

## CHAPTER SEVEN WATER STORAGE

### A. Introduction

Adequate water storage is required by Providence City to insure sufficient water pressure for peak domestic and fire flow in the water distribution system, to balance domestic peak demands with the available supply, and to provide a short supply of water in case a source should fail. The purpose of this chapter is to review the adequacy of the existing storage capacity and to project future storage requirements for Providence City.

### B. General Requirements

Water storage requirements for a community water system can be defined as follows:

$$S_t = S_d + S_i + S_f$$

where

$S_t$  = total storage required

$S_d$  = indoor storage required

$S_i$  = irrigation storage required

$S_f$  = fire flow storage required

The State PDWRs require the following capacity for community water systems:

<i>Indoor Requirement:</i>	source	=	800 gpd per connection
	storage	=	400 gallons

<i>Irrigation Requirement:</i>	source	=	1940 gpd per connection
	storage	=	970 gallons

### C. Existing Storage Capacity

Providence City has four existing reinforced concrete water storage tanks with a combined capacity of 2,630,000 gallons. The Coombe Flat tank sets the pressure in Zone 3 and has an overflow elevation of 5403. The Canyon (Redds) tanks set the pressure in Zone 2 and are located next to each other with an overflow elevation of 5110. The Eck Tank sets the pressure in Zone 1 and has an overflow elevation of 4810. The locations are shown in Exhibit 7-1.

Redds Tank 1 Capacity	1,000,000 gallons
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Redds Tank 2 Capacity	130,000 gallons
Eck Tank Capacity	500,000 gallons
Coombe Flat Tank Capacity	<u>1,000,000</u> gallons

Total Storage: 2,630,000 gallons

*New 1.5 mil Gal at Eck*

*1.50 000*  
4,130,000

D. Existing Water Storage Requirements

Our review of existing water storage requirements vs. storage capacity for Providence City indicates that the City has reached its storage capacity. The table below summarized the existing storage demands for Providence City. The demands can be viewed in more detail in Tables 3-1 through 3-4.

	Zone 1 (gallons)	Zone 2 (gallons)	Zone 3 (gallons)
Indoor Demands	307,700	215,000	12,800
Irrigation Demands	443,478	307,804	18,240
Fire Storage	<u>300,000</u>	<u>300,000</u>	<u>300,000</u>
<b>Total Storage Demand:</b>	1,051,178	822,804	331,040

Zone 1

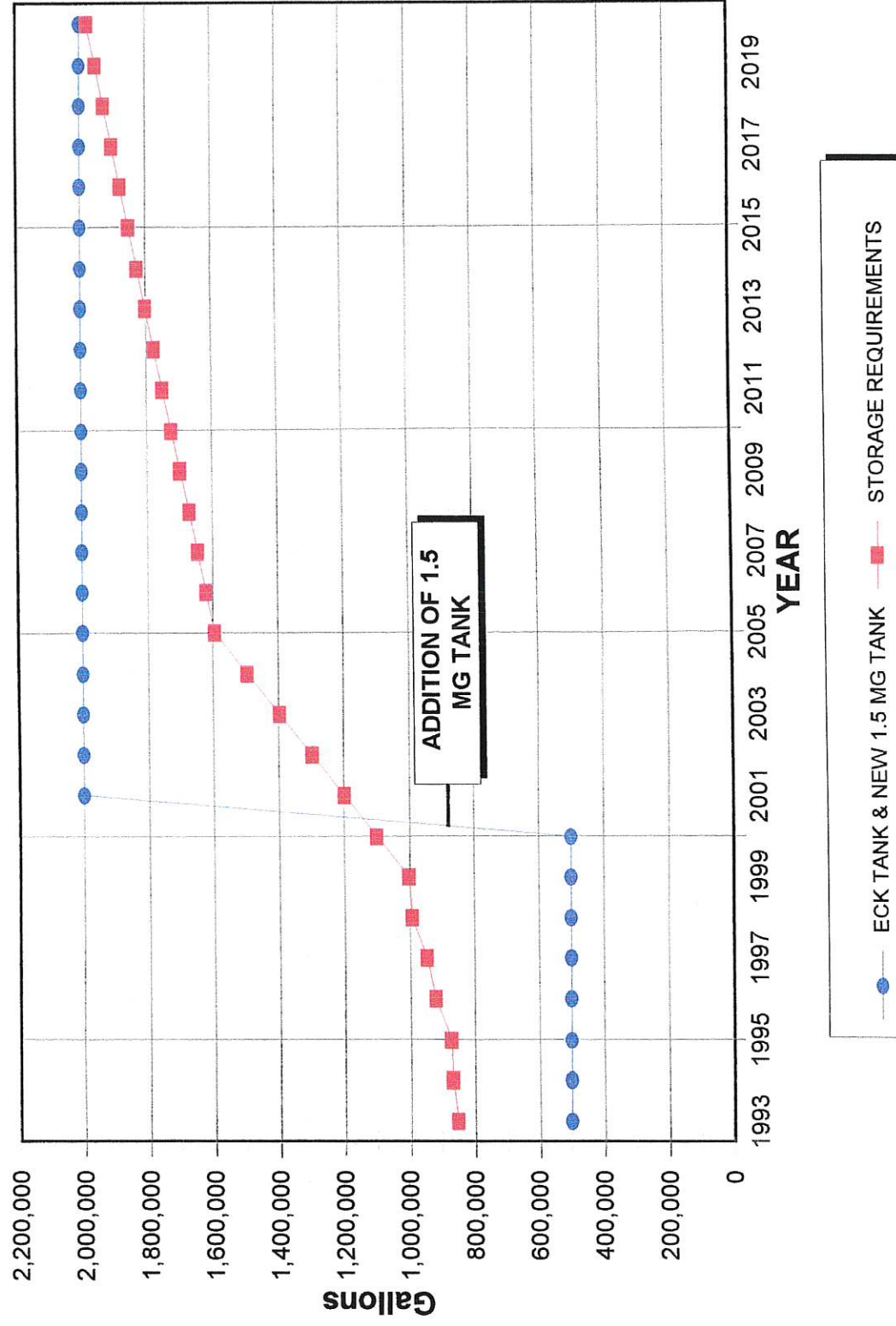
Figure 7-1 depicts the projected storage demand for Zone 1 (red line) through the 20 year study period (year 2020). To project storage demand through the year 2020, a 2500 gpm fire flow requirement was used for the period due to the type of development assumed present in this Zone. Projected development of residential and commercial areas in this Zone suggest that a 2500 gpm fire flow is required by the Uniform Fire Code now and in the future.

It can be seen from this figure that the storage capacity of the existing Eck Tank (blue line) is insufficient for the storage demand. The assumption has been made that no excess flow is available from any of the upper reservoirs during peak periods. This assumption was made since the Eck Tank is isolated during peak summer days. Currently, there is a deficit storage capacity of about 600,000 gallons. This suggests that the construction of a new 1.5 million gallon tank should be considered immediately. This additional storage capacity will provide the city with adequate storage until the year 2020.

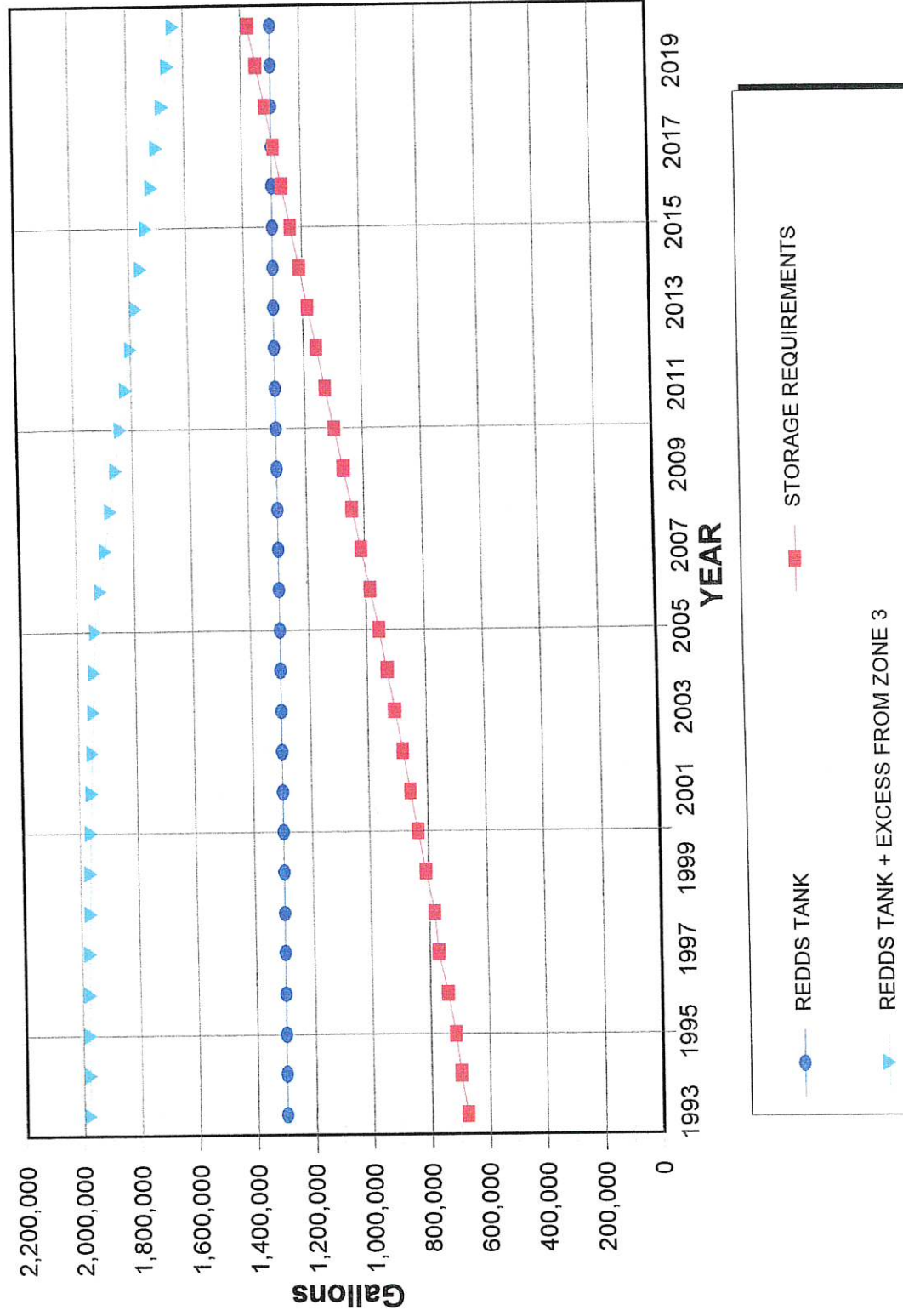
Zone 2

Figure 7-2 depicts the projected storage demand for Zone 2 (red line). The light blue line shows the combined Zone 2 demand plus the excess storage capacity from Zone 3. It can

# Required Storage Forecast Zone 1



# Required Storage Forecast Zone 2



be seen from this Figure that excess storage capacity currently exists and will exist throughout the study period. Therefore, this suggests that there will be no need to construct any additional storage facilities in this Zone until after year 2020.

### Zone 3

Figure 7-3 depicts the projected storage demand for Zone 3 (red line). The blue line shows the Zone 3 storage capacity. It can be seen from this Figure that excess storage capacity currently exists and will exist throughout the study period. Therefore, this suggests that there will be no need to construct any additional storage facilities in this Zone until after year 2020.

## E. Projected Water Storage Requirements

Tables 3-5 through 3-12 identify Providence City's future system demands. Projected year 2020 maximum day storage requirements for the City are summarized as follows:

	Zone 1 (gallons)	Zone 2 (gallons)	Zone 3 (gallons)
Indoor Demands:	714,100	451,100	152,500
Irrigation Demands:	971,300	644,961	218,027
Fire Storage:	<u>300,000</u>	<u>300,000</u>	<u>300,000</u>
<b>Total Storage Demand:</b>	1,985,400	1,396,061	670,527

## F. Proposed Water Storage Facilities

Providence currently has 2,630,000 gallons of existing storage capacity located in Zones 1, 2 & 3; the estimated total storage demand is 3,751,988 gallons (fire flow between zones 2 & 3 can be shared). These two numbers indicate that Providence City has outgrown its available storage and that the City has a storage deficit. We recommend that Providence City begin planning for the new tank immediately.

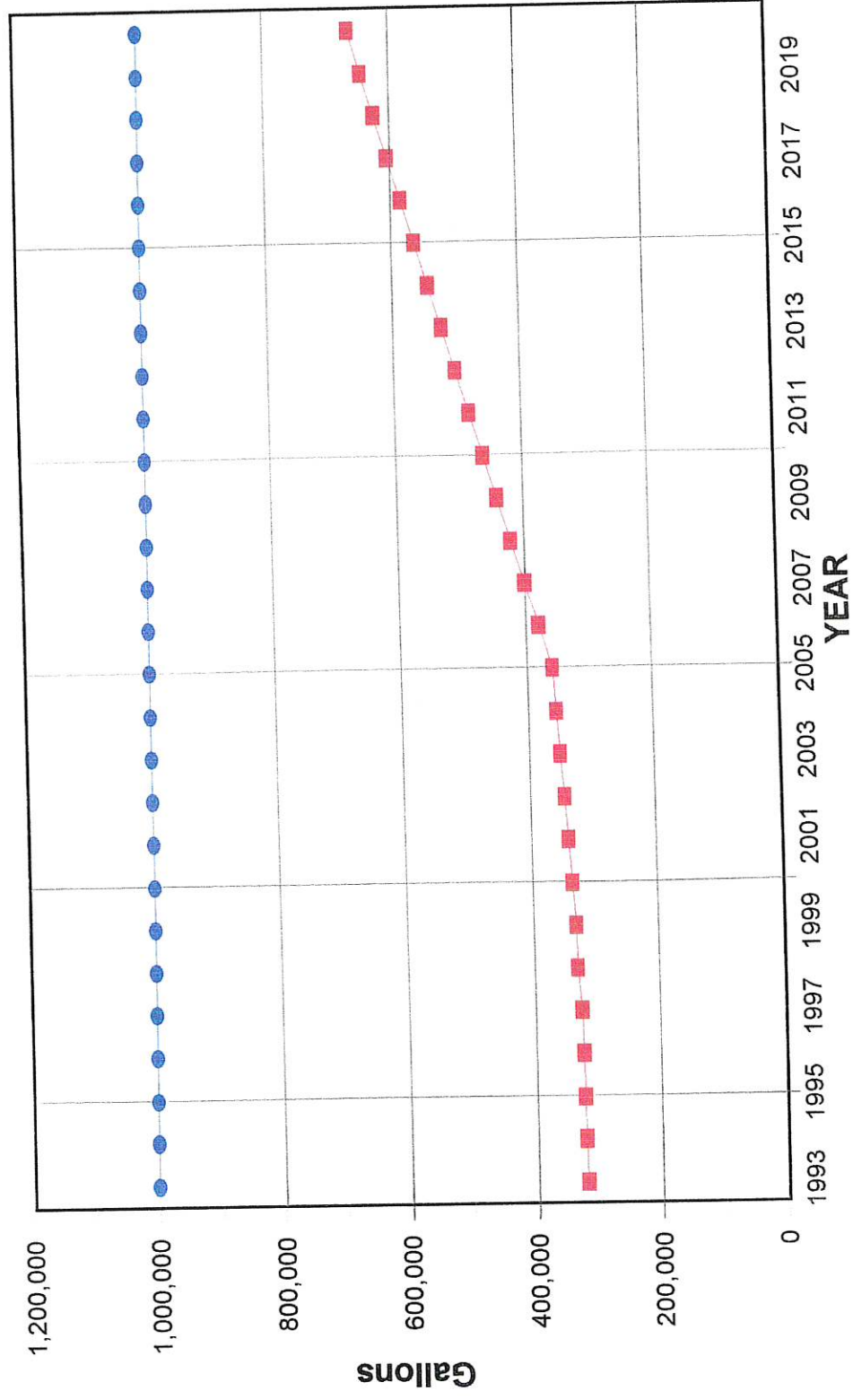
### 1. Zone 1 Tank Site (Eck Tank) - 1,500,000-Gallon Reinforced Concrete Tank

Figure 7-1 depicts the storage capacity vs. demand for Zone 1. The storage capacity shown (blue line) is deficient by about 600,000 gallons for the current demand (red line) for this Zone. As shown by the blue line on Figure 7-1, with the addition of the 1,500,000-gallon Eck Tank (occurring in the year 2000) the ability to meet this demand (red line) can be extended, to the year 2020.

The proposed location of the Zone 1 tank, shown in Exhibit 7-2, has several advantages. First, the City will be able to combine the transmission lines from the 1<sup>st</sup> East Well and the 4<sup>th</sup> South Well. Chlorination of the water can be performed



## Required Storage Forecast Zone 3



at a single location. In addition, the location is preferable since the distribution system has been designed with this location being connected to larger distribution lines.





