

Total number of connections to the system, based upon monthly water bill data provided by the City, varied monthly due to seasonal population in 1987-1988, and 804 to 834 for 1988-1989. Approximately 60 accounts are outside the City limits in the Chatmire area, and are all residential accounts. For the month of January, 1988, the number of commercial hook-ups was 168, all of which were within City limits. Land uses for the City's water service are similar as for the sanitary sewer service. With the exception of the Chatmire area, the geographic service area for potable water is essentially the same as for the sanitary sewer service. In addition, Vogt Springs, Blue Cove, and Hillside are provided with potable water.

Potable Water: Facility Capacity Analysis

Capacity Assessment:

The City's potable water system does not serve at least 37 households within City limits, but does serve approximately 60 accounts in the Chatmire area outside of City limits. In the year 1988, a total of 99,410,000 gallons were pumped. According to Public Works personnel, approximately 17,271,465 gallons were lost to unmetered flow and line loss (discussion of unmetered flow is provided later in this document). Of the total amount billed, which was 82,168,535 gallons, 50,084,800 gallons, or 61%, were attributed to residential accounts. Based upon monthly data provided by the Public Works Department, average daily demand for water between January and December 1988 was 225,119 gpd (82,168,535



divided by 365 days per year). By dividing average daily demand by most recent population estimates, a level of service per capita of 129 gallons (rounded) per person per capita is derived (225,119 divided by 1,741 persons). Considering the fact that at least 37 households (approximately 80 persons, using 2.14 occupants per household) within City limits do not receive service, but 60 households (144 persons) in Chatmire do receive service, an alternative method was calculated for level of service based upon the above anomalies. Using the above data, it would be estimated approximately 1,805 persons (1,741 plus 144 persons minus 80 persons) are provided with service, resulting in a level of service of 125 gallons (rounded) per person. It is estimated the second level of service figure is more realistic. Therefore, a level of service of 125 gallons per person per capita will be utilized to project future demand.

Projections for future potable water demand were developed for both average day demand and peak day demand using population projections to estimate the future number of gallons to be provided by the City's system, assuming the existing level of service is maintained. The existing level of service was calculated using total demands over a year by both residential and nonresidential use. It is estimated that future nonresidential use would grow in direct proportion to residential use, since additional nonresidential uses generally respond to an increase in residential population growth. By using this methodology, it is assumed future

nonresidential demands are included in these projections. It is also assumed that variations, due to seasonal population, have been accounted for through peak demand projections. This method assumes that all residents will eventually be provided with City water service. These projections do not assume extension of additional service to the Chatmire area. The City and Marion County should establish an intergovernmental agreement for provision of potable water service to Chatmire. The projections also assume the existing level of service of 125 gpd per person will be continued.

Peak day demand was determined by averaging figures for the months reported with the highest gallons demanded, and was determined to be 311,560 gpd. Based upon these data, the ratio of peak day demand to average day demand is 1.49. That is, daily demand for peak months is estimated to be 49% higher than the daily demand for average months. By using this ratio, the projected demands per day for a peak demand month were estimated. Peak demand is assumed to reflect total population demand.

Table 5 depicts the total projected potable water demand for the planning timeframe. Methodology used to obtain these figures follows.

1. Average day demand = projected population x LOS of 125 gpd
2. Peak day demand = Average day demand x peak to average demand per day ratio (1.49)

3. Projected demand per minute during peak hour = Projected Peak day demand divided by minutes in a day (1440)

TABLE 5

POTABLE WATER DEMAND PROJECTIONS

<u>Year</u>	Projected Avg.* Day Demand (gal) (gallons)	Projected Peak Day Demand <sup>1</sup> (gallons)	Projected Demand Per minute during Peak hour (gpm) <sup>2</sup>
1996	343,875	512,374	356
2001	382,000	569,180	395
2005	412,250	614,253	427
2010	450,500	671,245	466

\*Includes Chatmire.

Note: Numbers have been rounded to the nearest 10th.  
Assume level of service of 125 gpd per capita.

<sup>1</sup> Peak demand equals 1.49 times average daily demand.

<sup>2</sup> gpm = gallons per minute.

Source: Henigar & Ray, Inc., July 1988. Revised September 1991.

As discussed earlier, each well can pump a maximum of 400 gallons per minute. Therefore, it is obvious from Table 5 that the projected demand per minute during peak hourly demand can be met through 2010. With a third well as a backup, the existing pumping system appears to have ample capacity to meet future domestic demands for the planning timeframe.

It has been estimated that pump and storage capacity can meet future domestic potable water needs. However, it is noted that the

above analysis does not include demand for fire suppression needs. Such analysis should be coordinated with fire suppression professionals. Discussion of storage capacity in relation to annexation is discussed elsewhere in this document.

The issue of unmetered flow and line loss must be considered during analysis of capacity of the system to meet future needs. If meters are installed at City Hall and the Public Works Department, and any other uses not currently metered, a more accurate estimate of line loss can be obtained. It is estimated lines loss will be reduced as the City replaces some of the older mains. Assuming a 10% figure for line loss in the future, which would also include air release and pressure checking of fire hydrants, the following figures are calculated.

TABLE 6

REVISED POTABLE WATER DEMAND PROJECTIONS

USING 10% LINE LOSS

Year	Projected* Average Daily Demand	Projected Average Daily Demand Considering Line Loss	Projected Peak Day Demand	Projected Demand During Peak Hour (gpm) *
1996	343,875	378,263	563,612	392
2001	382,000	420,200	626,098	435
2006	412,250	453,475	675,678	469
2010	450,500	495,550	738,370	513

\*Includes Chatmire.

Source: Henigar & Ray, Inc., March 1989. Revised September 1991.

Note: Assumes level of service of 125 gpd per capita. \*gpm = gallons per minute. Numbers have been rounded to the nearest 10th.

Using these revised figures to reflect future potable water demand, it is concluded the existing system can meet future needs within the planning timeframe. It is evident from Table 6 that the projected demand will not exceed the pumping capacity of one well even during peak day demand. Therefore, the City will have ample capacity to meet future demand. However, if demand should exceed capacity of two wells, a fourth should be installed to ensure that adequate backup is available in an emergency. Tanks should be sized and have adequate storage capacity to service the peak daily and peak hourly demands with sufficient reserve for fire suppression. Pumps should be capable of refilling tanks during off-peak hours.

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Future Needs

In order to assure a level of safety for adequate public drinking water supply in an area of less susceptibility to well water contamination and to provide water supply for future service expansion to unserved areas of the City, including low to medium income districts, the City has identified a need to construct a fourth City well.

City Wells No. 1 and 2 are located within the central business district of the City, and are in close proximity to underground fuel storage tanks associated with nearby service stations. Current contaminant recover clean-up efforts are underway at the nearby Texaco site. According to a Containment Assessment Report complete by DELTA Environmental Consultants, Inc. (consultants assisting in the clean-up activities), monitoring of the City's Well No. 1 in January and February 1989 indicated MTBE (Methyl Tert-Butyl Ether) parameters. It was not concluded if the test results were influenced by the nearby contamination. At this time, the Florida Department of Health and Rehabilitative Services is monitoring water quality of the City's Wells.

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While recent tests are finding the groundwater to be acceptable, it is very possible that additional long term or increased pumping of the wells adjacent to the known contamination may result in permanent contamination of the public water supply. It is the City's objective to construct a new water supply Well No. 4 in an area less susceptible to groundwater contamination. When the proposed well comes on-line to serve the City, it is anticipated that the wells, No. 1 and 2, will continue to be monitored, and placed on stand-by or ceased as necessary to ensure the reduced likelihood of contamination of the City's water supply.

In order to accomplish the above objective, site procurement, final design and construction of the new Well No. 4 and water supply facility will be undertaken in an appropriate area, still to be determined. The new facility will assist in providing service to currently served areas within the City, which include areas west of the Rainbow River, as well as Chatmire, a small community located north of the City near U.S. Highway 41. In addition, the City will look to provide service to other residents within the City, including the areas east of the River, which are currently not served and in some cases are experiencing non-potable water conditions from their individual wells. With the new well, the City can expand its service without fear that increased pumping will result in potable water contamination.

Based on cost comparisons with similar water supply facilities, requiring no treatment, it is estimated that the new facility will require a capital expenditure of approximately \$315,000. In June 1990, the City applied for a loan/grant with the Farmers Home Administration (FmHA). In March 1991, FmHA notified the City it would be eligible for a loan at a 6 percent interest rate. No grant money is available. Debt payback will be accomplished through current utility user fees and connection fees. Further discussion is provided in the Capital Improvements Element. The City will continue to administer the operation and maintenance responsibilities to the Public Water Supply System.

Well No. 4 will primarily be used as a replacement supply for Wells 1 and 2. The proposed Well No. 4 is planned with a capacity of 800 gpm from a 12 inch diameter well. Actual design capacities will be established following installation of a 5 inch diameter test well and completion of well pumpage tests and water quality analysis.

Effective site will require acquisition of the land by the City, should the test well and production well prove to be usable for the proposed system. It is proposed that approximately 5 acres of land be acquired for the well site to allow for maintenance of a 200 foot buffer zone around the well and construction of facility structures.

Performance Assessment:

In addition to the need to reduce potential contamination of the City's water supply, the Public Works Department has identified several problems with the existing system which may affect service to the projected population. It is estimated that certain water distribution mains need to be upgraded. Many were constructed around 1930 and 1940 and consist of galvanized steel which is now rusted. In addition to the deterioration of some mains, it is also estimated that certain mains may be inadequate for fire suppression. Some of the City's fire hydrants are connected to 4-inch mains. To complicate matters, the City must rely on "as-built" plans for description of particular mains. According to a Marion County Master Plan for Water Supply dated April 1985, by Russell & Axon, Inc., the distribution system consists of approximately 11,200 feet of 8-inch pipe, 22,000 feet of 6-inch pipe, 3,900 feet of 4-inch pipe, and 31,700 feet of 2-inch pipe. The City has allocated funding in the five-year schedule of capital improvements to upgrade water mains.

Public Works personnel have recently inventoried the number and location of valves which serve to isolate the system by street during an emergency. Where it was estimated that existing valves located along the perimeter of the system are not sufficient, additional valves will be added to the system.

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The wells and storage tank are reported to be in good condition. However, it is estimated by Public Works personnel that the mechanical pumping system of Well #1 may need additional maintenance in order to provide service throughout the planning timeframe. The City is developing a maintenance program for its pumping systems, and corrective action is currently being taken to maintain this well's pumping system so that it may continue to provide service.

According to plant personnel, the average pressure provided by the existing elevated storage system is approximately 42 PSI. It is estimated, by Public Works Department personnel, that the existing system could not provide adequate pressure to areas annexed east of Dunnellon's present corporate limits without the addition of an additional storage tank. The storage tank for Well No. 4 has been allocated in the five-year schedule of capital improvements.

#### Natural Groundwater Aquifer Recharge Areas

The following information was obtained from the Marion County Groundwater Resource Availability Inventory (GWRAI), SWFWMD, August 1987.

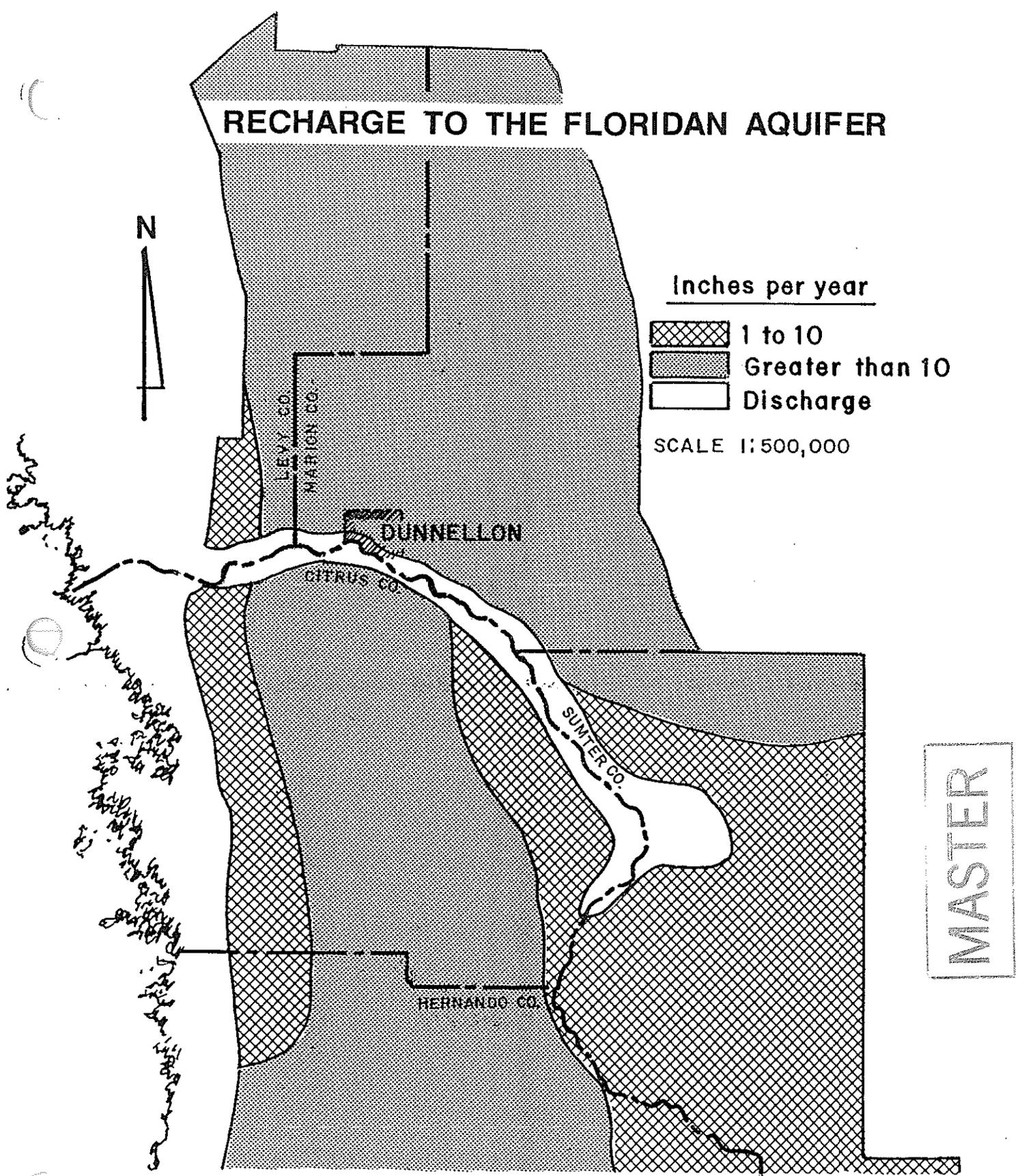
Dunnellon falls within the category of high recharge (10 to 20 inches per year). Recharge is defined as the depth of water that enters an aquifer per unit area of aquifer, and occurs directly by rainfall which has not been lost by evapotranspiration, runoff,

depression storage, or foliage. Areas of recharge to the Floridan Aquifer occur predominately to the east and west of the Oklawaha River Floodplain, according to the GWRAI. Figure 8, excerpted from this report, shows the areas of natural recharge to the Floridan Aquifer. Marion County includes nearly the entire Silver and Rainbow Springs groundwater basins, and the GWRAI assumes that predominately all of the water recharging the Floridan Aquifer system within these basins is discharged by these springs. The Southwest Florida Water Management District (SWFWMD) has not yet completed its determination of prime recharge areas in the Dunnellon area. However, it is noted that Dunnellon falls within the area of high recharge. Therefore, the Town should recognize the impacts that development can have on natural groundwater aquifer recharge areas. Increased development can cause an increase in impervious surfaces, thereby reducing recharge capabilities. This often results in stormwater runoff, a major source of pollution. The City should encourage the use of pervious pavement and other techniques which do not deter natural recharge processes. The City should also monitor sinkholes in the area for their possible contamination of groundwater.

### Funding Assistance

As noted above, the City may be eligible to obtain financial assistance towards eliminating deficiencies in its sanitary sewer, potable water and drainage facilities. The Farmer's Home Administration provides funding assistance (loans and grants) for wastewater and potable water treatment facilities to certain communities with a population of 5,000 or less. The City plans to utilize FmHA monies for both the water and sewer projects, and plans eventually to apply for funding for sewer expansion.

The Department of Environmental Regulation also provides loans for similar uses. The Community Development Block Grant (non-entitlement) Program for States and Small Cities, administered by the Department of Community Affairs, allocates federal funds to the state to distribute to local governments of under 50,000 population. The program provides grants to carry out a wide range of community development activities directed toward neighborhood revitalization, economic development, improved community facilities and services. Although applicants must give priority to activities which will benefit low and moderate income families, or aid in prevention or elimination of slums and blight, some funds are available to address other community development needs that present a serious and immediate threat to the health or welfare of the community. However, since the City has entered the CDBG program for rehabilitation of its substandard housing, it is not eligible at this time to receive CDBG funds for infrastructure improvements. However, this should be a consideration at a later time.



**SOURCE:**

Aucott, W.R., "Areal Variation in Recharge to and Discharge from the Floridan Aquifer System in Florida"  
 U.S. Geological Survey Water-Resources Investigations  
 Report 88-4057 (1988)

**Figure 8**