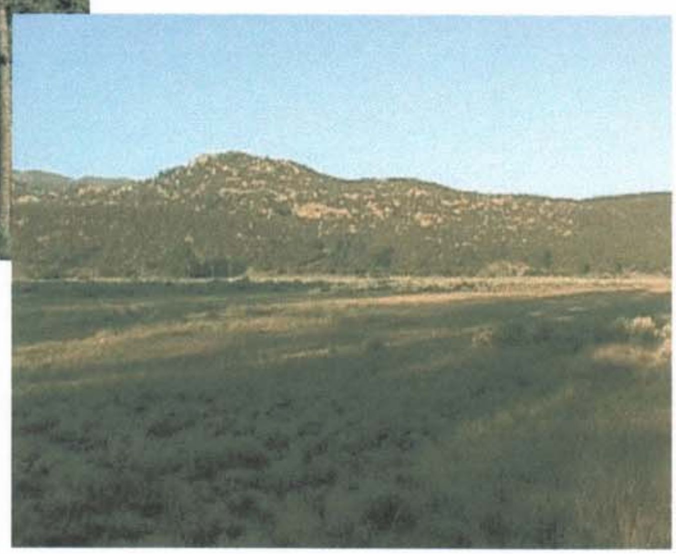
Lake Hemet Municipal Water District

Water System Master Plan of Garner Valley

August, 2002



ENGINEERING RESOURCES
OF SOUTHERN CALIFORNIA, INC.

Lake Hemet Municipal Water District

Report for

Water Master Plan Garner Valley

August, 2002

Engineering Resources of Southern California, Inc.

ERSC Job. No. 96006.019

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INTRODUCTION AND BACKGROUND

Engineering Resources of Southern California, Inc., has been contracted by the Lake Hemet Municipal Water District (District) to prepare a Water System Master Plan and compile a water system hydraulic simulation model for the Pine Meadow Estates. This system is not contiguous to the balance of the district and is wholly dependant on groundwater for supply. Our objective is to determine current and future system operating characteristics and determine the cost effectiveness of a pressure zone split. Future well and tank sites will be evaluated as part of the master planning effort and a 7 year capital improvement program compiled.

Study and Planning Area

The community of Pine Meadows Estates is situated in the middle of Garner Valley, located within the San Bernardino National Forest in Riverside County. It is 9 miles southeast of Idyllwild, along California State Highway 74. The community is mainly comprised of horse ranches and is bordered by Lake Hemet to the northwest, Thomas Mountain to the west, the San Jacinto Mountains to the east, and the Santa Rosa Indian Reserve to the southeast.

The Pine Meadows Estates encompasses approximately 3.5 square miles, or approximately 2,243 acres with elevations ranging from 4,500 feet to 4,850 feet. Presently, the system has only one pressure zone and therefore experiences pressure at lower elevations in excess of 240 psi. This variance in elevation constitutes the need for two pressure zones, which will be discussed later in this report.

The existing system is comprised of 3 production wells, a booster station, a 300,000 gallon reservoir and a 6,000 gallon aeration tank. The District has maintained the water system which was designed to serve residential units of approximately 5 acres in size since 1972.

MODEL DEVELOPMENT

This section describes the process utilized to develop the water system hydraulic simulation model employed in the master planning effort. The hydraulic simulation model was used to identify deficiencies with the existing system in meeting current and future water demand conditions, and to develop capital improvements for the anticipated future growth in water requirements within the water system study area.

Hydraulic Simulation Model

H2ONET is a hydraulic and water quality simulation modeling program that has been developed by MWH Soft, Inc. The program was used to model the hydraulic characteristics of the District's water distribution system under current demand conditions and under build-out demand conditions. The PC-based H2ONET program works within the Windows operating system environment and integrates its water system database structure inside the AutoCAD program. The program can perform both steady state and 24-hour extended period simulation hydraulic modeling of the water distribution system. In addition, the program provides the District with the capability to keep track of any distribution system information such as pipeline material, date of installation, pressure class, date of latest flushing, material, lining, pump manufacture, and any other information they wish to monitor.

Model Development

The first step in the model development process was to prepare a project base map using information obtained from the Riverside County G.I.S department. Engineering Resources then started the development of the existing water system distribution pipeline network from tract maps provided by the District from 1972/73 along with data from the composite system map. Once this was completed, the location of reservoirs, wells and booster pumps was established and a base map compiled.

At this point, district staff were then consulted to confirm and update the database to include pipelines that were constructed contrary to the builders plans or since 1973. The second step in the model development process was to assign pump head-capacity curves to the wells and booster pumps.

Distribution Pipeline Network

The model consists of 78 pipe segments ranging in size from 4 inch to 8 inch. The locations of the pipelines within the model were registered with the street overlay. The pipelines do not match the exact location relative to street center lines. All pipe lengths were automatically generated within the model and include the year of installation, street location, pipe material, class and roughness coefficient within the database.

Wells and Reservoirs

The existing production wells were included in the model database. Each well consists of a tank and a pump in the model. The tanks represent the groundwater aquifer and were modeled as fixed grade nodes with a bottom elevation of the groundwater level minus draw down. The pumps are modeled with a multi-point-curve using manufacturer's pump curve data supplied by the District. The pump controls have been added to the hydraulic model database, based on information provided by the District and model constraints.

Information regarding the 300,000 gallon steel reservoir was compiled from construction drawings prepared by Neste Brudin and Stone Inc. from 1972.

Elevations

The elevations of all of the model nodes were established from profile elevations contained within the tract map drawings and reservoir site plans.

Operations

The well pump operation is controlled by the water level in the 300,000 gallon reservoir. The booster pump station has one set of controls governing the level of the reservoir that it pumps out of. The pump controls for each pump in the system have been input into the H2ONET model database using the program's standard control features.

Demand Allocation

The existing water demands for Garner Valley were derived from the 2001 customer billing data and production data provided by the District. This method of demand allocation was used because it is more accurate than using land use factors or averaging the demands throughout the distribution system. A diurnal demand curve was developed to reflect the typical water demand trend for the area.

Existing Condition Demand Allocation Methodology

The existing condition distribution system demands are based on the actual District customer billing records for July/August 2001 which were obtained from the District. Several addresses were located within the system and water demands taken from billing records were assigned to the nearest node via street address.

Build-Out Condition Demand Allocation

Ultimate build-out of 307 connections was achieved by assigning ultimate system demands to the nearest node of vacant parcels. These parcels were identified on the map through customer billing records.

The hydraulic model for Garner Valley for maximum day usage was run for a 168 hour (7 day) scenario to determine the overall performance of the existing water system. A seven day scenario was utilized as this is what the District is experiencing in the summer.

EXISTING SYSTEM

Existing Demands

Garner Valley has one (1) Pressure Zone. There are a total of 214 connections in the Garner Valley system and 190 were active connections as of January 1, 2001. (Active connections were based on a minimum consumption of 1000 ccf per year per connection). **Table 1** is a summary of the metered consumptive demands for the years 2000 and 2001:

TABLE 1

Summary of Metered Consumptive Use for years 2000 and 2001

Year	Total Connections	Estimated Active Connections	Average Day Metered Demand (GPM)	Average Summer Day Metered Demand July/Aug. (GPM)	Estimated Maximum Day Demand (GPM)	Average Metered Demand Per Active Conn (GPD)
2000	**204**	**183**	**156**	282	353	1,228
2001	214	190	152	261	326*	1,152

*Estimated Max Day Demand was calculated at 1.25 times Average summer day. Daily records for July and August were not available and are necessary to determine actual maximum day demand. The smaller the water system the larger the variance between Average day and Maximum day demands.

Year	Total Consumption (ccf)	Total Consumption (af)	Consumption (gpd)	Average Day Metered Demand (gpm)	Estimated Active Connections	Average Consumption (gpm) per Active Connection
2000	10,995,800	252	225,340	156	183	0.85
2001	10,647,800	244	218,207	152	190	0.80

TABLE 2

Summary of Metered Consumptive Use for July/August

Year	Total Consumption (ccf)	Total Consumption (af)	Consumption (gpd)	Consumption (gpm)	Estimated Active Connections	Consumption (gpm) per Active Connection
2000	**3,367,600**	**77**	**406,289**	282	183	1.54
2001	3,110,900	71	375,335	261	190	1.37

TABLE 3
Summary of Well Production

	Production (ccf)	Production (af)	Production (gpd)	Production (gpm)	Estimated Active Connections	Actual gpm per connection
2001	**10,759,320**	**247**	**220,672**	153	190	0.81
July/Aug	3,005,640*	69	362,670	252	190	1.33

*Production is less than consumption for the same time period as in Table 2. Numbers are dependant on when the district took the readings.

The average day metered consumption for Garner Valley was 152 gpm and the average summer day demand in July/August was 261 gpm in 2001. There was 247.5 AF produced versus 244.44 AF metered for the same year which gave Garner Valley approximately 2.76 AF or 0.99 % of unaccounted for water. It is estimated that this water was used for filling fire trucks, the District's flushing program and for dust control at the common area. This then translates to an actual average day demand of 153 gpm, an actual maximum day demand of 329 gpm or 1.73 gpm per active connection for 2001.

The average daily usage per active metered connection for 2001 was 1,152 gpd. The average daily usage per active connection for 2001, including unaccounted for water, was 1,161 gpd. The estimated maximum day demand for build-out in Garner Valley is 307 connections which at 1.73 gpm per connection would require 531 gpm.

Existing Wells

Garner Valley has three (3) existing wells with a combined capacity of 360-434 gpm. **Table 4** is a listing of the current wells and their pumping capacities:

TABLE 4
Inventory of Existing Wells and Production

Well #	Location	Pumping Level (MSL)	Capacity (gpm)	AF/YR 2000	AF/YR 2001
1	**Devil's Ladder Road**	**4437' +/-**	125	**33.3**	**34.1**
2	**Tunnel Spring Road**	**4436' +/-**	**106**	**36.5**	**30.9**
4	Morris Ranch Road	4446' +/-	203	202	182.3
Total 3 Wells			**434**	**272**	**247**

Existing Reservoirs

Garner Valley has one (1) existing reservoir site which contains a 300,000 gallon welded steel reservoir. The tank is 24 feet in height, 47 feet in diameter with a high water level of 4,970 feet. The reservoir is located in the most southerly portion of the system on the west side of California State Highway 74 just off of Goldshot Creek Road.

The second reservoir is an aeration tank that has a capacity of 6,000 gallons. The tank is mounted horizontally just below the surface of the ground at the booster station on Tunnel Springs Road. The tank is approximately 6 feet in diameter and is fed from Well #4. With these two tanks combined, the system has 306,000 gallons of available storage capacity.

Existing Booster Stations

Garner Valley has one (1) booster station which consists of one (1) booster pump with a capacity of 490 gpm. This pump boosts water from the 6,000 gallon aeration tank on Tunnel Springs Road to the 300,000 gallon system reservoir.

Existing Waterlines

Garner Valley has a total of 64,353± feet of waterlines. **Table 5** is an inventory of the waterlines by pipe size.

TABLE 5
Inventory of Waterlines

Pipe Size	Garner Valley (LF)
4"	2,848
6"	29,085
8"	32,420
Total	**64,353**

Note: Pipe length totals are approximate.

ANALYSIS OF EXISTING WATER SYSTEM

Supply

Garner Valley requires a minimum of 329 gpm of supply for maximum day demand (24 hr/day pumping with 1.73 gpm per average connection) to serve the existing 190 active connections. Garner Valley should have a total of 370 gpm for its total 214 active and inactive connections. The wells can currently supply 434 gpm, if all of its wells are in operation during maximum demand periods. The Department of Health Services (DHS) requires that Garner Valley have the ability to supply maximum day demand with its largest source out of service. Well #4 is currently the largest source supply at 203 gpm. If Well #4 were out of service, 231 gpm of supply would be available within the system. This is not enough supply for all of the active connections. Therefore, Garner Valley cannot meet the DHS's minimum standards for water supply. A fourth well, with a minimum 150 gpm, will be required for the system to meet it's current obligations.

Storage

Lake Hemet Municipal Water Districts goal is to have enough storage capacity for one (1) day of maximum day demand, plus fire flow and 25% operational storage for each pressure zone. The above storage parameters are a goal of the District, but are not compulsory by the DHS. Storage capacity for one day of maximum day demand, per pressure zone, is all that is required by DHS. It is recommended that storage comply with DHS requirements and include fire flow. **Table 6** depicts the storage capacity desired for the 214 existing service connections.

TABLE 6
Existing System Storage Requirements

Criteria	Factor	Amount
Fire Flow	2 hours at 500 gpm	60,000 gallons
Operational Storage	25% of maximum day demand	133,279 gallons
Emergency Storage	1 maximum day demand	533,117 gallons
	Total	**726,396 gallons**

Garner Valley currently has 306,000 gallons of available storage, a short fall of 420,396 gallons of their target storage capacity. It is however, mandatory that the system have emergency storage provisions of one maximum day (533,117 gallons) and therefore currently does not meet the DHS's minimum standards for adequate storage. Garner Valley should maintain adequate storage to pump water from its wells to its reservoirs during low demand periods (10 pm to 6 am).

Pressure

The existing system is experiencing pressures in excess of 240 psi which has required the residences of Garner Valley to have pressure reducers on their services to eliminate any damage to household appliances. Pressures of this range can cause damage to indoor and outdoor piping and appliances. The preferred pressure for the system would be from 80 to 120 psi. The inclusion of a pressure zone split will help to minimize these pressures.

Projected Demands

The District averages three meter installations per year. Should the valley growth continue at the same rate, it is estimated that the system would not require a fifth well until the year 2012 (assuming growth rate on active connections). If this growth rate is more aggressive, this fifth well will be required sooner.

Currently, the estimated maximum day demand for the system in the summer months is 329 gpm or 473,760 gpd (based on 190 active connections). Once the zone split has been made in Phase 1, the demand will be distributed between the two pressure zones. This demand will not be evenly distributed between the two zones at that time. The upper pressure zone will consume 63% (207 gpm or 298,469 gpd) of the demand in the system and 37% (122 gpm or 175,291 gpd) of the demand will be in the lower pressure zone.

When a parallel line on Tunnel Springs road has been installed and the existing customers on that stretch of line (including Morris Ranch Road) have been transferred to the lower pressure zone, 55% of the demand (181 gpm or 260,568 gpd) will then be consumed by the upper pressure zone and 45% (148 gpm or 213,192) by the lower. The ultimate build-out demand of 307 parcels can be seen in **Table 7** below.

TABLE 7

Estimated Ultimate Build-out Demand per Pressure Zone

Pressure Zone	Estimated Parcels/zone	Ultimate Maximum Day Demand GPM	Maximum Day Demand GPD
Upper	180	311	447,840
Lower	127	220	316,800
Total	**307**	**531**	**764,640**

$H_2$0NET HYDRAULIC MODEL ANALYSIS

Several scenarios were performed on the hydraulic model to determine the best location for the zone split and how the existing facilities will perform once this transition is made.

Results of $H_2$0NET Analysis

Analysis of the existing system within the model revealed pressures in excess of 240 psi at the end of Morris Ranch Road, the north end of the system. This connection is the lowest elevation within the system and lowering the pressure in this section of the system is one of our objectives.

With the implementation of the initial zone split (Phase 2), pressures on Morris Ranch Road did not see any relief as they are within the lower portion of the upper pressure zone. When an 8-inch parallel line was put in on Tunnel Springs Road (Phase 3) and the service lines transferred to the lower pressure zone, pressures were dramatically lowered giving this line pressures averaging 100 psi. **Figure-1** is a graph depicting pressures, at the last connection on Morris Ranch Rd., from the existing system and Phases 2 and 3.

Analysis of the initial zone split reveals that 63% of the demand in the system is within the upper pressure zone and 37% in the lower zone. Once the parallel line on Tunnel Spring Road has been installed (Phase 3), the ratio changes to 55% and 45% respectively.

Several scenarios were performed with various future demands to analyze levels in the existing 300,000 gallon reservoir. The model was run for a 168 hour (7) maximum day condition during the summer with all of Garner Valley's wells operating. A 168 hour extended period simulation was utilized because Garner Valley has experienced seven (7) continuous days of maximum demands during the months of July and August.

The Department of Health Services, Office of Safe Drinking Water, requires that a water system have the ability to meet its maximum day demands with its largest source out of service and that its reservoirs have sufficient capacity to store one (1) day of maximum day demand plus fire flow for each pressure zone. When the hydraulic simulation analysis was run, assuming that Well #4 would be out of service, the reservoir could not recover after 3 maximum days and the reservoir went empty.

Connection on Morris Ranch Road

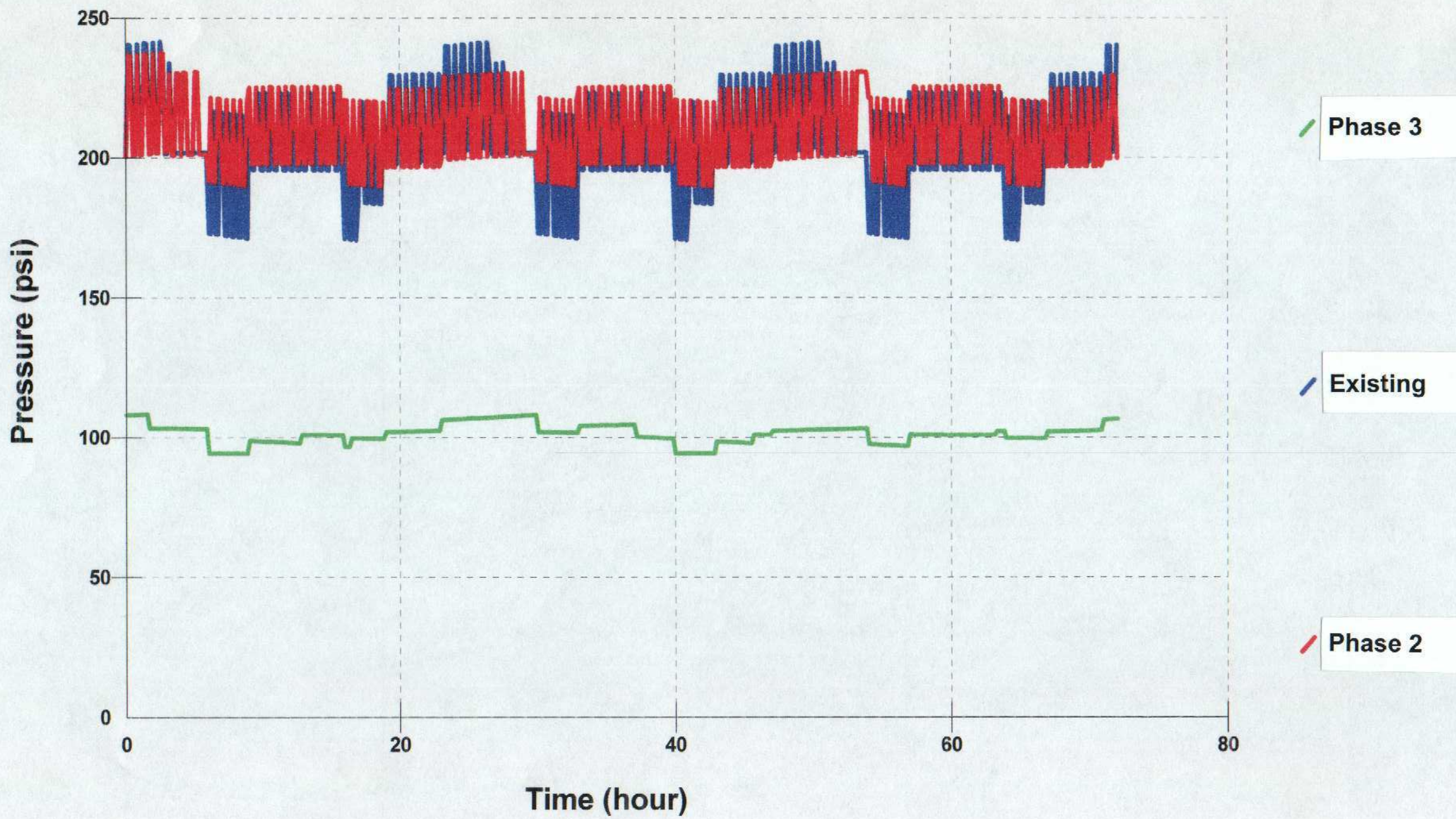

Figure - 1

Pressure reducers were located in the four areas where the zone split takes place and no flow was seen through the two most northerly valves under maximum day conditions when the valves were set at 50 psi.

A fire flow demand of 500 gpm was applied to node #1, which is located at the southerly end of Goldshot Creek Road, from 1:00 pm until 3:00 pm. The results of the existing and future scenario simulations register residual pressures in excess of 30 psi.

Conclusions of $H_2$0NET Results

The results of the 168 hour simulation ran for Garner Valley's existing water system shows that Garner Valley does not have the ability to supply maximum day summer demand under the minimum requirements of the Department of Health Services. If Well #4 is out of service, restrictions must be imposed on the large users during maximum day demand periods, in order for Garner Valley to meet its water system obligations. The reservoir will empty completely after three consecutive maximum day conditions.

It was also concluded that with the zone split, Well #1 would now have to pump to the lower pressure zone tank and that a fourth well would also be required to supply demand in the lower zone.

Two of the four pressure reducers analyzed could be omitted completely as there was no flow seen through them under maximum day conditions when the valves were set at 50 psi.

Minimum Recommendations for Existing System

Several scenarios were performed on the hydraulic model to determine the best location for the zone split and how the existing facilities will perform once this transition is made. Our aim was to determine the most cost effective way to make the split while factoring in tank and well locations, prv station placement and high system pressures.

These recommended improvements must be accompanied with modifications to the Well #1 pump (bowls and stages). Adjustments to the existing tank level set points in the control logic that Garner Valley has in use for Well #1 will also have to be modified. Well #1 would then pump to the new reservoir with a lower high water level.

Storage

With the proposed zone split and obligations to 214 connections (January 1, 2001) which includes both active and inactive connections, the reservoir capacity must be increased to store enough supply from the wells to satisfy maximum day demand, 25% operational storage plus fire flow for each zone. Since we are proposing to split the water system into two (2) pressure zones a reservoir with a high water level of *4,744' will be required to supply the lower zone. This reservoir should be located behind the commons building on the existing pad and have a capacity of 500,000 gallons. At a very minimum a 300,000 gallon reservoir is required but 500,000 would allow for future expansion to max. build-out for this zone. This additional storage will provide sufficient operational storage and will also allow for time of use pumping from the wells.

After Phase 2 of the Capital Improvements has been implemented, the existing 300,000 gallon reservoir will be serving the upper pressure zone. Currently one maximum day for this zone is estimated to be 298,469 gpd. The District will be able to store enough supply for emergency storage but will not have capacity for fire flow or operational storage.

Once Phase 3 has been implemented, the storage required for the upper zone would decrease to an estimated 260,568 gallons. With fire flow and 25% operational storage, this number amounts to 385,710 gallons. When the upper pressure zone max. day demand reaches 300,000 gpd a second tank will be required in that zone by the DHS to supply those demands. A second tank is more desirable than one large tank, as one tank could be taken out of service in low consumption periods for repair and or maintenance while still servicing the customers. This second tank should have a min. capacity of 320,000 gallons and be installed at a location in the upper pressure zone that would have the same high water level as the existing tank. One 500,000 gallon tank in the lower zone is all that is required. If this tank has to be taken out of service, the lower system can be fed from the upper zone through pressure reducing stations.

*Note: **The elevation of the existing reservoir pad located behind the Common Building has been estimated from USGS quad map contours** as no other information regarding elevation was available at this time.

With the addition of the 500,000 gallon reservoir for the lower system and the addition of the third tank in the upper pressure zone, this would satisfy the water storage requirements for the ultimate build-out of 307 parcels. **Table 8** and **Table 9** show the storage required for each zone at build-out of 307 parcels.

TABLE 8

Upper Pressure Zone Ultimate Build-out Storage Requirements

Criteria	Factor	Amount
Fire Flow	2 hours at 500 gpm	60,000 gallons
Operational Storage	25% of maximum day demand	111,960 gallons
Emergency Storage	1 maximum day demand	447,840 gallons
	Total	**619,800 gallons**

TABLE 9

Lower Pressure Zone Ultimate Build-out Storage Requirements

Criteria	Factor	Amount
Fire Flow	2 hours at 500 gpm	60,000 gallons
Operational Storage	25% of maximum day demand	79,200 gallons
Emergency Storage	1 maximum day demand	316,800 gallons
	Total	**456,000 gallons**

Supply

Garner Valley must drill an additional well (Well #5) to supply water to the lower pressure zone reservoir and to meet the Department of Health Services minimum requirements for supply. The location of the well should be in the lower pressure zone, just off of Penrod Canyon Road. The new well would be expected to yield approximately 150 gpm. Garner Valley would then have a minimum of 381 gpm, with its largest water supply source out of service. This could supply water to 222 total connections by the Department of Health Services standards.

Pipelines

Garner Valley will eventually need an additional 2,050 feet of 8 inch diameter pipeline once the system has been divided into two (2) pressure zones to loop the dead end from Butterfly Peak Road to Horse Canyon Road along Highway 74. A pipeline will also be required to transfer Morris Ranch Road and Tunnel Springs Road from the upper pressure zone to the lower zone. This line should be an 8-inch line approximately 1,770 feet long that will parallel the existing line within Tunnel Springs Road. (See the Water System Facilities Map for piping modifications).

Booster Station

No improvements are recommended for the existing system for booster station capacity.

Pressure Reducing Station

Once the system has been split into the two pressure zones, pressure reducing stations will be needed at (2) two locations. The set points on the two new pressure reducing valves must be set to allow the upper pressure zone to supply the lower zone during peak day demands.

One valve should be located just west of Tool Box Spring Rd. on Devil's Ladder Rd. and set to 54 psi. The other should be located just west of Well #1 on the 8" line that separates the well from Devil's Ladder Rd. and this pressure reducer should be set to 50 psi.

In order for the split to be complete, valves must be closed in two (2) locations. The first is at the intersection of Horse Canyon Rd. and Highway 74. The second would be just east of Tunnel Spring Rd. on Butterfly Peak Rd.

These changes will take effect when the zone split is implemented. Once the parallel line on Tunnel Springs Rd. is installed, the latter valve will need to be opened to included Tunnel Springs Rd. into the lower pressure zone. (See the Water System Facilities Map)

CAPITAL IMPROVEMENT PROGRAM

The report's function was to determine the most cost effective way to achieve a pressure zone split while factoring in tank and well locations, prv station placement and high system pressures. The Capitol Improvements are listed in order of importance and should be undertook as such.

Phase 1 - This phase consists of drilling and equipping Well #5 and connecting it into the distribution system. The location of the well should be on the District's property (in the future lower pressure zone), just off of Penrod Canyon Road, and should yield approximately 150 gpm.

Phase 2 - This phase of the capital improvement program encompasses the majority of the upgrades required for the system and would include the pressure zone split. The improvement required are, the addition of a 0.5mg reservoir for the lower pressure zone, piping to the reservoir from the distribution system, modifications to Well #1 that will be required to switch it to pump to the lower zone and two (2) pressure reducing stations.

Phase 3 - Once the pressure zone is split in phase 2, high pressures will still be seen on Morris Ranch Road. In order to rectify this situation, a parallel line will be needed on Tunnel Springs Road. It must be tied into the line on Morris Ranch Road and the customers switched to the lower pressure zone. In addition, the second reservoir to service the upper pressure zone will be needed once the maximum day demand in the upper zones reaches 300,000 gpd. A decision at that time will have to be made as to installation of a second tank of 320,000 gallons min. capacity or a larger 620,000 gallon minimum tank. If the option of using one tank is made, the existing tank site would have to be graded to allow for a taller wider tank. If the existing tank is to remain, a second tank site in the upper pressure zone will have to be located and purchased. This site must have an elevation equal to the existing site. In addition to the site, piping and telemetry will be required to tie the tank into the distribution system.

Phase 4 - The zone split in Phase 2 transforms Butterfly Peak Rd. and Horse Canyon Rd. into dead ends that will need to be looped. This phase closes the loop with approximately 1770 feet of 8-inch pipeline.

Phase 5 - Addition of well #6. The exact time that this well will be required is dependant upon future system demand characteristics and additional consumer connections. This additional Well will serve the lower pressure zone and will be required once the system reaches 222 active connections.

The following is a summary of the recommended improvements with their estimated construction costs:

Phase 1 - Year #1 (2002) - Recommended facility additions:

Construct Well #5 (capacity 150 gpm)	$210,500
Administration, inspection etc.	$25,260
Total	**$235,760**

Phase 2 - Year #2 (2003) - Recommended facility additions:

Construct and connect 500,000 gallon, 24 feet high reservoir (Includes welded steel tank, painting and concrete ringwall)	**$256,000**
Pipeline from distribution system to tank site (approx. 2,500 feet)	$100,000
Construct two (2) pressure reducing stations	$20,000
Modifications to Well #1 (to pump to lower pressure zone)	$10,000
Administration, inspection etc.	$46,320
Total	**$432,320**

***Phase 3 - Year #3 (2004) - Recommended facility additions:**

Construct 1,600 feet of 8-inch pipeline on Tunnel Springs Road (based on $30 per foot)	$48,000
Construct 350,000 gallon reservoir (Includes welded steel tank, painting and concrete ringwall)	**$204,000**
Design, administration, inspection etc.	$30,240
Total	**$282,240**

Phase 4 - Year #4 (2005) - Recommended facility additions:

Construct 1,770 feet of 8-inch pipeline from Butterfly Peak Road to Horse Canyon Road to close the loop (based on $30 per foot)	$53,000
Administration, inspection etc.	$2,650
Total	**$55,650**

Phase 5 - Recommended facility additions:

Construct Well #6 (capacity 150 gpm)	**$210,500**
Design, administration, inspection, construction management etc.	$25,260
Total	**$235,760**

SUBTOTAL	**$1,241,730**
15% Contingencies	**$186,260**
TOTAL	**$1,427,990**

* A decision will have to be made by the District whether a second tank or a larger tank will be utilized. Therefore exact pricing of this phase cannot be completed at this time. Price does not include piping to distribution system or land required for reservoir.

SUMMARY AND CONCLUSIONS

It is evident that the existing distribution system is deficient in storage and well capacity and that these two items need to be addressed as soon as possible.

The previously described improvements for the existing system and future projected increases in total connections up to 307 will meet the minimum standards required by the Department of Health Services, Office of Safe Drinking Water. These recommended improvements will also allow most of the wells and pump stations to operate without pumping between the hours of noon to 6:00 pm, during maximum demand periods. (Anza Electric on-peak rates)

The total construction costs are estimated to be **$1,427,990 for the** necessary minimum upgrades to the existing system. Garner Valley's water rates have not been increased since 1993 and should be increased along with capital facility charges for new connections to help finance these future upgrades. The current water rates and capital facility charges is not adequate to pay for the recommended upgrades for future connections.