CHAPTER 5

PUBLIC FACILITIES AND SERVICES

This chapter assesses the potential impacts of development under the *General Plan* on the public facilities and services serving Woodland. The issues addressed in this chapter are water, wastewater, storm drainage, law enforcement, fire protection, solid waste collection and disposal, and utility services.

5.1 WATER SUPPLY AND DELIVERY

ENVIRONMENTAL SETTING

City of Woodland Water System

The City is the only purveyor of water for domestic, commercial, and industrial use within the city limits. The City's sole source of water supply is currently groundwater. Chapter 4 of the *Background Report* describes the current water supply (including quality and treatment), demands, and delivery systems in the city. Some individual systems are located within the city limits. Outside the city limits, individual well systems, surface supplies, and recycled water (from Spreckels plant) provide water for agricultural and associated domestic needs. Chapter 8 of this *EIR* discusses issues related to surface and groundwater quality.

Regional Water Supply Planning

The Water Resources Association of Yolo County (WRA) was established to coordinate implementation of the *Yolo County Water Plan*. The WRA is a nonprofit mutual benefit corporation with agency members represented by all purveyors of water and major governmental entities in Yolo County. This includes the Dunnigan Water District, Yolo County Flood Control and Water Conservation District, UC Davis, Yolo County Board of Supervisors, and the Cities of Davis, Winters, West Sacramento, and Woodland.

The sources of surface water in the county are three natural water courses: the Cache Creek watershed, the Sacramento River watershed, and the Putah Creek watershed. Some water from Cache Creek is supplied from Clear Lake and Indian Valley reservoir. Sacramento River water is supplied directly from the river, under Bureau of Reclamation contracts through the Tehama-Colusa canal, and indirectly via the Colusa Drain in the form of return flow from irrigation in Colusa and Yolo Counties. Lake Berryessa (Putah Creek) water is supplied almost exclusively to Solano County.

The Yolo County Flood Control and Water Conservation District has submitted an application to the State Water Resources Control Board to divert up to 45,000 acre feet of water per year from the Sacramento River. This water is intended for use by the Cities of Woodland and Davis and the University of California, Davis, and is one of the programs proposed by the *Yolo County Water Plan Update* to ensure future supplies of water for municipal/domestic and industrial use.

METHODOLOGY

Assumptions

For the purposes of this *EIR*, it is assumed that the City's future water system will continue to rely on groundwater supply. Although the City continues to participate in regional efforts to investigate the use of surface water supplies, the ability to acquire surface water rights is uncertain, and development of a surface

water supply system would be a long-term effort that would take many years and additional environmental review.

The impacts to the City's water supply and distribution system from development of the Land Use Diagram were analyzed by applying the average water usage factors (water duties) shown in Table 5-1 to the new development potential under the *General Plan* (including undeveloped land within the city limits).

TABLE 5-1

ASSUMED AVERAGE WATER USAGE FACTORS

Land Use Designation	Water Duties (Acre-feet/ gross acre/year)
Rural Residential	0.8
Very Low Density Residential	2.5
Low Density Residential	4.1
Medium Density Residential	8.5
Neighborhood Commercial	2.1
General Commercial	2.6
Service Commercial	2.2
Highway Commercial	2.7
Business Park	1.8
Industrial	3.2
Public Services (schools)	2.7
Open Space (irrigated park)	2.8
Source: Montgomery Watson, 1995	

Peaking factors were determined using monthly production records. A maximum day to average day demand ratio of 1.75 was used; peak hour demand is assumed to be 3.5 times the annual average day demand.

The number of additional new wells was determined by using the peak hour demands for future development. The capacity of each well is assumed to be 1,800 gallons per minute (gpm). The current well capacity reserve is maintained by constructing additional wells to accommodate new demand only.

Main distribution pipelines were designed to carry fire flow and peak hour demand. In industrial areas, a minimum pipe size of 12 inches is required to accommodate a fire flow of 3,500 gpm. In residential areas, a minimum pipe size of 10 inches is required for flows up to 2,500 gpm at acceptable velocities.

Several assumptions are built into the water demand estimates:

1. Existing water demands met from private wells are not included

2. Existing average water demands reflect some conservation efforts, of which the conservation savings will be maintained

3. Year 2020 and buildout demands assume a 5 to 10 percent reduction over average current demands to reflect state conservation requirements

4. Year 2020 and buildout demands assume 5 to 10 percent system losses.

Thresholds of Significance

For purposes of this *EIR*, an impact is considered significant if adoption or implementation of the *General Plan* would result in the approval of development without adequate system capacity or the ability to add capacity through facility expansion or addition of wells, or if the water supply would not be adequate to serve projected new development.

IMPLICATIONS OF THE LAND USE DIAGRAM

Water Supply

Total future water use reflecting the development under the General Plan in 2020 and at buildout is presented in Table 5-2. This represents an increase of about 80 percent from existing demands to buildout conditions.

TABLE 5-2

EXISTING AND PROJECTED WATER DEMANDS
City of Woodland General Plan

Existing (1994) Demands		Year 2020 demands		Buildout Demands	
acre-foot/year	mgd(a)	acre-foot/year	mgd(a)	acre-foot/year	mgd(a)
12,600	11.3	21,700	19.4	23,200	20.7

mgd=million gallons per day

(a) Average annualized daily demand.

Source: Montgomery Watson, 1995

As discussed in the *Background Report*, the City and adjacent agricultural lands currently utilize groundwater as the primary source of supply. The aquifer is recharged primarily from precipitation and irrigation water applied to agricultural lands in the region. The groundwater levels fluctuate seasonally and reflect City and agricultural pumping patterns. Groundwater pumping for agricultural lands adjacent to the city appears to influence water levels under the city on a short-term basis. Groundwater levels recover relatively quickly.

As the agricultural lands within the Urban Limit Line are converted to urban uses, agricultural requirements will decline and urban demands will increase. Crops grown on agricultural lands within the Urban Limit Line are primarily tomatoes, corn, and alfalfa. A crop water use factor (3.25 acre-feet/year based on the average annual demands estimated by the State Department of Water Resources for these crops in the Sacramento Valley) was applied to an estimate of agricultural acreage planned for conversion to urban uses to estimate the approximate amount of irrigation water currently applied to these lands. This results in an estimate of the approximate amount of annual groundwater currently applied to these lands.

As presented in Table 5-3, the surplus or deficit in groundwater demands at 2020 and buildout over current usage can be calculated by adding the current urban and agricultural groundwater usage together (thus implying that this is the available supply) and then subtracting the projected future water demands. Using these calculations, Table 5-3 shows that at 2020 the deficit is 2,300 acre-feet per year and 3,800 acre-feet at buildout. The overall increase in demands occurs because the Land Use Diagram also includes lands which are vacant and not currently using groundwater but are planned for urban development. These projected demands are for average conditions; actual demands will vary each year depending on precipitation and hydrologic conditions and could be significantly higher during dry and critically-dry years.

TABLE 5-3

PROJECTED AVERAGE ANNUAL 2020 and BUILDOUT WATER NEEDS (Acre-Feet per Year)

Water Use	Urban Limit Line
Existing City Groundwater Usage	12,600
Existing Agricultural Groundwater Usage	6,800
Existing Total Groundwater Usage	19,400
Projected Urban Demand at 2020	21,700
Projected Urban Demand at Buildout	23,200
Water Demands above Current Usage (2020)	2,300
Water Demands above Current Usage (Buildout)	3,800
Source: Montgomery-Watson, 1995	

This future water need can be met by increasing groundwater pumping, but this may result in localized subsidence problems (discussed below). In addition, the groundwater basin may not be replenished at its current rate due to a reduction in groundwater recharge from irrigation water. Although urban water demands do not vary significantly from agricultural demands on a per-acre annual basis, much of the irrigation water infiltrates into the aquifer and recharges the groundwater basin. Recharge does occur with urban water applied to landscaping, but to a lesser extent than for agricultural land. In addition, urban land uses increase the amount of impervious surfaces, thus reducing the quantity of rainfall infiltrating directly to the aquifer.

Differential settling from subsidence occurs in the city and has resulted in compressive-type failures of well casings, pump damage, piping misalignment, distribution system pipeline breaks, and other facility problems. Increased groundwater pumping which results in the groundwater table falling to lower levels than historic conditions may exacerbate subsidence in localized areas.

At the rates assumed in this EIR with no water management efforts, projected urban water effects would be greater during critically-dry years, possible resulting in overdraft conditions, thus greatly reducing system reliability. Subsidence problems would likely increase in the future in specific areas where groundwater pumping is increased, both within the city limits and on adjacent lands. Because of the complexity of the Yolo groundwater basin and the lack of information regarding the long-term availability of groundwater to the City, overdraft, water quality, and subsidence problems in the future are unknown, but an overall decrease in supply and system reliability would be likely.

Since existing domestic water quality monitoring programs have not indicated significant water quality concerns (other than non-fecal coliforms), it appears that the current groundwater quality, with the current disinfection program, is adequate to meet the City's potable water needs. However, future monitoring requirements resulting from changes in federal or state drinking water quality regulations may indicate differing water quality conditions than those now assumed. Disinfection will continue to be required at some, and perhaps all, of the wells in the future due to the presence of non-fecal coliform bacteria and the trend towards increased federal groundwater treatment regulations.

Water Delivery System

Additional wells and water delivery pipelines will be required as lands are developed for urban uses. Facilities need to be sized to provide delivery capacity to meet water demands during peak conditions and at the same time to meet fire protection needs. Peaking factors, fire flow requirements, and a system pressure range, which must be utilized in designing the facilities, are set out in the City's standard specifications.

Estimates of the future number of wells that will be needed to serve new development in 2020 and at buildout are based on the additional future peak hour demands projected from new development under the Land Use Diagram. Table 5-4 indicates the incremental future peak hour demands needed to serve development within the Urban Limit Line. The northern area includes the future industrial development on the north and northeast; the southern area includes the area covered by planned residential development. This an approximate estimate; specific plans will identify more geographically-specific peak hour requirements.

TABLE 5 4

INCREMENTAL FUTURE PEAK HOUR DEMANDS
Urban Limit Line
(Gallons per Minute)

	2020		Buildout	
	Northern Area	Southern Area	Northern Area	Southern Area
Urban Limit Line	35,350	30,800	46,900	30,480

Source: Montgomery Watson, 1995

Table 5-5 shows the number of additional wells projected to be needed to serve new development through 2020 and at buildout.

TABLE 5-5

INCREMENTAL FUTURE ADDITIONAL WELLS
Urban Limit Line

	2020		Buildout	
	Northern Area	Southern Area	Northern Area	Southern Area
Urban Limit Line	6	5	8	5

Source: Montgomery Watson, 1995

Figure 5-1 shows the proposed water system layout. The City will update its *Water System Master Plan* to reflect the supply and system needs based on the adopted General Plan. The master plan serves as a guideline for review of proposed specific plans and individual projects. Locations and numbers of wells will be determined for each specific area. All wells will be connected to major distribution lines for maximum system reliability and better system hydraulics.

GENERAL PLAN POLICY RESPONSE

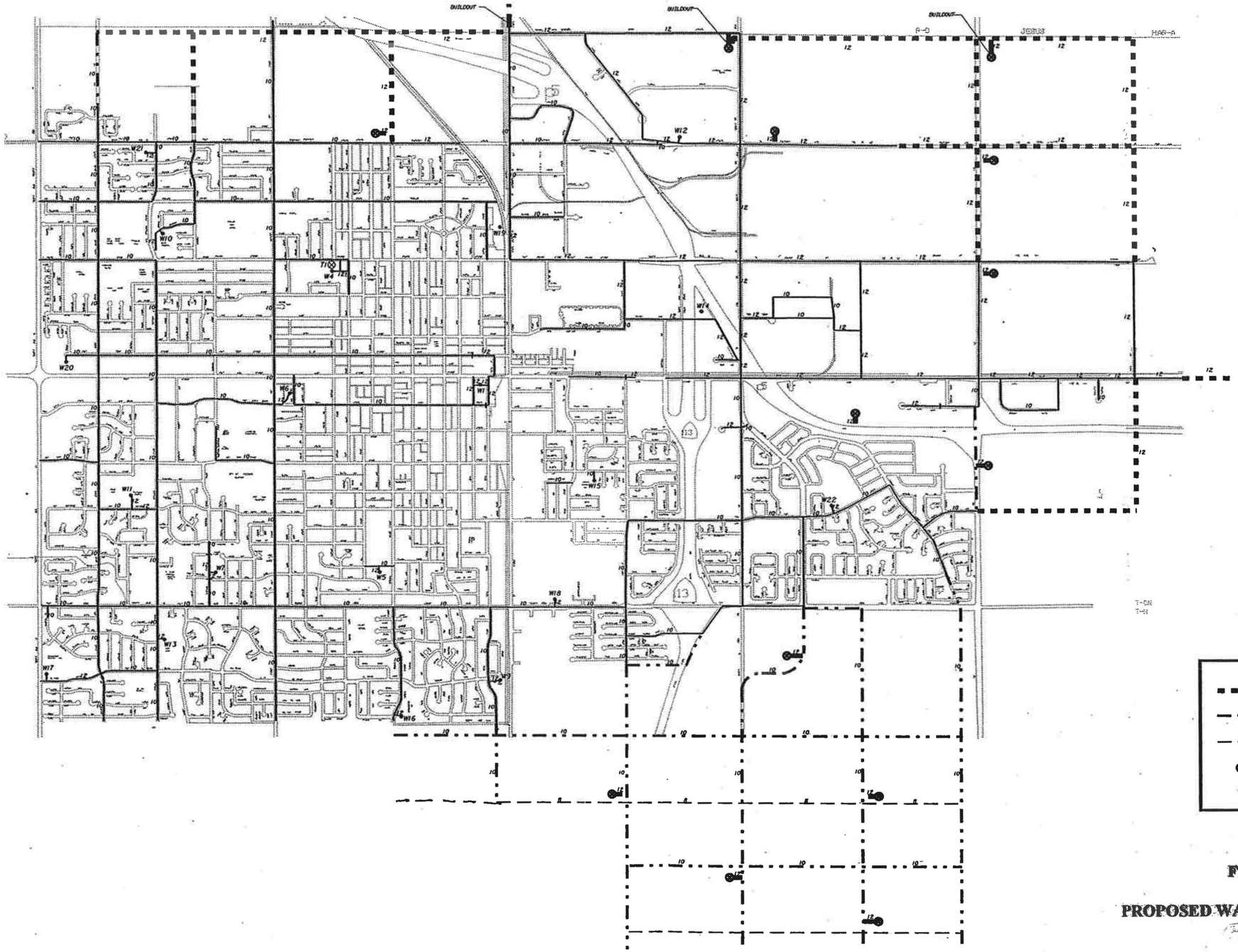
The following policies address the implications of development under the *General Plan* on the City's water supply and distribution system:

Water Supply and Delivery

4.C.1. The City shall protect the groundwater basin from overdraft from City use of groundwater. To this end, the City shall study,. working closely with other public and private entities as deemed appropriate, the safe yield of the groundwater basin and the the possibility of surface water supplies (e.g., obtaining water rights, transfers, or exchanges) for domestic and/or agricultural use within the Woodland area. Water management programs such as conjunctive use and recharge programs will also be considered. The City shall use this information to determine the most appropriate long-term water supply to serve Woodland.

4.C.2. If the studies in Policy 4.C.1 indicate an imbalance between safe groundwater yield and projected water requirements, the City shall develop a response plan to address the imbalance. This response plan will include an appropriate mix of water conservation measures, reuse, surface water supplements, and other water management techniques.

4.C.3. Prior to determination of the safe groundwater yield (Policy 4.C.1) and/or development of the response plan in Policy 4.C.2, if necessary, the City shall require major new development projects and/or specific plans to include measures that maintain annual average water use, averaged over all land in the proposal, at 80 percent or less than the following water duties by land use designation:



LENGEND

- 12" PIPE
- 10" PIPE
- 8" PIPE
- WELLS

FIGURE 5-1

PROPOSED WATER SYSTEM LAYOUT

REV	DATE	BY	DESCRIPTION

SCALE: 1" = 1480'±

WARNING: 0 ½ 1 — IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED
DRAWN
CHECKED

SUBMITTED
PROJECT ENGINEER — R. C. E. NO. — DATE
MONTGOMERY WATSON — R. C. E. NO. — DATE

MONTGOMERY WATSON
Walnut Creek, California

APPROVED — DATE
APPROVED — DATE

CITY OF WOODLAND

SHEET
OF SHEETS

JOB No.
REF: borde
FILE No. /usr/imml/city/woodland/pipewell.dgn
5-OCT-1995 08:26

Land Use Designation	*Water Duties (Acre-feet/ gross acre/year)*
Rural Residential	*0.8*
Very Low Density Residential	*2.5*
Low Density Residential	*4.1*
Medium Density Residential	*8.5*
Neighborhood Commercial	*2.1*
General Commercial	*2.6*
Service Commercial	*2.2*
Highway Commercial	*2.7*
Business Park	*1.8*
Industrial	*3.2*
Public Services (schools)	*2.7*
Open Space (irrigated park)	*2.8*

Exceptions will be allowed if no feasible mitigation measures are available to reduce the on-site use of water and if water use can be mitigated through other measures off-site.

4.C.4. ***The City shall promote efficient water use and reduced water demand by:***

a. Requiring water-conserving building design and equipment in new construction;
b. Encouraging water-conserving landscaping and other conservation measures; and
c. Encouraging retrofitting of existing development with water-conserving devices.

More stringent water conservation measures will be required, as appropriate, based on the findings of the studies in Policy 4.C.1.

4.C.5. ***The City shall investigate the use of reclaimed wastewater to offset the demand for new water supplies.***

4.C.6. ***The City shall promote watershed, aquifer, and wellhead protection programs.***

4.C.7. ***The City shall work closely with Yolo County and other public agencies in countywide watershed management efforts. Based upon these efforts, the City will develop a water transfer policy. In the interim, the City will oppose long-term water transfers from Yolo County to areas outside the county.***

4.C.8. ***The City shall work with other agencies to promote water conservation measures countywide for both urban and agricultural uses.***

4.C.9. The City shall reduce currently "unaccounted for" water losses by metering public facilities and substantial construction water use, and by developing and implementing a leak detection and repair program.

4.C.10. The City shall only approve new development that relies on an adequate City water supply and delivery system.

4.5. The City shall conduct a study of future water supply alternatives to determine the most appropriate long-term water supply to serve Woodland. This study will include the following components, as deemed appropriate to implement Policy 4.C.1.

a. An assessment of the safe yield of the groundwater aquifer
b. Development of a groundwater model
c. Examination of the costs and feasibility of various surface water supplies (e.g., obtaining water rights, transfers, or exchanges) for domestic and/or agricultural use within the Woodland area.
d. Consideration of water management programs such as conjunctive use and recharge

4.6. If the studies from Program 4.5 indicate an imbalance between safe yield of groundwater and projected water requirements, the City shall develop a response plan that will include an appropriate mix of water conservation measures, reuse, surface water supplements, and other water management techniques.

4.7 The City shall continue to implement a City water awareness program on water conservation.

4.8 The City shall update the Urban Water Management Plan to include water conservation and management measures, as required by state law.

General Public Facilities and Services

4.A.1. Where new development requires the construction of new public facilities, new development shall fund its fair share of the construction of those facilities.

4.A.2. The City shall ensure through the development review process that adequate public facilities and services are available to serve new development. The City shall not approve new development where existing facilities are inadequate unless the following conditions are met:

a. The applicant can demonstrate that all necessary public facilities will be installed or adequately financed (through fees or other means); and

b. The facility improvements are consistent with applicable master or facility plans adopted by the City.

4.A.3. The City shall require specific plan proposals to include plans for development and financing of public facilities and services.

4.A.4. The City shall update City facility master plans on a regular basis to ensure: compliance with appropriate state and federal laws; use of modern and cost-effective technologies; and compatibility with current land use policy.

4.A.5. Through fiscal revenues generated by new development, the City shall provide for expansion of general government services (e.g., City administrative services) in connection with new development, if warranted.

4.A.6. The City shall annually review the Major Projects Financing Plan (MPFP) and every five years update the MPFP to ensure the implementation and adequacy of the MPFP Plan.

4.1. The City shall update the Water Master Plan, Wastewater Master Plan, and Storm Drainage Master Plan based on the updated General Plan.

General Public Facilities and Services Funding

4.B.1. The City shall require that new development pay its fair share of the cost of providing new public services and/or the costs for upgrading of all existing facilities it uses, based on the demand for these facilities attributable to the new development; exceptions may be made when new development generates significant public benefits (e.g., low-income housing, primary-wage-earner employment) and when alternative sources of funding can be obtained to offset foregone revenues.

4.B.2. The City shall seek broad-based funding sources for public facilities and services that benefit current and future residents of the city.

4.B.3. The City shall require preparation of a fiscal impact analysis for all specific plans or significant general plan land use amendments. The analysis will examine the fiscal impacts on the City and other service providers that result from large-scale development. The fiscal analysis shall project a positive fiscal impact from new development or include mechanisms to fund projected fiscal deficits; exceptions may be made when new development generates significant public benefits (e.g., low-income housing, primary-wage-earner employment) and when alternative sources of funding can be obtained to offset foregone revenues.

4.2. The City will update the Major Projects Financing Plan based on updated water, sewer, and drainage master plans.

4.3. The City will update its development fee schedules based on updated Master Projects Financing Plan.

Policies of the *General Plan* seek to ensure a safe and adequate water supply for existing and future development. To this end, new development is conditioned so as not to adversely affect the groundwater supply, while water conservation and other sources of water are investigated and pursued. Policies of the plan further provides for expansion of the City's water delivery systems as needed to serve new development, and include mechanisms for funding needed improvements.

IMPACTS

Development under the *General Plan* will increase demand for potable water and reduce the demand for agricultural water resulting in a net average demand increase of up to 2,300 acre-feet per year in 2020 before any increased conservation or other groundwater management efforts. Under these same assumptions, development beyond 2020 would require up to 3,800 ac-ft/yr at buildout above the groundwater supply currently used in the Planning Area. This would be an increase over current groundwater usage of 12 percent in 2020 and 20 percent at buildout.

While the City has not experienced problems with the use of groundwater, there is currently not enough information concerning the groundwater basin to determine the long-term safe yield of the aquifer. To conduct such a study would take at least six months, beyond a reasonable time frame for input into this EIR. In addition, the City and other agencies in the region are investigating various sources of future water supplies, including the use of surface water from the Sacramento River and studies by the Yolo County Flood Control and Water Conservation District regarding the use of water from Cache Creek and groundwater recharge proposals. All these issues need to be studied to resolve what would be the most appropriate long-term water supply for the city of Woodland.

General Plan policies require that if these studies indicate that projected water requirements cannot be met through continued groundwater use, the City shall prepare a response plan to address any water deficit. This response plan would include an appropriate mix of water conservation measures, reuse, and surface water supplements. Woodland's current gross water consumption is approximately 270 gallons per capita per day. This is higher than the statewide average for urban applied water use, which is less than 200 gallons per day. This would indicate that an aggressive water conservation program could significantly reduce water demands if necessary. Literature reviews indicate that installing water meters and metering water in existing homes could reduce demand by 20 to 25 percent, depending on the change in the rates charged for water.

Without more extensive information on the sustainable yield of the aquifer, policies of the General Plan require new development to include measures so that annual average per-acre water use is 80 percent or less than the average per-acre water use assumed for the purposes of analyzing water impacts in this EIR, until studies regarding safe groundwater yield and long-term future water supplies for Woodland are resolved. Even with continued development, this would ensure that water use within the Planning Area in 2020 would not exceed current usage levels. This would reduce the demands on groundwater from urban development and would reduce the potential impacts on groundwater supply to a less-than-significant level.

Water quality regulations (monitoring requirements and standards) may change in the future, thus requiring additional groundwater treatment. Any new water quality regulations would be addressed by the City, and would not be considered an impact of new development.

In the future as the city grows, the number, sizing, and phasing of additional wells, pipelines, and storage tanks, will be specifically determined based on approved development proposals and the availability of existing facilities to accommodate the new development. Given the inclusion of a *General Plan* policy requiring new development to provide for all facilities needed to serve the specific area, the impact on the collection system (other than the potential subsidence problems discussed above) is considered to be less than significant.

MITIGATION MEASURES

No mitigation measures beyond the policies and programs of the *General Plan* are required.

5.2 WASTEWATER COLLECTION, TREATMENT, AND DISPOSAL

ENVIRONMENTAL SETTING

Chapter 4 of the *General Plan Background Report* describes the existing wastewater collection and treatment system in Woodland. The system is summarized below.

The City of Woodland's collection system presently has three trunk mains which run along Gibson Road, Beamer Street, and Kentucky Avenue. The collection system is a gravity sewer system with the trunk lines comprised mostly of vitrified clay pipe and some reinforced concrete pipe. There is one existing pump station in the collection system, located at the northwest corner of Gibson Road and County Road 102. This pump station was brought on-line in 1995 and serves the Gibson Ranch area.

Wastewater is pumped at the City's wastewater treatment plant headworks. The City of Woodland presently operates a 6 mgd capacity oxidation ditch facility. The treatment process consists of wastewater ponds, a motorized bar screen, aerated grit basin, oxidation ditches, secondary clarifiers, and disinfection/ dechlorination facilities. Waste sludge is discharged to treatment ponds on-site. Plant effluent is primarily discharged to the Tule Canal and a portion is discharged to approximately 300 acres of ponds surrounding the treatment plant. The ponds are integral to the treatment process and act to handle peak wet weather flows, receive non-dischargeable effluent flows and treat sludge (biosolids) and scum produced by the plant.

METHODOLOGY

The analysis focuses on changes to the City's municipal wastewater collection, treatment, and disposal system. No changes in operation are assumed for the City's industrial wastewater treatment facility within the time frame of the *General Plan*.

Assumptions

Wastewater flow estimates were obtained by applying wastewater generation coefficients to the various land use designations. A summary of the land use designations and associated wastewater coefficients are shown in Table 5-6. The coefficients were determined from flow monitoring in Woodland's sewer and water systems as well as representative data collected by other communities.

TABLE 5-6

WASTEWATER COEFFICIENTS
City of Woodland General Plan

Land Use Designations*			Base Sanitary Flow		Source
			Density Unit	Value	
Residential	RR	Rural Residential	gal/capita/day	75	Note 1
	VLDR	Very Low Density Residential	gal/capita/day	75	Note 1
	LDR	Low Density Residential	gal/capita/day	75	Note 1
	MDR	Medium Density Residential	gal/capita/day	75	Note 1
Commercial	NC	Neighborhood Commercial	gal / gross acre	1200	Note 2
	CC	Central Commercial	gal / gross acre	8000	Note 3
	GC	General Commercial	gal / gross acre	1500	Note 2
	SC	Service Commercial	gal / gross acre	1250	Note 2
	HC	Highway Commercial	gal / gross acre	1500	Note 2
Industrial	I	Industrial	gal / gross acre	1800	Note 2
	BP	Business Park	gal / gross acre	1000	Note 2
	PS	Public Service	gal / gross acre	2000	Note 3
	OS	Open Space	gal / gross acre	100	Note 4
	P	Park	gal / gross acre	275	Note 5
Peak Wet Weather Flow Peaking Factor				3.7	Note 6

Sources

Note 1: Per City of Woodland April 1986 *Wastewater Facilities Master Plan*

Note 2: Computed by assuming 75 percent of the water consumption rates developed by Montgomery Watson (7/18/95)

Note 3: Per "Wastewater Coefficients and Capacity Management within the Tri-Valley," Jan 1984

Note 4: This value is assumed

Note 5: Per the City of Tracy Design Standards

Note 6: Computed from the Woodland April 1986 *Wastewater Facilities Master Plan*
Flow monitoring data: 26.35 mgd (page 5-8)/ 9.79 mgd (page 5-4)
Peak flow into plant last winter @ 18- 19 mgd and current ADWF
at approximately 5 mgd (per Roy Wilson/ City of Woodland)
These values give a plant peaking factor of approx. 3.7

*Land within PN-designated areas has been allocated to a primary land use designation

Collection System

Future development was based on development potential by traffic analysis zone (TAZ), as included in Appendix C. City staff and CH2M HILL reviewed existing sewer capacity, current wastewater flows, and the estimated quantity of wastewater generated from the new development. Based on this information,

TAZs containing new development were identified which could be tributary to existing sewers. The TAZs containing new development not tributary to existing lines were assumed to be served by new interceptors or parallel pipe segments to existing interceptors.

Peak wastewater flow estimates from the TAZ's not considered tributary to existing lines and the alignment of the interceptors are the basis of this analysis of the new collection system to serve the expanded service area. A more detailed analysis of the components of the expanded conveyance system will be developed in connection with the preparation of the *Wastewater Master Plan* following adoption of the General Plan.

The methodology used to determine pipe sizing for the proposed new interceptors is described below:

- The proposed interceptors were divided into pipe segments. Based on the location of the pipe segments within the interceptor, the segments were assigned tributary TAZ.
- The average and peak wastewater flows from the tributary TAZ were totaled for each pipe segment. Peak wastewater flows were used in determining pipe size.
- The slope of each segment was estimated by analyzing the slope of the existing sewer line in the vicinity and running in the same direction. Existing sewer slopes were determined from the City of Woodland 1986 *Wastewater Facilities Master Plan.*
- The pipe diameter required was calculated using Manning's equation for a full pipe with Manning's *n* of 0.013. Based on the pipe diameter required, an assumed pipe size was selected.
- The approximate surface elevation at the lower end of segment was taken from USGS quad maps of the region. Using this surface elevation, the slope, and the length of each segment, and the minimum pipe depth for each segment was estimated. This calculation provides an estimate of the pipe depth at the treatment plant. It appears from this analysis that the proposed layout would terminate approximately 15 to 20 feet below grade. These depths would be appropriate for interfacing with the existing facilities.

Thresholds of Significance

For the purposes of this *EIR*, an impact is considered significant if adoption or implementation of the *General Plan* would result in new development without adequate system capacity, either currently or feasibly available.

IMPLICATIONS OF THE LAND USE DIAGRAM

Development under the *General Plan* will increase wastewater flows, requiring expansion of the wastewater collection and treatment systems. It is estimated that new development will produce approximately 4.3 mgd of average dry weather flow (ADWF) in the year 2020 and 5.3 mgd of ADWF at buildout. Similarly, peak wet weather flow (PWWF) is estimated to increase approximately 16 mgd for the year 2020 and 19 mgd at buildout.

Current ADWF for the city of Woodland is approximately 5 mgd and PWWF into the plant has been as high as 18 mgd. As shown in Table 5-7, new development under the *General Plan* would increase total wastewater flows to approximately 9.2 mgd ADWF in the year 2020 and to 10.3 mgd ADWF at buildout. PWWF would increase to 34 mgd in 2020 and to 38 mgd at buildout.

TABLE 5-7

TOTAL WASTEWATER FLOWS AT 2020 AND BUILDOUT

Time Frame	ADWF	PWWF
Current (1995)	5 mgd	18 mgd
2020	9.3 mgd	34 mgd
Buildout	10.3 mgd	38 mgd

Source: CH2M Hill, 1995

Collection System

Development under the *General Plan* will increase wastewater flows, requiring new collection systems. The layout of the proposed and existing collection is shown in Figures 5-2.

In addition to the proposed interceptors, a few existing sewer pipes have insufficient capacity to handle additional wastewater generated within the existing city limits. Pipes segments N5 and N6 would parallel pipes within the Beamer Street Sewer Interceptor to accommodate future wastewater flows.

Wastewater Treatment and Disposal

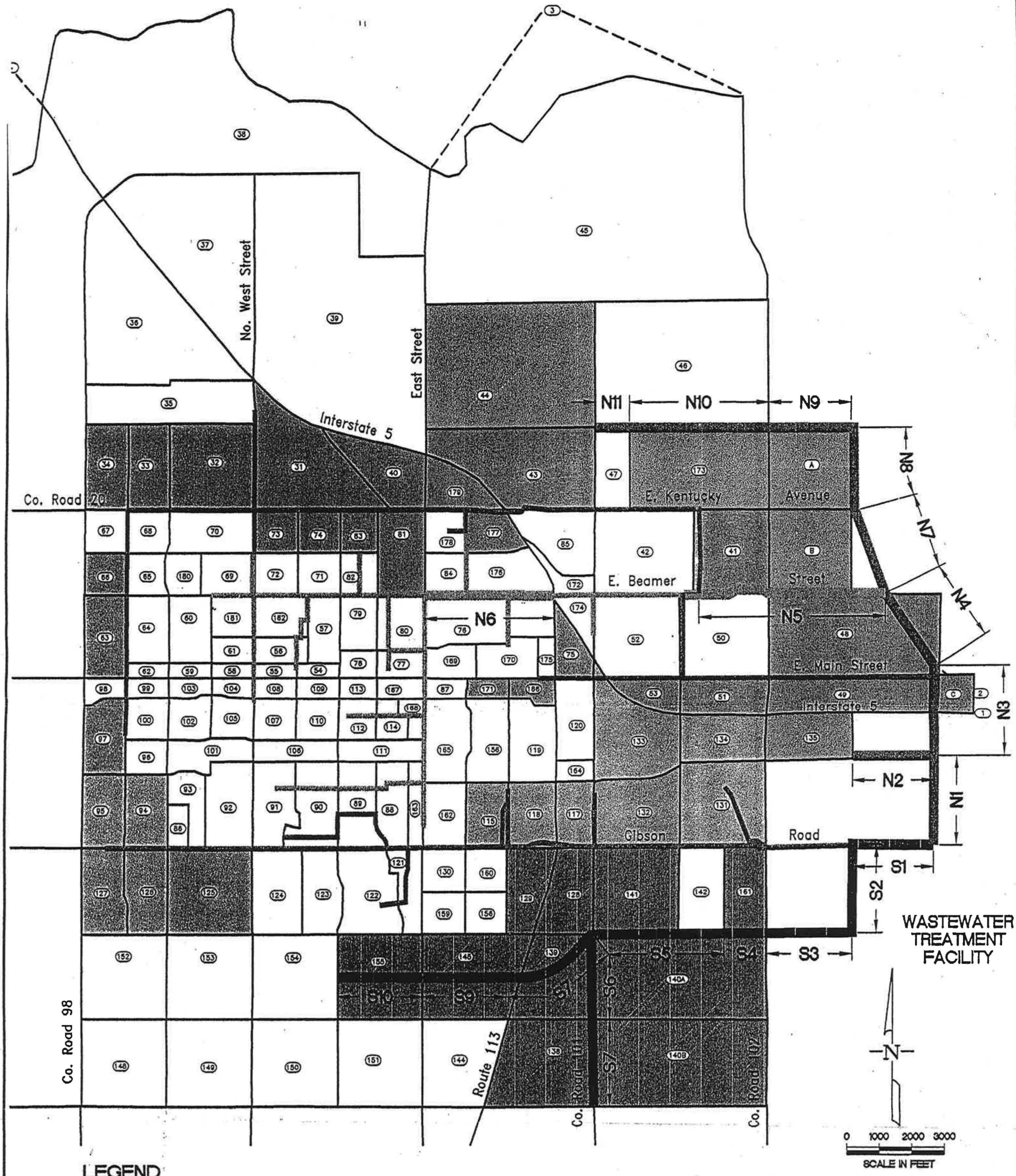
As described previously, increased wastewater flows will require expanded treatment and disposal facilities. Growth within the Planning Area will produce an additional 5.3 mgd of average dry weather flow (ADWF). The City of Woodland's current ADWF is approximately 5 mgd resulting in approximately 10.3 mgd of ADWF to be treated and disposed of at buildout. Peak wet weather flow (PWWF) at buildout would be approximately 38 mgd. The existing facility has an ADWF capacity of 6 mgd and a PWWF capacity of approximately 21 mgd. There are three general wastewater treatment and disposal alternatives that will be analyzed in the *Wastewater Master Plan*. Two involve expanding the facility at its existing site and one involves construction of a new regional treatment facility. These are discussed below.

Alternative A: Expanded Woodland Facility with Continued Discharge to Tule Canal

Alternative A assumes that the existing wastewater treatment plant (WWTP) would be expanded to handle all wastewater generated from the city of Woodland. The plant would require additional headworks facilities, oxidation ditches, secondary clarifiers, and disinfection and outfall facilities. In addition, many Central Valley surface dischargers are facing more stringent effluent discharge limits. Some communities are implementing tertiary filtration to address these limits. Therefore, for planning purposes, tertiary filtration is assumed as a part of the required facilities. This analysis also assumes that pond disposal of sludge may not be feasible in the future due to increased odor concerns; therefore new sludge stabilization and dewatering facilities may be required.

Alternative B: Expanded Woodland Facility with Disposal of Reclaimed Water on Agricultural Lands in the Woodland Area

Alternative B also assumes that the existing wastewater treatment plant would be expanded to handle all wastewater generated from the City of Woodland. The plant would require additional headworks facilities, oxidation ditches, secondary clarifiers, disinfection and outfall facilities. The effluent would be treated to



LEGEND

- North Sewer Intercepter (Proposed)
- E. Main Street Sewer Intercepter
- E. Beamer Street Sewer Intercepter
- Gibson Road Sewer Intercepter
- South Sewer Intercepter (Proposed)
- Existing Sewer Line
- New or Improved Sewer Line

FIGURE 5-2

PROPOSED SEWER SYSTEM LAYOUT

CITY OF WOODLAND

CH2M HILL

a State of California Department of Health "Title-22 Standard" for application on all types of crops, which would require the addition of effluent filters as well as upgraded disinfection facilities for a higher disinfection standard. The treated effluent would then be pumped, conveyed, and stored before being applied to agricultural lands. It is assumed that the application site would be approximately five miles from the treatment plant. No assessment of actual application sites or reservoir locations was conducted. This analysis also assumes that pond disposal of sludge would not be feasible in the future due to increased odor concerns, therefore new sludge stabilization and dewatering facilities would be required.

The existing City of Woodland WWTP site can readily accommodate the required facility expansions under Alternatives A or B. A significant area to the south of the existing plant has been set aside for facility expansion. For the purposes of this EIR, it is assumed that expansion at the existing site will take place. To provide greater flexibility for where the City disposes the treated effluent, it is recommended that the expanded facility provide the capability of upgrading the treatment plant to allow for reclamation. A full Title 22 Reclamation Facility (as described by Alternative B) serving the City of Woodland would require new effluent filters and upgraded disinfection facilities. The facility should also allow for pumping and conveyance to a reclamation site in the future. This plan provides the lowest treatment cost by maximizing the use of the existing facilities and existing site while also providing flexibility for more stringent discharge requirements in the future.

Alternative C: Regional Facility Serving Davis and Woodland

Under Alternative C, the existing Woodland WWTP would be replaced by a pumping station, with the raw wastewater conveyed approximately six miles to an expanded facility serving Woodland and the City of Davis at the existing City of Davis WWTP location. The expanded Davis facility would include primary and secondary treatment with effluent filtration. Because the City of Davis currently uses an overland flow treatment system, it is assumed that this would be abandoned and replaced with a mechanical form of secondary treatment and effluent filtration due to the significant increase in wastewater flows. Additional sludge treatment facilities would also be required. Because this alternative is the most costly, involves cooperation with another jurisdiction, and because no site has been studied or selected, this alternative is not assumed to be a viable option for the purposes of this *EIR*.. If the City were to select this option at some point in the future, separate environmental analysis would be required.

GENERAL PLAN POLICY RESPONSE

The following General Plan policies address the implications of development under the *General Plan* for the City's wastewater collection, treatment, and disposal systems:

Wastewater Collection, Treatment, and Disposal

4.D.1 The City shall promote reduced wastewater system demand through efficient water use by:

a. Requiring water-conserving design and equipment in new construction;
b. Encouraging retrofitting with water-conserving devices; and
c. Designing wastewater systems to minimize inflow and infiltration to the extent economically feasible.

4.D.2 The City shall implement and maintain an industrial pretreatment program in accordance with state and federal requirements.

4.D.3 The City shall require all sewage generators within its service area to connect to the City's system, except those areas where on-site treatment and disposal facilities are deemed appropriate.

4.D.4 The City shall require that collection systems be designed on a gravity-flow basis except where a site-specific engineering analysis clearly demonstrates the long-term cost-effectiveness of pumped facilities.

4.D.5 The City shall review development proposals in the vicinity of the wastewater treatment plant site to ensure their safety and compatibility.

4.D.6 The City shall investigate options for the reuse of treated wastewater.

4.D.7 The City shall investigate potential hazards and nuisance potential associated with operations at the wastewater treatment plant and shall identify any necessary buffering requirements or operational changes at the plant that may be necessary.

4.5 In connection with the Wastewater Master Plan update, the City will investigate potential hazards associated with chlorine gas use and potential nuisance associated with odor at the plant, and will identify buffering requirements or operational changes at the plant to address these issues.

General Public Facilities and Services

4.A.1 Where new development requires the construction of new public facilities, the new development shall fund its fair share of the construction of those facilities.

4.A.2 The City shall ensure through the development review process that adequate public facilities and services are available to serve new development. The City shall not approve new development where existing facilities are inadequate unless the following conditions are met:

a. The applicant can demonstrate that all necessary public facilities will be installed or adequately financed (through fees or other means); and

b. The facility improvements are consistent with applicable master or facility plans adopted by the City.

4.A.3 The City shall require specific plan proposals to include plans for development and financing of public facilities and services.

4.A.4 The City shall update City facility master plans on a regular basis to ensure: compliance with appropriate state and federal laws; use of modern and cost-effective technologies; and compatibility with current land use policy.

4.A.5 Through fiscal revenues generated by new development, the City shall provide for expansion of general government services (e.g., City administrative services) in connection with new development, if warranted.

4.1. The City shall update the Water Master Plan, Wastewater Master Plan, and Storm Drainage Master Plan based on the updated General Plan.

General Public Facilities and Services Funding

4.B.1 The City shall require that new development pay its fair share of the cost of providing new public services and/or the costs for upgrading of all existing facilities it uses, based on the demand for these facilities attributable to the new development; exceptions may be made when new development generates significant public benefits (e.g., low-income housing, primary-wage-earner employment) and when alternative sources of funding can be obtained to offset foregone revenues.

4.B.2 The City shall seek broad-based funding sources for public facilities and services that benefit current and future residents of the city.

4.B.3 The City shall require preparation of a fiscal impact analysis for all specific plans or significant general plan land use amendments. The analysis will examine the fiscal impacts on the City and other service providers that result from large-scale development. The fiscal analysis shall project a positive fiscal impact from new development or include mechanisms to fund projected fiscal deficits; exceptions may be made when new development generates significant public benefits (e.g., low-income housing, primary-wage-earner employment) and when alternative sources of funding can be obtained to offset foregone revenues.

4.2. The City will update the Major Projects Financing Plan based on updated water, sewer, and drainage master plans.

IMPACTS

Development under the *General Plan* will require expansion of the existing collection system facilities and treatment capacity. In general, sewers would be installed in newly developed areas at the same time as other buried utilities and will have no significant impacts other than those associated with construction.

Projected growth would also require expansion of the treatment plant. There is adequate space at the site to accommodate needed expansion. Policies of the General Plan, in addition to state and federal permitting requirements, reduce the potential impacts from expansion of the wastewater treatment plant to a less-than-significant level. Water quality regulations may change in the future, thus requiring additional wastewater treatment.

In the future as the city grows, the number, sizing, and phasing of new sewer lines and plant expansion will be specifically determined based on approved development proposals and the availability of existing facilities to accommodate the new development. Given the inclusion of a General Plan policy requiring new development to provide for all facilities needed to serve the specific area, including off-site needs, the impact on the collection and treatment system is considered to be less than significant.

MITIGATION MEASURES

No mitigation measures beyond the policies and programs of the *General Plan* are necessary.

5.3 STORM DRAINAGE

ENVIRONMENTAL SETTING

Chapter 4 of the *General Plan Background Report* describes the existing conditions and trends in flooding and drainage in the Woodland area. Flooding is also addressed in Chapter 9 of this *EIR*.

The City's existing storm drainage system consists of collection, conveyance, storage, and pumping facilities as shown in the *General Plan Background Report*. The conveyance system consists of pipelines (laterals and trunk lines) and open channels. In the newer parts of the city, runoff is collected by a storm drain lateral system. In these areas, the lateral system generally consists of regularly spaced drain inlets and pipes ranging from 12 to 24 inches in diameter. The lateral system delivers storm runoff to the storm drain trunk system.

Older parts of the city are not directly served by a lateral system. Runoff from these areas is conveyed through intersections in valley gutters, gutter culverts, or inverted siphons. Flow must travel relatively long distances to reach a drain inlet. As such, drain inlets serve relatively large areas and their capacities are exceeded frequently during storm events.

The storm drain trunk system generally conveys flow from west to east through the city by means of four main trunk lines. The trunk lines consist of pipes ranging from 30 to 84 inches in diameter. The trunk lines discharge into open channels that convey the flow to three pump stations located at East Main Street and the extension of County Road 103.

Two pump stations are located north of East Main Street and one is located on the south side of East Main Street. The stations discharge into an outfall channel located between the new and the original south levee of the Settling Basin. The channel flows from west to east and discharges directly into the Yolo Bypass.

Low flows are also released from the Settling Basin into the Yolo Bypass immediately north of the city's outfall channel. No defined channel exists to convey these or the city's flows from west to east across the Yolo Bypass to the Tule Canal. Discharges from these sources in the Yolo Bypass and the lack of a defined channel have reportedly resulted in severe scour of the Yolo Shortline Railroad trestle within the Yolo Bypass. The City, Reclamation District 2035, and the Department of Water Resources have reportedly agreed to study the scour problem and implement a solution immediately.

The City's *Storm Drainage Master Plan* (October 1987), prepared by Brown and Caldwell, identified problems with the existing storm drainage system and recommended improvements to solve existing problems and to provide service to future development. The City convened a Blue Ribbon Committee composed of area residents to address existing local flood problems identified in the 1987 *Storm Drainage Master Plan*. This committee concluded that the flood problems within the older portions of the city are primarily nuisance in nature and that the high costs to correct the problems are not warranted by the resulting benefits. In general, during periods of intense rainfall, there is localized flooding that encroaches on private property, but does not endanger structures. This flooding subsides within several hours after the storm passes.

At the time the 1987 *Storm Drainage Master Plan* was being prepared, stormwater quality was not an issue requiring attention. However, in 1987, Congress enacted the Clean Water Act. Section 402 (p) of the Clean Water Act requires communities with a population of over 100,000 to have a National Pollution Discharge Elimination System (NPDES) permit for the discharge of stormwater. Communities with populations less

than 100,000, such as Woodland, are not currently required to have a NPDES permit. However, this may change in the future. The EPA and the U. S. Senate are moving toward bringing smaller communities into the NPDES program. The current position of the U. S. House of Representatives is to continue to exclude these communities from the program.

The State administers the NPDES program for stormwater discharges. The State Water Resources Control Board (SWRCB) and the California Regional Water Quality Control Board have used their discretionary powers to bring smaller communities into the NPDES program. These communities have generally been part of a larger area wide permit as co-permittees. Woodland is not currently part of such an areawide permit.

In addition to the NPDES program, the federal legislation known as the Coastal Zone Act Reauthorization Amendments (CZARA) could impact Woodland with respect to the stormwater quality. Under CZARA, states are required to implement best management practices (BMPs) to control nonpoint source pollution including urban runoff. Although CZARA is directed at coastal communities, the SWRCB in conjunction with the Coastal Commission have expanded the application to the entire state. To comply with this law, the State has developed a set of guidance documents identifying control measures for urban runoff. These guidance documents apply to all municipalities, regardless of size.

METHODOLOGY

Design Considerations

This section presents the design considerations used to formulate a conceptual drainage system to serve future urban development. Hydrology and facility configuration criteria are addressed in the following paragraphs. The design considerations will be refined in the *Storm Drainage Master Plan* to be prepared following adoption of the General Plan.

A. Hydrology Criteria

Preliminary hydrologic and hydraulic analyses were completed to assess impacts of development of the Land Use Diagram and to develop a conceptual layout of the drainage system necessary to serve areas located between the existing city limits and the proposed urban limit line.

HEC-1 Modeling

In order to develop the conceptual drainage plans, it was necessary to estimate peak discharges and runoff volumes. The HEC-1 computer program is commonly used to simulate the rainfall-runoff process and was used in this study.

Standards or guidelines for the application of the HEC-1 program do not exist for Yolo County or the City. The HEC-1 models were developed using the criteria contained in the draft, *Sacramento City/County Drainage Manual, Hydrology Standards Volume 2*, March 1994. Borcalli & Associates (B&A) applied this criteria to formulate drainage master plans for the City of Sacramento and the City of West Sacramento, and in mapping floodplains for the County of Sacramento. B&A believes that a regional approach to HEC-1 modeling is appropriate.

The computer program SACPRE, a preprocessor for HEC-1, was used to generate unit hydrographs for each subbasin and HEC-1 data input files. However, the design storm generated by SACPRE was

substituted with the precipitation data contained in the report entitled, *Solano and Yolo County Design Rainfall*, prepared by James D. Goodridge, in June 1992. The primary aspects of the HEC-1 modeling effort are summarized below.

Subbasins -- The watershed tributary to the Planning Area was divided into subbasins to obtain discharge information at points of interest for existing and future conditions.

Topography -- Topographic information was obtained from U. S. Geological Survey quad maps.

Soils -- Hydrologic soil group information was obtained from the soil survey maps of Yolo County prepared by the Soil Conservation Service.

Land Use -- Existing land uses were delineated based upon B&A's field reconnaissance and review of 1993 aerial photographs covering the General Plan area. Future land uses were determined based on the Land Use Diagram.

Design Storms -- The design storms used reflect a 24-hour duration, single cloudburst temporal distribution, and recurrence intervals of 10 and 100 years.

Effective Percent Impervious -- The values of effective percent impervious used in the study were developed based upon the correlation of the City's land use types with criteria presented in the *Sacramento City/County Drainage Manual, Hydrology Standards Volume 2*, March 1994. The effective percent impervious factors assumed for the various land use designations are listed in Table 5-8.

TABLE 5-8

EFFECTIVE PERCENT IMPERVIOUS BY LAND USE
City of Woodland General Plan

Land Use Designation	Dwelling Units Per Acre	Effective Percent Impervious
Rural Residential (RR)	<2.0	15
Very Low Density Residential (VLDR)	1.0 - 4.0	30
Low Density Residential (LDR)	3.0 - 8.0	35
Neighborhood Preservation (NP)	3.0 - 8.0	35
Medium Low Density Residential (MLDR)	5.0 - 12.0	40
Medium Density Residential (MDR)	8.0 - 25.0	60
Planned Neighborhood (PN)	<6.0	40
Neighborhood Commercial (NC)		90
Central Commercial (CC)		90
General Commercial (GC)		90
Service Commercial (SC)		90
Highway Commercial (HC)		90
Business Park (BP)		90
Industrial (I)		85
Open Space (OS)		2
Public Service (PS)		50
Urban Reserve (UR)		2
Agriculture (A)		2

Initial Loss Depths -- The initial losses were varied by recurrence interval in accordance with the *Sacramento City/County Drainage Manual, Hydrology Standards Volume 2*, March 1994.

Uniform Loss Rates -- Infiltration rates by land use and hydrologic soil group were obtained from the *Sacramento City/County Drainage Manual, Hydrology Standards Volume 2*, March 1994.

Unit Hydrograph -- Unit hydrographs were generated using SACPRE that employs the U.S. Bureau of Reclamation's urban unit hydrograph method. The required lag time was computed using the following Basin "n" lag equation:

$$L_g = 1560n[LL_c/S^{0.5}]^{0.33}$$

where

L_g = Lag time in minutes. Lag frequency factors presented in the Sacramento County Hydrology Standards were applied to the lag times for the 100-year recurrence interval to reflect detention and attenuation which occurs in urbanized areas when the runoff significantly exceeds the design capacity of the storm sewer system.

L = Length of longest watercourse, measured as approximately 90 percent of the distance from the point of interest to the headwater divide of the basin, in miles.

L_c = Length along the longest watercourse, measured upstream from the point of interest to a point close to the centroid of the basin, in miles.

S = Slope of 90 percent of the longest watercourse between the headwaters and concentration point, in feet/mile.

n = Basin "n" from the *Sacramento City/County Drainage Manual, Hydrology Standards Volume 2*, March 1994.

Base Flow -- For purposes of this study, no base flow was assumed.

Hydrograph Routing -- The Muskingum-Cunge method was used to route hydrographs. The Manning's "n" values with regard to conveyance system type were obtained from the *Sacramento City/County Drainage Manual, Hydrology Standards Volume 2*, March 1994.

Detention Basins -- Stage-storage-discharge relationships were incorporated into the modeling process to reflect existing and proposed pond volumes and the resulting attenuation.

Limitations -- The HEC-1 models were not calibrated, therefore the model results are approximate.

Rational Method

The rational method was used in this study for the analysis of the stormwater runoff with the proposed storm sewer system. The peak runoff was computed using the following equation:

$$Q = cia$$

where

Q = Discharge in cubic feet per second.

c = Runoff coefficient (Table 5-9).

I = Precipitation intensity using the computed time of concentration and precipitation information contained in the Goodridge report. Time of concentration is calculated using the travel time component method presented in the "Sacramento City/County Drainage Manual, Hydrology Standards Volume 2," March 1994.

a = Subbasin drainage area, in acres.