CHAPTER 7 RECOMMENDED PROJECT SUMMARY

PROJECT DESCRIPTION

As stated in Chapter 6, Alternative 2 (26 *mgd CAS/ Tertiary Treatment, Agricultural Reuse, and Storage Reservoirs*) was identified as the recommended project of the LWRP 2020 Plan. The major components of the recommended project are as follows:

- Wastewater Treatment Facilities;
- Effluent Management Facilities;
- Municipal Reuse; and
- Maintenance of Piute Ponds.

Wastewater conveyance facilities (trunk sewers, manholes, pump stations, etc.) are routinely evaluated by District No. 14 and are thus not discussed in the LWRP 2020 Plan, which is a long-term plan that addresses the wastewater treatment and effluent management needs of District No. 14 through the year 2020. In March 2003, District No. 14 completed the *Rosamond Outfall and Trunk "F" Sewer Facilities Plan*, which identified current conditions in the wastewater conveyance system and recommended sewer relief and replacement projects.

Wastewater Treatment Facilities

According to the flow projections discussed in Chapter 5, the LWRP is expected to reach its current design wastewater treatment capacity of 16 mgd in approximately 2007-08. Therefore, the wastewater treatment facilities must be expanded in order to accommodate the projected increase in wastewater flow. The major primary treatment facilities that will be expanded in phases from 16 mgd to 26 mgd include the comminutors, aerated grit channels, and primary sedimentation tanks. The existing biosolids handling facilities will be expanded in phases from 16 mgd to 26 mgd via construction of digestion tanks and drying beds. Current practices for the ultimate disposal of biosolids will continue (see Chapter 4). The existing influent pump station will be abandoned in place because it cannot be expanded beyond its current capacity and will be replaced.

A 26-mgd CAS secondary treatment facility will be constructed in phases to replace the existing 16-mgd oxidation pond secondary treatment facilities. The CAS process will be operated in NDN mode to increase nitrogen removal from the wastewater. The facilities that will be constructed as part of the 26-mgd CAS secondary treatment process include aeration tanks, compressors, return activated sludge wetwells and pumps, final sedimentation tanks, waste activated sludge wetwells and pumps, dissolved air flotation (DAF) units, and chemical stations. A 26-mgd tertiary-treatment facility (including disinfection) will be constructed following CAS secondary treatment. The major facilities that will be constructed as part of tertiary treatment include filters, pumps, backwash recovery tanks, chlorine contact tanks, and chlorination stations. The AVTTP, which currently provides tertiary-treated effluent to Apollo Park by treating up to 0.6-mgd of effluent from the oxidation ponds, will be partially decommissioned and replaced with more current tertiary-treatment technology. Tertiary-treated effluent for municipal reuse, such as the City of Lancaster's proposed 1.5-mgd project, and agricultural reuse will be provided from the new tertiary-treatment facilities.

The tertiary-treated effluent produced by the LWRP will meet all of the prescribed DHS standards for unrestricted access uses, such as sprinkler irrigation of golf courses, parks, and schools. The effluent will be of a significantly higher quality than that required for irrigation of fodder crops.

A dechlorination station will be constructed in order to improve the quality of effluent that will be discharged to Piute Ponds. Nitrogen removal facilities may be constructed, and/or process modifications may be implemented, to further improve the quality of oxidation pond effluent during the interim period until CAS secondary treatment is online.

Construction of these components of the recommended project will require acquisition of land adjacent to the LWRP, since the current plant area is not large enough to accommodate the proposed facilities. Approximately 15 acres of land, some to the north and some to the west of the LWRP, will be acquired. The footprint of the proposed wastewater treatment facilities is shown in Figure 7-1.

Effluent Management Facilities

Aside from the delivery of recycled water for municipal reuse, which is described in the following subsection, effluent from the LWRP will be managed via discharge to (1) Piute Ponds, (2) the Impoundment Areas, (3) Apollo Park, (4) storage reservoirs, and (5) agricultural reuse operations. Effluent delivery to Piute Ponds, the Impoundment Areas, and Apollo Park will be relatively constant throughout the planning period. As influent to the LWRP increases throughout the planning period, the resultant increase in effluent flow will be managed by increased agricultural and/or municipal reuse operations and utilization of additional storage reservoirs.

Piute Ponds

District No. 14 will discharge recycled water to Piute Ponds in sufficient quantities to compensate for evaporative losses from the ponds. Therefore, annual effluent delivery will be relatively constant throughout the planning period. The approximate monthly effluent volume that will be discharged to Piute Ponds, based on its current size of approximately 400 acres, is shown in Table 7-1. Additional quantities of recycled water may have to be delivered to Piute Ponds periodically to flush the ponds.

Impoundment Areas

In accordance with an MOA signed by District No. 14 and EAFB, effluent will be discharged to the Impoundment Areas, which are approximately 90 acres, in sufficient quantity to initially fill the impoundments (November) and then to compensate for evaporative losses (December through April 15). Therefore, the annual effluent delivery to the Impoundment Areas will be constant throughout the planning period. The approximate monthly effluent volume that will be discharged to the Impoundment Areas, in accordance with the MOA, is shown in Table 7-1.

Apollo Lakes Regional County Park

Approximately 56 million gallons per year of tertiary-treated effluent will continue to be conveyed to Apollo Park. The recycled water is used to maintain a series of recreational lakes that are open to the public. The approximate monthly effluent volume that will be delivered to Apollo Park, based on historical data from 1998 to 2002, is shown in Table 7-1.

Storage Reservoirs

As plant flows increase throughout the planning period, the number of storage reservoirs that will be utilized, as well as the agricultural and/or municipal reuse operations established, will be increased to effectively manage the recycled water produced.

Storage reservoirs are required because of the seasonal fluctuation in the recycled water demand of reuse operations. Since most recycled water reuse applications tend to be seasonal (i.e., agricultural and municipal reuse demand is low during the winter), effluent storage is necessary during the winter months. During the months of October through April, when demand for recycled water is low, effluent from the LWRP, in excess of that needed to compensate for evaporation at Piute Ponds and the Impoundment Areas, as well as to satisfy any agricultural or municipal reuse demand, will be discharged to the storage reservoirs. During these months, the storage reservoirs will be gradually filled. During the months of May through September, when reuse demand for recycled water is high, recycled water will be withdrawn from the storage reservoirs to supplement effluent from the LWRP that

Table 7-1
Estimated Effluent Delivery to Piute Ponds, the Impoundment Areas, and Apollo Lakes Regional County Park

MONTH	PIUTE PONDS[a] (million gallons)	IMPOUNDMENT AREAS[b] (million gallons)	APOLLO PARK[c] (million gallons)
January	20.4	4.6	0.0
February	31.5	7.1	0.0
March	51.5	11.6	0.0
April	87.2	9.8	1.5
May	98.1	0.0	7.8
June	125.6	0.0	9.3
July	148.3	0.0	9.4
August	134.6	0.0	9.6
September	100.9	0.0	7.3
October	77.1	0.0	9.4
November	50.0	55.2	1.6
December	29.6	6.7	0.0
TOTAL	**954.7**	**95.0**	**55.9**

(a) Based on evaporation losses from 400 wetted acres.
(b) Effluent delivery in November is that which is required to initially fill the impoundments; effluent discharge from December to April 15 is based on evaporation losses from 90 wetted acres.
(c) Based on the average effluent delivery for the years 1998 to 2002.

will be conveyed to agricultural and municipal reuse operations.

Approximately 750 acres of land will be acquired for construction of storage reservoirs with a total wetted surface area of approximately 400 acres. The remaining land will be used to construct reservoir berms, service roads, and drainage channels, and will serve as a buffer from Avenue B, SR-14, and Sierra Highway. The new storage reservoirs will be constructed as rectangular and/or trapezoidal modules with a total capacity of approximately 2,300 million gallons (7,059 af). The reservoirs will have a water depth of approximately 20 feet. Three feet of freeboard will be allowed to prevent over-topping of the berms by wind-induced waves. The top of the reservoir berms will be approximately 20 feet above grade. The floors of the storage reservoirs will be constructed by excavating and recompacting native soils with a low permeability in order to minimize infiltration of tertiary-treated effluent. The proposed layout of the storage reservoirs is shown in Figure 7-2.

The existing network of eight, 30-acre oxidation ponds, which currently provide secondary wastewater treatment, will be emptied, cleaned, repaired as necessary, and utilized for effluent storage once the CAS secondary treatment facilities are online. The oxidation ponds will provide an effluent storage capacity of approximately 470 million gallons (1,442 af). The new storage reservoirs and converted oxidation ponds together will help increase the effluent management capacity of the LWRP to 26 mgd.

Agricultural Reuse Operations

Primarily during the months of May through September, recycled water from the storage reservoirs, along with effluent produced by the LWRP, will be reused by the agricultural operations. As plant flows increase throughout the planning period, additional agricultural reuse operations will be established to manage the increased volume of recycled water produced.

Approximately 4,650 acres of land will be acquired and developed into agricultural reuse operations. Approximately 3,800 of the 4,650 acres required will be actual farmed area. The remaining land will be used to construct service roads and agricultural support facilities. Acquiring land for agricultural operations, rather than leasing or entering into recycled water reuse contracts, will provide District No. 14 with the certainty of a long-term effluent management solution that will continue to comply with regulatory requirements.

The proposed site for agricultural reuse operations, which is located east of the LWRP, is shown in Figure 7-2. The total area of the agricultural study area east of the LWRP is significantly larger than the acreage required due to the fact that the precise location of the agricultural operations is not known at this time. The actual locations will be determined as the process of land acquisition progresses. This will be based in part on the number of owners willing to sell their land to District No. 14, the location of existing homes owned by individuals that are unwilling to sell on a voluntary basis, and the availability of vacant land. If District No. 14 is unable to acquire the necessary acreage within the agricultural site east of the LWRP, land may have to be acquired within the agricultural site west of the LWRP (see Figure 6-4).

In an effort to ensure continuation of its existing agricultural reuse operations, District No. 14 is negotiating to acquire Nebeker Ranch. If District No. 14 succeeds in purchasing Nebeker Ranch, then only 3,970 acres (4,650 acres less 680-acre Nebeker Ranch) will need to be acquired for agricultural reuse operations. District No. 14 has also offered Nebeker Ranch a short-term extension of the existing recycled water reuse contract. If District No. 14 renews the existing recycled water reuse contract with Nebeker Ranch, then all 4,650 acres will be acquired for agricultural operations due to the uncertainty inherent in an operation secured by a contract. District No. 14 must provide for an effluent management solution that will continue to comply with regulatory requirements. If recycled water reuse at Nebeker Ranch is discontinued, the existing effluent pipeline that delivers recycled water to Nebeker Ranch could be used to supply recycled water, if determined to be cost effective, to other farming entities under the terms of a recycled water reuse contract.

A recycled water pipeline approximately 42 inches in diameter, whose alignment is shown in Figure 7-2, and a pump station will be constructed to convey recycled water to the proposed agricultural operations. To the extent feasible, the pipeline will be constructed in public rights-of-way to minimize impact on privately-owned property. A 2-million-gallon-capacity storage tank will be constructed in the southeast corner of the proposed agricultural site to provide equalization for the recycled water pipeline and distribution system.

District No. 14 will develop agricultural reuse operations on land it acquires by entering into agreements with responsible and experienced farming entities such as independent farmers, farming cooperatives, and/or farming corporations. These entities will be selected following a competitive bidding process.

Based on information gathered by District No. 14, there are several farming entities that are interested in utilizing recycled water on land they own under the terms of a recycled water reuse contract. Although less desirable due to a lack of long-term effluent management certainty, District No. 14 may enter into recycled water reuse contracts with farming entities on land they own provided the proposals are cost effective. District No. 14 will retain ownership of any land it has acquired as contingency in order to ensure continuous compliance with regulatory requirements. The WDRs for the LWRP require District No. 14 to manage all effluent in an appropriate manner at all times or else be subject to fines. Reliance on reuse contracts with farming entities irrigating crops on their property does not provide District No. 14 with the assurance that adequate and cost-effective effluent management capacity will be available at all times into the future. Purchase of land for agricultural operations ensures that District No. 14 can meet its legal obligations under the WDRs for appropriate effluent management at all times.

District No. 14 may retain a farm manager to oversee the agricultural operations conducted by the farming entities. Depending on the negotiated terms of the agreements, District No. 14 or the farming entities will be responsible for preparing the land, installing distribution lines and irrigation systems, boosting the water pressure, etc. The farming entities will cultivate crops that are permitted by Title 22 of the CCR based on the quality of recycled water provided for irrigation. The methods of irrigation used will be ones that are permitted under Title 22 and are protective of the groundwater. The farming entities will be required to implement BMPs pertaining to agricultural operations. District No. 14 will prepare a recycled water reuse engineering report for DHS and obtain a recycled water reuse permit for the agricultural operations from the RWQCB-LR. District No. 14 may also have to conduct site-specific studies in order to establish the most appropriate irrigation rates to effectively manage the agricultural reuse operations in order to obtain the necessary permits and/or approvals.

Municipal Reuse

The City of Lancaster is in the process of implementing a recycled water reuse project for landscape irrigation and industrial purposes within its sphere of influence. District No. 14 has committed to provide a sufficient quantity and quality of recycled water to meet the demand of the reuse project. District No. 14 has negotiated a recycled water sale agreement with the City of Lancaster. As of March 2004, the agreement has not been executed.

The City of Lancaster's initial goal is to distribute up to 1.5 mgd (4.6 af per day) of tertiary-treated effluent to municipal users. Construction of the infrastructure (pipeline, pump station, distribution system, etc.) necessary to deliver recycled water to the various users from the LWRP, identifying and securing reuse sites, coordination with local water purveyors, and preparation of the environmental documentation, are the responsibility of the City of Lancaster. As demand for recycled water increases in the future, the City of Lancaster will construct additional facilities to meet the increased demand and District No. 14 will provide the appropriate quality of recycled water.

In addition to the City of Lancaster's recycled water reuse project, the development of a new municipal reuse project of a comparable size will ensure that the proposed facilities will be adequate for managing the expected year 2020 flow rate of 26 mgd. If neither the City of Lancaster's or any additional municipal reuse demand materializes, then District No. 14 may have to acquire approximately 800 additional acres of land in order to manage the surplus recycled water via agricultural reuse operations.

Based on information gathered by District No. 14, there is an existing golf course within the proposed agricultural site east of the LWRP where tertiary-treated effluent from the LWRP could be used in lieu of irrigation with groundwater. This potential reuse project will be thoroughly evaluated. District No. 14 will continue to support the development of reuse projects, such as irrigation of golf courses and groundwater recharge, by making available a sufficient quantity and quality of recycled water.

Maintenance of Piute Ponds

Piute Ponds will be preserved by (1) delivering a sufficient quantity of recycled water to the ponds to maintain the current habitat and (2) providing for the periodic flushing of the ponds, if needed, to ensure a healthy habitat.

In order to achieve the first objective, recycled water will be discharged year-round into Piute Ponds at a rate equal to its evaporative losses based on the current area of approximately 400 wetted acres. Flushing of Piute Ponds might be necessary to prevent the build-up of salts and other constituents, which are detrimental to a healthy habitat, as well as to maintain the Amargosa Creek delta and the adjoining mud flats. A detailed discussion on the maintenance of Piute Ponds, as well as preservation of the Amargosa Creek delta and the adjoining mud flats, is provided in the Final LWRP 2020 Plan EIR.

PROJECT IMPLEMENTATION AND SCHEDULE

The recommended project will be implemented in two phases. Phased construction will allow District No. 14 to reevaluate the planned facilities at an interim point between the two phases and determine whether any adjustments should be made based on the wastewater flow rate that actually materializes in the future. If the projected wastewater flow rate during the planning period does not materialize as anticipated, the construction phasing of the planned facilities will be revised accordingly. Alternatively, if the population in the planning area increases more rapidly than projected, the design and construction schedule will be accelerated to the extent possible to meet the needs of the service area. This approach will also allow District No. 14 to integrate future reuse opportunities that may become feasible in the subsequent phase of the project.

The two phases of the LWRP 2020 Plan, which will be known as the Stage V and Stage VI expansions, are discussed in the following sections.

Stage V Expansion

The wastewater flow projection for the District No. 14 planning area, illustrated in Figure 7-3, indicates that the LWRP is expected to reach its design treatment capacity in approximately 2007-08. Therefore, additional facilities must be constructed at the LWRP to accommodate the projected wastewater flows. The Stage V expansion, which is scheduled for completion by the summer of 2008, will increase the wastewater treatment and effluent management capacity of the LWRP to 21 mgd, the projected wastewater flow by the year 2014.

Wastewater Treatment Facilities

The primary treatment and biosolids handling capacity will be increased by 5 mgd from 16 mgd to 21 mgd as part of the Stage V expansion. Since the existing 16-mgd-capacity oxidation pond secondary treatment will be decommissioned, 21 mgd of CAS secondary treatment capacity (operated in NDN mode) will be constructed as part of Stage V. Similarly, since the AVTTP will be partially decommissioned, 21 mgd of tertiary-treatment capacity will be constructed as part of Stage V. This tertiary treatment capacity will be more than adequate to provide recycled water to Apollo Park and the proposed municipal reuse project of the City of Lancaster. It is anticipated that the excess tertiary effluent produced by the LWRP will encourage the emergence of additional municipal reuse projects in the Antelope Valley.

The major wastewater treatment facilities planned for construction as part of the Stage V expansion include an influent pump station, influent and primary odor control stations, a comminutor, aerated grit channels, primary sedimentation tanks, CAS secondary treatment facilities (aeration tanks, final sedimentation tanks, DAF tanks, chemical stations, etc.), tertiary-treatment facilities with disinfection (filters, pumps, chlorine contact tanks, chlorination, etc.), digestion tanks, and drying beds.

A dechlorination station will be constructed by August 2005 in order to improve the quality of effluent that will be discharged to Piute Ponds. Dechlorination is necessary so that the LWRP can achieve full compliance with the free residual chlorine limit for discharge to Piute Ponds prescribed in the WDRs for the LWRP. Nitrogen removal facilities may be constructed, and/or process modifications may be implemented, by August 2006 to further improve the quality of oxidation pond effluent. Such facilities and/or modifications following oxidation pond treatment would help the LWRP meet the ammonia

Table 7-2
Acreage Required for Stage V and Stage VI of the Recommended Project

PROJECT COMPONENT	STAGE V (acres)	STAGE VI (acres)	TOTAL (acres)
Wastewater Treatment and Biosolids Handling Facilities	15	—	15
Storage Reservoirs	750	—	750
Agricultural Reuse Operations	4,650[a]	—	4,650[a]
TOTAL ACREAGE REQUIRED	**5,415**	—	**5,415**

(a) Acquisition of Nebeker Ranch would secure 680 acres of the amount indicated.

limit for discharge to Piute Ponds prescribed in the WDRs for the LWRP during the interim period until CAS secondary treatment is online.

A detailed layout of the proposed wastewater treatment facilities that are planned for construction during the Stage V expansion are shown in Figure 7-1. The treatment capacity of the LWRP following the Stage V expansion is shown in Figure 7-3.

Effluent Management Facilities

The major effluent management facilities planned for construction as part of the Stage V expansion to 21 mgd include new effluent storage reservoirs with a total capacity of approximately 1,530 million gallons (4,696 af), a recycled water pump station, a recycled water pipeline approximately 42 inches in diameter, and approximately 4,650 acres of agricultural operations.

Upon completion of the CAS secondary and tertiary treatment facilities in 2008, the existing network of oxidation ponds will be emptied, cleaned, and repaired as necessary. Once maintenance is complete, the oxidation ponds will be used for effluent storage. Since each of the eight-oxidation pond modules that will be used is approximately 30 acres in size, with an effective water depth of six feet, the oxidation ponds will provide an effluent storage capacity of approximately 470 million gallons (1,442 af). This strategy of utilizing the decommissioned oxidation ponds for storage will minimize the overall project cost and reduce the number of reservoirs that would otherwise have to be constructed north of the LWRP. The converted oxidation ponds and Stage V storage reservoirs and agricultural operations will increase the effluent management capacity of the LWRP to 21 mgd.

Although all reasonable efforts are being made to have facilities in place to meet the RWQCB-LR deadline, all Stage V effluent management facilities will not be completed in time. The process of acquiring land for agricultural operations and storage reservoirs is anticipated to last through the summer of 2005 due to the significant number of parcels that will be involved and the necessary legal requirements that must be complied with for public acquisition of land. The recycled water pipeline to the proposed agricultural reuse sites east of the LWRP is scheduled for completion in the summer of 2006, while the Stage V storage reservoirs and agricultural pump station are scheduled for completion in early 2007.

District No. 14 will manage effluent from the LWRP by delivering recycled water to the existing effluent management sites (Piute Ponds, Impoundment Areas, Apollo Park, Nebeker Ranch, and existing storage reservoirs), and applying recycled water at defined irrigation rates on the Stage V agricultural reuse sites as they are established. During the winter months, when evaporation rates and reuse demand are low, District No. 14 will continue its present practice of controlled effluent discharge to Piute Ponds in a manner that does not create a threatened nuisance condition for EAFB.

Although the Stage V storage reservoirs and agricultural pump station are expected to be complete in early 2007, the CAS and tertiary treatment facilities are not scheduled for completion until the summer of 2008. Elimination of effluent-induced overflows onto

Rosamond Dry Lake is controlled by the completion of the CAS and tertiary treatment facilities. Storing oxidation pond effluent in the Stage V reservoirs from early 2007 to the summer of 2008 may not be acceptable to the RWQCB-LR. After the summer of 2008, tertiary effluent will be available for agricultural and municipal reuse operations and surplus effluent will be stored in the Stage V reservoirs. As these facilities become operational, effluent-induced overflows onto Rosamond Dry Lake will be greatly reduced. All effluent overflows onto Rosamond Dry Lake will be eliminated after April 2009. District No. 14 is working with the RWQCB-LR and EAFB to ensure that continuation of controlled effluent overflows during this period does not create a threatened nuisance condition.

In order to minimize the volume of surplus effluent that will continue to be discharged to Piute Ponds through April 2009, District No. 14 will acquire, as part of the Stage V expansion, all of the land necessary for agricultural reuse operations for the entire planning period. Similarly, Stage V will also include acquisition of all the land necessary for construction of the proposed wastewater treatment facilities and storage reservoirs for the entire planning period. District No. 14 will make every effort to acquire land from willing sellers. However, District No. 14 may have to acquire property via eminent domain in order to expedite full compliance with the RWQCB-LR deadline. A summary of the acreage that is necessary for the Stage V expansion is shown in Table 7-2. In order to expedite implementation of the Stage V facilities, design, advertising, acceptance of bids, and award of the construction contracts will occur concurrently with land acquisition. Additionally, District No. 14 will conduct, as soon as reasonably possible, the studies and analyses required in order to obtain the necessary regulatory approvals for implementation of agricultural reuse operations and utilization of the proposed effluent storage reservoirs. The major effluent management facilities that are planned for construction as part of the Stage V expansion are illustrated in Figure 7-4.

According to the wastewater flow projection for the District No. 14 planning area in Figure 7-3, the 21-mgd capacity of the LWRP following the Stage V expansion will be adequate through the year 2014, which will provide District No. 14 with the flexibility to make any adjustments to the facilities planned for construction as part of Stage VI. The implementation schedule for the Stage V expansion is shown in Figure 7-5.

Stage VI Expansion

According to the District No. 14 planning area wastewater flow projection in Figure 7-3, the Stage VI expansion will need to be constructed by the year 2014. Stage VI will involve construction of the facilities necessary to increase the wastewater treatment and effluent management capacity of the LWRP from 21 mgd to 26 mgd, the projected wastewater flow by the year 2020.

The major facilities planned for construction by 2014 as part of the Stage VI expansion from 21 mgd to 26 mgd include 5 mgd of primary treatment capacity, 5 mgd of CAS secondary treatment capacity (operated in NDN mode), 5 mgd of tertiary-treatment capacity (including disinfection), 5 mgd of biosolids handling capacity, and additional effluent storage reservoirs with a total capacity of approximately 770 million gallons (2,363 af). The Stage VI storage reservoirs will increase the effluent management capacity of the LWRP from 21 mgd to 26 mgd. The location of the proposed primary, CAS secondary, tertiary, and biosolids handling facilities is illustrated in Figure 7-1. The storage reservoirs planned for construction during the Stage VI expansion are illustrated in Figure 7-4. The implementation schedule for the Stage VI expansion is shown in Figure 7-5.

The proposed facilities and timing of the Stage VI expansion will be reevaluated in 2010-11 to respond to any changes in wastewater flow projections or other factors affecting the recommended project. As municipal reuse projects that require tertiary-treated effluent increase, the agricultural reuse component

Table 7-3
Summary of Design Criteria for the Lancaster Water Reclamation Plant

UNIT PROCESS	DESIGN CRITERIA	LWRP EXISTING FACILITIES	LWRP STAGE V	LWRP STAGE VI	LWRP 2020 FACILITIES
Plant Capacity	Average Flow	16.0 mgd	21.0 mgd	+ 5.0 mgd	26.0 mgd
	Peak Sanitary Flow	28.8 mgd	36.5 mgd	+ 7.7 mgd	44.2 mgd
	Peak Storm Flow	40 mgd	53.8 mgd	+ 13.8 mgd	67.6 mgd
Influent Pump Station	Number of Pumps	5	5	—	5
	Capacity, each	10 mgd	13.6 mgd	—	13.6 mgd
	Total Wetwell Capacity	35,530 gallons	52,273 gallons	—	52,273 gallons
Odor Control Stations	Number of Stations	—	2	—	2
	Number of BioTrickling Filters	—	4	—	4
	Capacity, each	—	11,000 scfm	—	11,000 scfm
	Number of Recirculation Pumps	—	4	—	4
	Capacity, each	—	190 gpm	—	190 gpm
Comminutors	Number	2	+ 1	—	3
	Capacity, each	26 mgd	26 mgd	—	26 mgd
Aerated Grit Channels	Number	4	+ 2	+ 2	8
	Total Capacity	28.8 mgd	+ 7.7 mgd	+ 7.7 mgd	44.2 mgd
	Detention Time @ Avg. Flow	1.57 minutes	+ 0.19 minutes	+ 0.14 minutes	1.90 minutes
Aerated Grit Blowers	Number	2	+ 1	+ 1	4
	Capacity, each	400 cfm	400 cfm	400 cfm	400 cfm
Primary Sedimentation Tanks	Number	6	+ 2	+ 2	10
	Length, each	175 feet	175 feet	175 feet	175 feet
	Width, each	16 feet	16 feet	16 feet	16 feet
	Depth, each	2 @ 7.5 feet 4 @ 10 feet	10 feet	10 feet	2 @ 7.5 feet 8 @ 10 feet
	Overflow Rate @ Avg. Flow	952 gpd/sf	—	—	952 gpd/sf
	Detention Time @ Avg. Flow	1.73 hours	+ 0.06 hours	+ 0.05 hours	1.84 hours
Sludge Pumps	Number	2	+ 2	—	4
	Capacity, each	1 @ 470 gpm 1 @ 550 gpm	550 gpm	—	1 @ 470 gpm 3 @ 550 gpm
Sludge Grinders	Number	1	+ 3	—	4
CAS Aeration Tanks	Number	—	12	+ 4	16
	Capacity, each	—	1.75 mgd	1.75 mgd	1.75 mgd
CAS Sedimentation Tanks	Number	—	10	+ 4	14
	Capacity, each	—	2.1 mgd	2.1 mgd	2.1 mgd
CAS DAF Tanks	Number	—	2	—	2
	Capacity, each	—	0.23 mgd	—	0.23 mgd
Oxidation Ponds	Number of Treatment Ponds	8	—	—	—
	Total Capacity	16 mgd	—	—	—
	Average Surface Area, each	30.3 acres	—	—	—
	Organic Loading Rate	175 lbs BOD/ac-d	—	—	—
	Total Surface Aerators	24	—	—	—
Anaerobic Digestion Tanks	Primary and WAS Design Flow	80,552 gpd	+ 81,648 gpd	+ 38,620 gpd	200,820 gpd
	Total Number of Digesters	5	+ 5	+ 3	13
	No. of 1st Stage Digesters	4	+ 2	+ 2	9
	Capacity, each	1 @ 504,000 gallons 3 @ 618,240 gallons	618,240 gallons	618,240 gallons	2 @ 504,000 gallons 7 @ 618,240 gallons
	Detention Time	29.3 days	+ 7.7 days	- 1.2 days	35.8 days
	No. of 2nd Stage Digesters	1	3	+ 1	4
	Capacity, each	504,000 gallons	618,240 gallons	618,240 gallons	618,240 gallons
	Detention Time	6.3 days	+ 3.7 days	—	10.0 days
	Total Detention Time	35.6 days	+ 11.4 days	- 1.2 days	45.8 days

Table 7-3 (continued)
Summary of Design Criteria for the Lancaster Water Reclamation Plant

		LWRP			
UNIT PROCESS	**DESIGN CRITERIA**	**EXISTING FACILITIES**	**STAGE V**	**STAGE VI**	**2020 FACILITIES**
Digested Biosolids Transfer Pumps	Number Capacity, each	5 1 @ 450 gpm 1 @ 350 gpm 3 @ 280 gpm	+ 3 280 gpm	+ 3 280 gpm	11 1 @ 450 gpm 1 @ 350 gpm 9 @ 280 gpm
Ferrous Chloride Station	Number of Pumps Capacity, each Solution Tank Capacity	2 1 @ 39.9 gpm 1 @ 3.5 gpm 5,700 gallons	+ 2 1 @ 39.9 gpm 1 @ 3.5 gpm + 5,700 gallons	— — —	4 2 @ 39.9 gpm 2 @ 3.5 gpm 11,400 gallons
Biosolids Drying Beds	Number Length, each Width, each Depth, each Design Loading Rate	12 140 feet 60 feet 3 feet 45 dry lbs/sf-yr	+ 13 140 feet 60 feet 3 feet - 30 dry lbs/sf-yr	+ 4 140 feet 60 feet 3 feet —	29 140 feet 60 feet 3 feet 15 dry lbs/sf-yr
Supernatant Pumps	Number Capacity, each	2 250 gpm	+ 4 250 gpm	— —	6 250 gpm
Tertiary Filters	Number Capacity, each	— —	5 5 gpm/sf	+ 2 5 gpm/sf	7 5 gpm/sf
Tertiary Backwash Pumps	Number Capacity, each	— —	2 13,500 gpm	— —	2 13,500 gpm
Chlorine Contact Tanks	Number of Tanks Capacity, each	— —	3 7 mgd	+ 1 5 mgd	4 3 @ 7 mgd 1 @ 5 mgd
Chlorination Stations	Number of Stations Total Capacity	— —	1 21 mgd	+ 1 5 mgd	2 26 mgd
Oxidation Pond Effluent Disinfection	Number of Stations Total Chlorination Capacity Total Dechlorination Capacity	1 16 mgd —	— — 5 mgd	— — —	— — 5 mgd
Recycled Water Pump Station	Number of Pumps Capacity, each	— —	4 4,513 gpm	+ 1 4,513 gpm	5 4,513 gpm
Storage Reservoirs	Number Total Wetted Surface Area Average Capacity, each Average Water Depth, each Average Freeboard, each Total Capacity	4 160 acres 125 million gallons 10 feet 2 feet 500 million gallons	+ 4 + 240 acres 383 million gallons 19.6 feet 3 feet + 1,533 million gal.	+ 2 + 120 acres 383 million gallons 19.6 ft 3 ft + 766 million gal.	10 520 acres 4 @ 125 million gallons 6 @ 383 million gallons 4 @ 10 ft 6 @ 19.6 ft 4 @ 2 ft 6 @ 3 ft 2,799 million gallons
Oxidation Ponds Used for Effluent Storage	Number Total Wetted Surface Area Average Capacity, each Average Water Depth, each Total Capacity	— — — — —	8 240 acres 59 million gallons 6 feet 469 million gallons	— — — — —	8 240 acres 59 million gallons 6 feet 469 million gallons
Agricultural Recycled Water Pump Station and Pipelines	Number of Pumps Capacity, each Number of Pipelines Pipeline Diameter	3 2 @ 2,100 gpm 1 @ 3,125 gpm 1 24 inches	+ 4 5,000 gpm + 1 42 inches	— — — —	7 2 @ 2,100 gpm 1 @ 3,125 gpm 4 @ 5,000 gpm 2 1 @ 24 inches 1 @ 42 inches
Agricultural Reuse Operations	Total Farmed Area Total Land Area	616 acres 680 acres	+ 3,170 acres + 3,970 acres	— —	4,326 acres 4,650 acres

of the recommended project will be adjusted accordingly. If neither the City of Lancaster's or any additional municipal reuse demand materializes, then District No. 14 may have to acquire approximately 800 acres of land as part of Stage VI in order to manage the surplus recycled water via agricultural reuse operations.

PROJECT DESIGN CRITERIA

The design criteria of the existing, Stage V expansion, Stage VI expansion, and year 2020 facilities for the LWRP are summarized in Table 7-3. The planned facilities were designed using peaking factors of 1.7 for sanitary flow and 2.6 for storm flow. These factors were developed from historical data collected at the LWRP.

Plant capacity data in the first row of Table 7-3 under *Existing Facilities* is based on secondary treatment capacity at the LWRP; while under *Stage V, Stage VI*, and *2020 Facilities* plant capacity is based on tertiary treatment capacity. This is due to the replacement of the existing 16-mgd oxidation pond secondary treatment capacity in Stage V with 21 mgd of CAS/ tertiary-treatment capacity. The existing influent pump station will be abandoned in place and replaced in Stage V with a 26-mgd-capacity influent pump station. In addition, the existing 504,000-gallon, second-stage digestion tank will be converted to a first-stage digestion tank in Stage V.

PROJECT SITE SELECTION

This section describes the site evaluation process that resulted in identifying the optimum location for construction of the proposed wastewater treatment facilities, storage reservoirs, and agricultural reuse operations. The footprint of the recommended project developed from the results of the site evaluation and selection process is shown in Figures 7-1 and 7-2.

Location of Wastewater Treatment Facilities

Site selection for expansion of LWRP wastewater treatment facilities was constrained by the fact that these facilities must be located adjacent to the existing facilities. Therefore, the approximately 15 acres of land necessary for construction of the proposed wastewater treatment facilities must be acquired adjacent to the LWRP. Adjacent areas to the south were not considered suitable because Avenue D would divide the existing and new facilities and would create O&M problems. Adjacent areas to the east are owned by EAFB and therefore are not viable. Thus, the areas immediately west and north of the LWRP, which are adjacent to existing facilities, were considered to be the most suitable for the proposed wastewater treatment facilities.

Location of Storage Reservoirs

Approximately 750 acres of land are necessary for construction of the proposed effluent storage reservoirs. Five study areas around the LWRP, which are shown in Figure 7-6, were identified and evaluated to determine the study area most suitable for construction of the proposed storage reservoirs. The five study areas identified range in size from approximately 1.75 square miles to two square miles. Each study area is large enough to accommodate all of the proposed storage reservoirs. The major considerations in identifying the most suitable study area were (1) operational considerations, (2) soil suitability, (3) environmental impact, (4) public impact, (5) EAFB impact, and (6) cost effectiveness. These criteria and how they relate to each storage reservoir study area are discussed in the following subsections.

Screening of Storage Reservoir Study Areas

- *Operational Considerations*

  For ease in operation and maintenance of the new storage reservoirs, a location close to the LWRP is advantageous. LWRP personnel can more easily monitor and maintain the reservoirs if they are constructed adjacent to the existing plant. In addition, control rooms, offices, equipment, and service roads can be shared by the existing and new storage reservoirs. Hence, Study Area 2 is superior to Study Areas 1, 4, and 5 since it is located adjacent to the LWRP. Study Area 3 is neutral due to the fact that it is located closer to the LWRP than Study Areas 1, 4, and 5, but is separated from the existing facilities by Avenue D, a relatively major thoroughfare.

- *Soil Suitability*

  District No. 14 commissioned a geotechnical investigation within the study areas to quantify the presence and type of clay in the near-surface soils. The presence of clay was an important consideration since it can be used in the construction of reservoir floors. Approximately 20 test pits, measuring 20 feet in length, three feet in width, and eight feet in depth, were excavated in each of the five study areas. The soils in the test pits were logged and samples were analyzed for hydraulic conductivity, among other parameters. The results of the geotechnical investigation indicated that, in general, the study areas are comparable with respect to the quantity and type of clay in the near-surface soils with low hydraulic conductivity.

- *Environmental Impact*

  The study areas were compared with respect to potential environmental impact (i.e., cultural, biological, hydrology, etc.) resulting from construction of storage reservoirs.

  Little information is available for cultural resources within each study area with the exception of Study Area 4 on EAFB. Study Area 4 has numerous homestead sites and trash deposits that would require cataloging in accordance with the federal Historic Preservation Act. With respect to biological resources, the major sensitive species evaluated within the five study areas include the *alkali mariposa lily, Mohave ground squirrel,* and *desert tortoise.* Construction of storage reservoirs within any of the study areas would not be limited due to the presence of biological resources. However, Study Area 2 is slightly less desirable due to the higher incidence of *alkali mariposa lily.* Study Area 5 is slightly less desirable due to the fact that a majority of the study area is within the proposed SEA, which does not classify effluent storage reservoirs as a compatible use and would therefore require issuance of conditional use permit from DRP. With respect to surface hydrology, Study Areas 3 and 4 are slightly less desirable than the others due to their locations with respect to potential impact from Amargosa Creek storm water flow. With respect to visual resources, traffic, and air quality impacts, the study areas are relatively comparable due to the fact that storage reservoir construction would impact each similarly regardless of the location.

  Although trade-offs exist between the study areas with respect to environmental impact, Study Areas 2, 3, 4, and 5 were deemed to be relatively inferior to Study Area 1. A detailed discussion of the potential environmental impact of storage reservoir construction within each study area is included in the Final LWRP 2020 Plan EIR.

- *Public Impact*

  Storage reservoirs can potentially impact the public by displacing residents and businesses or causing an insect nuisance for motorists along major highways such as SR-14 or Sierra Highway.

  Aerial photographs and site surveys indicate that siting storage reservoirs within Study Area 1 or Study Area 3 would require displacement of up to three residences and up to six residences in Study Area 5. No residences or businesses would be displaced from Study Areas 2 and 4. As a result, these two study areas are more desirable. Additionally, Study Area 3 is adjacent to Leisure

Table 7-4
Summary of the Screening and Ranking of Storage Reservoir Study Areas [a]

CRITERIA	PROPOSED STORAGE RESERVOIRS LOCATION				
	STUDY AREA 1 (west of LWRP)	STUDY AREA 2 (north of LWRP)	STUDY AREA 3 (south of LWRP)	STUDY AREA 4 (east of LWRP, on EAFB)	STUDY AREA 5 (southeast of LWRP)
Operational Considerations	–	+	0	–	–
Soil Suitability	0	0	0	0	0
Environmental Impact	+	–	–	–	–
Public Impact	–	0	–	+	0
EAFB Impact	0	0	0	–	+
Cost Effectiveness	–	+	+	+	–
Total Score	2–	1+	1–	1–	2–
OVERALL RANKING	**4**	**1**	**2**	**2** [b]	**4**

(a) Comparative ratings are Superior (+), Neutral (0), and Inferior (–).
(b) Public concerns regarding encroachment on EAFB rendered construction of storage reservoirs within this study area infeasible.

Lake, a mobile home community of primarily senior citizens that is located at the intersection of Avenue E and SR-14. Study Area 5 is adjacent to various industrial uses to the south and east.

During the summer months, standing water in the storage reservoirs could lead to mosquito and midge accumulation. If reservoirs were constructed within Study Areas 1, 2, or 3, the prevailing winds out of the west would blow these insects over SR-14 and/or Sierra Highway, which could present a nuisance to motorists.

Overall, Study Area 4 is relatively superior, Study Areas 2 and 5 are neutral, and Study Areas 1 and 3 relatively inferior to the other study areas with respect to public impact.

- *EAFB Impact*

EAFB has designated air space over the southwest portion of the base as a low-flight corridor, also known as the Alpha Corridor. Low-flight is considered to be several hundred feet above ground. This low-flight corridor ends at the western border of EAFB, which is adjacent to the LWRP. EAFB has expressed concern over the proximity of water features that attract birds to the area. EAFB has indicated that the presence of birds, which could accumulate due to the operation of effluent storage reservoirs, could impact the low flight corridor by increasing the potential for bird-air-strike hazards. Therefore, Study Area 4 is the least desirable because it is located directly within the low-flight corridor where flight is permitted to the ground level. Study Areas 1, 2, and 3 are neutral since flight is permitted down to 200 feet above ground level. Study Area 5 is the most desirable since no significant low-level flight routes are directly above this area.

Nevertheless, construction of effluent management facilities within Study Area 4 was tentatively agreed to by EAFB in September 2002. However, significant opposition to such an arrangement was expressed by various members of the public, including some elected officials, due to concerns over encroachment on EAFB for non-military uses. These individuals argued that construction of non-military facilities (e.g., effluent storage reservoirs) on EAFB could affect the base mission by preventing the area from being used for other purposes. This incremental encroachment on EAFB could create a cumulative adverse impact that could potentially lead to base closure. Therefore, this potentially cost-effective study area was eliminated as a feasible location of effluent storage reservoirs.

- *Cost Effectiveness*

A positive or negative difference in elevation between the LWRP and a study area determines whether effluent would have to be pumped, or if it could flow via gravity, to the storage reservoirs. Pumping cost is proportional to the degree of elevation change. Topographical maps indicate that, relative to the LWRP, areas to the west and southeast are at a higher elevation while areas to the north, south, and east are at a similar or lower elevation. Thus, conveying effluent to storage reservoirs situated within Study Areas 1 and 5 would be more expensive than delivering effluent to storage reservoirs located within Study Areas 2, 3, or 4.

Selection of Storage Reservoir Study Area

The qualitative comparison and ranking of the storage reservoir study areas based on the criteria discussed is summarized in Table 7-4. Examination of the table indicates that Study Area 2 is superior to the other four study areas with respect to construction of effluent storage reservoirs. Therefore, Study Area 2 is the recommended location for the construction of the proposed storage reservoirs.

Location of Agricultural Reuse Operations

In order to identify the location for approximately 4,650 acres of agricultural reuse operations, a 900-square-mile area around the LWRP was surveyed for large, existing farming operations interested in using recycled water from the LWRP, and/or large, contiguous parcels owned by willing sellers. Other than one proposal from a currently inactive farming operation located approximately 17 miles west of the LWRP, this process did not result in the identification of any entities with enough land to satisfy a significant portion of the agricultural acreage requirement. The proposal received from the farming entity west of the LWRP was thoroughly evaluated. However, it was determined that pumping recycled water over a distance of 17 miles and approximately 400 feet higher in elevation than the LWRP was cost prohibitive.

Therefore, District No. 14 identified four study areas near the LWRP within which agricultural reuse operations could be established. Delineation of study areas was limited within an area around the LWRP bounded by EAFB to the northeast, the Los Angeles/Kern County line to the north, the City of Lancaster to the south, and a one-mile buffer from the Antelope Acres community to the west. The four study areas identified, which are shown in Figure 7-7, range in size from approximately eight square miles to 15 square miles. Each study area is larger than the acreage required under the recommended project due to the fact that the precise location of the 4,650 acres of agricultural operations cannot be arbitrarily selected. The actual location of agricultural operations will be determined during the land acquisition process when a number of factors will be taken into consideration such as the number of owners willing to sell their land to District No. 14, its fair market value, the results of soil and subsurface characterization studies, etc.

Study Area 1 is bounded by Avenue A-8 to the north, 45th Street West to the east, Avenue E to the south, and 70th Street West to the west. This study area includes Nebeker Ranch. Study Area 2, located immediately west of the LWRP, is bounded by the Los Angeles/Kern County line (Avenue A) to the north, 25th Street West to the east, Avenue E to the south, and 40th Street West to the west. Study Area 3 is bounded by EAFB to the north (Avenue E), 40th Street East to the east, Avenue G to the south, and Division Street to the west. Finally, Study Area 4 is bounded by EAFB to the north (Avenue D), 100th Street East to the east, Avenue G to the south, and 50th Street East to the west. Since the development of agricultural operations would be infeasible on land with soil unsuitable for farming, the study areas were first evaluated for their suitability as farm land. The study areas with soil suitable for farming were subject to a second level of screening to determine the study area most suitable for the development of agricultural reuse operations.

First-Level Screening of Agricultural Reuse Study Areas

- *Land Suitability*

The most important factor in determining the suitability of land for agricultural operations is soil conditions. In order to determine the soil conditions in each study area, District No. 14 hired Dellavalle Laboratory, Inc. and Provost & Pritchard Engineering Group (P&PEG) to conduct studies of the suitability for farming the land within each study area. A panel of agricultural experts, consisting of Dr. Daniel Putnam, University of California Cooperative Extension (UCCE) Agronomist, Steve Orloff, UCCE Farm Advisor, and Blake Sanden, UCCE Irrigation and Agronomy Farm Advisor, evaluated an agricultural site study prepared by Dellavalle Laboratory, Inc. and P&PEG.

In general, Dellavalle Laboratory, Inc. and P&PEG concluded, and the panel of agricultural experts agreed, that the majority of the soil types in Study Areas 2 and 3 are highly stratified, poorly drained, and appear to be saline-sodic. The pH in these salt-containing areas is highly alkaline, and could limit productivity. In addition, the National Resources Conservation Service considers the soil types in Study Area 2 and the western portion of Study Area 3 to be poorly suited for reclamation. In contrast, Study Areas 1 and 4 contain soils in the Rosamond Series, which is considered to be one of the better agricultural soils in the Antelope Valley. In addition, Study Areas 1 and 4 exhibit many signs of historical and existing farming, which are indications of their potential usefulness. Signs of historical farming include land that has been previously cleared and graded, or land where there is evidence of abandoned water wells and flood irrigation standpipes. Study Areas 2 and 3, on the other hand, exhibit no obvious signs of historical farming, and do not currently support any farming operations.

The results of the first-level screening of the agricultural reuse study areas is summarized in Table 7-5.

Table 7-5
Summary of the First-Level Screening of Agricultural Reuse Study Areas

	LAND SUITABLE FOR AGRICULTURAL OPERATIONS
Study Area 1	Yes
Study Area 2	No
Study Area 3	No
Study Area 4	Yes

The general lack of suitable land for farming within Study Areas 2 and 3 was deemed to be a fatal flaw of each of these two study areas, eliminating them from further consideration. Since the soil conditions of Study Areas 1 and 4 indicate that the majority of the land within either would be suitable for farming, these two study areas were further evaluated to identify the study area most suitable for agricultural operations. The second-level screening criteria used were (1) operational considerations, (2) environmental impact, (3) public impact, (4) cost effectiveness, and (5) recycled water reuse interest.

Second-Level Screening of Suitable Agricultural Reuse Study Areas

- *Operational Considerations*

The distance of the agricultural operations relative to the LWRP is an important consideration. Although the agricultural operations will be managed by contracted farming entities, the proximity of the sites could make effluent management at these locations more efficient for District No. 14 staff. Since both study areas are located relatively far from the LWRP, they are deemed to be similar with respect to operational considerations.

District No. 14 owns and operates a 24-inch diameter, seven-mile pipeline that conveys recycled water to Nebeker Ranch, which is located within Study Area 1. However, irrigation of additional agricultural operations with water from this existing pipeline is not possible since it operates near capacity during the peak summer months. Therefore, no additional agricultural operations can be served as a result of the fact that there is an existing pipeline from the LWRP to Study Area 1.

- *Environmental Impact*

  Study Areas 1 and 4 were evaluated and compared with respect to the potential environmental impact resulting from the development of agricultural operations within each area. A detailed discussion of these potential environmental impacts is included in the Final LWRP 2020 Plan EIR.

  In general, the potential environmental impacts, based on air quality, visual, cultural, traffic, and groundwater resources, are considered to be similar in each study area. However, in terms of biological and land use resources, Study Area 4 is deemed to be superior to Study Area 1. This is primarily due to the fact that Study Area 4 has fewer undisturbed areas that could support rare or sensitive plants based upon a survey of areas within each study area that exhibit signs of recent substantial disturbance, grading, or agricultural activities. It is likely that development of agricultural operations in Study Area 1 would disturb more areas that currently support sensitive plants, including *alkali mariposa lily*. Although the federal Bureau of Land Management, in its Draft West Mojave Plan, identifies SR-14 as the westernmost boundary of the *Mojave ground squirrel's* historic range, few undisturbed areas exist in Study Area 4 that could support *Mojave ground squirrel.* On the other hand, DFG representatives have indicated that undisturbed areas within Study Area 1 could still support *Mojave ground squirrel.*

  In terms of land use resources, the areas within Study Area 4 are more compatible with agricultural operations than Study Area 1. DRP is proposing to extend the SEA in the Antelope Valley (see Figure 2-6). The SEA considers agricultural land uses to be compatible. Therefore, District No. 14 would not likely be required to obtain a conditional use permit to implement agricultural operations within the proposed SEA. Finally, Study Area 4 is located within a County-designated Agricultural Opportunity Area that encourages agricultural uses. Land within Study Area 4 has proven to be suitable for agricultural operations as evidenced by the existing and historic agricultural activities within this study area.

- *Public Impact*

  Extensive research using aerial photographs and multiple field inspections were conducted to identify the residences and businesses within each study area. Study Area 1 was found to contain fewer residential and business developments, including farming interests, than Study Area 4. However, this is due in part to the fact that Study Area 1 encompasses an area of 5,600 acres while Study Area 4 encompasses an area of 9,600 acres. There are large, vacant, contiguous parcels of land within Study Areas 1 and 4 that could be acquired and developed as agricultural operations, thereby minimizing the direct impact on existing homes or farming operations.

  In addition, Study Area 1 is located near Antelope Acres, which has expressed opposition to the siting of effluent management facilities near its community of homes. Similarly, the residents in and near Study Area 4 have also expressed opposition to construction of effluent management facilities near their homes. Overall, Study Areas 1 and 4 were deemed to be equal in terms of public impact.

- *Cost Effectiveness*

  The three major cost considerations affected by the location of the agricultural operations are (1) cost of land, (2) cost of water conveyance, and (3) cost of land preparation.

Based on data gathered from mass appraisals conducted by District No. 14, the average fair market value of land within Study Area 1 is higher than Study Area 4. This is primarily due to the fact that there is a larger number of small parcels in Study Area 1 than Study Area 4. Smaller parcels tend to have a higher per-acre cost than larger parcels. Therefore, in terms of average land cost, Study Area 4 is superior to Study Area 1.

Under the simplified assumption that cost of water conveyance is a function of distance and elevation difference with the LWRP, the study areas are deemed to be equivalent. Although, Study Area 4 is further from the LWRP than Study Area 1, the elevation difference between Study Area 1 and the LWRP is twice as much as between Study Area 4 and the LWRP.

Land preparation costs, which include the cost of clearing, leveling, and grading, for the implementation of agricultural operations would be slightly less in Study Area 4 due to the larger number of parcels that are currently farmed or that have been farmed in the recent past. Therefore, in terms of cost effectiveness when considering land, water conveyance, and land preparation, Study Area 4 is deemed to be superior to Study Area 1.

- *Recycled Water Reuse Interest*

District No. 14 held meetings in the Antelope Valley in June 2001, February 2003, and May 2003, with farmers, representatives of farming entities, and/or the Los Angeles County Farm Bureau in order to gauge interest in the reuse of recycled water from the LWRP for agricultural operations. The meetings were advertised in the *Antelope Valley Press* and/or the *Los Angeles County Farm Bureau* quarterly newsletter.

The majority of the attendees expressed interest in utilizing recycled water by entering into mutually beneficial contracts and developing agricultural reuse operations on land acquired by District No. 14. Most of these farming entities currently do not own land within Study Areas 1 or 4. The farmers who currently own land within the study areas and expressed interest in utilizing recycled water are located within Study Area 4. These individuals own between 10 and 40 acres of land on which they cultivate alfalfa. However, these areas are not large enough to satisfy a significant portion of the land required for agricultural operations. Therefore, Study Areas 1 and 4 were deemed to be similar with respect to reuse interest based on the fact that a number of farming entities would be willing to conduct agricultural operations wherever District No. 14 acquires land.

Selection of Agricultural Reuse Study Area

The qualitative comparison and ranking of the suitable agricultural reuse study areas based on the second-level screening criteria is summarized in Table 7-6. Examination of the table indicates that Study Area 4 is superior to Study Area 1 for the development of agricultural operations. Therefore, Study Area 4 is the recommended location for the implementation of the proposed agricultural reuse operations.

PROJECT COST

The cost of the recommended project is presented as both the total capital cost and as an equivalent annual cost. Although the project costs will be incurred in future years, all amounts contained in the following discussion are in 2003 dollars. Table 7-7 shows the capital cost breakdown of the recommended project for the Stage V expansion, the Stage VI expansion, and the total project. In addition to these facilities construction costs, which include 10 percent for design, Table 7-7 also includes the cost of land, land acquisition services, relocation expenses, and contingency for mitigating implementation of the recommended project. It should be noted

Table 7-6
Summary of the Second-Level Screening and Ranking of Suitable Agricultural Reuse Study Areas [a]

CRITERIA	PROPOSED AGRICULTURAL REUSE OPERATIONS LOCATION	
	STUDY AREA 1 (west of LWRP)	STUDY AREA 4 (east of LWRP)
Operational Considerations	0	0
Environmental Impact	–	+
Public Impact	0	0
Cost Effectiveness	–	+
Recycled Water Reuse Interest	0	0
Total Score	2–	2+
OVERALL RANKING	**2**	**1**

(a) Comparative ratings are Superior (+), Neutral (0), and Inferior (–).

Table 7-7
Capital Cost Breakdown of the Recommended Project [a,b]

PROJECT COMPONENT	LWRP		
	STAGE V	STAGE VI	TOTAL
Preliminary - Influent Pump Station	$3,953,000	—	$3,953,000
Preliminary - Odor Control Stations	$779,000	—	$779,000
Preliminary - Ferrous Chloride Stations	$194,000	—	$194,000
Primary - Comminutors, Aerated Grit Channels	$277,000	$277,000	$554,000
Primary - Sedimentation Tanks	$2,737,000	$2,736,000	$5,473,000
Secondary (CAS) - Aeration Tanks, Return Activated Sludge	$13,348,000	$3,178,000	$16,526,000
Secondary (CAS) - Sedimentation Tanks, Waste Activated Sludge	$6,216,000	$1,480,000	$7,696,000
Secondary (CAS) - DAF Units	$782,000	$186,000	$968,000
Secondary (CAS) - Chemical Stations	$984,000	$234,000	$1,218,000
Secondary (CAS) - Piping	$3,950,000	$941,000	$4,891,000
Tertiary - Filters, Pumps, Backwash Recovery	$12,875,000	$3,066,000	$15,941,000
Tertiary - Piping	$1,317,000	$313,000	$1,630,000
Tertiary (Disinfection) - Chlorine Contact Tanks	$2,982,000	$710,000	$3,692,000
Tertiary (Disinfection) - Chlorination	$620,000	$148,000	$768,000
Biosolids Handling - Digestion Tanks	$7,528,000	$4,517,000	$12,045,000
Biosolids Handling - Drying Beds	$1,443,000	$444,000	$1,887,000
Effluent Management - Storage Reservoirs	$16,013,000	$8,006,000	$24,019,000
Effluent Management - Agricultural Operations	$9,758,000	—	$9,758,000
Effluent Management - Piping, Pump Station	$25,000,000	—	$25,000,000
Miscellaneous - Oxidation Pond Effluent N-Removal, Dechlorination	$2,130,000	—	$2,130,000
Miscellaneous - Roads, Fences, Culverts	$2,015,000	$1,008,000	$3,023,000
Miscellaneous - Plant Monitoring Wells	$853,000	—	$853,000
Miscellaneous - Laboratory Building	$2,147,000	—	$2,147,000
Land - Wastewater Treatment, Biosolids Handling	$75,000	—	$75,000 [c]
Land - Storage Reservoirs	$3,750,000	—	$3,750,000 [d]
Land - Agricultural Operations	$29,109,000	—	$29,109,000 [e]
Land Acquisition Services	$5,075,000	—	$5,075,000
Relocation Expenses	$5,361,000	—	$5,361,000
Contingency for Mitigation	$11,399,000	—	$11,399,000
TOTAL CAPITAL COST	**$172,670,000**	**$27,244,000**	**$199,914,000**

(a) 2003 dollars.
(b) All costs, except land, land acquisition services, relocation expenses, and contingency for mitigation, include 10 percent for design.
(c) 15 acres @ $5,000 per acre.
(d) 750 acres @ $5,000 per acre.
(e) 4,650 acres @ $6,260 per acre.

Table 7-8
Equivalent Annual Cost of the Recommended Project[a]

PROJECT COMPONENT	LWRP		
	STAGE V	STAGE VI	TOTAL
Design	$10,718,000	$2,477,000	$13,195,000
Construction	$107,183,000	$24,767,000	$131,950,000
Land	$32,934,000	—	$32,934,000
Land Acquisition Services	$5,075,000	—	$5,075,000
Relocation Expenses	$5,361,000	—	$5,361,000
Contingency for Mitigation	$11,399,000	—	$11,399,000
Total Capital Cost	$172,670,000	$27,244,000	$199,914,000
Annualized Capital Cost[b]	$15,827,000	$2,497,000	$18,324,000
Annual O&M Cost[c]	$7,454,000	$1,636,000	$9,090,000
EQUIVALENT ANNUAL COST	**$23,281,000**	**$4,133,000**	**$27,414,000**

(a) 2003 dollars.
(b) Amortized at 6.625 percent annual interest rate for 20 years.
(c) Based on 21 mgd for Stage V facilities, 5 mgd for Stage VI facilities, and 26 mgd for Total facilities.

that mitigation can vary significantly depending upon the location of the land being developed. Table 7-8 shows the equivalent annual project cost, which is comprised of the annualized capital cost and the anticipated annual O&M cost, for the Stage V expansion, Stage VI expansion, and the total project.

The capital cost of the recommended project was split into two subcategories: (1) upgrade of the LWRP and (2) expansion of the LWRP. Upgrade components provide a higher level of treatment or correct existing deficiencies without providing additional capacity, which is currently 16 mgd. Expansion components provide increased capacity (16 mgd to 26 mgd), but not a higher level of treatment. The design capacity of the major components of the recommended project that will be constructed, including the allocation between upgrade and expansion, are shown in Table 7-9. The estimated capital cost of all the upgrade and expansion components of the recommended project are listed in Table 7-10. The basis for the upgrade/expansion allocation percentages is discussed in the following section.

Upgrade Cost

The existing influent pump station can manage up to the current 16-mgd design capacity of the LWRP. However, its construction is non-modular and, as such, cannot be expanded above its current capacity at its existing location. Additionally, adjacent space for construction of a separate 10-mgd station is limited. Consequently, an entirely new, modular influent pump station will be constructed with a capacity of 26 mgd. Thus, 61.5 percent (16 mgd of 26 mgd) of the cost of the new influent pump station is attributable to upgrade.

The LWRP currently has no odor control, nitrogen removal, or dechlorination facilities. Thus, 61.5 percent (16 mgd of 26 mgd) of the cost of each is attributable to upgrade. Similarly, since the existing 16-mgd capacity oxidation ponds and 0.6-mgd capacity AVTTP will be decommissioned, 61.5 percent of the 26-mgd CAS and tertiary treatment facilities costs are attributable to upgrade.

As indicated in Table 4-9, the LWRP currently has an annual average effluent management capacity of approximately 9 mgd. Therefore, 7 mgd of the

Table 7-9
Major Upgrade and Expansion Components of the Recommended Project

PROJECT COMPONENT	CAPACITY	LWRP	
		UPGRADE	EXPANSION
Preliminary - Influent Pump Station	26 mgd	16 mgd (61.5%)	10 mgd (38.5%)
Primary Treatment	10 mgd	—	10 mgd (100%)
Secondary (CAS) Treatment	26 mgd	16 mgd (61.5%)	10 mgd (38.5%)
Tertiary Treatment	26 mgd	16 mgd (61.5%)	10 mgd (38.5%)
Biosolids Handling	10 mgd	—	10 mgd (100%)
Effluent Management - Storage Reservoirs	2,300 million gallons	948 mil. gal. (41.2%)	1,352 mil. gal. (58.8%)
Effluent Management - Agricultural Operations	3,970 acres [a]	1,636 acres (41.2%)	2,334 acres (58.8%)
Land - Storage Reservoirs	750 acres	309 acres (41.2%)	441 acres (58.8%)
Land - Agricultural Operations	4,650 acres	2,316 acres (49.8%)	2,334 acres (50.2%)

(a) Does not include the 680-acre Nebeker Ranch since it is included in the existing LWRP effluent management capacity of 9 mgd.

Table 7-10
Capital Cost of Upgrade and Expansion Components of the Recommended Project[a,b]

PROJECT COMPONENT	LWRP		
	UPGRADE	EXPANSION	TOTAL
Preliminary - Influent Pump Station	$2,431,000	$1,522,000	$3,953,000
Preliminary - Odor Control Stations	$479,000	$300,000	$779,000
Preliminary - Ferrous Chloride Stations	—	$194,000	$194,000
Primary - Comminutors, Aerated Grit Channels	—	$554,000	$554,000
Primary - Sedimentation Tanks	—	$5,473,000	$5,473,000
Secondary (CAS) - Aeration Tanks, Return Activated Sludge	$10,163,000	$6,363,000	$16,526,000
Secondary (CAS) - Sedimentation Tanks, Waste Activated Sludge	$4,733,000	$2,963,000	$7,696,000
Secondary (CAS) - DAF Units	$595,000	$373,000	$968,000
Secondary (CAS) - Chemical Stations	$749,000	$469,000	$1,218,000
Secondary (CAS) – Piping	$3,008,000	$1,883,000	$4,891,000
Tertiary - Filters, Pumps, Backwash Recovery	$9,804,000	$6,137,000	$15,941,000
Tertiary – Piping	$1,002,000	$628,000	$1,630,000
Tertiary (Disinfection) - Chlorine Contact Tanks	$2,271,000	$1,421,000	$3,692,000
Tertiary (Disinfection) – Chlorination	$472,000	$296,000	$768,000
Biosolids Handling - Digestion Tanks	—	$12,045,000	$12,045,000
Biosolids Handling - Drying Beds	—	$1,887,000	$1,887,000
Effluent Management - Storage Reservoirs	$9,896,000	$14,123,000	$24,019,000
Effluent Management - Agricultural Operations	$4,020,000	$5,738,000	$9,758,000
Effluent Management - Piping, Pump Station	$10,300,000	$14,700,000	$25,000,000
Miscellaneous – Oxidation Pond Effluent N-Removal, Dechlorination	$1,310,000	$820,000	$2,130,000
Miscellaneous - Roads, Fences, Culverts	$1,245,000	$1,778,000	$3,023,000
Miscellaneous - Monitoring Wells	—	$853,000	$853,000
Miscellaneous - Laboratory Building	$1,320,000	$827,000	$2,147,000
Land - Wastewater Treatment, Biosolids Handling	—	$75,000	$75,000
Land - Storage Reservoirs	$1,545,000	$2,205,000	$3,750,000
Land - Agricultural Operations	$14,496,000	$14,613,000	$29,109,000
Land Acquisition Services	$2,091,000	$2,984,000	$5,075,000
Relocation Expenses	$2,209,000	$3,152,000	$5,361,000
Contingency for Mitigation	$4,696,000	$6,703,000	$11,399,000
TOTAL CAPITAL COST	**$88,835,000**	**$111,079,000**	**$199,914,000**

(a) 2003 dollars.
(b) All costs, except land, land acquisition services, relocation expenses, and contingency for mitigation, include 10 percent for design.

17 mgd increment required to increase the LWRP effluent management capacity from 9 mgd to 26 mgd is attributable to an upgrade of the LWRP to 16 mgd. Thus, 41.2 percent (7 mgd of 17 mgd) of the cost of effluent management facilities (e.g., storage reservoirs, agricultural operations, etc.) is attributable to upgrade of the LWRP. These facilities will increase the effluent management capacity of the LWRP from 9 mgd to 16 mgd and are necessary to properly manage the effluent that currently overflows from Piute Ponds onto Rosamond Dry Lake. As indicated in Table 7-9, the upgrade portion of the major effluent management facilities that will be constructed amounts to 948 million gallons of new storage capacity (including a portion of the total land on which the reservoirs will be sited), 1,636 acres of agricultural operations (41.2 percent of 3,970 acres, which is 4,650 acres minus the 680-acre Nebeker Ranch operation [should District No. 14 be successful in purchasing Nebeker Ranch] since it is already accounted for in the existing 9 mgd effluent management capacity of the LWRP), and 2,316 acres (1,636 acres plus the 680-acre Nebeker Ranch, or equivalent acreage if District No. 14 is not successful in purchasing Nebeker Ranch) of the 4,650 acres of land required for agricultural operations. According to the detailed project component cost summary in Table 7-10, the total capital cost associated to the upgrade portion of the recommended project is $88,835,000.

As stated previously, the upgrade portion of the recommended project does not provide additional capacity. Its purpose is to provide a higher level of treatment for existing users or correct existing deficiencies. Therefore, the existing users are responsible for paying for the capital costs associated with the upgrade portion of the recommended project. The existing users will ultimately pay for this portion of the recommended project through the Service Charge Program, as discussed in the *Revenue Program* section of this chapter.

Expansion Cost

The recommended project includes construction of facilities that will increase the wastewater treatment and effluent management capacity of the LWRP from 16 mgd to 26 mgd. This 10 mgd increase in capacity is necessary to manage the increased demands within the District No. 14 planning area through the year 2020 created by new users of the sewer system, or existing users who significantly increase their discharge flow and/or strength to the sewer system.

The major expansion components of the recommended project include influent pumping; odor control; ferrous chloride stations; primary, secondary, and tertiary wastewater treatment; biosolids handling; and effluent management. The cost of influent pumping, odor control, secondary treatment, and tertiary treatment facilities attributable to expansion is based on 38.5 percent (10 mgd of 26 mgd). The cost of the ferrous chloride station, primary treatment, and biosolids handling facilities attributable to expansion is 100 percent (10 mgd of 10 mgd).

As stated previously, the LWRP currently has an annual average effluent management capacity of approximately 9 mgd. Therefore, 10 mgd of the 17-mgd increment required to increase the LWRP effluent management capacity from 9 mgd to 26 mgd is attributable to expansion. Thus, 58.8 percent (10 mgd over 17 mgd) of the cost of effluent management facilities (e.g., storage reservoirs, agricultural operations, etc.) is attributable to expansion of the LWRP. These facilities will increase the effluent management capacity of the LWRP from 16 mgd to 26 mgd. As indicated in Table 7-9, the expansion portion of the major effluent management facilities that will be constructed amounts to 1,352 million gallons of new storage capacity (including the land on which the reservoirs will be sited), 2,334 acres of agricultural operations (58.8 percent of 3,970 acres, which is 4,650 acres minus the 680-acre Nebeker Ranch operation [should District No. 14 be successful in purchasing Nebeker Ranch] since it is already accounted for in the existing 9 mgd effluent management capacity of the LWRP), and 2,334 acres (4,650 acres minus the 2,316 acres required for upgrade) of land for agricultural operations. Based on the detailed project component cost summary in Table 7-10, the total capital cost associated to the expansion portion of the recommended project is $111,079,000.

Since the expansion portion of the recommended project is designed to provide additional capacity at the same level of wastewater treatment and effluent management as the existing facilities, new users of the system, or those that significantly increase their discharge flow and/or strength, are responsible for the capital costs associated with the expansion. The new users will ultimately pay for this portion of the recommended project through the Connection Fee Program, as discussed in the *Revenue Program* section that follows.

REVENUE PROGRAM

A revenue program allocates costs and supplemental revenue as needed from the users of the system to ensure sufficient revenues for construction and subsequent operation of facilities. Specifically, a revenue program must demonstrate that the proposed system of user charges is both (1) fair and equitable and (2) based on both the flow and the strength of the user's discharge. Furthermore, a revenue program must provide that, following completion of construction, there will be a sufficient revenue stream to continue to operate and maintain each facility throughout its useful life. Lastly, as it pertains to SRF loans, a revenue program must provide for repayment of the loan funds.

The Districts first addressed the issue of a revenue program in the May 1979 *Report on the Future Revenue Program of the Sanitation Districts of Los Angeles County*. This report was updated as subsequent facilities plans were submitted to the SWRCB for approval. The revenue program for District No. 14 was most recently approved by the SWRCB Division of Clean Water Programs in 1996.

The Districts' financial program is based on maximum utilization of existing sources of revenue, supplemented by revenues from (1) the Service Charge Program and (2) the Connection Fee Program.

The Service Charge Program is applicable to existing users and includes the following provisions:

- Existing users are charged for operation, maintenance, and upgrade capital costs;
- Charges are based on the estimated usage of the system (based on user category and facility size);
- Charges are based on a combination of flow and strength (chemical oxygen demand and suspended solids); and
- Charges are collected as a specific lien on the property tax bill.

The Connection Fee Program, on the other hand, applies to new users and existing users who significantly increase their discharge flow and/or strength. This program includes the following provisions:

- New users, or existing users who significantly increase their discharge flow and/or strength, are charged a one-time fee for the incremental cost of expanding capital facilities to accommodate the new discharge;
- Charges are based on the anticipated usage of the system (based on user category and facility size); and
- Charges are based on a combination of flow and strength (chemical oxygen demand and suspended solids).

The connection fees from new users, or existing users who significantly increase their discharge flow and/or strength, are collected and deposited into a restricted fund designated as the "Capital Improvement Fund." As expansion-related projects are constructed, the necessary funds are withdrawn from this account and used to cover the cost of expansion.

Copies of the enabling Master Service Charge Ordinance and Master Connection Fee Ordinance are included as Appendices D and E, respectively.

The revenue program approved by the SWRCB in 1996 established the basis for calculation of the annual service charge in District No. 14. The Service Charge Rate Ordinance, adopted by District No. 14 on February 28, 2001, is included as Appendix F. The Connection Fee Rate Ordinance, adopted by District No. 14 on April 25, 1996, is included as Appendix G.

In order to prevent a large fluctuation in the service charge rates from year to year, District No. 14 utilizes outside financing to the maximum extent possible to distribute the capital costs of projects over an extended period of time. The primary mechanism that District No. 14 uses is the SRF loan program. This program makes funds available at one-half the current state general obligation bond rate for a period of 20 years. Additionally, a 20-year bond was issued by District No. 14 in June 2003 that yielded $8,500,000 in net proceeds for the construction fund.

Projected Service Charge Rate

On an annual basis, District No. 14 reviews its anticipated capital improvement and operational expenses and its available sources of funding. The available funding includes both SRF loans and bond proceeds, while the expenses include any associated debt repayment. The difference between the anticipated expenses and the available funding represents the supplemental revenue that must be collected through the Service Charge Program. This analysis is done on a District-wide basis as opposed to a project-by-project basis in order to incorporate funding limitations that may be imposed on the cumulative capital program that would otherwise not be triggered by any single capital project.

District No. 14 has also covenanted, pursuant to the *Joint Acquisition Agreement* to which it became signatory as part of the recent bond sale, to establish rates and charges to meet certain requirements. These requirements, commonly referred to as "coverage tests," generally state that operating revenues must be sufficient to cover 100 percent of the O&M costs, 120 percent of the debt service associated with senior obligations, and 100 percent of the debt associated with subordinate obligations. The supplemental revenue determined above must be compared to the coverage amount, and the service charge rate is based on the larger of these two amounts.

As discussed previously, the upgrade portion of the recommended project is estimated to be $88,835,000. This equates to approximately $1,800 per equivalent single-family home. If the recommended project had to be funded in a single year, the cost per single-family home would probably be prohibitive for many homeowners. However, the time needed to construct Stage V of the recommended project, as shown in Figure 7-5, will be approximately five years. This will spread the project cost over this time period. However, this will not sufficiently reduce the cost impact on the service charge. Therefore, District No. 14 plans to utilize the SRF loan program to finance the project cost over 20 years. SRF funding will be supplemented with additional bond proceeds, as required, to minimize the impact on the service charge rate. When taking all of these factors into consideration, as well as all other capital and operational expenses, it is projected that the service charge rate will have to increase from the current $67 per year per single-family home to approximately $220 per year per single-family home by fiscal year 2008-09. This translates to an increase of approximately $31 per year per single-family home for each year over the next five years.

The current service charge rate of $67 per year per single-family home has been in effect for 11 years, since fiscal year 1993-94. Although a significant increase in the present rate is projected as a result of the cost to construct and operate the recommended project, the projected future rate of $220 per year per single-family home is within the range that other communities in California currently pay for wastewater treatment. For comparison, the current service charge rates for the City of Los Angeles and the community of Tehachapi are $256 and $349 per year, respectively, while the current rate for the community of Rosamond is $227 per year. On a statewide level, the projected future rate of $220 per year for District No. 14 is equal to the median rate charged in 2002 by all communities in California.

Projected Connection Fee Rate

When District No. 14 first implemented the Service Charge Program, the public was very adamant in its desire that the existing users not be required to subsidize new growth occurring within the service area. Consequently, District No. 14 implemented a Connection Fee Program whereby new users, or existing users who significantly increase their discharge flow and/or strength, are required to pay for the incremental cost of expansion. The determination of the incremental cost is based on an exact replication of the existing wastewater management facilities when the next expansion is constructed. This ensures that the new facilities will provide the same quality of treatment as existing facilities. The connection fee is not intended to pay for upgrades (e.g., higher levels of wastewater treatment) of existing facilities.

One of the goals of the revenue program is that users not be double charged for the same facilities. It would not be equitable to include a future upgrade as part of the connection fee rate because a user would also be required to pay for the same upgrade as part of their service charge after they connected to the sewerage system. Likewise, it would not be equitable to exclude an upgrade from the connection fee rate until construction of the upgrade was complete because any new users who connected just before the upgrade was complete would end up paying virtually nothing for the upgrade. The compromise solution is to phase a portion of the cost of the upgrade into the connection fee rate over time according to the percentage of the upgrade completed during each fiscal year. Therefore, it is projected that the connection fee rate will have to increase, in phased increments, from its current rate of $1,780 per single-family home to approximately $3,900 per single-family home, over a five-year period that parallels the Stage V construction time frame.