further verify service connections in the communities. Many of these reports were prepared in calendar year 2000 and were reasonably current. Sanitary Survey reports were not contained in approximately half of the files inspected, but as shown in Table 5-1, there was generally satisfactory agreement between the service connections reported by the communities (place and non-place) and the service connections reported by the Sanitary Surveys.

The number of residential service connections was one area of interest from the communities. Also, of interest was the number of service connections that are non-residential and represent commercial, industrial or institutional water use. Table 5-1 summarizes the number of service connections that were reported by the communities with diameters greater than 1" (87 connections). Larger diameter service connections generally represent a higher demand for water than residential connections, which are typically 3/4" in diameter. The number of connections that are *equivalent* to a 3/4" connection was also computed. A 3/4" connection was counted as one equivalent, a 1" connection was counted as 1.78 equivalent s, and a 2 inch connection was counted as 7.11 equivalents.

These factors are in proportion to the cross-sectional area of each connection size or the square of the diameter. At comparable pressures, a 2" connection will deliver 7.11 times the flow rate of a 3/4" connection. The number of larger service connections was examined as a basis for assessing historic maximum flow rates for each community and was used as a basis for billing rates by Dry Prairie. In the evaluation of billing rate, it was reasoned that the number of *equivalent* connections had greater bearing on the sizing of the main transmission facilities (pipelines and pumping stations) than the number of service connections and therefore greater bearing on that part of the rate structure servicing debt on the local cost share.

5.2 Existing Public Water System Facilities

Table 5-2 presents a summary of existing public water system facilities, including storage, source water and water treatment process for "place" and "non-place" communities. Sanitary Survey reports (not available for all communities) and correspondence with individual communities provided the source of information for Table 5-2.

Public water systems have a total 7,210,000 gallons of storage capacity. Storage per occupied housing unit ranges from as little as 235 gallons per unit (Westby) to as much as 18,197 gallons per unit (St. Marie). (Table 5-2)

The Missouri River provides source water for three communities: Culbertson, Glasgow and St. Marie. Glasgow and St. Marie rely on a system owned and operated by Boeing that draws water from Fort Peck Lake and conveys raw water to a point of interconnection for Glasgow and St. Marie, the latter at the location of the former Glasgow Air Force Base. All other communities rely on groundwater for source of supply. The Missouri River provides 2,648,000 gallons per day capacity, and wells provide an additional 9,848,520 gallons per day for a total capacity of 12,496,520 gallons per day from the Missouri River and groundwater for the reporting communities. Existing sources provide as little as 299 gallons per occupied housing unit (Antelope) to as much as 8,108 gallons per unit (Westby). (Table 5-2)

Existing surface water treatment includes settlement and flocculation of suspended sediments followed by disinfection through a chlorination method. Existing groundwater treatment involves chlorination in most communities. Outlook is an exception where chlorination facilities are available but not in use. Iron and manganese removal are common in many communities that rely on groundwater, such as Bainville, Medicine Lake, Plentywood, Poplar and Wolf Point. Green sand filters are in use for iron and manganese removal. Ion exchange is used in Flaxville for nitrate removal (Table 5-2). Frazer and Froid use reverse osmosis for their treatment systems.

Sanitary Survey reports completed in 2000 generally describe the existing water source, storage and treatment facilities in most communities as in good condition and repair. Operating procedures are generally considered satisfactory. The records disclose some concern in smaller

TABLE 5-2

EXISTING PUBLIC WATER SYSTEM FACILITIES

| Place/Rural | Census | | | Source Capacity, gpd | | | | | | | Storage | Source |
|---------------|---------|---------|-----------|----------------------|-------------------|-----------|-----------|-----------|--------------------|------------|------------|----------|
| | Census | PWS | Estimated | Storage (gal) | Missouri River | Well 1 | Well 2 | Well 3 | Total | Water | Per | Capacity |
| | PWS | Total | Occupied | | | | | | | Treatment | House | Per |
| Population | Housing | Housing | Occupied | Occupied | House | House | House | House | Process (gal/unit) | (gal/unit) | (gal/unit) | |
| Place | | | | | | | | | | | | |
| Bainville | 166 | 109 | 79 | -- | -- | -- | -- | -- | -- | 1,2 | -- | -- |
| Brockton | 507 | 142 | 123 | -- | -- | -- | -- | -- | -- | 1 | -- | -- |
| Culbertson | 784 | 363 | 309 | 1,125,000 | 648,000 | -- | -- | -- | 648,000 | 3 | 3,643 | 2,098 |
| Flaxville | 0 | 0 | 0 | -- | -- | -- | -- | -- | -- | 4 | -- | -- |
| Frazer | 422 | 139 | 114 | -- | -- | -- | -- | -- | -- | 5 | -- | -- |
| Froid | 253 | 157 | 125 | 50,000 | -- | -- | -- | -- | -- | 5 | 401 | -- |
| Glasgow | 3,662 | 1,852 | 1,633 | 2,500,000 | 2,000,000 | -- | -- | -- | 2,000,000 | 3 | 1,531 | 1,225 |
| Medicine Lake | 381 | 202 | 144 | 70,000 | -- | -- | -- | -- | -- | 1,2 | 486 | -- |
| Nashua | 379 | 226 | 171 | 250,000 | -- | -- | -- | -- | -- | -- | 1,460 | -- |
| Opheim | 144 | 99 | 72 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Outlook | 143 | 67 | 49 | 20,000 | -- | 24,480 | 11,520 | 57,600 | 93,600 | 2 | 406 | 1,902 |
| Plentywood | 2,119 | 1,100 | 893 | 1,000,000 | -- | 720,000 | 1,440,000 | -- | 1,440,000 | 1,2 | 1,119 | 1,612 |
| Poplar | 2,114 | 904 | 814 | -- | -- | 806,400 | 648,000 | 792,000 | 2,246,400 | 1,2 | -- | 2,761 |
| Scobey | 1,160 | 632 | 488 | -- | -- | 1,008,000 | 1,008,000 | -- | 2,016,000 | -- | -- | 4,128 |
| Westby | 265 | 132 | 107 | 25,000 | -- | 432,000 | 432,000 | -- | 864,000 | 1 | 235 | 8,108 |
| Wolf Point | 3,518 | 1,535 | 1,350 | 1,750,000 | -- | 720,000 | 1,440,000 | 1,019,520 | 3,179,520 | 1,2 | 1,296 | 2,355 |
| | 16,017 | 7,659 | 6,472 | 6,790,000 | 2,648,000 | 3,710,880 | 4,979,520 | 1,869,120 | 12,487,520 | | | |
| Not Place | | | | | | | | | | | | |
| Whitetail | 112 | 61 | 46 | Not PWS | -- | -- | -- | -- | -- | -- | -- | -- |
| Peerless | 17 | 10 | 6 | Not PWS | -- | -- | -- | -- | -- | -- | -- | -- |
| Oswego | -- | -- | -- | Not PWS | -- | -- | -- | -- | -- | -- | -- | -- |
| Fort Kipp | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Raymond | -- | -- | -- | Not PWS | -- | -- | -- | -- | -- | -- | -- | -- |
| Antelope | 79 | 39 | 30 | 20,000 | -- | -- | -- | -- | 9,000 | 1,2 | -- | 299 |
| St. Marie | -- | 1,223 | 22 | 400,000 | -- | -- | -- | -- | -- | 3 | 18,197 | -- |
| | 208 | 1,333 | 105 | 420,000 | - | - | - | - | 9,000 | | | |
| Total | 16,225 | 8,992 | 6,577 | 7,210,000 | 2,648,000 | 3,710,880 | 4,979,520 | 1,869,120 | 12,496,520 | -- | -- | -- |

Treatment Process Code:

- 1 Groundwater Chlorination
- 2 Groundwater Iron and Manganese Removal
- 3 Conventional Surface Water Treatment (Filtration, Disinfection)
- 4 Ion Exchange
- 5 Reverse Osmosis

communities outside the Fort Peck Indian Reservation that operator certification is needed. There are isolated references to cross connections and some concern about dead end facilities. Within the Fort Peck Indian Reservation, the Assiniboine and Sioux Tribes have recently implemented a reverse osmosis system for the community of Frazer and seek a similar system for Fort Kipp.

Distribution systems are generally in good repair. Several of the systems utilize asbestos cement pipe, which requires monitoring to insure that asbestos is not contributing to the drinking water. To date, this has not been a problem. With diligent monitoring, there is no reason for immediate concern with this material.

Larger communities in the region have undertaken investigations to improve their systems for future purposes. Wolf Point, for example, has investigated a conversion to surface water and has undertaken a process to obtain water rights from the State of Montana. Boeing undertook investigations to rehabilitate the Missouri River intake, pipeline, pumping stations and treatment system with costs ranging from \$1,748,000 for a partial upgrade to \$4,272,000 for a total system upgrade in 1990 dollars (approximately \$2,350,000 to \$5,750,000 in current dollars)². Boeing also undertook investigations of increasing the supply from the Missouri River to 5.0 million gallons per day, including 2.5 million gallons per day for Glasgow and 2.0 million gallons per day for St. Marie at an estimated cost of \$441,000 (\$600,000 in current dollars)³.

²Morrison-Maierle/CSSA, October 1990, *Facilities Study of the Missouri River Pipeline*, Boeing Co., Seattle, Washington.

³Morrison-Maierle/CSSA, November 1991, *Preliminary Engineering Report and Cost Estimate*, Missouri River Pipeline Upgrade, Boeing Co., Seattle, Washington.