The District's primary water supply is North Shirttail Creek. Sugar Pine Dam was constructed on North Shirttail Creek by the Bureau of Reclamation (the Bureau) in the 1980's. The District purchased the project from the Bureau in 2003. The storage impoundment behind the dam is referred to as the Sugar Pine Reservoir. Raw water from Sugar Pine Dam flows into a 40-acre-ft forebay prior to entering the treatment plant. Plant flow is controlled through a rate of flow control valve located at the filter outlet manifold.

The treatment plant is considered a direct filtration plant. Two dual media pressure filters provide treatment. The maximum allowable flow based on filter loading rates is 2,184 gpm, or 3 million gallons per day (nominal).

The filters are backwashed periodically to clean them. Backwash water is currently stored in onsite ponds and evaporates or percolates. No backwash water is discharged offsite.

A cationic polymer is used for coagulation/flocculation. The coagulant is injected into the 21-inch raw water pipeline from the 40-acre foot reservoir. No mixing devices are employed in the process. Floc form as the water mixes in the pipeline which increases the solids removal efficiency of the pressure filters. The existing treatment plant is considered a direct filtration plant by the CDPH.

Sodium hypochlorite is used as a disinfectant. Hydrated lime is used for pH adjustment. The existing treatment facility produces excellent quality water. The facilities are maintained very well.

Treated water is discharged from the filters and enters the distribution system. Three 430,000-gallon bolted steel tanks are located on the southwest corner of the treatment plant site providing about 1.3 Mgal of treated water storage. In their current configuration the tanks "ride the line" whereby the tanks are connected to the main transmission pipeline via branched tees with a lateral to the tank(s). Under the current plant piping configuration, maintaining adequate contact time for disinfection requires special operating and sampling procedures. District staff is currently working towards a solution to address that problem as discussed below.

Treated water from the water treatment plant flows directly into the gravity distribution system that serves the lower elevation of the District. The booster pump station (BPS) is supplied directly from the 21-inch transmission main via a 12-inch suction pipeline, and serves the higher elevations of the system east of the treatment plant site, and provides auxiliary flow to lower portion of the system through a pressure reducing/pressure sustaining station across the street from Walter Way.

2.3.2 TREATMENT PLANT IMPROVEMENTS

Improvements to the existing treatment facility are discussed in this section. The proposed treatment plant layout at the build-out condition is shown on Figure 2-6. The improvements will be constructed in phases as additional capacity is required.

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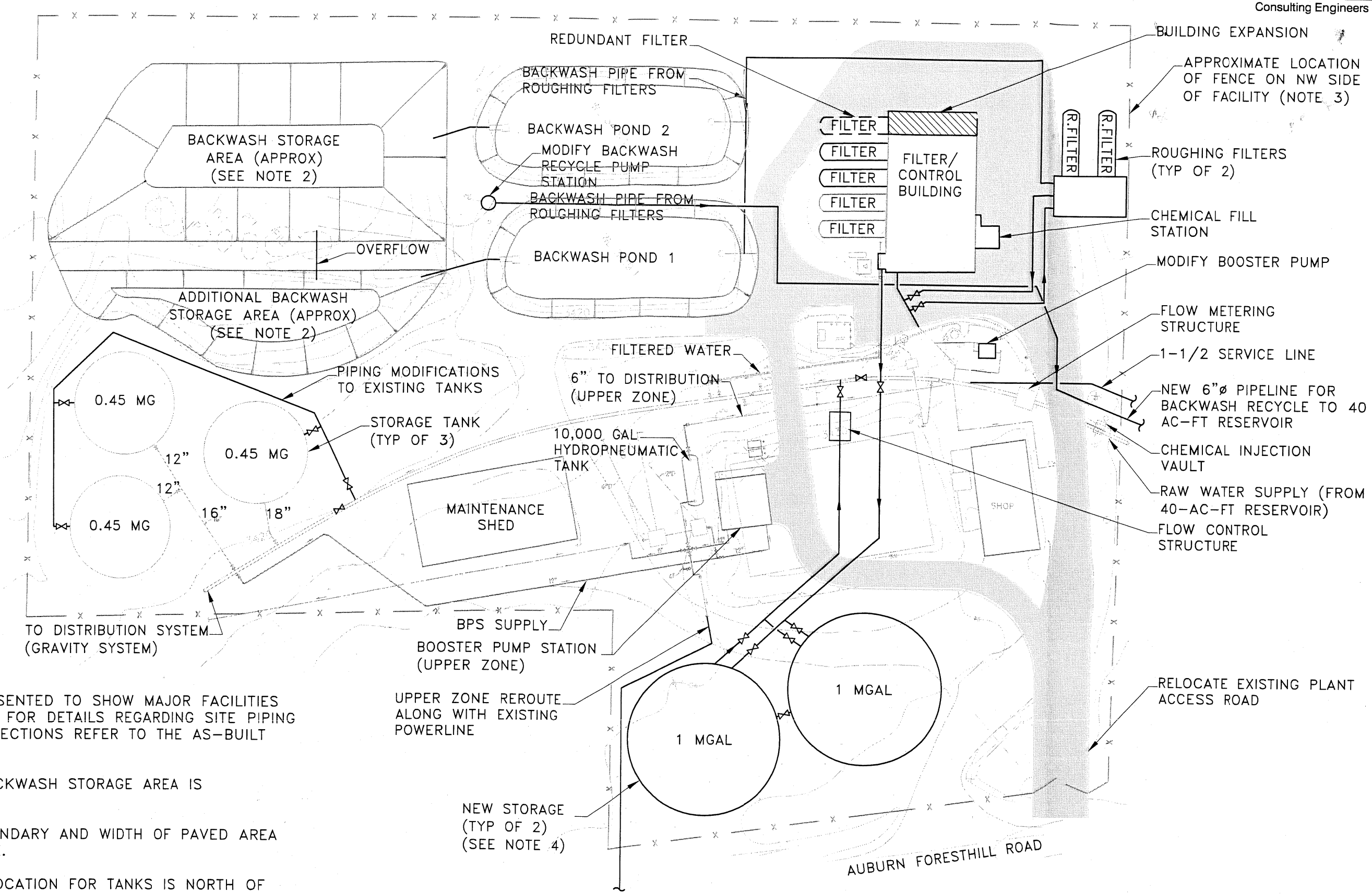
Consulting Engineers

SCALE 1"=50'



NOTES:

1. SITE PLAN PRESENTED TO SHOW MAJOR FACILITIES AND PIPELINES. FOR DETAILS REGARDING SITE PIPING AND INTERCONNECTIONS REFER TO THE AS-BUILT DRAWINGS.
2. ADDITIONAL BACKWASH STORAGE AREA IS APPROXIMATE.
3. NORTHERN BOUNDARY AND WIDTH OF PAVED AREA IS APPROXIMATE.
4. ALTERNATIVE LOCATION FOR TANKS IS NORTH OF EXISTING TANKS WITHIN BACKWASH STORAGE AREA. EVALUATION OF PREFERRED SITE TO OCCUR DURING PREDESIGN.

P:\FHIL06-0 Jan 07, EXECUTIVE SUMMARY\FHIL06-001-FIGURE 2-6.dwg 8:34am

FIGURE 2-6 TREATMENT PLANT SITE PLAN BUILDOUT-6 MGD

The improvements included herein are based on a planning level analysis used to determine the nature of improvements and planning level costs. Prior to implementing improvements, a preliminary engineering report must be completed to confirm the assumptions used to develop the improvements identified herein. As discussed below, a major assumption is that continued use of the pressure filters will be approved for future expansions, possibly with the addition of roughing filters. The Long-Term-2–Enhanced Surface Water Treatment Rule now applies to small systems, and requires that the raw water quality be analyzed for bacteriological contamination. Results of that testing may require that more treatment be provided in the future.

Prior to implementing any of the suggested improvements included herein the District will comply with the California Environmental Quality Act (CEQA) and prepare the necessary documentation depending on the nature of the improvements. The District may also be subject to the National Environmental Protection Act (NEPA) and other Federal regulations depending on the nature of the project and funding sources. The determination of necessary documentation to comply with CEQA, and possibly NEPA, should occur during the predesign phase of the project when the specific nature of the improvements are known.

Filter Capacity. The original treatment plant was designed to accommodate two additional filters within the existing building, sized and configured similarly to the existing filters. Each filter provides a nominal capacity of 1.5 MGD at the approved loading rate. Future filter capacity expansions will be accomplished by adding additional filters and appurtenances.

With four filters in service the filter capacity will be 6 MGD. The projected maximum day demand is about 6.5 MGD, slightly higher than the capacity the treatment plant was originally designed for. The additional capacity needed could be provided by providing slightly larger filters with more capacity, or by adding a fifth filter in the future, which is considered the preferred alternative.

Pretreatment. The existing water treatment plant is considered a direct filtration plant, which is an approved treatment method. Direct filtration includes coagulation and flocculation followed by filtration, and excludes sedimentation. Inline filtration is not an approved treatment process, and generally consists of the addition of coagulant immediately upstream of the filter units, with little or no time for coagulation and flocculation processes to occur. The designation between a direct and inline filtration is not always clear, and the District's system could be reclassified as an inline filtration process in the future. Reclassification to inline filtration would require major upgrades to the existing facility. Due to the high source water quality and long detention time provided in the 21-inch raw water pipeline between the 40-acre foot reservoir and treatment plant which provides time to allow flocculation to occur prior to filtration, reclassification to inline filtration is unlikely; however, pretreatment could be required. The addition of pretreatment processes at the District's treatment plant has been included in this Master Plan. Roughing filters would be installed just upstream of the existing filters.

Backwash Recovery System. The backwash, filter to waste and instrument water must be contained on the site. Typically these streams are recycled back into the treatment system after some form of processing to remove excess solids. The current system is configured to return the

backwash recycle stream directly in front of the filters and doing so negatively impacts the filter water quality. As mentioned previously, District Operators have expanded the backwash storage basins to a size capable of evaporating and percolating all of the water. To address these requirements, District staff plans to construct a pipeline up to the 40-acre foot reservoir which will convey and discharge the water into the basin.

Treated Water Storage. Additional treated water storage at the site is needed to provided the required contact time for treatment, and provide reliability and equalization. A total of approximately 6.8 Mgal of storage is recommend in the system through build -out. Of that, approximately 3 to 3.5 Mgal would be located at the treatment plant, with remaining storage located in the distribution system. The final configuration should be determined based on site constraints and hydraulics through the treatment plant.

Chemical Feed Systems. Chemical feed system improvements needed to expand the system are relatively minor and the improvements anticipated and include upsizing feed pumps and storage.

2.3.3 CAPITAL COST ESTIMATE

Planning level costs for the improvements discussed in this section are included below. All costs included are based on 2007 cost levels. The estimates include a 30-percent contingency and a 25-percent allowance for engineering, administration and legal fees. A summary of the cost are included in Table 2-8.

2.4 TRANSMISSION, DISTRIBUTION AND STORAGE

The transmission, distribution system and associated treated water storage (distinct from raw water storage and treated water storage improvements at the District's treatment plant site) are discussed in this section. Detailed discussion of the facilities is included in Section 6.

2.4.1 EXISTING SYSTEM

Transmission mains are the primary means of conveying water throughout the system. Transmission mains have distribution laterals emanating from the main, there are no services connected directly to the transmission pipelines. The District's current transmission and distribution system is shown on Figure 6-1 (see the inside back cover of this Master Plan). The transmission main begins at the water treatment plant and heads southwest, through a cross country route north of downtown Foresthill, until it begins to run adjacent and parallel to Foresthill Road.

The entire transmission system is fed by gravity. As the elevation decreases away from the treatment plant, the pressure increases due to gravity head, and would exceed 520 psi (1,200 feet) at the end of the system near Bella Vista. These system pressures would require special pipeline materials and construction, and would present safety concerns. There are currently five pressure reducing stations (PRVs) located along its length with inlet pressures upwards of 200 pounds per square inch (psi). Outlet pressures are reduced down to 90 to 110 psi.

Table 2-8
Proposed Improvements[a]

Improvements	Cost (x1,000)
Filtration Equipment	
Add additional filters, including face piping, media and manifolds – total of three additional filters including redundant unit	$1,250
Expand/modify existing building to accommodate a fifth redundant filter unit	120
Construct pretreatment building	250
Install roughing filters (total of two units)	900
Site piping modifications to accommodate roughing filters	75
Modify existing backwash pump to increase capacity and design point to accommodate roughing filters and new tanks	150
Sitework	100
Electrical and controls (at approximately 30% of improvements)	850
Sub-Total	**$3,695**
Contingencies @ 30%	1,100
Sub-Total	**$4,800**
Engineering, Admin, Legal @ 25%	1,200
Sub-Total Filtration Equipment	**$6,000**
Storage Facilities	
Construct two 1 Mgal steel storage tanks	$2,000
Site piping for new storage tank	110
Hydraulic control structure (between new & existing tanks)	25
Relocate access road and gate	30
Modify inlet/out piping on existing tanks (work by District forces)	45
Sub-Total	**$2,210**
Contingencies @ 30%	660
Sub-Total	**$2,870**
Engineering, Admin, Legal @ 25%	720
Sub-Total Storage Facilities	**$3,590**
Miscellaneous Improvements	
Chemical feed modifications	20
Backwash recycle pump station (6” pipeline and two new pumps)	140
Sub-Total	**160**
Contingencies @ 30%	50
Sub-Total	**$210**
Engineering, Admin, Legal @ 25%	50
Sub-Total Miscellaneous Improvements	**$260**
Total – Treatment Plant Improvements	**$9,850**

[a] June 2007 20 Cities ENR CCI = 7,984.

The transmission main is constructed of asbestos concrete (AC) pipe, and is in good condition. Due to the high pressures involved special thickness classes were required to prevent failures and District staff must maintain an inventory of specialized repair materials suited to the unconventional pipe diameters. District staff report that problems with the PRVs and/or pipeline are infrequent and the system runs well.

The existing transmission pipeline was constructed with minimal looping. Looping creates interconnections which allow operators to divert flow around areas that must be isolated due to emergencies, or for heavy maintenance. Due to the linearity of the current system, water service is interrupted to all customers downstream of the isolation valve used to shut the water off.

Distribution system pipelines are supplied directly from the transmission main. Distribution pipelines are typically smaller diameter and provide water service to customers via a service lateral and meter set.

The overall transmission/distribution system is in good shape, which is evident based on the low percentage of unaccounted water in the system.

2.4.2 TRANSMISSION MAIN/STORAGE IMPROVEMENTS

Improvements to the existing system are proposed to help the system meet the pressure and flow criteria. A hydraulic model was prepared and used to assess the existing and future hydraulics within the system. Areas within the existing system which do not meet the flow/pressure criteria were identified as existing deficiencies within the system along with proposed remedies.

The expanded transmission system presented herein has been developed to provide service for future development, provide looping/parallel pipelines to increase redundancy, and includes additional treated water storage within the system through build-out. Future improvements consider use of existing facilities where possible to reduce project costs. Where possible the proposed pipeline alignments are along existing roads, or in the vicinity of future roadways currently planned by Placer County.

Improvements have been developed to a facilities planning level. Detailed engineering studies are needed prior to implementing the improvements to confirm assumptions, verify elevations and system hydraulics, consider alignment route alternatives, etc.

Prior to implementing any of the suggested improvements included herein the District will comply with the California Environmental Quality Act (CEQA) and prepare the necessary documentation depending on the nature of the improvements. The District may also be subject to the National Environmental Protection Act (NEPA) and other Federal regulations depending on the nature of the project and funding sources. The determination of necessary documentation to comply with CEQA, and possibly NEPA, should occur during the predesign phase of the project when the specific nature of the improvements are known including transmission main alignments and storage tank locations within the system.

Distribution systems associated with specific developments are not addressed in this report. The "onsite" pipelines and appurtenances to serve individual developments will be designed by the developers to District standards. The layout of those facilities will be tailored to the individual development project based on the planned layout of the development. The District will review and approve the improvements, including the point of connection to existing facilities. In some cases, key pipelines within the developments may need to be upsized so they can be used to connect/extend some of master planned facilities identified herein.

All of the improvements identified herein are within the existing District boundary. The majority of the new pipelines, and potential to provide looping and parallel pipelines within the system is within the northern portion of the District. Two storage tank sites are proposed within the transmission system. Storage within the transmission system will provide redundancy in the event of a pipeline failure, and will also provide additional storage in the event of a water supply emergency, such as a treatment plant failure.

The proposed transmission pipelines to serve build-out are shown on Figure 6-3, in the back of this report. The alignments shown are for planning purposes only necessary for modeling and determining planning level cost estimates. Detailed analysis including soils, topography, environmental constraints, right-of-ways, etc. will be necessary prior to selecting the actual alignment.

Design criteria and recommended system storage improvements were discussed in Section 5. Treated water storage is needed within the system to provide equalization, emergency storage and fire flow capacity. Currently all storage is at the water treatment plant site. Given the size and configuration of the District providing storage within the distribution system is recommended. Based on the criteria presented in Section 5, upwards of seven (7) Mgal of storage is recommended at build-out. Three (3) Mgal of storage is proposed at the treatment plant site, with the balance located within the distribution system.

Two potential tank sites were located, one in the vicinity of Melody Lane, the second up near the High School. The specific sites and configuration should be determined during predesign of the facilities. Development of the lower site in the vicinity of Melody Lane prior to the High School site is likely.

2.4.3 CAPITAL COST ESTIMATE

Probable costs for improvements to the existing and build-out systems were estimated for all major infrastructure. Infrastructure to serve a particular neighborhood was not included and is assumed to be the responsibility of the developer. A summary of the estimated capital costs are included in Tables 2-9 through 2-11. Capital costs have been determined based on existing deficiencies, distribution system storage, and transmission pipelines in each respective table. As shown all costs include a 30-percent contingency and a 25-percent allowance for engineering, legal and administrative costs.

Table 2-9
Existing Distribution System Improvements Cost Estimate [a] [b]

Item	Improvements	Unit	Qty	Unit Cost	Cost (x$1,000)
a	Replace 6" transmission main with 8" main in Crestline Drive	LF	2,640	$80	$210
b	Replace 6" transmission mains with 8" mains in Old Mill Street south of Foresthill Road	LF	3,510	$80	$280
c	Replace 4" transmission mains with 6" mains in Old Mill Street south of Foresthill Road	LF	710	$60	$40
d	Replace 6" transmission main with 8" main in Gas Canyon Court	LF	1,110	$80	$90
e	6" transmission main connection between Thomas Street and Timber Land Drive	LF	860	$75	$60
f	Replace 6" transmission main with 8" main in Hard Rock Drive	LF	950	$80	$80
g	Replace 6" transmission main with 8" main in Mayflower Road	LF	700	$80	$60
h	Replace 6" transmission main with 8" main in Moshiron Drive up to Pine Crest Drive	LF	420	$80	$30
i	Replace 6" transmission main with 8" main in Hosmer Mine Court	LF	830	$80	$70
j	Replace 6" transmission mains with 8" mains in Pine Crest Drive	LF	940	$80	$80
k	Replace 4" transmission mains with 6" mains in Pine Crest Drive	LF	660	$60	$40
l	6" transmission main connection between the ends of Eagle Ridge Drive and Ponderosa Way	LF	2,179	$75	$160
m	Replace 6" transmission mains with 8" mains in the northwest corner of Monte Verde area	LF	950	$80	$80
	Sub-Total				**$1,280**
	Contingencies @ 30%				$385
	Sub-Total				**$1,665**
	Engineering, Admin, Legal @ 25%				$415
	Total Existing System				**$2,080**

[a] June 2007 20 Cities ENR CCI = 7,984
[b] Refer to Figure 6-2 for improvement location based on item identification.

Table 2-10
Distribution System Storage Improvements Cost Estimate [a] [b]

	Improvements	Unit	Qty	Unit Cost	Cost (x1,000)
	STORAGE TANKS AND APPURTENANCES				
	Distribution System Storage 1 Site (DS-1)				
a	Two – 1 Mgal tanks with land	Gal	2,000,000	$1	2,000
	Land for tank site	Ac	1	50,000	50
b	10" transmission main, on the East of Timberland Drive, from the existing 18" main in Foresthill Road to the proposed tank	LF	2,380	$115	275
c	FCV station for proposed storage	Ea	1	$50,000	50
d	PRV station for proposed storage	Ea	1	$50,000	50
e	12" transmission main from the proposed tank site towards Spring Garden	LF	21,370	$135	2,885
f	PRV stations for proposed 12" transmission main (item e)	Ea.	2	$50,000	100
	Distribution System Storage 2 Site (DS-2)				
g	Two 0.75-Mgal tanks with land	Gal	1,500,000	$1	$1,500
	Land for tank site	Ac	1	50,000	50
h	10" transmission main from the existing 18" main in Foresthill Road to the proposed tank on the East of Melody Lane	Lf	2,210	$115	255
i	FCV station for proposed storage	Ea	1	$50,000	50
j	12" transmission main from the tank to the existing main in Foresthill Road	Lf	7,060	$135	955
	Sub-Total Distribution System Storage				**$8,220**
	Contingencies @ 30%				2,465
	Sub-Total				**$10,685**
	Engineering, Admin, Legal @ 25%				2,670
	Total Distribution System Storage				**$13,355**

[a] June 2007 20 Cities ENR CCI = 7,984
[b] Refer to Figure 6-3 for improvement location based on letter identification.

Table 2-11
Build-out Transmission Pipeline Improvements Cost Estimate [a] [b]

	Improvements	Unit	Qty	Unit Cost	Cost (x1,000)
k	10" branch transmission main from 12" proposed main to the existing main in Foresthill Road on the east of Polaris Way	LF	7,210	$115	$830
l	PRV station from DS 2 to transmission main in Foresthill Road	Ea.	1	$50,000	$50
m	8" transmission main from the 10" tank feeder main in Powerline Road at the vicinity of the proposed tank through Hard Rock Drive	LF	9,050	$95	$860
n	12" transmission mains from the existing 18" main at the vicinity of Old Mill PRV to the proposed 12" main via Yankee Jim area	LF	20,840	$135	$2,810
o	PRV stations along 12" transmission main	Ea.	2	$50,000	$100
p	10" transmission main along McKeon Ponderosa Way from Spring Garden	LF	7,840	$115	$900
q	8" transmission main along McKeon Ponderosa Way from the end of line 10" towards the south of the Gas Canyon area	LF	12,170	$95	$1,160
r	10" transmission main from the end of the proposed 8" pipeline to the vicinity of the Richardson PRV	LF	2,140	$115	$250
s	Check valve in 6" main on Red Rock Drive	Ea	1	$10,000	$10
t	PRV stations	Ea	3	$50,000	$150
	Sub-Total				**$7,135**
	Contingencies @ 30%				2,140
	Sub-Total				**$9,275**
	Engineering, Admin, Legal @ 25%				$2,320
	Total				**$11,595**

[a] June 2007 20 Cities ENR CCI = 7,984
[b] Refer to Figure 6-3 for improvement location based on letter identification.

The total estimated capital cost for the existing system to remedy existing deficiencies is $2.1 million. The estimated capital cost for the improvements to serve future growth is approximately $25 million, including transmission pipelines and distribution system storage. The cost of remedying existing deficiencies is the responsibility of the existing customers, whereas improvements to accommodate future growth should be borne by new users. Only the cost of future expansion improvements was included in the proposed connection charge calculation methodology included in Section 7.

2.5 PROPOSED METHODOLOGY FOR CONNECTION CHARGE CALCULATION

Improvements and associated capital costs to increase the capacity of the existing system to serve future growth have been identified in previous sections of this Master Plan. Facilities financed with connection charges include backbone facilities such as water treatment, transmission system improvements and storage, which provide the necessary capacity to serve future growth. A

proposed methodology to calculate a water connection charge to fund these improvements is developed in this section. Any such calculations or formulations expressed in this section are for example purposes only.

The proposed capital improvements included in this plan are based on full build-out within the existing District service area. The length of time for build-out within the District is unknown, and may take several decades to fully develop. Master Plans typically have a useful life of five to 10-years before updates are necessary due to changing conditions (e.g. regulations, rate of growth, changes in construction costs, etc.). The connection fee eventually adopted by the District Board of Directors will be developed using a shorter time horizon which will based on input from developers, the County's Community Plan Update and other factors to be determined in separate document. A proposed methodology is included herein for consideration.

The connection charge must have a relationship to the cost of providing the service which is related to the cost of the improvements needed to provide the capacity. To simplify the process of determining the share of these costs for which an increment of future development is responsible, the concept of the Equivalent Dwelling Unit (EDU) has been used, which represents the demand exerted on the system from a single family home, which is 495 gpd/EDU, including unaccounted water.

The connection charge calculated herein is based on the capital cost estimate for the improvements required to provide service to a single EDU within the system. This charge has been broken down into three categories by the type of capital improvements funded as summarized in Table 2-12.

Table 2-12
Summary of Connection Charge Components [a] [b]

Component	Estimated Construction Cost, (x 1,000)	Connection Charge, $
Treatment [c]	$9,850	$2,745
Storage [d]	$13,355	$3,722
Transmission	$11,595	$3,232
Total	**$34,800**	**$9,699**

[a] June 2007 ENR 20 Cities CCI = 7,984.
[b] Based on a total of 3,588 additional EDU through build-out of existing District.
[c] Includes storage at treatment plant.
[d] Three new tanks within the District's distribution system.

The connection for a single family home would be $9,699. The 3/4-inch meter is the smallest size meter that the District currently provides and is typically used to provide service to single family residential development to District customers. The 3/4-inch meter represents the potential water demand for one (1) EDU. To add perspective, the Placer County Water Agency's (PCWA) current water connection charge in Zone 3 (above Auburn in the Foothills) is $9,234 for a single family residence.

As the size of the meter increases, so does the potential demand placed on the system and the associated water connection charge should increase in some proportion. This methodology is common practice, and based on the American Water Works Association (AWWA) standard meter ratios which are summarized in Table 2-13. The ratios are simply based on the capacity of the various meters.

Table 2-13
Meter Equivalence Ratios and Proposed Connection Charge

Meter Size, inches	AWWA Standard Ratio[a]	AWWA Modified Ratio[b]	Maximum Continuous Flow, gpm [c]	Proposed Connection Charge, $
5/8	1	---	20	---
3/4	1.5	1	30	$9,699
1	2.5	1.7	50	$16,488
1.5	5	3.3	100	[d]
2	8	5.3	160	[d]
3	17.5	11.7	350	[d]
4	31.5	21	630	[d]

[a] American Water Works Association (AWWA) meter ratio calculation based on a 5/8-inch meter.
[b] Modified ratio based on ¾-inch meter as standard.
[c] Based on AWWA standards for maximum flow through meter.
[d] Connection charge for meters larger than 1.5-inches discussed below.

As stated, the smallest meter the District uses is a 3/4-inch meter. Therefore the standard meter ratios have been adjusted and shown in the column labeled “modified ratio”. Therefore a customer requesting a 1-inch meter would be required to pay a water connection charge of 1.7 x 3/4-inch meter charge. That methodology works wells for small meters; however, meters sizes over 1.5-inches have the potential to place excessive burden on the system capacity and should be addressed differently as discussed below.

The maximum flow rates through the larger meters can place an excessive burden on the system, while at the same time, not provide adequate funding for capacity related improvements.

The recommended means of calculating the connection charge for commercial/industrial and multifamily sites is based on the use ratio compared to a single family dwelling unit. The applicant should provide the District with the average and maximum day water demands expected to be placed on the system which can then be converted to an EDU basis and used to determine the connection charge. This information would be submitted as part of the will serve application for the development.

Indexing is used to provide for automatic adjustment of fees to account for inflationary cost increase. The enabling ordinance can provide for automatic fee adjustment on a prescribed date each year, or every other year or third year, etc. Annual indexing revisions are recommended to minimize the magnitude of the change and insure that revenue more closely follows expenses. One approach involves adjustment based on an accepted cost indicator such as the CPI

(Consumer Price Index) or the ENR Construction Cost Index. The latter is preferred since it more closely reflects costs in the construction industry, which are used as the basis for computing connection fees. This approach provides the most accurate adjustment, although the incremental change (increase or decrease) is not known beyond the current year.

2.6 IMPLEMENTATION PLAN

This proposed implementation plan outlines the infrastructure upgrades to provide additional capacity to serve future development. Improvements previously discussed include upgrades to the water treatment process, additional storage and transmission facilities. Project phasing will depend on the rate of growth experienced within the District, which is subject to economic forces outside the District's control. Projected water demands are based on the existing District service area boundaries and land uses described in the 1981 Foresthill General Plan. Estimated capital costs have been provided for the improvements and used to calculate the water connection charge in prior sections of this report.

Figure 2-7 includes the demand projections within the District based on 2.5 to 5 percent growth rates. Critical improvements at the treatment plant are identified based on the average annual flow, so if the rate of growth changes, it does not affect the need for the improvement at the indicated flow, but will change the timing on when the improvement is needed.

Provision of additional storage at the treatment plant should occur as soon as possible. In the event of a problem at the treatment plant, there is less than one-half day of total storage during summer months, which does not included flow equalization, fire flow or contact time for disinfection. The addition of 1 Mgal of storage is recommended immediately before significant demands are added to the system, along with the tank the accompanying improvements include:

- A second 1-Mgal tank should be added by the time average daily flow is about 1.3 MGD. A total of approximately 3.3 Mgal of storage would be provided at the at the treatment plant. Additional storage within the distribution system is recommended and discussed in Section 8.3.
- Modifications to the existing storage tank piping should be completed to resolve the current operation problems associated with the disinfection system. District staff plans to make those improvements during the winter when demands are reduced, and the various tanks can be taken offline for modifications.
- A number of miscellaneous improvements were identified in Section 5. The improvements are relatively minor, and will likely be completed by District staff as needed and are not addressed herein.

2.6.1 TRANSMISSION SYSTEM IMPROVEMENTS

- The transmission mains are the primary conveyance facilities to move water through the District. A number of transmission main improvements are identified in Section 6, and were located in a manner to provide system looping and reliability throughout the system. The District will need to determine which transmission system improvements are necessary on a case by case basis. It is likely that the transmission mains will be built in increments and complete loops over a series of project, each requiring an extension of the main to their specific project. Where possible, over sizing mains

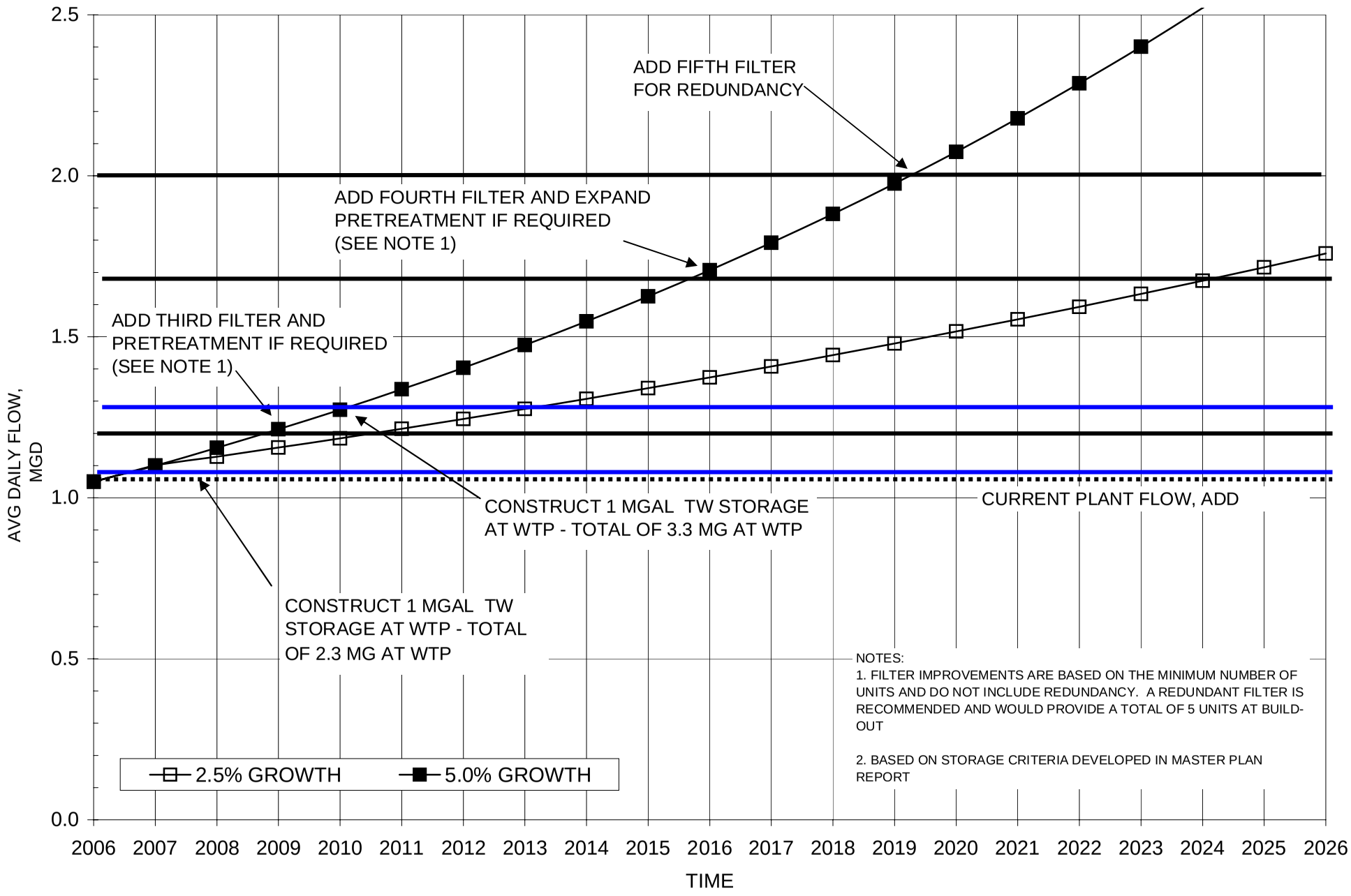


FIGURE 2-7 IMPLEMENTATION OF WATER TREATMENT PLANT IMPROVEMENTS

through developments that could integrate into the transmission system should be considered.

Two tank sites were located within the transmission system. The locations of the new storage tanks can vary depending on the specific development that occurs within the District. The tank elevation will be the critical factor. Two areas within the District were identified, one near the High School deemed Distribution Storage Site 1 (DS 1), and the second near Melody Lane and identified as DS 2. The site located in the area around Melody Lane (DS 2) would like be the first to be constructed and would benefit the western portion of the District, especially Todd Valley and any new developments in that portion of the District.

2.6.2 WATER SUPPLY

Water demand projections based on current land uses within the District were developed, and compared to the estimated reliable yield of the Sugar Pine Reservoir. Based on the demand projections and yield there will be a shortfall during the a drought event similar to the 1976/77 condition as the District approaches build-out.

The estimated annual demand within the current District boundary under current and build-out conditions is 1,079 and 3,069 ac-ft, respectively. The existing reservoir has an estimated reliable yield of 2,150 acre-ft. As annual demands increase to near 2,000 ac-ft (roughly double the current demand), the District should be prepared to impose deficiencies on customers during drought events such as the critical period, or be prepared to expand reservoir capacity by installing radial gates. The existing reservoir has ample capacity to serve existing District customers, and it will likely be many years before demands exceed the estimated yield providing ample time to prepare some type of contingency plan in place.

2.6.3 CONNECTION CHARGE

The District's current connection charge to fund future capacity improvements necessary to serve future growth should be updated to reflect costs of the improvements identified herein. Section 7 includes a proposed methodology for calculating the connection. The District plans to develop a modified version of the improvements identified herein on based on a shorter time horizon (i.e. something less than build-out). The planning horizon will be determined based on input from developers, Placer County and staff.

2.6.4 FUTURE UPDATES

The water master presented herein should be adopted by the District and implemented accordingly. Periodic updates to the master plan are recommended on a five to ten year basis to ensure that the assumptions presented herein remain valid. The Master Plan should also be updated if any major changes in the County's land use policies occur that would significantly increase the level of development expected within the District.

Section 3

Land Use and Water Demand

Land uses and water demands are developed in this section. The water demands were used to evaluate improvements necessary to expand the system to meet future water demands.

3.1 PURPOSE AND SCOPE

This section provides a summary of land uses and water demands within the Foresthill Public Utility District (District) water service boundary. Water demands have been developed based on historical water use data and projected build-out within the current District boundary using approved land uses as defined by the existing General Plan and land uses. The water demand projections will be used for planning purposes including water supply, treatment, distribution and storage discussed in subsequent sections of this report.

3.2 LAND USE

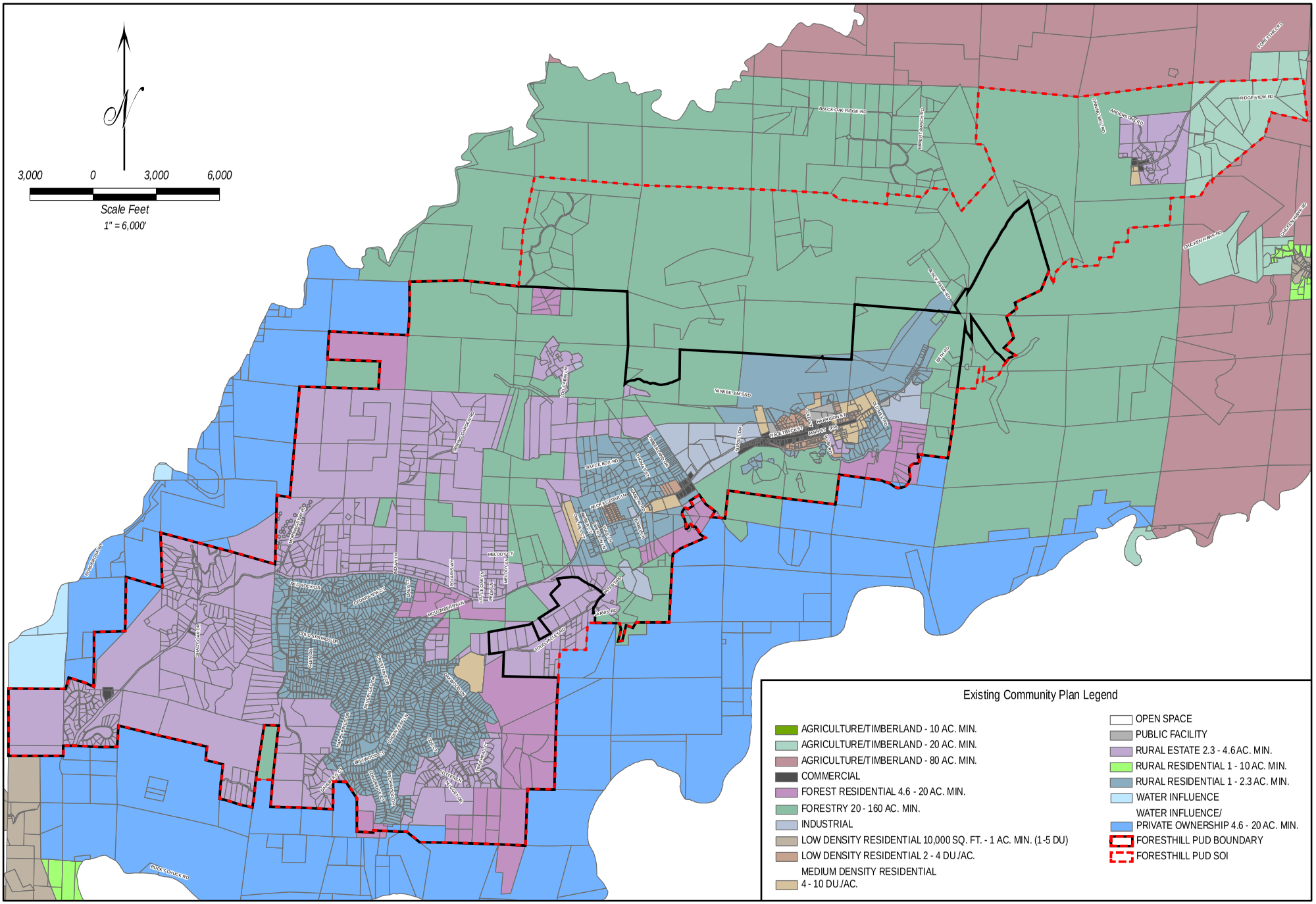
Projections of future water demands, including the magnitude and location, are necessary to plan future water system improvements. Existing water demands have been developed using existing land uses established in the Foresthill General Plan and Environmental Impact Report (Placer County, 1981) (the 1981 Plan). The Placer County Community Development Resource Agency (CDRA) is in the process of updating the 1981 Plan, which could affect the water demand projections.

3.3 EXISTING LAND USE

Existing land use is established in the 1981 Plan (implemented in the Placer County Zoning Ordinance). The parcel data used was obtained from the Placer County Assessors Office and the Community Development Resource Agency (CDRA). The existing land uses within the current District boundary are shown on Figure 3-1 and summarized in Table 3-1. The developed acreages shown are based on the Assessors data where property indicated as vacant was considered undeveloped. The zoning within the District is shown on Figure 3-2.

3.4 FUTURE LAND USE

Future growth within the District's service area boundary is estimated based on the land designations in the 1981 Plan and information provided by the Placer County Community Development Resource Agency (CDRA). The Placer County CDRA is updating the Foresthill Divide Community Plan and has prepared a draft plan which is currently in the public comment period. The community plan update process has been ongoing since 1995/96; it is not certain when the final plan will be adopted, partially due to differing opinions and interests regarding land uses in the Foresthill area. The District proceeded with the master plan to assess the condition of the existing system and formulate a plan for moving forward to ensure an adequate



Source: Placer County Redevelopment Agency: Parcels, Assessors' Data

This map is provided for information purposes only.

Figure 3-1

Existing Land Use

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and reliable water supply for its customers even though the community plan update is not completed. As necessary updates will be made to the master plan to reflect changes in land use included in the final community plan that affect the water supply system.

Table 3-1
Existing Land Use[a]

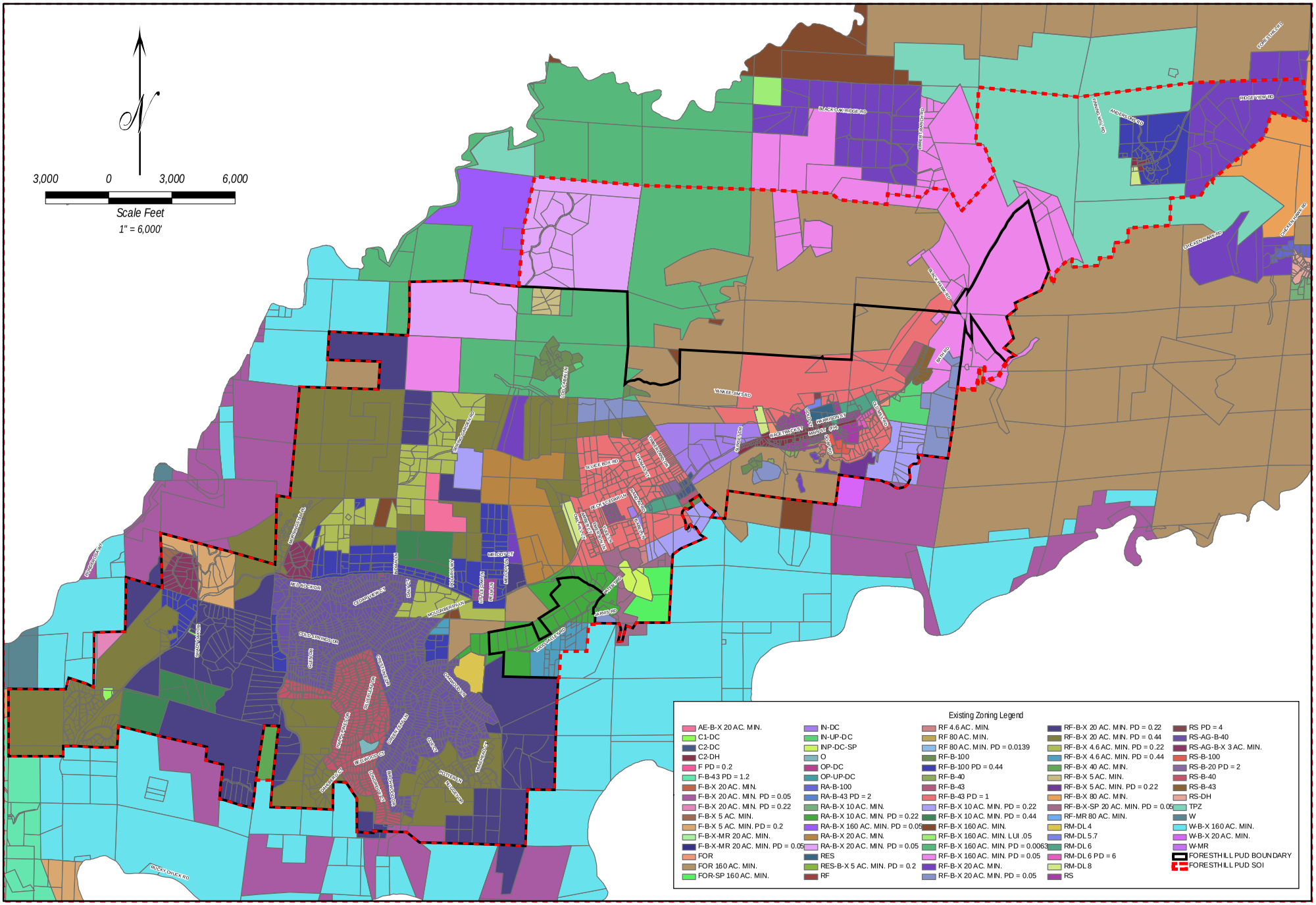
Land Use	Total Acres Within the District Boundary	Estimated Developed Acreage Within District Boundary[b]	Estimated Vacant Acreage Within District Boundary
Forest Residential 4.6 - 20 Ac. Min.	1,121	418	703
Forestry 20 - 160 Ac. Min.	3,322	1,101	2,221
Commercial	79	42	37
Industrial	305	167	138
Rural Estate 2.3 - 4.6 Ac. Min.	5,234	2,671	2,563
Public Facilities	26	10	16
Low Density Residential 2 - 4 DU./Ac.	99	77	22
Medium Density Residential 4 - 10 DU./Ac.	170	140	30
Rural Residential 1 - 2.3 Ac. Min	2,844	2,286	558
Water Influence[c]	123	91	32
Total	13,323	7,003	6,320

[a] Source: Placer County Community Development Agency. All acreages shown are approximate and are within the current District boundary.
[b] Estimated acreage based on County tax role data.
[c] Water influence is a land use found in the 1981 Foresthill Community Plan and defined in the Placer County General Plan as a land use designation which identifies significant lakes, reservoirs, and other bodies of water. Areas potentially impacted by inundation zone of the proposed Auburn Dam were included in this land use description.

3.5 FUTURE LAND USE

Future growth within the District's service area boundary is estimated based on the land designations in the 1981 Plan and information provided by the Placer County Community Development Resource Agency (CDRA). The Placer County CDRA is updating the Foresthill Divide Community Plan and has prepared a draft plan. It is not certain when the final plan will be adopted, partially due to differing opinions and interests regarding land uses in the Foresthill area.

The District is responsible to provide water service to approved land uses; therefore land uses and the associated water demand projections have been based on the 1981 plan. Once the new plan is completed, the projected water demands should be updated to reflect changes in the land use designations that may occur as a result of the community plan update. The new plan cannot be adopted by the County without addressing potential impacts resulting from any proposed changes to the plan, including water supply. The District should remain engaged with the County as the community plan is updated and attempt to ensure that any and all impacts to the District are addressed in the CEQA document covering the Community Plan update.



Source: Placer County Redevelopment Agency: Parcels, Assessors' Data

This map is provided for information purposes only.

Figure 3-2

Existing Zoning

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A projection of potential development through build-out of property within the existing District service area using the current land use designations was made. All of the land within the District's current service area can not be built-out due to regulatory, geographic and right-of-way constraints, and as a result, it was necessary to reduce the acreage based on these constraints prior to estimating future water demands.

The development projections based on the constrained analysis are generally based on assumptions similar to those used by the CDRA in predicting traffic impacts to the Foresthill Divide for the proposed Community Plan Update that is currently underway, but applied to parcels within the current District boundary. These constraints are based on geographical conditions as well as County policy and were provided based on input from CDRA staff. Examples of constraints used in the analysis include:

- Parcels with a Forestry zoning designation are assumed to remain 80 percent undeveloped
- Density for parcels zoned higher than one dwelling unit per acre have been reduced by 20 percent to account for necessary infrastructure (including roads), and density on these parcels is held to 4 units per acre due to septic limitations.
- Areas with slope greater than 30 percent have had density reduced (Placer County Land Use Regulations restrict development in areas with slope greater than 30 percent)
- No property zoned as commercial develops with any residential use (assumed due to septic limitations). Current zoning allows for commercial zoning to be developed as medium density with up to 21 units per acre as reflected below.

Table 3-2 includes a summary of the total acreage that could be developed for various land use categories for the constrained and unconstrained conditions. The estimated area currently developed as of 2006 is also included based on County Assessor tax data. Table 3-3 includes the estimated number of units for the various types of land uses for both the unconstrained and constrained case.

Table 3-2
Community Development within Foresthill PUD Service Area, 2006 and Build-out, Acres[a]

Year	Residential	Commercial[c]	Industrial
2006 [b]	6,785	52	167
Build-out – Unconstrained	12,869	105	305
Build-out – Constrained	11,250	94	291

[a] The acreages presented here are approximate and include areas designated (planned or existing) for right-of-way, easements, etc.
[b] Source: Placer County Assessor's Office.
[c] Includes area designated as Public Facilities in Table 3-1.