# Chapter 3

# Culinary Water System

## 3.1 Summary & Recommendations

**Introduction**

This chapter addresses the culinary water system of Midway City. The chapter will identify the criteria used in establishing the level of service that the culinary system provides as well as identify the deficiencies and recommended improvements to meet the projected 10 year planning period demands. Impact fees were analyzed to determine the feasibility of implementing the recommended improvements.

Future conditions in Midway City were analyzed by projecting both the 10 year planning period population and the approximate build-out population, which is anticipated by the year 2049. Rather than try to predict which development will occur during the 10 year planning period we have addressed the build-out conditions. However, the impact fee calculation is based on our predicted 10 year improvements. It is important to know when new culinary sources and storage will be required so it can be planned for accordingly. From the population projections, the number of future equivalent residential units (ERUs) was calculated. Based upon the projected average yearly, peak daily, and peak instantaneous demands, the culinary flows were projected through the planning period. These flows were used to determine the required capacities of the culinary water source, storage, and distribution system. Recommendations are made to provide the needed capacity for the projected population in the three categories.

Upon evaluation to update the culinary water system impact fee, it was determined that the existing fee is adequate to meet the future needs of Midway City.

**Culinary Water Impact Fee $2,300.00**

The criteria used in this study are summarized below:

- Indoor/outdoor demand (800 gpd indoor / 2.8 gpm/acre outdoor)
- Storage (400 gpd indoor, 1,873 gal/acre outdoor)
- Storage – Fire: 2,500 gpm for 2 hr; or 300,000 gallons
- Minimum static pressure of 50 psi
- Maximum static pressure of 120 psi
- Peak day demand pressure of 40 psi

- Peak day demand with fire flow pressure of 20 psi.
- Pipe Sizes: Minimum 8-inch
- Velocity: Design velocity - 5 fps, Peak Flow velocity 10 fps.

**Projected Population**

Midway City's full time and secondary population is expected to increase to 21,195 people by the build-out year 2049. It is expected to increase to 10,159 people during the 10 year planning period. See Chapter 1 for more details.

**Projected Culinary Water Use**

Using 3,448 projected equivalent residential units in the year 2022, it is calculated that 2,171 gallons per minute (gpm) will be required to meet peak day demand. It is also projected that an average yearly demand of 1,657 acre feet (ac/ft) will be used for indoor and outdoor water usage.

**Recommended Culinary Water System Improvements**

Capital improvements recommended to meet the projected population demands are shown in Figure 3-2. These recommendations were determined by the use of a computer model of Midway City's culinary water system, projected culinary water flows, and input from City officials.

**Source Protection**

Midway City has submitted the Drinking Water Source Protection plans for each of its sources as defined in section R309-113-3(2) of the Utah Administrative Code. Midway City must also submit an Annual Water Quality Report.

**Water Rights**

Midway City's present water rights currently provide sufficient water to meet the projected peak daily flows through the year 2041. Therefore, it is recommended that the City change its water rights point of diversion so that the needed water can be taken from city wells or springs when additional water is necessary. The City should continue to require developments to provide to the City the required water rights as per the current City water ordinance.

The installation of the pressurized irrigation system reserves potable culinary water for indoor purposes and postpones the burden of finding new potable sources.

All water within the Midway area has been judicated. Therefore, additional water rights cannot be obtained for new wells unless it is purchased from agriculture or obtained through land development. development. Because of this, it is recommended that the City continue requiring developed land to to provide the required water for indoor use for each new development.

**Operation**
Midway City has converted the majority of its water meters to be read remotely. This conversion has decreased operating costs and enhanced the accuracy and water billing process by allowing monthly water billings to be based on actual flows instead of estimated flows. Meters are currently read during the months of April through September of each year.

## 3.2 Future Conditions

The culinary water demand can be projected through the planning period using the projected number of ERUs based on population growth, historical culinary demands, and Utah State regulations. Projected capacities of the average yearly, average daily, peak daily and the peak instantaneous flows can also affect the overall performance of a culinary water system.

Midway City's future conditions will affect the amount of water used and the storage capacity required of the present culinary water system. By identifying these conditions, projected flows can be determined so the inadequacies of the existing system can be found.

From the projected population, the increased number of culinary connections is determined along with the increased number of ERU's. Using State design regulations, the future water demands, including the average yearly, average daily, peak daily, and the peak instantaneous demands, are projected through the planning period. Our existing system uses the same State design regulations.

The number of future culinary water connections within a city is dependent upon the projected population and their proximity to lines within the culinary water system. It will be assumed that all new growth in Midway will be connected to the culinary water system. Therefore, the projected number of culinary water connections within Midway City is expected to increase at the same rate as the projected population.

**Indoor and Outdoor Water Use**
Culinary water used by city connections can be separated into two categories, indoor and outdoor water use. The amount of water used indoors and outdoors depends on the type of connection. For example, a commercial restaurant may use the same amount of water in the summer as the winter. However, an office building with a large amount of grass or other types of vegetation may use up to three times more water in the summer than in the winter.

**Indoor Water Use**
The State of Utah Public Drinking Water Rules (R309-510) requires that sources provide sufficient supply to meet Peak Day and Average Yearly indoor water demands. The rules recommend the use of 800 gpd per ERU for Peak Day, and 400 gpd per ERU (146,000 gallons per year) for Average Yearly demands for indoor water use. Storage is required to provide 400 gallons per ERU for indoor indoor water use. Due to the numerous leaks throughout the City and un-metered watering, Midway

Midway City's yearly peak indoor water demand cannot be accurately calculated. Therefore, the State State requirements will be used for this document.

**Outdoor Water Use**

The Department of Drinking Water also requires source and storage systems to provide outdoor water. Water used outdoors should be in addition to the indoor water demands. The combined capacity must be provided by the sources and storage. The procedure for determining the water used outdoors consists of the following:

- Determine the consumptive water use zone in which Midway City resides (Zone 2).
- Determining the amount of land which will be irrigated
- Determine the average peak flows and the required storage using Table 3 and Table 5 found in the State of Utah Public Drinking Water Rules, R309-510

Midway City is in a "low consumptive use and precipitation zone". Therefore, with respect to the rest of the State, the consumptive use of the vegetation and average annual precipitation is low. Using Table 3 and 5 in the Drinking Water Rules, the peak daily demand is 2.8 gpm per irrigated acre of land. The average yearly demand for sources is 1.23 acre-feet per irrigable acre and 1,873 gallons per irrigable acre of land for storage.

With the installation of a pressurized irrigation system throughout Midway, the demand on the culinary water system is decreased. The culinary water system was modeled figuring that 10% of the ERUs would use the culinary water system for outdoor watering. This should account for areas that are not feasible to connect to pressurized irrigation and other individuals that don't utilize the pressurized irrigation system.

The irrigable land in Midway City is related to the ERU's by estimating that 80 percent of the ERU lot is irrigated. It is also assumed that there are 3 ERUs per acre of land. Therefore, the State requirements for Midway City's outdoor water use would be a peak daily demand of 0.74 gpm per ERU utilizing culinary water for outdoor use, and an average yearly demand of 105,810 gallons per year per ERU utilizing culinary for outdoor use. Since the majority of new growth within the City will fall under these criteria, and at least 90% of new development will utilize pressurized irrigation, the above criteria will be used.

**Equivalent Residential Units (ERU)**

The ERUs are found by using the state requirements of the respective types of connections. The usage demands of the different connections are then divided by the average residential usage demand. For example, the average commercial water usage is 0.357 million gallons/year and the residential State requirement usage is 0.146 million gallons/year. Therefore, the average commercial connection is equal to 0.357/0.146 = 2.42 residential connections.

The total number of projected residential, church, government and commercial culinary water connections with the calculated ERU's are shown in Table 3-1. These Equivalent Residential Connections will be used to calculate the projected culinary water flows.

Table 3-1: Total ERUs through Planning Period

| Year | Residential ERUs | Commercial ERUs | Total ERUs |
|---|---|---|---|
| 2012 | 2,179 | 107 | 2,287 |
| 2013 | 2,274 | 110 | 2,383 |
| 2014 | 2,372 | 117 | 2,489 |
| 2015 | 2,474 | 124 | 2,599 |
| 2016 | 2,581 | 132 | 2,713 |
| 2017 | 2,693 | 136 | 2,829 |
| 2018 | 2,809 | 141 | 2,950 |
| 2019 | 2,931 | 146 | 3,077 |
| 2020 | 3,060 | 151 | 3,211 |
| 2021 | 3,172 | 156 | 3,327 |
| **2022** | **3,288** | **161** | **3,448** |

**Projected Number of Culinary Water Connections**

The projected number of new culinary water connections was determined using the growth numbers in Chapter 1. To evaluate the commercial, agricultural, and residential connections on an equal basis, the equivalent residential connection (ERU) was used.

Historical growth trends were used along with the population projections to determine the projected growth of the respective connections. The residential connections are assumed to increase at the same rate as the population growth. However, commercial and agricultural connections are assumed to increase at a percentage rate equal to the ratio of historical commercial growth.

Agricultural connections are used primarily to water livestock. It is assumed they will remain the same throughout the planning period. With the conversion to pressurized irrigation and progressive zoning regulations, the number of livestock watering will probably decrease. Due to the minimal amount of water used, this study will maintain the present agricultural demand throughout the planning period.

### Projected Areas of Development

To relate the projected population to the improvements needed to serve them, the areas expected to be developed need to be determined. The areas projected to be developed by the increased population are determined based upon the existing zoning regulations, available land within city limits, and land presently being annexed.

City officials have anticipated where and how future development will occur through the proposed annexation boundary and zoning map. This study uses the proposed annexation boundary and build-out in the year 2049 for the planning area.

### Projected Culinary Water Use

Utah State regulations require sources to be capable of meeting peak daily demands and average yearly demands; storage to meet average daily demands; and distribution systems to meet peak instantaneous demands. The projected flows were determined by using State regulations and the projected indoor and outdoor ERUs.

A definition of the flows required by the City's culinary water system will be given in the following paragraphs. These flows will be used to determine culinary water improvements needed to meet the projected demands of the population.

### Average Daily Demand

The average daily demand is found by dividing the total annual flow by 365 days. Due to numerous leaks and inaccuracies in measuring the total annual flow, the state requirements will be used in calculating the average daily demands.

### Peak Daily Demand

Peak daily demand is found by determining the maximum daily flow throughout the year. With un-metered park watering and various losses in the system, it is difficult to calculate Midway's historical peak daily demand. Therefore, the state indoor required flow of 800 gpd will be used; the resulting indoor peak flow is 0.56 gallons per minute. Outdoor flow will be modeled using 10% of new growth at the state requirement of 2.8 gallons per minute per irrigated acre. These peaking flow rates were used in the determination of required sources for Midway City and when new sources will need to be established.

### Peak Instantaneous Demand

Peak instantaneous demand is the maximum flow on any given day. The Department of Drinking Water recommends using Equation (1) to determine the peak instantaneous flows for indoor use within the system.

$$Q=10.8*N^{.64} \qquad \text{Equation (1)}$$

The variable N in the equation is the total number of ERUs in the system; Q plus the maximum fire flow is equal to the peak instantaneous flow for indoor use. Peak instantaneous demand for outdoor use is calculated using Table 7 from the Drinking Water Rules and the total number of irrigable acres. The number of irrigable acres is calculated using 10% of Total ERUs watering 80% of 1/3 acre lots. This is equivalent to 1.48 gpm per outdoor ERU.

### Fire Flow

Midway City has adopted the Uniform Fire Code to determine the fire flows required for buildings within the City. The fire code determines the size and duration of flow that will be required. The amount of fire flow required for a building is based on the type of construction, square footage, and distance from other buildings.

For the purpose of this study, fire flows will be calculated using a minimum of 1,500 gpm for 2 hours for residential and 2,500 gpm for 2 hours for commercial. This criterion was implemented based on recommendations from the Wasatch County Fire Marshall. In cases where fire flows for buildings exceed these criteria, fire sprinkling will be required.

### Summary of Projected Culinary Water Flows

Determining the projected flows includes projecting the indoor and outdoor flows along with the fire flow and the inherent system losses. Required indoor water use was calculated using an average yearly demand of 0.45 ac-ft/ERU for sources, a peak day demand of 800 gpd/ERUs for sources, and a storage requirement of 400 gallons/ERU. Required outdoor water sources and storage capacity was calculated by taking 10% of the total ERUs and using 0.74 gpm/Outdoor ERU for peak day demand, 0.32 ac-ft/yr per Outdoor ERU for the average yearly demand, and 800 gallons/ERU plus 300,000 fire flow for the storage requirement. By combining the required indoor, outdoor, and fire demands, the source and storage requirements were calculated as seen in Table 3-2. The end of the planning period is in bold.

**Table 3-2: Culinary Water Demands**

| Year | Number of ERUs | Average yearly Source Demand (ac-ft) | Peak Day Source Demand (gpm) | Storage volume Required (MG) |
|---|---|---|---|---|
| 2012 | 2,287 | 1,099 | 1,440 | 1.33 |
| 2017 | 2,829 | 1,360 | 1,781 | 1.57 |
| **2022** | **3,448** | **1,657** | **2,171** | **1.85** |
| 2030 | 4,567 | 2,194 | 2,875 | 2.35 |
| 2040 | 6,004 | 2,885 | 3,780 | 3.00 |
| 2049 | 7,085 | 3,405 | 4,460 | 3.48 |

## 3.3 Culinary Water System Analysis

Midway City's present culinary water system's capacity is determined by analyzing the source, storage, and distribution systems. Improvements are then recommended to increase the capacity to meet the projected population's demands. The present system will be discussed, design parameters introduced, and recommendations for needed improvements will be made.

SOURCE

Midway City's culinary water system is presently served by three springs and one well. The source capacity will be determined based upon the amount of water the City has available through water rights, amount of water physically provided, and the peak daily and average yearly flow requirements. Improvements needed by Midway City's sources will then be determined along with a discussion of the Division of Drinking Water's Drinking Water Source Protection Rule.

### Water Rights

Water used by Midway City is obtained from springs and wells that have municipal water rights. The City owns both culinary and irrigation water rights. Some of the irrigation water rights are from land that was annexed into the City. In this portion of the chapter, both the municipal and irrigation water rights will be discussed.

Water rights state the legal amount of water the City owns and has access to. State regulations require that the City's water sources be legally and physically capable of meeting peak daily flows and average yearly flows. Midway City has both culinary water rights and shares in irrigation companies. These rights are summarized in Table 3-3.

**Table 3-3: Midway City's Water Rights**

| Water Right | Flow | | | Notes |
|---|---|---|---|---|
| | **gpm** | **cfs** | **ac-ft** | |
| 55-4614 | 8.8 | 0.1 | 14.2 | Cabin Springs Area |
| 55-4615 | 30.1 | 0.267 | 48.6 | Faucett's Devils Hole, Big Hollow |
| 55-5950 | 71.8 | 0.16 | | Developed Spring |
| 55-8131 | 235.1 | | 379.2 | Provo River, Snake reek and Mahogany Spring |
| 55-9364 | 2.98 | | 4.8 | Cabin Spring Area |
| 55-9365 | 2.98 | | 4.8 | Faucett's Devils Hole, Big Hollow |
| 55-9395 | 557.9 | 5 | 900 | Snake Creek, Pine Creek Springs, and Provo River |
| a15217 | 164.5 | | 265.4 | Underground Water Well – Evidenced by 45 Midway Irrigation Shares |
| a15824 | 235.1 | | 379.2 | Provo River and Mahogany Spring – Evidenced by 80 Midway Irrigation Shares |

| | | | | |
|---|---|---|---|---|
| a17418 | 557.9 | 5 | 900 | Snake Creek, Provo River, and Other |
| a17887 | 27 | | 43.6 | Underground Water Well |
| a24462 | 2468.4 | 5.5 | | Ontario Drain Tunnel and Provo River |
| **TOTAL** | **4363** | **16.03** | **2940** | |

**Irrigation Shares**

Midway City currently requires new development to turn in irrigation shares or some other equivalent water right sufficient to provide for that development. Midway City should continue to require these water rights and appropriate these rights to the City.

**State Source Requirements and Regulations**

Regulations are placed on the city's culinary water sources by the State of Utah Department of Health. These regulations attempt to require sufficient water to meet the needs of cities and also protect the sources themselves from environment and development.

**Source Capacity**

Culinary water source capabilities are required to meet the cities peak daily and average yearly flows as shown in Table 3-2 Section 3.2 of this chapter. The State requires sources to be able to provide 800 gpd per ERU for indoor use and 146,000 gallons per year (0.45 acre foot) for indoor use for each ERU. For outdoor water use an additional 1,064 gpd per Outdoor ERU for peak daily flows and 0.32 ac-ft. per Outdoor ERU for average yearly flow are required. As previously mentioned, only 10% of ERUs will utilize the system for outdoor demand, the remainder will utilize the pressurized irrigation system for their outdoor needs.

The amount of source that Midway City culinary water system is physically capable of producing is shown in Table 3-4.

**Table 3-4: Midway City Culinary Water Sources**

| Description | Approximate Capacity (gpm) |
|---|---|
| Mahogany Spring | 897 |
| Gerber Spring | 500 |
| Alpenhof Well | 150 |
| Indian Springs | 50 |
| **TOTAL** | **1,597** |

**Culinary Water Source Improvement Recommendations**

Although the City has sufficient water rights to meet peak daily demands, the existing springs and wells will not be capable of providing the needed peak daily demand. Due to the fact that the peak flow is estimated to occur only eight hours a day, storage can help during peak times and sources can replenish the storage at night. It is estimated, however, that by 2015 additional source capacity will be required. Table 3-5 shows a summary of the reserve flows required by the springs and wells.

**Table 3-5: Culinary Water Flows**

| Year | Peak Day Demand (gpm) | Available flow (gpm) | Reserve flow (gpm) |
|---|---|---|---|
| 2012 | 1,440 | 1,597 | 157 |
| 2013 | 1,500 | 1,597 | 97 |
| 2014 | 1,567 | 1,597 | 30 |
| 2015 | 1,636 | 1,597 | (39) |
| 2016 | 1,708 | 1,597 | (111) |
| 2017 | 1,781 | 1,597 | (184) |
| 2018 | 1,857 | 1,597 | (260) |
| 2019 | 1,937 | 1,597 | (340) |
| 2020 | 2,021 | 1,597 | (424) |
| 2021 | 2,094 | 1,597 | (497) |
| **2022** | **2,171** | **1,597** | **(574)** |

The peak source demand can be alleviated by implementing a number of items. First, the City could investigate for major leaks within the system. This would make the system more efficient and place fewer burdens on the pumps. Secondly, an educational program could be started to inform the citizens of the summer water demand problem and give the users conservation guidelines (sprinkler irrigation at night, landscaping with drought tolerant plants, eliminate over watering, etc.). Although these items will help, in the end the City will need to increase their share of Mahogany or Gerber Springs or locate a new source in order to meet the projected peak demand.

## STORAGE

Midway City presently has six storage reservoirs in the culinary water system. Midway City is required by the State of Utah to provide sufficient storage for average daily flows. In addition, reservoirs provide capacity for fire flows and operating reserve.

### Available Storage

The Gerber and Mahogany tanks are the backbone of Midway's culinary water system with a capacity of 800,000 gallons each. The Cottages on the Green Tank also has an 800,000 gallon capacity. The Alpenhof Tank and the Swiss Oaks Tank feed the upper zone with 250,000, gallons each. The Indian Springs is a 100,000 gallon tank that supplements the Lower Zone.

### Capacity Requirements

The State of Utah Department of Drinking Water requires cities to provide 400 gallons per ERU per day for indoor water use. Since Midway City is located in a low consumptive use and precipitation zone, approximately 494 gallons of storage per Outdoor ERU is required for outdoor use. In addition to outdoor and indoor water demands, it is recommended that the City provide storage for the maximum city fire flow. It will be assumed that 90% of the ERUs will require 400 gallons due to the installation of the pressurized irrigation system and 10% of the ERUs will require 894 gallons since outdoor watering will be provided through the culinary system.

### Recommendations

Table 3-6 shows the summary of the storage capacities needed for Midway City through the proposed build-out year of 2049. The total storage includes indoor and outdoor water use and the required fire flow. Midway City has adequate storage throughout the 10 year planning period. However, it should budget for future expenditure for additional storage.

**Table 3-6: Summary of required storage capacity**

| Year | Required ERU Storage (MG) | Available Storage (MG) | Reserve Storage (MG) |
|---|---|---|---|
| 2012 | 1.33 | 3 | 1.67 |
| 2017 | 1.57 | 3 | 1.43 |
| 2022 | 1.85 | 3 | 1.15 |
| 2030 | 2.35 | 3 | 0.65 |
| 2040 | 3.00 | 3 | 0.00 |
| 2049 | 3.48 | 3 | (0.48) |

## DISTRIBUTION SYSTEM

Midway City's water system was analyzed using peak instantaneous flows in a water distribution computer modeling program called Water CAD®. The capacity of the existing distribution system will be discussed in this section. Improvements will then be recommended to meet the projected water demands and areas of development.

## Distribution Requirements and Regulations

The distribution system needs to be able to meet the peak instantaneous demands in addition to providing the maximum fire flows and still maintain a minimum of 20 psi at all connections within the system.

## Distribution System Recommendations

The peak instantaneous flow was modeled with the maximum fire flow and with demands in the projected areas of development. The pipes were able to meet the pressure requirements at the additional flows. Different scenarios were also modeled to determine the most efficient system. Figure 3-1 shows the existing distribution system.

Midway City installed a telemetry system that helps to determine the future needs of Midway City. The telemetry system provides a less labor-intensive water system. Without a telemetry system, a City employee would be required to physically inspect each tank and well daily. The telemetry system allows the operator to monitor the system from a computer. The computer is programmed to automatically call the system operator in the event of a problem. However, the critical items such as pumps and tanks should be inspected at least weekly. All future improvements should be tied into Midway City's telemetry system, and the system should be upgraded on a regular basis as technology evolves.

## Computer Model of Culinary Water System

A computer program called Water CAD® was used to model Midway City's water system. The program requires that all pipes, elevations at intersections, wells, tanks, booster pumps, and pressure reducing valves be entered into the model as they are constructed. System demands are then entered in. The program calculates static pressure throughout the system based on the given elevations. Available fire flows can also be determined. The program determines the available fire flows at various locations based on the user-defined parameters, such as required flow and residual pressure.

After the model is run and problem areas are defined, improvements can be modeled to bring the system up to the minimum level of service (LOS). Determining which improvements in the system will bring the system up to the minimum LOS in the most economical manner is a trial and error process. The cost of these system improvements are shown as Capital Improvement Projects (CIP).

**The following scenarios were modeled for Midway City's culinary water system:**

- **Present conditions**
- **10 year planning period conditions**
- **Build-out conditions**

The existing water system was modeled and the areas that did not meet the minimum LOS were identified. Improvements were determined that would allow minimum fire flows and pressures to be provided throughout the existing system. These improvements are recommended in this section and shown as CIP projects.

Based on the current and anticipated conditions, the projected number of ERUs in undeveloped areas was determined. Twenty percent of the area was assumed to be used in the development of roadways, sidewalks, etc. The additional demand projected for undeveloped areas was added to the present demand. From this information, the future improvements were identified to provide fire flows and pressures.

**The following is a description of each scenario that was computer modeled.**
**Scenario 1**: The existing water system was modeled under present conditions. This model was used used to determine the recommended improvements for the existing system which did not meet the minimum LOS.

**Scenario 2**: Recommended improvements were added to provide for future demand. Future storage and source and pumping requirements were also identified to provide water for future demand.

**Summary of the Recommended Improvements**
The entire culinary water system was modeled for both present and projected populations for instantaneous conditions and a 24-hour extended period simulation. Midway City's existing distribution system is presently adequate for peak instantaneous flows and fire flows.

Recommended improvements and estimated costs are shown in Figure 3-2 and in Table 3-8. The total estimated cost for the recommended improvements during the planning period is $2,895,366. These estimated costs and dates will assist in determining the needed connection fees and water rates.

## 3.4 ECONOMIC FEASIBILITY ANALYSIS

The capital improvements required to bring the existing system up to the minimum LOS are referred to as operating costs or expenses. Other items included in operating expenses are personnel and contractual services, materials, supplies, depreciation, and other miscellaneous expenses. These improvements cannot be funded through impact fees but could be funded through general funds, revenue from water sales, and bonds.

Improvements that are required for future development are called non-operating expenses. These improvements should be funded through impact fees and bonds. Independently, sufficient revenue should be generated to fund the respective operating and non-operating expenses.

In this section, the two types of expenses are discussed individually. Projected revenue and expenditures have been analyzed to determine if the present rates and fees are sufficient to fund the recommended improvements and other expenditures.

The impact fee will be calculated to provide revenue for future improvements.

**Impact Fee Fund**

The Impact Fee Fund or capital project fund is used to fund improvements needed to meet the increased demands due to the growth. Revenue is currently generated from the "impact fee" charged to new developments. This revenue is used for capital improvement projects and debt service.

The impact fee can be used to fund capital improvements including construction costs, land acquisition, material costs, planning, surveying, and engineering fees provided for and related directly to the construction of the system improvements, and debt service charges to the principal and interest on bonds, notes or other obligations issued to pay the cost of the system improvements. This revenue can also be used to fund periodic master plan reviews and master plan updates.

Currently, the impact fee that is charged to new development is $2,300 per 3/4-inch meter. Based on the estimated cost of the required improvements as shown in Table 3-8, the impact fees in Table 3-7 are calculated based on meter capacity as shown.

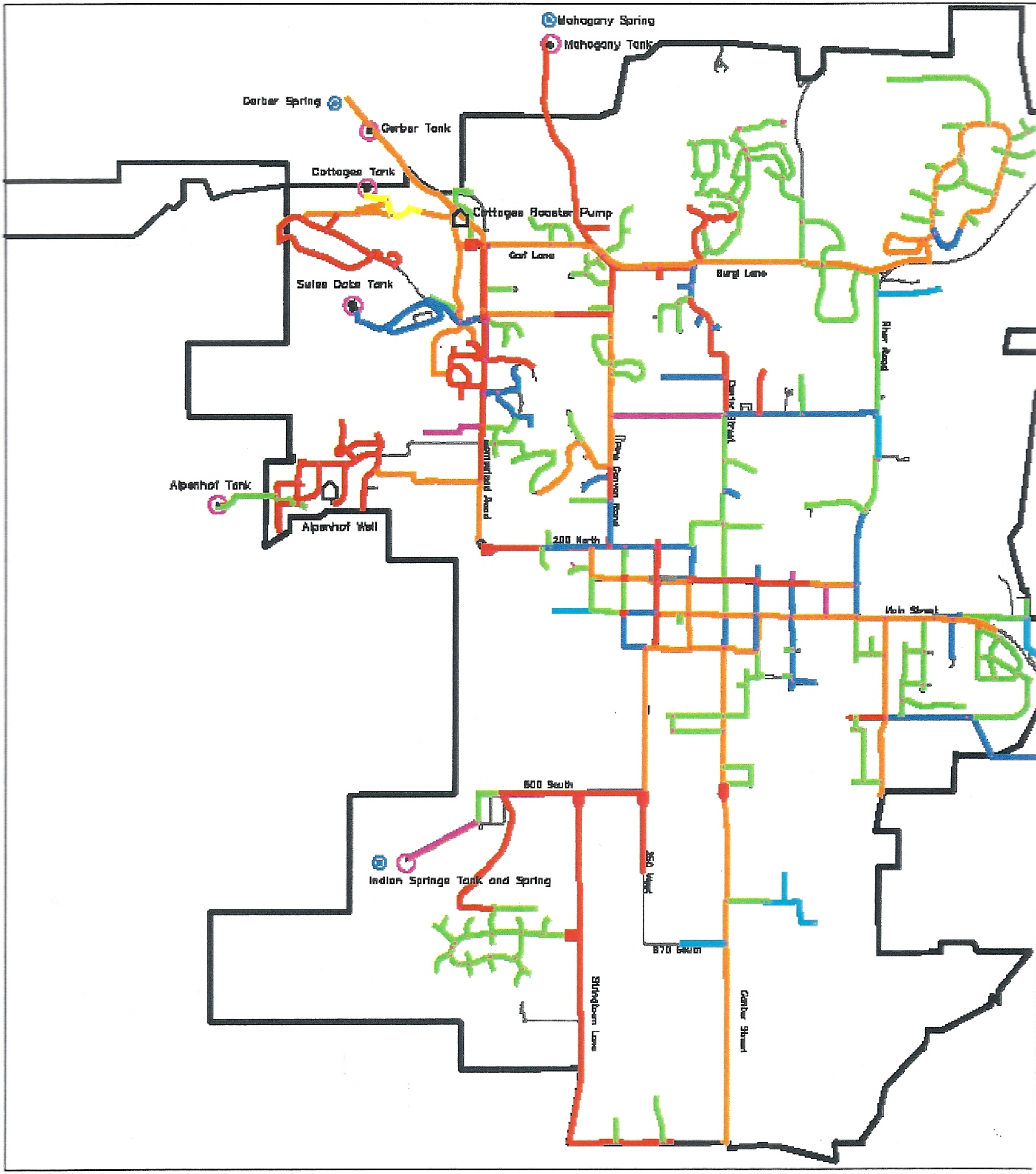
The money generated from the current impact fees and the projected numbers of connections should generate sufficient revenue to fund the recommended capital improvements.

To keep abreast of inflation and increasing construction costs, the water rates and impact fees should be reviewed periodically to ensure that the required funding will be available.

In addition to the impact fees, a hook-up fee may also be charged for the average cost of services provided for and directly attributable to utility services. Specific city service would include meter installation and inspection of developer's connection to the system.

**Table 3-7: Impact Fees**

| Meter Size (inches) | Flow Capacity (gpm) | ERUs | Impact Fee |
|---|---|---|---|
| 0.75 | 30 | 1 | $2,300 |
| 1 | 50 | 1.67 | $3,833 |
| 1.5 | 100 | 3.33 | $7,667 |
| 2 | 160 | 5.33 | $12,267 |
| 3 | 350 | 11.67 | $26,833 |
| 4 | 1,000 | 33.33 | $76,667 |



Mahogany Spring
Mahogany Tank
Gerber Spring
Gerber Tank
Cottages Tank
Cottages Booster Pump
Golf Lane
Burgi Lane
Sulee Dobe Tank
River Road
Center Street
Pine Canyon Road
Alpenhof Tank
Alpenhof Well
200 North
Main Street
600 South
Indian Springs Tank and Spring
350 West
670 South
Stringtown Lane
Center Street


# FIGURE 3-1

## MIDWAY CITY

## EXISTING CULINARY WATER SYSTEM

### LEGEND

20 YEAR BUILDOUT BOUNDARY

PRV'S

WELL OR PUMP

SPRING

RESERVOIRS

### PIPE SIZE

2 INCH

4 INCH

6 INCH

8 INCH

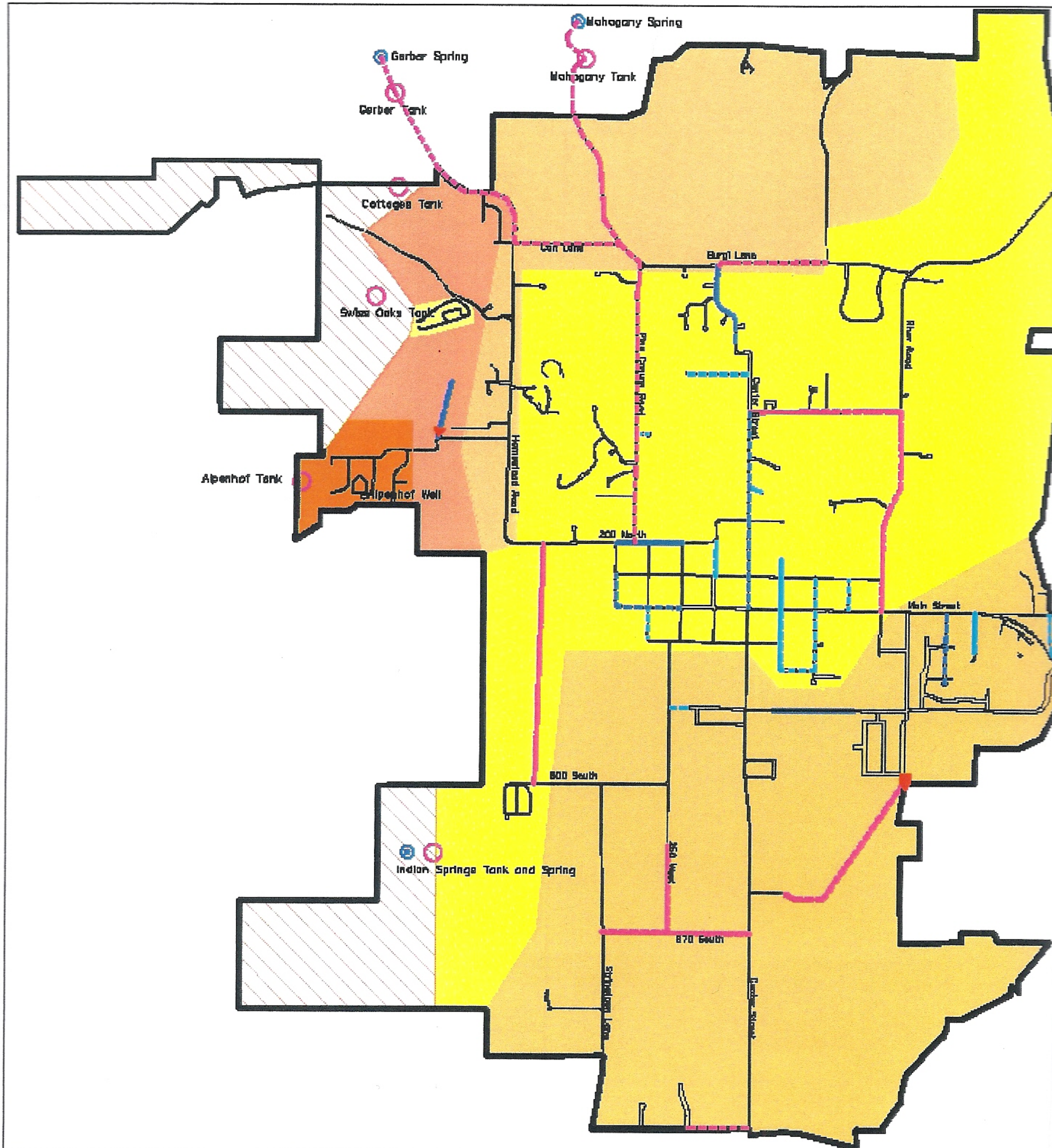
10 INCH

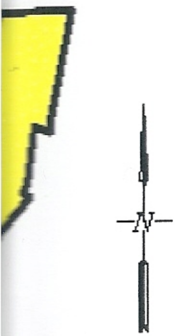
12 INCH

15 INCH

HORROCKS
ENGINEERS

725 WEST 100 SOUTH #2
HEBER CITY, UTAH 84032
(801) 654-2226


Mahogany Spring
Gerber Spring
Mahogany Tank
Gerber Tank
Cottages Tank
Burgi Lane
Swiss Oaks Tank
River Road
Homestead Road
Alpenhof Tank
Alpenhof Well
200 North
Main Street
600 South
350 West
Indian Springs Tank and Spring
870 South




# FIGURE 3-2

## MIDWAY CITY

## MASTER PLAN IMPROVEMENTS

### LEGEND

- EXISTING WELL OR PUMP
- EXISTING SPRING
- EXISTING RESERVOIR
- BUILD-OUT BOUNDARY
- FUTURE PRV
- FUTURE CHECK VALVE

### FUTURE WATER LINES

| PIPE SIZE(in.) | PIPE COLOR |
|---|---|
| 8 | |
| 10 | |
| 12 | |

### PRESSURE ZONES

- MAIN PRESSURE ZONE (HGL 5780)
(GERBER, MAHOGANY, AND DUTCH FIELDS TANK)
- HOMESTEAD PRESSURE ZONE (HGL 6036)
(COTTAGES TANK)
- ALPENHOF PRESSURE ZONE (HGL 6040)
(ALPENHOF TANK)
- SWISS OAKS PRESSURE ZONE (HGL 6035)
(SWISS OAKS TANK)
- INDIAN SPRINGS ZONE (5828)
(INDIAN SPRINGS TANK)
- VALAIS PRV ZONE
- BOOSTER PUMP ZONE

HORROCKS
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