FINAL REPORT

VOLUME III SUPPORTING REPORT

F. WATER SUPPLY PLAN

STUDY
ON
INTEGRATED WATER RESOURCES DEVELOPMENT
IN THE CAÑETE RIVER BASIN
IN
THE REPUBLIC OF PERU

FINAL REPORT
VOLUME III
SUPPORTING REPORT

F: Water Supply Plan

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Chapter 1 Present Situation of the Water Supply Systems

1.1 Present Situation of Water Supply Systems in the Service Area

1.1.1 Service Area

The service area to be covered by the Study for domestic, industrial and tourism water supply is shown on Figure 1.1(1/2) and 1.1(1/2), including:

- Canete River Basin itself (34 districts)
- Axis Chilca-Canete (6 districts)
- Lima South Cone (10 districts out of 12)
- Pampas Concon-Topara (2 districts)

1.1.2 Water Supply Systems Administrated by EMAPAC S.A

Within Canete River Basin and Axis Chilca-Canete there are nine (9) water supply systems, see Figure 1.2, which are administrated and operated by EMAPAC S.A (Canete Municipal Enterprise of Water Supply and Sewerage), they are: Imperial, San Vicente, Mala, San Luis, Quilmana, Cerro Azul, San Antonio, Santa Cruz de Flores and Lunahuana.

After a field survey carried out in the service area as well as after reviewing EMAPAC S.A M/P main indicators are shown in Tables 1.1 and 1.2 and summarized as follows:

- Surface water source : 25%(numbers of surface water intakes)
- Groundwater source : 75%(numbers of Groundwater intakes)
- Surface water production : 168,347 m3/month (25%)
- Groundwater production : 493,125 m3/month (75%)
- Average unaccounted water : 47% (total water supply system losses)
- Average service continuity : 19 hours/day
- Average service coverage : 65% (% of population with drinking water)
- Average unit water sales price : US$ 0.14/m3
- Population with drinking water : 72,594 (64% as 1998)
- Deficit of water : 400,329 m3/month (as 1998)

EMAPAC S.A is conducting since 1998 basic M/P study on water supply and sewerage aims to improve overall drinking water and sewerage service as well. They basically propose to rehabilitate all water supply and sewerage systems. Main parameters and goals are summarized as follows:

- Master Plan Stage I, 2000-2009, Stage II, 2010-2024
- To include Nuevo Imperial system in Imperial/San Vicente system and make a regional water supply and sewerage system. This system will be composed by San Vicente de Canete, Nuevo Imperial, Imperial, San Luis and Cerro Azul. Two alternative from the view point of raw water source and water treatment plant are proposed, the first one is to rehabilitate all facilities having groundwater as main raw water source and the second one is to built a new regional water treatment plant at Socsi having Canete river as surface water source.
- To rehabilitate remaining five (5) water supply and sewerage systems having groundwater as main raw water source.
- As year 2009 to achieve 95% of coverage in both water supply and sewerage, 100% metering, to reduce losses up to 20% and 22 hours as service continuity.

This M/P study at present is behind schedule to draft level and they expected to finalize it by early year 2000. Implementation will start hopefully by 2001 if funds are available. In Figures 1.3 and 1.4 are shown San Vicente and Imperial current water supply systems.

1.1.3 Water Supply Systems Administrated by Municipalities

These water supply systems are majority and they are distributed in the service area as follows:

(1) Lima South Cone: Punta Hermosa, Punta Negra,San Bartolo and Santa Maria
(2) Axis Chilca-Canete: Chilca and Asia
(3) Canete River Basin: Nuevo Imperial plus 26 districts of Yauyos Province
(4) Pampas Concon-Topara: Grocio Prado

In case of Yauyos Province, main features of those water supply systems are shown on Table 1.3 as well as Figures 1.5 and 1.6. These water supply systems are very small and usually raw water is taken from groundwater and intake capacity ranges from 1.0 l/s to 15 l/s. Population ranges from 100 to 3,000.

1.2 Present Situation of the Lima City Water Supply System

1.2.1 Surface Water Source

Surface water resources for Lima City Water Supply System consist in:

- Small lagoons located at upper part of Santa Eulalia River which is a tributary of Rímac river with a total effective storage of 75.7 MCM
- Yuracmayo reservoir located on Blanco river which is a tributary of Rímac river with an effective storage of 48 MCM
- Marca I project located in the upper part of Mantaro river basin regulated in Antacoto reservoir with an effective storage of 60 MCM
- Marca III project with regulation in Antacoto reservoir with effective storage of 60 MCM more. There are four (4) more lagoons which are parts of Marca I and III projects, they are Marcacocha (10.7 MCM), Marcapomacocha (14.8 MCM), Sangrar (8.8 MCM) and Tucto (2.5 MCM); in total 280.5 MCM of regulated water is available as surface water for Lima water supply system.

(1) Rímac River Water Quality

At present raw water quality for Lima water supply system is not good due to:

- Heavy metals and others chemical residues from mines go to the Rímac river
- Sewage from population settled along Rímac river go to it (reported total coliform at La Atarjea ranges between 60,000 in average to 460,000 in rainy season).
- In rainy season a lot of Huaycos (debris flow) take place in the Rímac river basin carrying a big amount of suspended solids which contribute to the river contamination.

(2) Raw Water Treatment Plant

The raw water treatment plant for Lima & Callao Water Supply System is named La Atarjea and it is composed for two plants with capacity of 10 m3/s each. In 1998 the total average potable water produced was 7.21 m3/s (plant #1) and 8.51 m3/s (plant #2) which represents 79% of the La Atarjea plant total capacity.

1.2.2 Groundwater Source

SEDAPAl administrates and operates 442 wells from which 371 wells are in condition to produce water. Total groundwater discharge up to June 1998 was 7.32 m3/s. At present withdrawal of water from the ground to the above rates resulted in lowering the water table, reversed the normal seaward gradient and permitted salt water to move inland and contaminated the aquifer and besides it has problems related to sulfate and nitrates.

1.2.3 Main Water-Distribution System

This system is composed by pipes whose diameters range from 14” (350 mm) to 72” (1,800 mm) with total length of 400 km as December 1998.

1.2.4 Secondary Water-Distribution System

This system is composed by pipes whose diameters range from 3” (75 mm) to 12” (300 mm) with total length of 7,933 km as 1998. There are also 241 re-pumping stations.

1.2.5 Summary of Present Situation

Main indexes showing present situation of Lima & Callao Water Supply System are depitected as follows:

Present Situation of Lima & Callao Water Supply System

Item	Value
Surface water production	40,746,240 m3/month (15.72 m3/s)
Groundwater production	18,973,440 m3/month (7.32 m3/s)
Average unaccounted water	35%
Average service continuity	16.5 hours/day
Average service coverage	82.7%
Average unit water sales price	US$ 0.42/m3
Population with drinking water service as 1998	5,894,126 (82.7%)
Deficit of drinking water as 1998	23,976,000 (9.25 m3/s)
Total population as 1998	7,130,008
Population without drinking water service as 1998	1,235,882 (17.3%)

1.3 Population and Coverage

Present population and coverage for the service area is depicted as follows:

Population and Coverage

Service Area	Population as 1998	Population with Drinking Water	Population Without Drinking Water	Coverage (%)
Lima South Cone	1,023,500	710,323	313,197	69.4
Axis Chilca-Canete	45,628	(*)	(*)	(*)
Canete River Basin	141,062	(*)	(*)	(*)
Concon-Topara	4,224	(*)	(*)	(*)
EMAPAC S.A	114,162	72,494	41,568	63.6

Note: (*) means there is not available information

1.4 Production Capacity and Unit Water Consumption

The capacity and per person water consumption of the SEDAPAL (Metropolitan Lima & Callao) and EMAPAC S.A systems are summarized below, as of the year 1998.

Production Capacity and Unit Water Consumption

W/S System	Production Capacity	Population Served	Unit Water Consumption
Lima & Callao (SEDAPAL)	1,990,656 m3/day	5,894,126	338 l/person/day
EMAPAC S.A	22,049 m3/day	72,594	304 l/person/day

1.5 Present Water Demand Volume

Present water demand volume for the service area as well as for Metropolitan Lima & Callao are summarized below, as of the year 1998.

Present Water Demand Volume

Lima-Callao City and Service Area	Population in Year 1998	Present Water Demand (MCM)	Present Water Demand (m3/s)	Domest. Water Demand (MCM)	Indust Water Demand (MCM)	Tourism Water Demand (MCM)
Lima-Callao City	7,130,008	1,018.30	32.29	981.00	38.00	0
Lima South Cone	1,023,520	113.25	3.59	109,06	4,19	0
Axis Chilca-Canete	45,628	3.11	0.10	2,80	0.23	0.08
Canete River Basin	141,062	9.37	0.30	8.65	0.55	0.17
Concon-Topara	4,224	0.20	0.006	0.19	0	0.01
Sub-Total Service Area	1,214,434	125.93	4.00	120.70	4.97	0.26

1.6 Present Water Use

Present water use for EMAPAC S. A system as well as for Metropolitan Lima & Callao (SEDAPAL) are summarized below, as of the year 1998.

Present Water Use

Water Use	Lima & Callao (%)	EMAPAC S.A (%)
Social	0.5	-
Domestic	91.1	74.3
Commercial	6.8	25.2
Industrial	1.0	0.5
State (Government)	0.6	-
Total	100.0	100.0

Chapter 2 Review, Analysis and Evaluation of Lima & Callao City Water Supply M/P

2.1 Summary of the M/P

SEDAPAL M/P study was carried out from June 1997 to December 1998 with the following aim:

- To ensure continuity (24 hours) and a better quality of the drinking water service.
- To ensure an adequate sewerage system in order to avoid diseases and to reduce the environment pollution.
- To evaluate capacity and deficiency of the current systems to respond to the population demand.
- To propose an institutional and operative improvement program (MIO) in order to improve all services to a middle term.
- To select expansion priority projects from technical, environmental, economic and financial view points and to choose that one with the minimum cost.
- To establish an investment program.
- To establish a feasible water tariff in order to fulfill what has been proposed in the M/P.

As the year 1998 deficit of drinking water in Metropolitan Lima amounted to 23,976,000 m^3/month (9.25 m^3/s), average unaccounted water was 35% and only 18% of household have water consumption metering system and pipes leakage account for 9% of total losses.

With the implementation of the above mentioned MIO program total losses will be reduced from 35% to 25% which is considered as the maximum economically feasible to be attained in the Latinamerican countries.

This M/P has been planned to cover the period 1998-2030 and it is to be revised and updated every 5 years.

The population of Metropolitan Lima up to year 2030 has been assessed to be 11,751,000 and the coverage by drinking water will be 98%. The active water demand to the year 2030 will be 31 m^3/s and necessity of water production will be 40.68 m^3/s (1,282.88 MCM) as shown in Tables 2.1, 2.2 and 2.3.

2.2 Implementation of Water Projects

Following the programs in the M/P projects in nine (9) categories are currently under implementation including:

- Development of surface source and groundwater source.

- Raw water conveyance.
- Water treatment plants.
- Conveyance of drinking water which includes main and secondary distribution network pipe.
- Storage of drinking water.
- Pumping Station of drinking water.
- Drinking water distribution including domiciliary pipe connection.
- MIO Program.
- Tariff.

All above projects were under an integrated evaluation and as outcome of the selected scenario of Alternative 2 which proposes implementation of new water sources including Mantaro-Carispacha water transfer, Chillón river development, Huascacocha reservoir & water transfer and Lurín groundwater exploitation.

2.3 Water Demand and Supply Balance as Year 2030

In Table 2.4 is shown water demand and supply balance prepared by SEDAPAL M/P for Alternative 2 (Mantaro-Carispacha Water Transfer, Q=5m3/s) which is good too for Alternative 1a (Canete Water Conveyance, Q=5m3/s) as year 2030. This table shows that total water sources during low water season(40.78 m3/s) are enough to meet the monthly average water demand (40.59 m3/s), even there is a surplus of 0.17 m3/s.

2.4 Comments by JICA Study Team to the SEDAPAL M/P

2.4.1 Development of surface source

Regarding Mantaro–Carispacha water transfer project, SEDAPAL M/P did not assessed followings items which are very fundamental:

- The reliability of the annual mean discharge (5 m3/s) to be diverted from Mantaro upper catchment area to Marcapomacocha reservoir.
- How Marca III water transfer project already commissioned affects the above annual mean discharge to be diverted. By example water diversion from Corsucancha and Casacancha streams which belong to Marca III scheme as well as to Mantaro- Carispacha is 3.0m3/s, then part of this discharge has to be deducted from 5 m3/s.
- How Mantaro-Carispacha water transfer will affect the potential for generating electricity on Mantaro Hydropower Station (under operation). Gain /Loss balance among increase electricity generation on Rímac river, decrease electricity generation on Mantaro river and energy required for pumping up from Carispacha reservoir to Marcapomacocha reservoir has to be carried out.

- Losses between upper part of Rímac river and La Atarjea Water Treatment Plant Intake has been considered by SEDAPAL M/P to be 5%, however measurements of discharge conducted by SEDAPAL itself lead to assess that losses are in the range of 25%, if this fact is confirmed then shortage of raw water will take place in the future.
- SEDAPAL M/P did not considered relocation of Marcapomacocha village with a population of 1,756 in 1981 and 1,301 in 1993 which is required for construction of Marcapomacocha new dam. This relocation constitute a big negative environmental issue
- Rímac river is very contaminated due to heavy metals, intensive agriculture development and sewerage outflow, then in some extend fresh water from Rímac river basin is required as agent diluent. This fresh water to be used as diluent instead to use it as source of drinking water has to be replaced for another surface source and Canete river is an alternative for this purpose.

2.4.2 Development of groundwater source

- Lurin new wells (0.30 m3/s) to be developed in 2002 for Lima South Cone are not reliable from view point of water quality besides nearby in Punta Hermosa salt water has contaminated the aquifer.
- There are evidences that Lima aquifer due to overdraft salt water has moved inland and contaminated it.
- Then as a general policy is better to think in develop surface water rather than groundwater. Under this circumstances Canete river is an alternative for Lima South Cone.

2.4.3 Water Demand and Water Production

Both water demand and water production have been well assessed however uncertainty remains regarding reduction in consumption due to introduction of water meters. Experience in other countries shows that reduction in consumption following the implementation of meters is usually only temporary.

Chapter 3: Water Demand Projection

3.1 Projection of Future Population in the Service Area

Future population(total, urban and rural) in the service area was estimated by JICA Study Team based on 1940, 1961, 1972, 1981 and 1993 census record of INEI and is shown in Tables 3.1(1/2), 3.1(2/2),3.2, 3.3(1/3), 3.3(2/3) and 3(3/3) by each district.

The population of the service area was projected to reach 1,214,434 in 1998, 1,304,038 in the year 2000, 1,662,141 in 2010, 2,103,640 in 2020 and 2,612,706 in the planning horizon of 2030.

Summary of population projection is given below:

Summary of Population Projection

Year / Service Area	1998	2000	2010	2020	2030
Lima South Cone	1,023,520	1,105,343	1,409,247	1,782,149	2,207,308
Axis Chilca-Canete	45,628	48,319	64,619	86,962	117,688
Canete River Basin	141,062	145,982	174,169	209,312	252,962
Concon-Topara	4,224	4,394	14,106	25,216	34,748
Total Population	1,214,434	1,304,038	1,662,141	2,103,640	2,612,706
Annual Growth Rate		3.62%	2.46%	2.38%	2.19%

3.2 Projection of Future Population of Metropolitan Lima

Metropolitan Lima is constituted by 43 districts of Lima Province and 6 districts of Callao Province. Its total population as 1993 census was 6,434,323 which is 28.4% of the total population of Peru. In Table 3.4 is shown the future population of Metropolitan Lima as estimated by SEDAPAL M/P and for the planning horizon of 2030 such population is projected to be 11,751,197. A summary is given below:

Metropolitan Lima Population Projection

	1993	1998	2000	2010	2020	2030
Metropolitan Lima	6,434,323	7,130,008	7,505,802	8,934,224	10,266,351	11,751,197
Annual Growth Rate		2.08%	2.6%	1.76%	1.4%	1.36%

3.3 Projection of Unit Water Demand for the Service Area and Metropolitan Lima

3.3.1 Projection of Unit Water Demand for the Service Area

For the service area other than Lima South Cone domestic unit water demand or per person water consumption is shown in Table 3.5. This table was prepared based on Peruvian standard for similar population (DIGESA, PRONAP, CAPECO and SEDAPAL-Colegio de Ingenieros del Peru) as well as based on past Master Plan Study experience in Latinamerican countries. Population was

divided in groups and domestic unit water demand was assigned to each group in the basic year (1998) ranging from 60 l/p/d for population less or equal to 2,000 and as for population larger than 50,000, unit water demand was assessed to be 210 l/p/d. Unit water demand was projected until year 2030 as shown in such table.

3.3.2 Projection of Unit Water Demand for Metropolitan Lima

SEDAPAL M/P based on a very detailed field survey projected for Metropolitan Lima total unit water demand per districts for the period 1998-2030 as shown in Table 3.6, in average it ranges from 297 l/p/d (1998) to 228 l/p/d (2030). This total unit water demand was divided in domestic and non-domestic use(industrial, commercial, state and gardening). Non-domestic accounts for 22% in year 1998 and 20% in 2030,out of these percentages industrial use accounts for 3.7% in year 1998 and 1.8% in 2030.

On the other hand JICA Study Team made its own estimate not per districts but per sector of the total unit water demand as shown in Table 3.7. For industrial purpose it was taken as 10% of domestic use.

3.4 Water Demand Projection for the Service Area and Metropolitan Lima

The Study Team made estimates of water demand by categorizing water demand into domestic use, industrial use, and for tourism use, with procedure briefed below.

Water demand consists of those for domestic use, industrial water and for tourism. Future water demand is forecasted by the following procedure.

3.4.1 Domestic use

Domestic water use was projected by projecting future population by each district in the service area, and unit water demand (per person water consumption).

3.4.2 Industrial use

Industrial water use was projected in case of Lima South Cone for two cases, a) to be the same as forecasted by SEDAPAL M/P, which is ranging from 3.7% (1998) to 1.8% (2030) of the total water consumption and b) as 10% of the domestic water consumption for the area where population is equal or larger than 10,000, this is JICA Study Team approach. For the remaining service area industrial water demand was assumed to be 10% of the domestic water consumption for the area where population is equal or larger than 10,000.

3.4.3 Tourism use

Tourism water use is projected by estimating future domiciliary connection in resort areas in the service area and unit consumption of water per connection.

Water demand projection are shown in Tables 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14, 3.15, 3.16, 3.17, 3.18 and 3.19 as follows:

- Table 3.8, it shows projection of total drinking water necessity production for domestic use. In this table figures for Lima South Cone were taken from SEDAPAL M/P.

- Table 3.9, it shows projection of total water necessity production for industrial use. In this table figures for Lima South Cone were taken from SEDAPAL M/P.

- Table 3.10, it shows projection of total water necessity production for tourism.

- Table 3.11, it summarizes total necessity of water production (domestic, industrial and tourism) projection to the year 2030 for the service area. In this table domestic and industrial water production for Lima South Cone were taken from SEDAPAL M/P.

- Table 3.12, it shows total water production projection per districts for the service area. In this table domestic and industrial water production for Lima South Cone were taken from SEDAPAL M/P.

- Table 3.13, it shows same as above one but in m3/s.

- Table 3.14, it shows same as Table 3.11 but domestic, industrial necessity of water production for Lima South Cone as assessed by JICA Study Team.

- Table 3.15, it shows same as Table 3.12 but as assessed by JICA Study Team.

- Table 3.16, it shows same as above but in m3/s.

- Table 3.17, it shows active water demand in m3/s for Metropolitan Lima as assessed by JICA Study Team.

- Table 3.18, it shows total necessity of water production for Metropolitan Lima in m3/s as assessed by JICA Study Team.

- Table3.19, it shows same as above but in MCM.

Results are summarized as follows for years 1998 and 2030.

Present Water Demand

Lima-Callao City and Service Area	Population in Year 1998	Water Production Required year 1998 (MCM)	Water Production Required (m^3/s)	Water Production Required in year 1998 (MCM)		
				Domestic	Industrial	Tourism
Lima Callao City	7,130,008(*)	1,018.30/ 1,053.00[1]	32.29/ 33.39			
Lima South Cone	1,023,520	113.25/ 119.42	3.59(**)/ 3.79			
AxisChilca-Cañete	45,628	3.11	0.10	120.70(***)/120.86	4.97/ 10.98	0.26
Cañete River Basin	141,062	9.37	0.30			
Concón-Topará	4,224	0.20	0.006			

Water Demand Projection

Lima-Callao City and Service Area	Population in Year 2030	Water Production Required year 2030 (MCM)	Water Production Required (m^3/s)	Water Production Required in year 2030 (MCM)		
				Domestic	Industrial	Tourism
Lima-Callao City	11,751,197(*)	1,282.88/ 1,330.00[1]	40.68/42.17			
Lima South Cone	2,207,308	199.94/ 205.6	6.34(**)/6.52			
Axis Chilca-Cañete	117,688	15.17	0.48	239.34(***)/ 230.69	7.32/ 21.67	2.67
Cañete River Basin	252,962	29.59	0.94			
Concón-Topará	34,748	4.63	0.15			

The results of the above projection show close figures between those of SEDAPAL M/P and JICA Study Team. Final figures adopted lead to say as for year 1998 water demand for Metropolitan Lima-Callao city is 1,018.3 MCM and 125.93 MCM for the Service Area. As year 2030 water demand for Metropolitan Lima-Callao will be 1,282.9 MCM and 249.33 for the Service Area.

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[1] In fractions numerator indicates figures given by SEDAPAL M/P and denominator indicates figures estimated by JICA Study Team.

(*) Taken from "Master Plan of Drinking Water and Sewerage Systems of Lima and Callao", SEDAPAL 1998.

(**) Ten (10) districts out of twelve (12) have been considered in accordance with Alternative 1 and 1a of SEDAPAL "Master Plan of Drinking Water and Sewerage System of Lima and Callao".

(***) Total amount of water production for the Service Area which includes Lima South Cone, Axis Chilca-Cañete, Cañete River Basin and Concón-Topará.

[1] In fractions numerator indicates figures given by SEDAPAL M/P and denominator indicates figures estimated by JICA Study Team.

(*) Taken from "Master Plan of Drinking Water and Sewerage Systems of Lima and Callao", SEDAPAL 1998.

(**) Ten (10) districts out of twelve (12) have been considered in accordance with Alternative 1 and 1a of SEDAPAL "Master Plan of Drinking Water and Sewerage System of Lima and Callao". For the purpose of water balance analysis 5.00 m^3/s out of 6.34 m^3/s were taken because 1.34 m3/s will be supplied by other source to Lima South Cone which is not Cañete river.

(***) Total amount of water production for the Service Area which includes Lima South Cone, Axis Chilca-Cañete, Cañete River Basin and Concón-Topará.

Chapter 4: Plan Formulation on Priority Water Supply Projects

Based on the water conveyance system proposed to bring 5 m3/s of raw water to Lima South Cone, present situation of water supply systems in the service area and topographic conditions, water supply regional projects are proposed as follows and shown in Figure 4.1.

- Lima South Cone Water Supply Regional Project which includes following districts: Pucusana, Santa Maria, San Bartolo, Punta Negra, Punta Hermosa, Lurin, Pachacamac, Villa Maria del Triunfo, Villa El Salvador and San Juan de Miraflores. Water treatment plant will be located at Flor de Nieve site at elevation 200 m.a.s.l. Population to be served in the planning horizon of 2030 is 2,207,308.
- Chilca-Asia Water Supply Regional Project which includes following districts: Chilca, Santa Cruz de Flores, San Antonio, Mala and Asia. Water treatment plant will be located at Mala. Population to be served in the planning horizon of 2030 is 117,688.
- Quilmana Water Supply Project for Quilmana district. Water treatment plant will be located at Quilmana. Population to be served in the planning horizon of 2030 is 30,726.
- Imperial-San Vicente Water Supply Regional Project which includes following districts: San Vicente de Canete, Nuevo Imperial, Imperial, San Luis and Cerro Azul. Water treatment plant will be located close to the Nuevo Imperial Intake at Socsi. Population to be served in the planning horizon of 2030 is 186,061.
- Pampas Concon-Topara Water Supply Project which includes following districts: San Vicente de Canete y Grocio Prado. Water treatment plant will be located in between Palo and Quebrada Topara. Population to be served in the horizon of 2030 is 34,748.
- Upper and Middle Canete River Basin Water Supply Project which includes small individual water supply projects among them the more important is existing one Lunahuana. Population to be served in the planning horizon of 2030 is 222,236.

Proposed Water Supply Regional Systems

W/S System	Av. Daily Water Demand (m^3/s)	Max. Daily Water Demand(m^3/s)	Water Treatment Plant Capacity(m^3/s)
Lima South Cone	5.00	5.75	6.04
Chilca-Asia	0.48	0.55	0.58
Imperial-San Vicente	0.77	0.88	0.92
Quilmana	0.10	0.11	0.12
Pampas Concon-Topara	0.15	0.17	0.18
Upper and Middle Canete River Basin	0.07	0.008	0.008
Total	6.57	7.54	7.85

Note: In above table Average Daily Water Demand as year 2030

Chapter 5: Expansion Plan

Two expansion plan have been foreseen as follows:

- Long term expansion considering Lima South Cone as part of the integrated water supply and sewerage system planned by SEDAPAL M/P
- Short term expansion considering Lima South Cone as an independent water supply system fed by Canete Water Transfer Project

Under these circumstances water treatments plants shall be implemented and expanded in order to meet water demand as follows:

5.1 Long Term Expansion

Long Term Expansion

Project	Operation Year	Surface Water Source	W. T. Plant Capacity (m^3/s) Stage I	W. T. Plant Capacity (m^3/s) Stage II
Lima South Cone	2021 2026	Canete and Other Source	2.50	5.00
Chilca-Asia	2021 2026	Canete	0.25	0.50
Quilmana	2021 2026	Canete	0.06	0.10
Imperial-S. Vicente	2021 2026	Canete	0.50	0.80
Pampas Concon-Topara	2021 2026	Canete	0.10	0.15
Upper & Middle Canete Basin	2021 2026	Canete	0.04	0.08

5.2 Short Term Expansion

Short Term Expansion

Project	Operation Year	Surface Water Source	W. T. Plant Capacity (m^3/s) Stage I	W. T. Plant Capacity (m^3/s) Stage II
Lima South Cone	2005 2015	Canete and Other Source	3.00	5.00
Chilca-Asia	2005 2018	Canete	0.25	0.50
Quilmana	2005 2015	Canete	0.05	0.10
Imperial-S. Vicente	2005 2015	Canete	0.40	0.80
Pampas Concon-Topara	2005 2020	Canete	0.10	0.15
Upper & Middle Canete Basin	2005 2026	Canete	0.04	0.08

Chapter 6 Alternative Plan For Metropolitan Lima Water Supply

6.1 Background

As the main result of SEDAPAL Water Supply and Sewerage Master Plan Study (SEDAPAL M/P) carried out in 1998, four (4) alternatives were considered and evaluated in order to meet water demand of Lima & Callao Cities up to year 2030. Alternative 2 was selected and at present is under implementation.

Cañete water transfer project is involved in alternatives 1 and 1a. Alternatives 2 and 1a have same components except Mantaro- Carispacha water transfer project (Alternative 2) and Cañete water transfer project (Alternative 1a), thus Cañete and Mantaro-Carispacha water transfer projects, are competitive. Figures 6.1 and 6.2 show above two alternatives.

6.2 Balance Between Demand and Supply up to year 2030

Relationships between water demand, water source and plant treatment capacity are shown in Tables 6.1 and 6.2 for low water period (Winter) as foreseen by SEDAPAL M/P.

Water availability during the low water period are summarized below for both alternative 1a and 2.

6.2.1 Existing water source

	Alternative 1a (Cañete)	Alternative 2 (Mantaro-Carispacha)
Rímac River:	**13.01 m^3/s**	**13.01 m^3/s**
Yuracmayo reservoir	**1.78**	**1.78**
Lurín River:	**0.08**	**0.08**
Wells:	**8.70**	**8.70(*)**
Total:	**23.57 m^3/s**	**23.57 m^3/s**

(*) Maximum annual exploitable production.

6.2.2 Future water source

Year Schedule	Water Source	Discharge (m^3/s) Alternative 1a	 Alternative 2
2000	Marca III	3.1 m^3/s	3.1 m^3/s
2002	Chillon river Development (Under tendering for BOT)(*)	2.0 m^3/s	2.0 m^3/s
2003	Lurin New Wells	0.3 m^3/s	0.3 m^3/s
2003 – 2004	Marca II	6.5 m^3/s	6.5 m^3/s
2003 – 2005	(Start Operation of Huachipa Water Treatment Plant Stage I)	5.0 m^3/s	5.0 m^3/s
2011 / 2014	Huascacocha	2.5 m^3/s	2.5 m^3/s
2022 / 2026	Mantaro (Carispacha)	-----	2.94/5.00m^3/s
2022 / 2026	Cañete	2.5/5.0 m^3/s	----

Water sources up to year 2021 are same in both alternatives, five (5) cubic meters per second new water will be required from the Alternative 1a or 2.

6.3 Water Production up to Year 2021

Table 6.3 presents the capacities of water sources for both alternatives (Alternative 2 and 1a) categorized into river basin and status of implementation.

Table 6.4 presents the capacities of water treatments plants to be completed by year 2005.

Table 6.5 presents water demand prediction up to year 2030 prepared with use of the data given in the SEDAPAL M/P.

By comparing above tables, it is said that water demand will be satisfied until year 2015 by either alternative water source development plan, but La Atarjea water treatment plant should be in operation with full design capacity up to 20 m^3/s. Besides, development of new water sources shall be started in the near future in order to cope with increasing water demand.

6.4 Preliminary Assessment of Water Sources Development Alternatives

The SEDAPAL M/P assesses four water sources development alternatives (Alternatives 1, 1a, 2 and 3), in which Alternative 1a (Cañete) and 2 (Mantaro-Carispacha) are assumed to convey 5m3/s.

The economic evaluation at net present value which includes total investment cost as well as operation and maintenance costs shows that Alternative 2 is more recommendable than alternative 1a. Cost of water surface development, raw water conveyance, water treatment plant, conveyance of drinking water, reservoirs, main and secondary distribution network pipes and domiciliary

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(*) Chillón River: 0.5 – 1.9m^3/s

Jacaybamba Reservoir: 1.2 – 0.1 m^3/s

Wells: 0.3 – 0 m^3/s

connections, are included within the total investment cost. The marginal cost also named "incremental cost" which is the average cost of one cubic meter of drinking water without taking into account the current cost was calculated as US$0.52/m3 for Alternative 1a and US$ 0.50/m3 for Alternative 2.

Taking further into consideration technical, environmental and social aspects, the master plan concludes that Alternative 2 is the one which has minimum implementation cost and less negative environmental impact and consequently recommended to be implemented (see Table 6.6)

6.5 Tentative List of Alternative Water Source Development Plan After Year 2015

SEDAPAL is speeding up the project implementation. For example, MARCA III project to convey 3.1 m^3/s to the Rímac river was comissioned on October 1999, and the construction of Huachipa Water Treatment Plant Stage I ($Q=5m^3/s$) as well as Ramal Norte Conveyance ($Q=5m^3/s$, D = 1.6 m) and part of Ramal Sur Conveyance ($Q=5m^3/s$, D = 1.8m), (see Figure 6.3), have been scheduled to start in year 2001 and to be commissioned in year 2005. This project has been committed for loan by OECF. Also Chillón River Development project is at present under BOT procedure. Referring to such accelerated situation a new demand supply balance is worked out as in Table 6.7 and Figure 6.4, which aims to define alternatives to meet and cope with increasing water demand.

Table below shows the summary.

Tentative List of Alternative Water Source Development Plan After Year 2015

Alternative	Operation Year	Surface Water Source		Water Production Capacity	
		Source	Q (m^3/s)	Water Treatment Plant	Q (m^3/s)
2a	2016	Huascacocha	2.50	Chillón Stage II	2.50
	2021	Mantaro-Carispacha	5.00	Huachipa Stage II	5.00
2a.1	2016	Huascacocha	2.50	Chillon Stage II	2.50
	2021	Mantaro-Carispacha	2.50	Huachipa Stage II	7.50(*)
	2026	Mantaro-Carispacha	5.00	Huachipa Stage III	10.00
1a.1	2016	Huascacocha	2.50	Chillón Stage II	2.50
	2021	Cañete	5.00	Flor de Nieve	5.00
1a.2	2016	Huascacocha	2.50	Chillón Stage II	2.50
	2021	Cañete	2.50	Flor de Nieve Stage I	2.50
	2026	Cañete	5.00	Flor de Nieve Stage II	5.00

(*) Stage I for $5m^3/s$ is scheduled to be commissioned in 2005 having as surface water source Marca III and Marca II Projects.

Chapter 7 Water Tariff and Water Benefit

7.1 Water Tariff

SEDAPAL tariff in the past has been evolved as summarized as follows:

Evolution of Average Water Tariff

(Unit: US$/m3)

1996 Jan	1996 Feb-May	1996 Jun-Aug	1996 Sep-Oct	1996 Nov-Dec	1997 Jan	1997 Feb-Aug	1997 Sep-Oct	1997 Nov-Dec	1998 Jan-Apr	1998 May-Dec	1999 Jan-Date
0.34	0.37	0.36	0.35	0.34	0.38	0.37	0.42	0.41	0.41	0.42	0.42

At present, water tariff system has been established as follows:

- SEDAPAL prepares a tariff proposal
- SEDAPAL Board of Directors reviews and approve or not the proposed tariff
- The National Superintendant of Water Supply and Sewerage Services (Superintendencia Nacional de Servicios de Saneamiento-SUNASS) proceeds to review and to approve or not such proposed tariff.

7.1.1 Tariff Classification

(1) Metered connections

Water tariff based on water meter reading what is the same to say water consumption, is classified as follows:

Tariff for Metered Connections

(Unit: S/./m3)

Categories	Monthly Consumption	As of Dec. 98	From Jan. 99
Social	0 to more m3/month	0.72	0.80
	0-20 m3/month	0.72	0.80
	21-30 m3/month	1.00	1.11
Domestic	31-50 m3/month	1.40	1.55
	51-80 m3/month	1.92	2.13
	81 to more	2.70	3.00
	Average	0.913	1.014
Commercial	0 to more m3/month	2.60	2.89
Industrial	0 to more m3/month	2.60	2.89
State	0 to more m3/month	1.30	1.44
Average		1.183	1.314
Basic Charge (m3/month)	Per connection	2.79	3.10
Sewerage Charge (S/./m3)		1.59	1.76

Note: S/. = Nuevos Soles = Peruvian currency

(2) Non- metered connections

For those users with no meter, water tariff is charged based on the presumable water consumption, which varies in accordance with the district and number of hour of water supply. SEDAPAL has established four categories, A,B,C, and D, and number of hour supply was also considered.

Water unit charges are shown as follows. Connection charge and general sales tax are included in the unit prices

Tariff for Non-metered Connections (Incl. IGV)

(As of Jan. 99)

W/S hours Categories	to 24 hours (m3/month)	S/.	4 to 6 hours (m3/month)	S/.	Less than 3 hours (m3/month)	S/.
Domest. A	58	93.22	49	70.39	40	53.93
Domest. B	36	46.61	32	39.29	23	26.47
Domest. C	32	39.29	25	29.09	20	22.54
Domest. D	21	23.85	18	20.65	15	17.82
Social	12	14.99	7	10.27	4	7.43
Small scale C/I	18	65.04	15	54.81	10	37.76

7.1.2 SEDAPAL's Policy on Water Tariff System

(1) Problems on present water tariff system

(a) Items have to be improved on actual tariff system:

- Cross subsidy between customers in different classes
- Reduce the gaps among the water tariffs in different categories
- Appropriate billing based on meter reading
- Clarification and simplification of tariff system

(b) Arrangement for the lowest class

- Estimate precise water consumption and suitable water charge by conducting a field survey
- Introduction of government subsidy

(c) Periodical review

- Tariff shall be reviewed every 5 years

(d) Action plan

As action plan SEDAPAL decided to carry out a water tariff program which is composed of the preparation stage, the improvement stage, and the final stage. The preparation stage already was implemented and the

improvement stage is under implementation. Preparation of a master plan, suitability survey in the lowest class and examination on introduction of government subsidy were already completed. The study on tariff structure being conducted by British consultants was completed and it is at present under reviewing of SEDAPAL.

(2) Proposed unified tariff system

A unified tariff system is intended to be imposed in the final stage. In this system, cross subsidy among user category will be abolished. The unified tariff only will be imposed on users in accordance with the consumed water volume.

In the SEDAPAL M/P a plan for an unified tariff system was prepared based on economic and financial analyses as well as within the framework of the ordinance for regulation of general law on water supply and sewerage services (No. 09-95-PRES). Following unit cost a) long term average cost (CMLP and CMeLP), b) marginal cost (cm), and c) long term average incremental cost (CIP) were determined a follows:

(a) Long term average cost

	Water Supply	Sewerage	Total
CMLP-Long Term Aver. Cost (30 yrs)	0.398 US$/m3	0.156 US/m3	0.554 US/m3
CMeLP-SUNASS Aver. Cost (5yrs)	0.288 US$/m3	0.162 US$/m3	0.450 US$/m3

(b) Marginal cost

	Water Supply	Sewerage	Total
cm- Marginal Cost	0.558 US$/m3	0.456 US$/m3	1.014 US$/m3

(c) Long term average incremental cost

Stage	Water Supply	Sewerage	Total
CIP-1-Stage 1 (1998-2005)	0.475 US$/m3	0.409 US$/m3	0.884 US$/m3
CIP-2 Stage 2 (2006-2019)	0.321 US$/m3	0.618 US$/m3	0.939 US$/m3
CIP-3 Stage 3 (2020-2030)	0.953 US/m3	0.823 US$/m3	1.776 US$/m3
CIP Average (1998-2030)	0.576 US$/m3	0.499 US$/m3	1.075 US$/m3

7.2 Water Supply Benefit

Basically there are two approaches to determine water supply benefit as follows:

(1) Economic Value of Raw Water (Raw water price)

It is very difficult to be determined but it should be at least equal to the raw water cost which consists of water source development cost, raw water conveyance cost, and operation and maintenance cost of raw water. Drinking water sales price therefore is recommended to include the raw water cost in addition to the production cost, as far as water supply business is based on the self-supporting concept.

(2) Population without Access to Piped Water Supply

Under this consideration people are obliged to buy water mainly for domestic use from water-venders and benefits accrued from water supply shall be valued multiplying water consumption of the population without access to water supply system by the balance of water charge payable to venders and water tariff. After field survey carried out by JICA Study Team was found that in Lima South Cone price of 55 gallons of water in drum can is S/.1.50 which is equivalent to 2.20US$/m3. Also was estimated based on SEDAPAl(M/P) that for such area out of 1,024 thousand people as of 1998, 317 thousand (31%) of them have not access to water supply.

7.2.1 Raw Water Cost in Peru

As background in the past in Peru for M/P, P-F/S and F/S unit raw water costs were assessed as follows:

- Marca II Project (F/S) Q=3-6 m3/s 0.08US$/m3 (1997)
- Punrun Project (P-F/S) Q=10 m3/s 0.09 US$/m3 (1997)
- Canete Project (P-F/S) Q=5 m3/s 0.14 US$/m3 (1995)
- Mantaro-Carispacha (M/P) Q=5 m3/s 0.08 US$/m3 (1998)

7.2.2 Breakdown of SEDAPAL Water Tariff

For Huachipa Drinking Water Treatment Plant, SEDAPAL adopted an average water tariff of 0.45US$/m3, whose components are 0.18US$/m3 (40%) as drinking water production and treatment, 0.15US$/m3 (33%) as drinking water distribution and 0.12US$/m3 (27%) as drinking water conveyance. Raw water cost was not included.

7.2.3 Breakdown of SEDAPAL Marginal Cost

Breakdown of SEDAPAL marginal cost or “incremental cost” was assessed as follows:

Marginal Cost Breakdown

Components	Cost in US$/m3	%
Water source development and raw water Conveyance	0.084	15
Drinking water production and treatment	0.133	24
Drinking water conveyance and storage tanks	0.102	18
Drinking water distribution	0.239	43

7.2.4 Recommended Unit Value of Raw Water

Besides of raw water unit cost some benefit of drinking water tariff has to be allocated to the raw water cost in order to get the unit value of raw water. In this regard based on what was stated in above numerals 6.2.2 and 6.2.3, the

percentage of the water tariff to be allocated as unit value of raw water ranges between 33% and 60%.

(1) Recommended unit economic value of raw water

Based on what was stated above as well as in numeral 6.1.2 (2) and besides taking into consideration 5% of water losses in the raw water conveyance system, the recommended unit economic value of raw water for economic evaluation is as follows:

Recommended Unit Economic Value

Year	Water Tariff	Min. Unit Econ.Value	Max. Unit Econo. Value
2000-2005	0.288 (CMeLP)	0.09 US$/m3	0.16 US$/m3
2006-2019	0.321 (CIP-2)	0.10 US$/m3	0.18 US$/m3
2020-2030	0.953 (CIP-3)	0.30 US$/m3	0.54 US$/m3

Then those above ranges are recommended as a unit economic value of raw water for water supply purpose as one of the sensitivity tests on economic evaluation of the project.

7.2.5 Economic Benefit

In order to assess economic benefit following parameters were assumed:

- Project life is set as 30 years after completion of works
- Early commissioning of works : 2005
- Conveyance efficiency: 95%
- Raw water unit economic value: As shown on 7.2.4 (1)
- Raw water conveyed per year: 157,680,000 (5 m3/s).

Raw Water Economic Benefit

Year	Min. Unit Eco. Value	Max. Unit Eco. Value	Min. Economic Benefit (US$)	Max. Economic Benefit (US$)
2005	0.09 US$/m3	0.16 US$/m3	13,481,640	23,967,360
2006-2019	0.10 US$/m3	0.18 US$/m3	14,979,600	26,963,280
2020-2035	0.30 US$/m3	0.54 US$/m3	44,938,800	80,889,840

7.2.6 Financial Evaluation

The financial rate of return (FIRR) shall be calculated for water tariffs for water supply as assessed by SEDAPAL M/P and depicted as follows:

Water Tariffs for Financial Evaluation

Year	Water Tariff
2000-2005	0.288 US$/m3
2006-2019	0.321 US$/m3
2020-2030	0.953 US$/m3

7.2.7 Annual Equivalent Cost

Taking into consideration the total annual raw water to be conveyed either from Mantaro-Carispacha or Canete (5 m3/s=157.68 MCM/year) and the annual equivalent cost of each alternative (annual discount rate of 12%), then unit cost per cubic meter of raw water shall be determined for each alternative and compare between them. The alternative with less raw water unit cost shall be recommended.

Chapter 8 Surface and Groundwater Use Water Right in The Canete River Basin

As stated on chapter 1, 75% of the water used in the Canete river basin for water supply purpose is groundwater and 25% is surface water. In the lower Canete river basin a huge aquifer exists, in this area 90 wells have been drilled and 65% of them are for domestic use, 24% for livestock and agriculture use and 11% for industrial use.

Use water right in Peru is granted by Ministry of Agriculture through permission, license or authorization. In Figure 8.1 and Tables 8.1 and 8.2 are shown all permissions and licenses granted at present in the Canete river basin. At present 46.82 m3/s and 506 MCM have been granted to be used from the Canete river basin surface water. Out of 46.82 m3/s 37.69 m3/s are from the river itself and remaining from lagoons. As far as groundwater is concerned only 0.31 m3/s have been granted.

TABLES

Table 1.1 Present Situation of the Water Supply Systems Administrated and Operated by EMAPAC S.A.

District	Present Water Production (m^3/month)			Water Sales		Losses	Losses	Continuity	Coverage	Cost		
	Groundwater	Surface water	Total	(m^3/mes)		m^3 / month	(%)	(hours per day)	(%)	Tipo	S/./m^3	$ / m^3
Imperial	43,760	168,347	212,107	Domestic:	71,282	119,861	57	24	74	Domestic:	0.46	0.14
				Comercial:	20,964					Comercial:	0.68	0.21
				Industrial:	0					Industrial:	0.00	0.00
				Total:	92,246					Weighted:	0.51	0.15
San Vicente	189,878	0	189,878	Domestic:	66,059	90,273	48	20	63	Domestic:	0.53	0.16
				Comercial:	32,217					Comercial:	0.78	0.24
				Industrial:	1,329					Industrial:	1.54	0.47
				Total:	99,605					Weighted:	0.62	0.19
Mala	71,542	0	71,542	Estimated (*)		2,766	4	17	63	Average :	0.46	0.14
				Total:	68,775							
San Luis (**)	49,605	0	49,605	Domestic:	13,445	34,195	69	24	45	Domestic:	0.42	0.13
				Comercial:	1,965					Comercial:	0.67	0.20
				Industrial:	0					Industrial:	0.00	0.00
				Total:	15,410					Weighted:	0.46	0.14
Quilmana	47,706	0	47,706	Domestic:	21,989	19,411	41	18	56	Domestic:	0.28	0.09
				Comercial:	6,306					Comercial:	0.35	0.11
				Industrial:	0					Industrial:	0.00	0.00
				Total:	28,295					Weighted:	0.30	0.09
Cerro Azul (**)	33,070	0	33,070	Domestic:	16,050	13,985	42	24	89	Domestic:	0.37	0.11
				Comercial:	3,035					Comercial:	0.75	0.23
				Industrial:	0					Industrial:	0.00	0.00
				Total:	19,085					Weighted:	0.43	0.13
San Antonio	25,384	0	25,384	Domestic:	10,465	10,640	42	9	90	Domestic:	0.46	0.14
				Comercial:	4,279					Comercial:	1.02	0.31
				Industrial:	0					Industrial:	0.00	0.00
				Total:	14,744					Weighted:	0.62	0.19
Santa Cruz de Flores	11,744	0	11,744	Domestic:	5,500	5,252	45	8	94	Domestic:	0.41	0.13
				Comercial:	992					Comercial:	0.59	0.18
				Industrial:	0					Industrial:	0.00	0.00
				Total:	6,492					Weighted:	0.44	0.13
Lunahuana	20,437	0	20,437	Domestic:	4,649	14,506	71	24	32	Domestic:	0.30	0.09
				Comercial:	1,282					Comercial:	0.59	0.18
				Industrial:	0					Industrial:	0.00	0.00
				Total:	5,931					Weighted:	0.37	0.11
Total	**493,125**	**168,347**	**661,472**	**350,583**		**310,889**	**47**	**Average : 19**	**65**	**Average :**	**0.47**	**0.14**

Exchange rate: 1$=3.30 Nuevos Soles

(*) Estimated based on the monthly water sales divided by average tariff

(**) Out of the total water production for both systems it was taken 60% for San Luis and 40% for Cerro Azul

Table 1.2 Present Deficit of Water for EMAPAC Water Supply System

System	Urban Population 1998 (1)	Rural Population 1999 (1)	Urban Population With Water Service (1)	Rural Population With Water Service (1)	Present Water Production (2)	Population Without Water Service	Per Person Net Consumption (3) (l/p/d)	Eficiency Ratio (%)	Per Person Gross Consumption (l/p/d)	Deficit (4) (m^3/mes)
Imperial	33,634	3,363	21,553	2,156	212,107	13,288	175	43	406	161,909
San Vicente	27,300	2,731	18,613	1,862	189,878	9,556	175	52	336	96,277
Mala	17,553	1,755	10,915	1,091	71,542	7,302	152	96	158	34,662
San Luis	9,331	932	3,403	340	49,605	6,520	125	31	402	78,648
Quilmana	6,784	679	4,049	405	47,706	3,009	125	59	211	19,067
Cerro Azul	3,902	390	3,253	325	33,070	714	97	58	168	3,595
San Antonio	2,421	242	2,143	214	25,384	306	97	58	168	1,540
S. Cruz de Flores	1,530	153	1,262	126	11,744	295	61	55	111	981
Lunahuana	1,330	132	804	80	20,437	578	61	29	210	3,650
Total	**103,785**	**10,377**	**65,995**	**6,599**	**661,473**	**41,568**	**155**	**48**	**321**	**400,329**

(1) Numbers reported by EMAPAC Master Plan

(2) Numbers reported by EMAPAC Master Plan adjusted by JICA Study Team

(3) Proposed by JICA Study Team

(4) Population without service multiplied by person gross consumption

Table 1.3 Present Situation of Potable Water System - Yauyos Province - Lima Department (Sep. 1999)

District	Intake			Conveyance km		Storage Tank			Housing Connections			Losses for	System	Urban	Total	Population	Benefited	Frecuency	Tariff	Water
	Source	Name	Intake (l/s)	From the Intake to the Storage Tank	From the storage tank to the city	Inlet Pipe (pulg)	Outlet Pipe (pulg)	Capacity (m3)	Total	Active	Required	Conduction (%)	Age (years)	Population 1993	Projected Population	Informed in situ (+ -)	Population (%)	hours / day	S/. / month	Quality
1 PACARAN	Source / river	San Marcos	-	1.0 / 3.0	0.40	8.00	-	80	382	382	300	50	45	796	1,592	1,500 + Anex	75	24	3.0	Good
2 ZUÑIGA	River / channel	San Juanito	-	5.00	0.50	2.00	3.00	10	200	177	-	25	40	373	1,335	1,600 + Anex	60	4	5.0	Bad
3 HUANGASCAR	Source	Pijo/Chunalla/ Huancor	2.5	2.5 / 3.0	0.10	2.00	2.00	21	100	20	-	0	40	407	808	500	20	24	0.0	Good
4 CHOCOS	Source	Tumonayoc	< 1.0	6.00	0.60	1.00	2.00	24	120	120	-	30	6	291	775	700	65	24	1.5	Good
5 AZANGARO	Source	Quimpira	0.4	1.50	0.15	1.00	1.00	10	60	54	-	0	7	154	668	700 + Anex	90	24	5.0	Good
6 MADEAN	River	-	< 1.0	4.50	0.10	3.00 / 4.00	2.00	37	120	96	-	50	8	238	867	800 PI	80	6	2.0	Bad
7 VIÑAC	Source	Pichacac	1.5	1.50	-	2.00	-	40	130	130	-	10	28	257	1,670	180 PI	100	24	1.0	Good
8 LINCHA	Source	Yanacocha	0.2	0.46	0.90	-	-	2.5	Without connection	60	-		-	87	497	120 PI	100	24	-	Bad
9 CACRA	Source	Maccuay	< 1.0	5.00	0.10	3.00	3.00	46	65	65	-	0	35	199	929	135 PI	100	24	2.0	Good
10 HONGOS	Source	-	0.8	4.50	-	-	-	46	100	90	-	0	20	389	468	500 PI	90	24	1.0	Good
11 CATAHUASI	Source	Catahuasi	6.0	2.50	-	2.50	3.00	29	145	130	-	0	1	389	1,202	725	100	24	0.0	Good
12 TUPE	Source	Antihuapalla	11.5	0.88	0.05	1.00	1.00	10	132	132	-	10	5	302	654	550 PI	100	24	0.0	Good
13 PUTINZA	Channel	-	-	0.80	0.40	3/4	3/4	30	100	90	20	0	20	373	447	600	20	14	1.0	Bad
14 YAUYOS	Source	-	15.0	0.40		4.00	4.00	20	400	320	-	(LD)	20	1439	1,963	-	80	24	2.0	Good
15 HUANTAN	Source	-	4.0	1.50	0.20	4.50	4.50	50	130	110	-	0	5	873	928	873	15	24	1.0	Good
16 CARANIA	Source	Calcacho	2.0	1.00	0.00	1.50	1.50	30	80	80	-	(LD)	0	225	285	230 PI	100	24	0.0	Good
17 LARAOS	Source	Puquiococha	3.5	0.30	0.05	3.00	4.00	50	148	100	60	(LD)	30	728	1,186	1,000	70	24	0.5	Good
18 ALIS	Source	Parachaca	1.0	1.50	0.02	8/4	2.00	48	120	120	-	0	27	3071	3,215	600	100	24	0.0	Good
19 TOMAS	River	-	-	0.20	0.01	2.00	2.00	10	20	20	-	60 (DP)	3	613	937	500 PI	20	24	0.0	Good
20 MIRAFLORES	Source	Machapuquio / Campuasi	1.5	0.5 / 1.0	0.15	2.00	3.00	26	135	85	-	50	31	314	452	450	70	24	0.8	Good
21 VITIS	Source	Chaupimpuquio	-	1.00	-	2.00	2.00	27	115	75	-	0	30	316	326	580	80	24	0.4	Good
22 HUANCAYA	Source	Cutuhuay	-	1.00	0.30	Channel	3/4	9	90	80	-	(DP)	30	344	489	150 PI	90	24	0.0	Good
23 VILCA	Source	-	< 1.0	1.50	0.30	1.00	1.00	17	40	40	15	(LD)	10			300 PI	100	24	1.0	Good
24 TANTA	Channel	-	< 1.0	0.05	0.30	Channel	4.00	18	120	105	30	(LD)	6	414	517	599 PI	87.5	24	3.0	Bad
25 AYAUCA	Source		0.8	0.80	0.20	-	-	10	120	120	-	-	17	276	1,120	676	100	-	-	-
26 COLONIA	Source		1.5	0.752	0.657	1.50	1.50	5	70	70	Under construction	-	0	846	1,537	400	100	-	-	-

PI = Permanent inhabitants
LD = Losses due to damages
DP = Design Problems

Table 2.1 Active Projection of Water Demand For Metropolitan Lima
Per District And Per Service Center
Period 1998-2030 (*)
(m^3/s)

DISTRICT	YEAR							
	1998	2000	2005	2010	2015	2020	2025	2030
CARABAYLLO	0.36	0.30	0.38	0.40	0.52	0.57	0.60	0.65
COMAS	1.42	1.10	1.13	1.20	1.26	1.33	1.30	1.42
INDEPENDENCIA	0.56	0.40	0.42	0.40	0.43	0.44	0.40	0.45
LOS OLIVOS	0.95	0.70	0.86	0.90	1.00	1.03	1.00	1.10
PUENTE PIEDRA	0.33	0.30	0.41	0.50	0.70	0.89	1.20	1.64
RIMAC	0.62	0.40	0.46	0.40	0.47	0.48	0.40	0.49
SAN MARTIN DE PORRAS	1.45	1.10	1.14	1.20	1.30	1.37	1.40	1.52
C. S. COMAS	**5.68**	**4.50**	**4.80**	**5.20**	**5.67**	**6.09**	**6.60**	**7.27**
BELLAVISTA	0.33	0.20	0.25	0.20	0.25	0.26	0.20	0.26
CALLAO	1.35	1.00	1.08	1.10	1.21	1.27	1.30	1.41
C. DE LA LEGUA	0.14	0.10	0.10	0.10	0.11	0.12	0.10	0.13
LA PERLA	0.25	0.10	0.18	0.10	0.18	0.18	0.10	0.19
LA PUNTA	0.03	0.00	0.03	0.00	0.03	0.03	0.00	0.03
VENTANILLA	0.33	0.20	0.34	0.40	0.47	0.56	0.60	0.78
C. S. CALLAO	**2.42**	**1.90**	**1.98**	**2.10**	**2.26**	**2.43**	**2.60**	**2.81**
BREÑA	0.39	0.30	0.29	0.20	0.30	0.30	0.30	0.31
JESUS MARIA	0.37	0.20	0.30	0.30	0.31	0.32	0.30	0.34
LA VICTORIA	1.02	0.70	0.75	0.70	0.78	0.79	0.80	0.82
LIMA CERCADO	1.69	1.30	1.28	1.30	1.33	1.36	1.30	1.41
MAGDALENA	0.25	0.20	0.21	0.20	0.22	0.23	0.20	0.23
PUEBLO LIBRE	0.34	0.20	0.27	0.20	0.29	0.29	0.30	0.30
SAN MIGUEL	0.54	0.40	0.44	0.40	0.47	0.48	0.40	0.49
C. S. BREÑA	**4.59**	**3.50**	**3.53**	**3.60**	**3.69**	**3.77**	**3.80**	**3.91**
ATE VITARTE	1.03	0.90	1.04	1.20	1.33	1.41	1.40	1.50
CHACLACAYO	0.12	0.10	0.11	0.10	0.12	0.12	0.10	0.13
CIENEGUILLA	0.04	0.00	0.05	0.00	0.08	0.10	0.10	0.14
EL AGUSTINO	0.45	0.30	0.37	0.30	0.40	0.42	0.40	0.44
LA MOLINA	0.53	0.40	0.60	0.70	0.84	0.94	1.00	1.07
LURIGANCHO	0.32	0.20	0.32	0.30	0.38	0.41	0.40	0.46
SAN LUIS	0.24	0.10	0.18	0.10	0.18	0.18	0.10	0.19
SANTA ANITA	0.41	0.30	0.39	0.40	0.49	0.54	0.50	0.62
C. S. ATE VITARTE	**3.13**	**2.70**	**3.06**	**3.40**	**3.83**	**4.13**	**4.30**	**4.55**
S. J. LURIGANCHO	1.89	1.60	1.68	1.80	1.93	2.05	2.10	2.30
C. S. S.J. LURIGANCHO	**1.89**	**1.60**	**1.68**	**1.80**	**1.93**	**2.05**	**2.10**	**2.30**
BARRANCO	0.17	0.10	0.14	0.10	0.15	0.15	0.10	0.16
CHORRILLOS	0.72	0.50	0.60	0.60	0.64	0.67	0.60	0.70
LINCE	0.37	0.20	0.26	0.20	0.28	0.29	0.20	0.30
MIRAFLORES	0.49	0.40	0.47	0.40	0.50	0.52	0.50	0.55
SAN BORJA	0.51	0.50	0.53	0.50	0.58	0.60	0.60	0.62
SAN ISIDRO	0.38	0.30	0.37	0.30	0.40	0.41	0.40	0.44
STGO. SURCO	0.96	1.00	1.17	1.20	1.41	1.54	1.60	1.82
SURQUILLO	0.33	0.30	0.31	0.30	0.32	0.33	0.30	0.34
C. S. SURQUILLO	**3.92**	**3.60**	**3.85**	**4.00**	**4.29**	**4.51**	**4.70**	**4.92**
LURIN	0.12	0.10	0.16	0.20	0.29	0.37	0.40	0.54
PACHACAMAC	0.06	0.00	0.09	0.10	0.15	0.19	0.20	0.28
PUCUSANA	0.02	0.00	0.02	0.00	0.03	0.04	0.00	0.06
S. J. MIRAFLORES	0.95	0.80	0.84	0.90	1.01	1.09	1.10	1.22
VILLA MARIA	0.82	0.70	0.74	0.80	0.91	1.01	1.10	1.25
V. SALVADOR	0.74	0.60	0.69	0.70	0.87	0.98	1.10	1.23
C. S. V. EL SALVADOR	**2.71**	**2.30**	**2.54**	**2.80**	**3.26**	**3.68**	**4.10**	**4.59**
SAN BARTOLO	0.02	0.01	0.03	0.04	0.05	0.07	0.09	0.12
PUNTA HERMOSA	0.02	0.02	0.03	0.04	0.05	0.06	0.08	0.09
PUNTA NEGRA	0.02	0.01	0.01	0.02	0.02	0.03	0.04	0.04
SANTA MARIA	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
ANCON	0.05	0.05	0.07	0.11	0.15	0.19	0.24	0.30
SANTA ROSA	0.05	0.04	0.05	0.05	0.07	0.08	0.08	0.10
NO ADM. FOR SEDAPAL	**0.15**	**0.10**	**0.20**	**0.20**	**0.34**	**0.43**	**0.50**	**0.66**
METROPOLITAN LIMA	**24.50**	**20.50**	**21.63**	**23.40**	**25.28**	**27.09**	**29.00**	**31.01**

Note : Does not include own source however it includes Parks and Gardens irrigation

(*) This table was taken from SEDAPAL Master Plan, 1998

Table 2.2 Active Projection Of The Water Production Necessity For Metropolitan Lima
Lima Per District and Per Service Center
Period 1998-2030 (*)
(m^3/s)

DISTRICT	YEAR							
	1998	2000	2005	2010	2015	2020	2025	2030
CARABAYLLO	0.47	0.43	0.52	0.60	0.68	0.75	0.80	0.86
COMAS	1.86	1.51	1.55	1.56	1.65	1.74	1.80	1.86
INDEPENDENCIA	0.72	0.58	0.57	0.55	0.56	0.57	0.58	0.59
LOS OLIVOS	1.25	1.05	1.17	1.23	1.30	1.35	1.39	1.44
PUENTE PIEDRA	0.43	0.42	0.57	0.71	0.91	1.16	1.61	2.15
RIMAC	0.81	0.64	0.62	0.60	0.61	0.62	0.63	0.64
SAN MARTIN DE PORRAS	1.91	1.52	1.56	1.60	1.69	1.80	1.90	2.00
C. S. COMAS	**7.45**	**6.16**	**6.57**	**6.85**	**7.41**	**7.99**	**8.71**	**9.54**
BELLAVISTA	0.44	0.34	0.34	0.33	0.33	0.34	0.34	0.35
CALLAO	1.77	1.45	1.49	1.49	1.58	1.67	1.76	1.85
C. DE LA LEGUA	0.18	0.14	0.14	0.14	0.15	0.16	0.17	0.17
LA PERLA	0.32	0.25	0.25	0.24	0.24	0.24	0.24	0.25
LA PUNTA	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
VENTANILLA	0.43	0.40	0.46	0.52	0.62	0.73	0.87	1.02
C. S. CALLAO	**3.17**	**2.62**	**2.71**	**2.76**	**2.96**	**3.18**	**3.42**	**3.69**
BREÑA	0.53	0.41	0.40	0.38	0.39	0.40	0.41	0.41
JESUS MARIA	0.50	0.40	0.41	0.40	0.41	0.43	0.44	0.45
LA VICTORIA	1.37	1.05	1.04	1.00	1.02	1.04	1.06	1.08
LIMA CERCADO	2.30	1.80	1.77	1.72	1.75	1.79	1.82	1.86
MAGDALENA	0.34	0.28	0.28	0.28	0.29	0.30	0.30	0.31
PUEBLO LIBRE	0.45	0.37	0.37	0.36	0.37	0.38	0.39	0.39
SAN MIGUEL	0.72	0.60	0.61	0.59	0.61	0.63	0.64	0.64
C. S. BREÑA	**6.19**	**4.91**	**4.88**	**4.74**	**4.85**	**4.96**	**5.05**	**5.14**
ATE VITARTE	1.36	1.21	1.42	1.56	1.74	1.85	1.92	1.97
CHACLACAYO	0.15	0.13	0.15	0.15	0.15	0.16	0.16	0.17
CIENEGUILLA	0.06	0.05	0.07	0.08	0.11	0.13	0.16	0.18
EL AGUSTINO	0.58	0.50	0.51	0.50	0.53	0.55	0.56	0.58
LA MOLINA	0.70	0.65	0.82	0.95	1.10	1.23	1.31	1.40
LURIGANCHO	0.42	0.40	0.44	0.46	0.50	0.54	0.57	0.61
SAN LUIS	0.32	0.25	0.24	0.23	0.24	0.24	0.25	0.25
SANTA ANITA	0.54	0.48	0.54	0.58	0.64	0.71	0.77	0.81
C. S. ATE VITARTE	**4.11**	**3.67**	**4.19**	**4.52**	**5.00**	**5.41**	**5.71**	**5.96**
S. J. LURIGANCHO	2.46	2.14	2.30	2.37	2.52	2.69	2.85	3.02
C. S. S.J. LURIGANCHO	**2.46**	**2.14**	**2.30**	**2.37**	**2.52**	**2.69**	**2.85**	**3.02**
BARRANCO	0.23	0.19	0.19	0.19	0.19	0.20	0.20	0.21
CHORRILLOS	0.93	0.80	0.81	0.81	0.84	0.88	0.90	0.91
LINCE	0.51	0.36	0.36	0.36	0.37	0.38	0.39	0.39
MIRAFLORES	0.67	0.64	0.65	0.64	0.66	0.69	0.71	0.73
SAN BORJA	0.67	0.67	0.73	0.72	0.76	0.79	0.81	0.82
SAN ISIDRO	0.52	0.50	0.52	0.51	0.53	0.55	0.56	0.58
STGO. SURCO	1.25	1.38	1.60	1.67	1.84	2.02	2.22	2.38
SURQUILLO	0.44	0.43	0.43	0.42	0.42	0.43	0.44	0.45
C. S. SURQUILLO	**5.21**	**4.97**	**5.29**	**5.31**	**5.61**	**5.93**	**6.22**	**6.46**
LURIN	0.16	0.16	0.22	0.28	0.37	0.48	0.59	0.71
PACHACAMAC	0.08	0.09	0.12	0.15	0.20	0.25	0.31	0.37
PUCUSANA	0.02	0.02	0.02	0.03	0.04	0.05	0.06	0.08
S. J. MIRAFLORES	1.24	1.07	1.15	1.21	1.32	1.43	1.51	1.60
VILLA MARIA	1.06	0.94	1.01	1.07	1.19	1.33	1.47	1.63
V. SALVADOR	0.96	0.86	0.94	1.00	1.13	1.28	1.43	1.61
C. S. VILLA EL SALVADOR	**3.51**	**3.14**	**3.46**	**3.75**	**4.26**	**4.82**	**5.38**	**6.01**
SAN BARTOLO	0.02	0.02	0.04	0.05	0.07	0.09	0.12	0.16
PUNTA HERMOSA	0.03	0.03	0.04	0.05	0.07	0.08	0.10	0.12
PUNTA NEGRA	0.02	0.02	0.02	0.03	0.03	0.04	0.05	0.05
SANTA MARIA	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
ANCON	0.06	0.07	0.10	0.14	0.19	0.25	0.32	0.40
SANTA ROSA	0.06	0.06	0.07	0.07	0.09	0.10	0.11	0.13
NO ADM. FOR SEDAPAL	**0.19**	**0.20**	**0.27**	**0.34**	**0.45**	**0.57**	**0.71**	**0.87**
METROPOLITAN LIMA	**32.29**	**27.80**	**29.67**	**30.64**	**33.05**	**35.54**	**38.05**	**40.68**

Note: Includes Water Demand of Clients with own source as well as unaccounted Water

(*) This table was taken from SEDAPAL Master Plan, 1998

Table 2.3 Active Projection Of The Water Production Necessity For Metropolitan Lima
Lima Per District and Per Service Center
Period 1998-2030 (*)
(MCM/year)

DISTRICT	YEAR							
	1998	2000	2005	2010	2015	2020	2025	2030
CARABAYLLO	14.82	13.56	16.40	18.92	21.44	23.65	25.23	27.12
COMAS	58.66	47.62	48.88	49.20	52.03	54.87	56.76	58.66
INDEPENDENCIA	22.71	18.29	17.98	17.34	17.66	17.98	18.29	18.61
LOS OLIVOS	39.42	33.11	36.90	38.79	41.00	42.57	43.84	45.41
PUENTE PIEDRA	13.56	13.25	17.98	22.39	28.70	36.58	50.77	67.80
RIMAC	25.54	20.18	19.55	18.92	19.24	19.55	19.87	20.18
SAN MARTIN DE PORRAS	60.23	47.93	49.20	50.46	53.30	56.76	59.92	63.07
C. S. COMAS	**234.94**	**194.26**	**207.19**	**216.02**	**233.68**	**251.97**	**274.68**	**300.85**
BELLAVISTA	13.88	10.72	10.72	10.41	10.41	10.72	10.72	11.04
CALLAO	55.82	45.73	46.99	46.99	49.83	52.67	55.50	58.34
C. DE LA LEGUA	5.68	4.42	4.42	4.42	4.73	5.05	5.36	5.36
LA PERLA	10.09	7.88	7.88	7.57	7.57	7.57	7.57	7.88
LA PUNTA	1.26	1.26	1.26	1.26	1.26	1.26	1.26	1.26
VENTANILLA	13.56	12.61	14.51	16.40	19.55	23.02	27.44	32.17
C. S. CALLAO	**99.97**	**82.62**	**85.46**	**87.04**	**93.35**	**100.28**	**107.85**	**116.37**
BREÑA	16.71	12.93	12.61	11.98	12.30	12.61	12.93	12.93
JESUS MARIA	15.77	12.61	12.93	12.61	12.93	13.56	13.88	14.19
LA VICTORIA	43.20	33.11	32.80	31.54	32.17	32.80	33.43	34.06
LIMA CERCADO	72.53	56.76	55.82	54.24	55.19	56.45	57.40	58.66
MAGDALENA	10.72	8.83	8.83	8.83	9.15	9.46	9.46	9.78
PUEBLO LIBRE	14.19	11.67	11.67	11.35	11.67	11.98	12.30	12.30
SAN MIGUEL	22.71	18.92	19.24	18.61	19.24	19.87	20.18	20.18
C. S. BREÑA	**195.21**	**154.84**	**153.90**	**149.48**	**152.95**	**156.42**	**159.26**	**162.10**
ATE VITARTE	42.89	38.16	44.78	49.20	54.87	58.34	60.55	62.13
CHACLACAYO	4.73	4.10	4.73	4.73	4.73	5.05	5.05	5.36
CIENEGUILLA	1.89	1.58	2.21	2.52	3.47	4.10	5.05	5.68
EL AGUSTINO	18.29	15.77	16.08	15.77	16.71	17.34	17.66	18.29
LA MOLINA	22.08	20.50	25.86	29.96	34.69	38.79	41.31	44.15
LURIGANCHO	13.25	12.61	13.88	14.51	15.77	17.03	17.98	19.24
SAN LUIS	10.09	7.88	7.57	7.25	7.57	7.57	7.88	7.88
SANTA ANITA	17.03	15.14	17.03	18.29	20.18	22.39	24.28	25.54
C. S. ATE VITARTE	**129.61**	**115.74**	**132.14**	**142.54**	**157.68**	**170.61**	**180.07**	**187.95**
S. J. LURIGANCHO	77.58	67.49	72.53	74.74	79.47	84.83	89.88	95.24
C. S. S.J. LURIGANCHO	**77.58**	**67.49**	**72.53**	**74.74**	**79.47**	**84.83**	**89.88**	**95.24**
BARRANCO	7.25	5.99	5.99	5.99	5.99	6.31	6.31	6.62
CHORRILLOS	29.33	25.23	25.54	25.54	26.49	27.75	28.38	28.70
LINCE	16.08	11.35	11.35	11.35	11.67	11.98	12.30	12.30
MIRAFLORES	21.13	20.18	20.50	20.18	20.81	21.76	22.39	23.02
SAN BORJA	21.13	21.13	23.02	22.71	23.97	24.91	25.54	25.86
SAN ISIDRO	16.40	15.77	16.40	16.08	16.71	17.34	17.66	18.29
STGO. SURCO	39.42	43.52	50.46	52.67	58.03	63.70	70.01	75.06
SURQUILLO	13.88	13.56	13.56	13.25	13.25	13.56	13.88	14.19
C. S. SURQUILLO	**164.30**	**156.73**	**166.83**	**167.46**	**176.92**	**187.01**	**196.15**	**203.72**
LURIN	5.05	5.05	6.94	8.83	11.67	15.14	18.61	22.39
PACHACAMAC	2.52	2.84	3.78	4.73	6.31	7.88	9.78	11.67
PUCUSANA	0.63	0.63	0.63	0.95	1.26	1.58	1.89	2.52
S. J. MIRAFLORES	39.10	33.74	36.27	38.16	41.63	45.10	47.62	50.46
VILLA MARIA	33.43	29.64	31.85	33.74	37.53	41.94	46.36	51.40
V. SALVADOR	30.27	27.12	29.64	31.54	35.64	40.37	45.10	50.77
C. S. VILLA EL SALVADOR	**110.69**	**99.02**	**109.11**	**118.26**	**134.34**	**152.00**	**169.66**	**189.53**
SAN BARTOLO	0.63	0.63	1.26	1.58	2.21	2.84	3.78	5.05
PUNTA HERMOSA	0.95	0.95	1.26	1.58	2.21	2.52	3.15	3.78
PUNTA NEGRA	0.63	0.63	0.63	0.95	0.95	1.26	1.58	1.58
SANTA MARIA	0.04	0.04	0.04	0.08	0.08	0.32	0.32	0.32
ANCON	1.89	2.21	3.15	4.42	5.99	7.88	10.09	12.61
SANTA ROSA	1.89	1.89	2.21	2.21	2.84	3.15	3.47	4.10
NO ADM. FOR SEDAPAL	**6.03**	**6.35**	**8.56**	**10.80**	**14.27**	**17.98**	**22.39**	**27.44**
METROPOLITAN LIMA	**1,018.30**	**876.70**	**935.67**	**966.26**	**1,042.26**	**1,120.79**	**1,199.94**	**1,282.88**

Note: Includes Water Demand of Clients with own source as well as unaccounted Water

(*) This table was taken from SEDAPAL Master Plan, 1998

Table 2.4 Alternativa 2. Balance de Demanda y Suministro de Agua, Año 2030

Alternative 2, includes Mantaro-Carispacha Project						Year :	2030										
Description	Imp. Date	Poss. Discharge	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Aver.	Dry Season	High Water Season
Water Sources																	
Rimac River Basin																	
Rimac River 90% (Flow Duration Curve)	-	22.22	28.94	45.73	50.27	31.14	16.88	12.32	11.46	11.38	11.97	12.83	14.25	19.42	22.22	13.01	35.10
Yuracmayo	-	2.50	-	-	-	-	2.00	2.00	2.00	2.00	2.00	2.00	2.00	-	2.00	2.00	-
Marca III	2001	3.10	-	-	-	-	5.31	5.31	5.31	5.31	5.31	5.31	5.31	-	5.31	5.31	-
Marca II	2002	3.95	-	-	-	-	6.00	6.00	6.00	6.00	6.00	6.00	6.00	-	6.00	6.00	-
Losses		-5%	-	-	-	-	(0.67)	(0.67)	(0.67)	(0.67)	(0.67)	(0.67)	(0.67)	-	(0.67)	(0.67)	-
Total Rimac River Basin Projects			28.94	45.73	50.27	31.14	29.52	24.96	24.10	24.02	24.61	25.47	26.89	19.42	29.59	25.65	35.10
Mantaro-Carispacha Water Transfer	2021	6.20	-	-	-	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00	-	5.00	5.00	-
Total Rimac River Basin			28.94	45.73	50.27	31.14	34.52	29.96	29.10	29.02	29.61	30.47	31.89	19.42	32.51	30.65	35.10
Chillon River Basin																	
Chillon River (Irrigation Water Demand)	-	1.00	1.30	1.80	1.90	1.70	1.00	1.30	0.80	0.30	0.30	0.30	0.30	1.00	1.00	0.61	1.54
Chillon Aquifer	2001	0.53	-	-	-	-	-	0.10	0.10	0.10	0.10	0.10	0.20	-	0.12	0.10	-
Huascacocha Reservouir	2013	1.92	1.10	1.10	1.10	1.10	2.50	2.50	2.50	2.50	2.50	2.50	2.50	1.10	1.92	2.50	1.10
Total Chillon River Basin			2.40	2.90	3.00	2.80	3.50	3.90	3.40	2.90	2.90	2.90	3.00	2.10	2.98	3.21	2.64
Lurin River Basin																	
Lurin River 90% (Flow Duration Curve)		2.28	2.13	8.77	10.84	4.41	0.30	0.15	0.05	0.02	0.02	0.01	0.04	0.65	2.28	0.08	5.36
Lurin River New wells	2002	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Total Lurin River Basin			2.43	9.07	11.14	4.71	0.60	0.45	0.35	0.32	0.32	0.31	0.34	0.95	2.58	0.38	5.66
Wells	-	5.00	3.70	3.70	3.70	3.70	6.52	6.52	6.52	6.52	6.52	6.52	6.52	3.70	5.35	6.52	3.70
Total Water Sources			37.47	61.40	68.11	42.35	45.14	40.83	39.37	38.76	39.35	40.20	41.75	26.17	43.41	40.76	47.10
Water Producction required			42.03	42.03	42.03	42.03	42.03	42.03	42.03	42.03	42.03	42.03	42.03	42.03	42.03	42.03	42.03
Seasonal Factor			1.03	1.07	1.09	1.05	1.00	0.98	0.95	0.98	0.96	0.92	0.97	0.99	1.00	0.97	1.05
Monthly Production required			43.29	44.97	45.81	44.13	42.03	41.19	39.93	41.19	40.35	38.67	40.77	41.61	42.00	40.59	43.96
Potable Water Superavit (Deficit)			(5.82)	16.43	22.30	(1.78)	3.11	(0.36)	(0.56)	(2.43)	(1.00)	1.53	0.98	(15.44)	1.41	0.17	3.14
Agriculture and Irrigation Water Demand (Rimac and Lurin)			2.50	2.50	2.50	2.50	1.80	1.80	1.80	1.80	1.80	1.80	1.80	2.50	2.09	1.80	2.50
Minus Water reused projects	2005		0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Raw Water Superavit (Deficit)			(7.82)	14.43	20.30	(3.78)	1.81	(1.66)	(1.86)	(3.73)	(2.30)	0.23	(0.32)	(17.44)	(0.18)	(1.13)	1.14

Table 3.1(1/2). Population census by Districts, Urban and Rural within the Provinces of Huarochiri, Yauyos, Cañete, Lima and Chincha related to the " Study on Integrated Water Resources Development in the Cañete River Basin"

CENSUS	CENSUS 1940			CENSUS 1961			CENSUS 1972			CENSUS 1981			CENSUS 1993			Density	(1) TC
DISTRICT	TOTAL	URBAN	RURAL	TOTAL	URBAN	RURAL	TOTAL	URBAN	RURAL	TOTAL	URBAN	RURAL	TOTAL	URBAN	RURAL	(Hab./Km^2)	%
1. San Lorenzo de Quinti	3,635	1,377	2,258	4,171	1,580	2,591	2,059	1,713	346	1,854	1,415	439	1,771	1,293	478	16.90	-1.35
Sub total District	**3,635**	**1,377**	**2,258**	**4,171**	**1,580**	**2,591**	**2,059**	**1,713**	**346**	**1,854**	**1,415**	**439**	**1,771**	**1,293**	**478**	**16.90**	**-1.35**
2. Tanta				414	253	161	457	315	142	573	421	152	528	414	114	1.54	0.76
3. Huancaya	1,158	683	475	804	474	330	656	336	320	557	332	225	500	344	156	1.73	-1.57
4. Tomas	1,098	345	753	1,642	516	1,126	2,107	1,150	957	1,884	859	1,025	958	613	345	3.34	-0.26
5. Vitis				492	470	22	549	527	22	422	389	33	333	316	17	3.21	-1.21
6. Miraflores	757	410	347	781	423	358	740	709	31	575	372	203	462	314	148	2.30	-0.93
12. Carania	704	518	186	642	472	170	586	432	154	481	309	172	291	225	66	2.41	-1.65
13. Alis	1,041	242	799	2,308	537	1,771	2,562	2,329	233	4,535	4,276	259	3,287	3,071	216	24.43	2.19
14. Laraos	1,620	885	735	1,708	933	775	1,687	1,064	623	1,388	838	550	1,212	728	484	4.51	-0.55
19. Tauripampa	1,004	649	355	1,308	845	463	1,097	1,035	62	894	642	252	748	599	149	1.42	-0.55
20. Ayauca	1,402	368	1,034	1,777	467	1,310	1,517	340	1,177	1,181	313	868	1,145	276	869	2.61	-0.38
21. Yauyos	2,048	1,197	851	2,491	1,456	1,035	2,275	1,834	441	2,208	1,362	846	2,005	1,439	566	6.10	-0.04
22. Colonia	2,391	236	2,155	2,680	265	2,415	1,977	940	1,037	1,845	1,074	771	1,571	846	725	4.96	-0.79
23. Putinza							469	301	168	490	347	143	457	373	84	6.39	-0.12
24. Huantán	1,328	983	345	1,231	911	320	1,076	1,026	50	1,148	930	218	948	873	75	2.06	-0.63
25. Catahuasi										907	536	371	1,228	389	839	9.78	2.56
26. Tupe				1,992	557	1,435	1,682	411	1,271	963	322	641	668	302	366	2.07	-3.36
27. Cacra	1,822	780	1,042	1,523	652	871	778	425	353	566	327	239	949	199	750	4.35	-1.22
28. Hongos							537	453	84	564	462	102	478	389	89	3.90	-0.55
29. Lincha				933	221	712	925	327	598	807	233	574	508	87	421	2.24	-1.88
30. Viñac	2,089	180	1,909	3,235	278	2,957	2,590	287	2,303	1,946	275	1,671	1,707	257	1,450	10.86	-0.38
31. Chocos				1,242	397	845	1,249	269	980	1,103	260	843	792	291	501	3.69	-1.40
32. Huangáscar	2,843	1,030	1,813	1,308	474	834	1,261	468	793	1,115	443	672	826	407	419	16.64	-2.31
33. Madean							1,082	348	734	935	257	678	886	238	648	3.86	-0.95
34. Azángaro				945	200	745	910	141	769	735	93	642	703	154	549	7.74	-0.92
Sub total Province	**21,305**	**8,506**	**12,799**	**29,456**	**10,801**	**18,655**	**28,769**	**15,467**	**13,302**	**27,822**	**15,672**	**12,150**	**23,190**	**13,144**	**10,046**	**5.51**	**0.16**

(1) TC : Annual rate of growth in % (1940-1993)

Years in which those districts still had been not created

Prepared by JICA Study Team, August 1999

Table 3.1(2/2). Population census by Districts, Urban and Rural within the Provinces of Huarochiri, Yauyos, Cañete, Lima and Chincha related to the " Study on Integrated Water Resources Development in the Cañete River Basin"

CENSUS	CENSUS 1940			CENSUS 1961			CENSUS 1972			CENSUS 1981			CENSUS 1993			Density	(1) TC
DISTRICT	TOTAL	URBAN	RURAL	TOTAL	URBAN	RURAL	TOTAL	URBAN	RURAL	TOTAL	URBAN	RURAL	TOTAL	URBAN	RURAL	(Hab./Km^2)	%
35. Zuñiga				1,241	487	754	1,226	614	612	1,375	517	858	1,278	373	905	6.67	0.09
36. Pacaran	2,549	1,571	978	1,640	1,011	629	1,642	989	653	1,922	1,070	852	1,524	796	728	6.02	-0.97
37. Lunahuaná	5,216	716	4,500	6,240	856	5,384	5,156	896	4,260	5,011	1,594	3,417	4,308	1,214	3,094	8.75	-0.36
38. S Vicente de cañete	10,782	5,265	5,517	14,712	7,184	7,528	17,052	9,589	7,463	24,153	15,407	8,746	33,121	22,647	10,474	64.51	2.14
39. Nuevo Imperial							9,740	2,981	6,759	12,016	8,021	3,995	13,368	9,574	3,794	42.00	1.52
40. Imperial	10,598	4,089	6,509	16,446	6,345	10,101	14,571	9,671	4,900	25,097	21,934	3,163	31,196	28,709	2,487	596.60	2.06
41. San Luis	4,075	1,344	2,731	6,096	2,011	4,085	6,268	2,533	3,735	8,392	6,038	2,354	10,339	7,866	2,473	280.80	1.77
42. Quilmana				4,773	1,945	2,828	6,791	3,320	3,471	9,623	4,594	5,029	11,320	5,719	5,601	25.54	2.74
43. Cerro Azul	1,751	1,352	399	2,035	1,571	464	2,609	2,004	605	3,659	2,425	1,234	5,215	3,331	1,884	44.13	2.08
44. Asia							2,337	971	1,366	2,821	1,597	1,224	3,527	1,902	1,625	12.64	1.98
45. Coayllo	2,290	241	2,049	4,391	463	3,928	1,766	514	1,252	1,131	345	786	1,038	253	785	1.75	-1.48
46. Mala	4,098	1,878	2,220	5,774	2,646	3,128	9,904	6,065	3,839	14,445	11,291	3,154	19,042	15,320	3,722	144.44	2.94
48. Sta Cruz de Flores	1,543	835	708	2,277	1,232	1,045	2,577	1,485	1,092	2,584	1,428	1,156	2,169	1,494	675	22.86	0.64
49. San Antonio	1,426	1,287	139	1,949	1,759	190	1,991	1,836	155	2,259	1,857	402	2,861	2,218	643	74.66	1.32
50. Chilca	1,819	1,441	378	2,960	2,345	615	5,374	3,369	2,005	8,032	5,514	2,518	12,658	11,435	1,223	26.33	3.73
Sub total Province	**46,147**	**20,019**	**26,128**	**70,534**	**29,855**	**40,679**	**89,004**	**46,837**	**42,167**	**122,520**	**83,632**	**38,888**	**152,964**	**112,851**	**40,113**	**90.51**	**2.29**
51. Pucusana				1,700	1,331	369	2,935	2,420	515	4,318	4,109	209	4,293	4,022	271	136.00	2.94
52. Sta Maria del Mar							46	46	0	101	101	0	185	128	57	19.00	6.85
53. San Bartolo				952	734	218	1,509	1,502	7	3,065	2,862	203	3,350	3,258	92	74.00	4.01
54. Punta Negra				345	345	0	770	770	0	582	582	0	2,406	2,322	84	18.00	6.26
55. Punta Hermosa				301	301	0	940	940	0	1,063	1,063	0	3,327	3,130	197	28.00	7.80
56. Lurín	3,716	1,651	2,065	6,171	2,741	3,430	13,239	11,080	2,159	17,834	14,225	3,609	34,752	30,364	4,388	193.00	4.31
57. Pachacamac	3,597	1,114	2,483	11,726	8,475	3,251	4,694	2,220	2,474	7,133	2,467	4,666	20,131	16,325	3,806	115.00	3.30
58. Villa M. Del Triunfo							106,550	106,530	20	182,981	182,981	0	267,278	267,278	0	3,787.00	1.75
59. Villa el Salvador							80,778	80,758	20	147,679	147,679	0	258,239	258,239	0	7,283.00	2.22
60. San J. De Miraflores							106,755	106,118	637	174,398	173,912	486	287,353	287,353	0	11,983.00	1.89
Sub total Districts	**7,313**	**2,765**	**4,548**	**21,195**	**13,927**	**7,268**	**318,216**	**312,384**	**5,832**	**539,154**	**529,981**	**9,173**	**881,314**	**872,419**	**8,895**	**2,363.60**	**9.46**
Grocio Prado				6,881	1,374	5,502	9,458	3,817	5,641	12,011	9,475	2,536	14,912	13,376	1,536	68.05	1.82
Sub total District				**6,881**	**1,374**	**5,502**	**9,458**	**3,817**	**5,641**	**12,011**	**9,475**	**2,536**	**14,912**	**13,376**	**1,536**	**68.05**	**1.82**
TOTAL	**78,400**	**32,667**	**45,733**	**132,237**	**57,537**	**74,695**	**447,506**	**380,218**	**67,288**	**703,361**	**640,175**	**63,186**	**1,074,151**	**1,013,083**	**61,068**	**43.46**	**5.06**

(1) TC : Annual rate of growth in % (1940-1993)

Years in which those districts still had been not created

Prepared by JICA Study Team, August 1999

TABLE 3.2. TOTAL POPULATION PROJECTION APPLYING THE GEOMETRIC GROWTH METHOD USING THE HISTORICAL RATE OF GROWTH FOR THE CAÑETE RIVER BASIN, CORRIDOR LURIN-CAÑETE (LIMA SOUTH CONE AND AXIS CHILCA-CAÑETE) AND PAMPAS CONCON-TOPARA

Zone		Year	1998	1999	2000	2005	2010	2015	2020	2025	2030
		District	Total	Total	Total	Total	Total	Total	Total	Total	Total
Cañete River Basin		1. San Lorenzo de Quinti (1)	52	51	49	41	34	28	24	20	16
		2. Tanta (2)	537	540	546	568	591	615	640	666	692
		3. Huancaya	462	455	448	413	382	353	326	301	278
		4. Tomas	946	943	941	929	917	905	894	882	871
		5. Vitis	313	309	306	288	271	255	240	225	212
		6. Miraflores	441	437	433	413	394	376	359	343	327
		12. Carania	268	263	259	238	219	202	186	171	157
		13. Alis	3,664	3,744	3,826	4,264	4,753	5,298	5,905	6,581	7,335
		14. Laraos	1,179	1,173	1,166	1,135	1,104	1,074	1,045	1,017	990
		19. Tauripampa (3)	661	657	655	641	627	613	599	585	572
		20. Ayauca	1,123	1,119	1,115	1,094	1,073	1,053	1,033	1,013	994
		21. Yauyos	2,001	2,000	1,999	1,995	1,991	1,987	1,983	1,979	1,976
		22. Colonia	1,510	1,498	1,486	1,428	1,373	1,320	1,268	1,219	1,172
		23. Putinza	454	454	453	450	448	445	442	439	437
		24. Huantán	918	913	907	878	851	824	798	773	749
		25. Catahuasi	1,393	1,429	1,465	1,663	1,886	2,140	2,428	2,755	3,126
		26. Tupe	563	544	526	443	374	315	266	224	189
		27. Cacra	892	881	871	819	770	724	681	640	602
		28. Hongos	465	462	460	447	435	423	412	400	389
		29. Lincha	462	453	445	404	368	334	304	277	252
		30. Viñac	1,675	1,668	1,662	1,631	1,600	1,570	1,540	1,511	1,483
		31. Chocos	738	728	718	669	624	581	542	505	471
		32. Huangáscar	735	718	702	624	556	494	440	392	349
		33. Madean	845	837	829	790	754	719	685	653	623
		34. Azángaro	671	665	659	629	601	574	548	523	499
		35. Zuñiga	1,284	1,285	1,286	1,292	1,298	1,304	1,310	1,316	1,322
		36. Pacaran	1,679	1,708	1,739	1,890	2,045	2,203	2,361	2,518	2,673
		37. Lunahuaná (4)	4,518	4,605	4,694	5,135	5,587	6,047	6,508	6,969	7,421
		38. S Vicente de cañete (5)	31,632	32,366	33,117	37,131	41,617	46,629	52,225	58,473	65,445
		39. Nuevo Imperial	14,415	14,634	14,856	16,019	17,274	18,626	20,085	21,657	23,353
		40. Imperial	34,541	35,252	35,977	39,834	44,106	48,834	54,070	59,868	66,287
		41. San Luis	11,288	11,488	11,692	12,765	13,937	15,217	16,614	18,139	19,804
		42. Quilmana	12,955	13,310	13,674	15,649	17,910	20,497	23,458	26,847	30,726
		43. Cerro Azul	5,781	5,901	6,024	6,677	7,401	8,203	9,093	10,079	11,172
		Sub total River Basin	**141,062**	**143,492**	**145,982**	**159,290**	**174,169**	**190,782**	**209,312**	**229,963**	**252,962**
Corridor Lurin Cañete	Axis Chilca Cañete	44. Asia	3,890	3,967	4,046	4,462	4,922	5,428	5,987	6,604	7,284
		45. Coayllo (6)	323	322	320	312	304	296	288	280	272
		46. Mala	22,012	22,659	23,325	26,963	31,167	36,028	41,646	48,141	55,648
		48. Sta Cruz de Flores (7)	2,073	2,087	2,102	2,178	2,256	2,337	2,421	2,507	2,596
		49. San Antonio	3,055	3,096	3,137	3,350	3,577	3,820	4,079	4,356	4,652
		50. Chilca (8)	14,275	14,822	15,390	18,567	22,393	26,998	32,541	39,211	47,236
		Sub total Axis	**45,628**	**46,953**	**48,319**	**55,831**	**64,619**	**74,907**	**86,962**	**101,099**	**117,688**
	Lima South Cone	51. Pucusana	4,510	4,781	5,068	6,623	8,453	10,789	13,770	17,574	21,900
		52. Sta Maria del Mar	224	237	251	369	568	835	1,314	2,069	3,040
		53. San Bartolo	3,693	3,988	4,307	6,041	8,472	11,883	16,667	22,835	30,558
		54. Punta Negra	3,143	3,331	3,531	4,615	6,032	7,884	10,062	13,026	16,625
		55. Punta Hermosa	4,263	4,519	4,790	6,410	8,579	11,480	14,652	18,700	22,751
		56. Lurín	42,714	45,704	48,904	68,590	91,789	122,834	156,771	190,736	232,059
		57. Pachacamac	25,807	27,614	29,547	41,441	55,457	74,214	94,718	115,239	140,206
		58. Villa M. Del Triunfo	304,305	316,477	329,136	363,393	401,215	442,974	489,079	539,983	596,185
		59. Villa el Salvador	303,574	315,717	328,346	362,520	400,251	441,910	487,904	538,686	594,753
		60. S. J. Miraflores	331,287	341,226	351,463	388,043	428,431	461,542	497,212	522,574	549,231
		Sub total South Cone	**1,023,520**	**1,063,594**	**1,105,343**	**1,248,045**	**1,409,247**	**1,586,345**	**1,782,149**	**1,981,422**	**2,207,308**
Pampas Concón Topará		San V. De Cañete*	3,753	3,828	3,904	4,310	11,256	16,140	19,676	23,580	26,962
		Grocio Prado *	471	480	490	541	2,850	4,434	5,540	6,760	7,786
		Sub total Concon-Topara	**4,224**	**4,308**	**4,394**	**4,851**	**14,106**	**20,574**	**25,216**	**30,340**	**34,748**
Total Population			**1,214,434**	**1,258,346**	**1,304,038**	**1,468,018**	**1,662,141**	**1,872,609**	**2,103,640**	**2,342,824**	**2,612,706**

Note of explanation

TC: Annual rate of growth % (1940-1993)

(1) Only 13% of the rural population has ben considered within Cañete River Basin

(2) All urban population and 89% of the district rural population have been considered within Cañete River Basin

(3) All urban population and 51% of the district rural population have been considered within Cañete River Basin

(4) All urban population and 77% of the district rural population have been considered within Cañete River Basin

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(6) All urban population and 10% of the district rural population have been considered within Cañete River Basin

(7) All urban population and 75% of the district rural population have been considered within Cañete River Basin

(8) All urban population and 32% of the district rural population have been considered within Cañete River Basin

* This population comprises 47% of San Vicente District rural population and 28% of Grocio Prado District rural population. After year 2010 also is included the immigrant population to be settled of Concón-Topará irrigation System

SEDAPAL proyection in the "Master Plan of Drinking Water and Severage Systems of Lima and Callao" Volume III

TABLE 3.3 (1/3)

TOTAL POPULATION PROJECTION APPLYING THE GEOMETRIC GROWTH METHOD USING THE HISTORICAL RATE OF GROWTH AND ITS BREAKDOWN IN URBAN AND RURAL POPULATION FOR THE CAÑETE RIVER BASIN CORRIDOR LURIN-CAÑETE (LIMA SOUTH CONE AND AXIS CHILCA-CAÑETE) AND PAMPAS CONCON-TOPARÁ

Zone		Year	1998			1999			2000		
		District	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural
Cañete River Basin		1. San Lorenzo de Quinti (1)	52	0	52	51	0	51	49	0	49
		2. Tanta (2)	537	442	95	540	447	93	546	453	93
		3. Huancaya	462	322	140	455	317	137	448	313	134
		4. Tomas	946	633	313	943	636	307	941	640	301
		5. Vitis	313	297	16	309	293	16	306	290	16
		6. Miraflores	441	305	136	437	303	134	433	301	131
		12. Carania	268	208	60	263	205	59	259	201	58
		13. Alis	3,664	3,493	171	3,744	3,581	163	3,826	3,671	155
		14. Laraos	1,179	714	465	1,173	712	461	1,166	709	458
		19. Tauripampa (3)	661	591	70	657	589	68	655	588	67
		20. Ayauca	1,123	269	855	1,119	267	852	1,115	266	849
		21. Yauyos	2,001	1,458	543	2,000	1,462	538	1,999	1,466	533
		22. Colonia	1,510	896	614	1,498	905	593	1,486	913	573
		23. Putinza	454	384	70	454	386	67	453	388	65
		24. Huantán	918	854	64	913	850	62	907	846	60
		25. Catahuasi	1,393	312	1,081	1,429	297	1,132	1,465	283	1,183
		26. Tupe	563	271	292	544	265	279	526	259	267
		27. Cacra	892	173	719	881	168	713	871	164	707
		28. Hongos	465	375	90	462	372	90	460	369	91
		29. Lincha	462	75	387	453	73	380	445	71	374
		30. Viñac	1,675	265	1,410	1,668	267	1,402	1,662	268	1,394
		31. Chocos	738	277	461	728	274	454	718	272	446
		32. Huangáscar	735	372	364	718	365	353	702	358	343
		33. Madean	845	217	628	837	213	624	829	209	620
		34. Azángaro	671	148	523	665	147	518	659	145	514
		35. Zuñiga	1,284	356	928	1,285	353	932	1,286	350	936
		36. Pacaran	1,679	862	817	1,708	874	834	1,739	886	853
		37. Lunahuaná (4)	4,518	1,613	2,905	4,605	1,658	2,947	4,694	1,709	2,985
		38. S Vicente de cañete (5)	31,632	25,782	5,850	32,366	26,455	5,911	33,117	27,144	5,973
		39. Nuevo Imperial	14,415	11,426	2,989	14,634	11,794	2,839	14,856	12,161	2,695
		40. Imperial	34,541	32,408	2,133	35,252	33,184	2,068	35,977	33,973	2,004
		41. San Luis	11,288	8,933	2,355	11,488	9,157	2,331	11,692	9,386	2,306
		42. Quilmana	12,955	6,745	6,210	13,310	6,971	6,339	13,674	7,203	6,470
		43. Cerro Azul	5,781	3,610	2,171	5,901	3,668	2,233	6,024	3,727	2,297
		Sub total River Basin	**141,062**	**105,084**	**35,978**	**143,492**	**107,509**	**35,982**	**145,982**	**109,984**	**35,998**
Corridor Lurin Cañete	Axis Chilca Cañete	44. Asia	3,890	2,212	1,678	3,967	2,279	1,688	4,046	2,347	1,698
		45. Coayllo (6)	323	252	71	322	252	70	320	252	68
		46. Mala	22,012	18,202	3,809	22,659	18,834	3,825	23,325	19,484	3,841
		48. Sta Cruz de Flores (7)	2,073	1,571	502	2,087	1,587	501	2,102	1,603	500
		49. San Antonio	3,055	2,318	738	3,096	2,338	758	3,137	2,358	779
		50. Chilca (8)	14,275	13,840	435	14,822	14,378	445	15,390	14,936	454
		Sub total Axis	**45,628**	**38,395**	**7,233**	**46,953**	**39,666**	**7,286**	**48,319**	**40,979**	**7,340**
	Lima South Cone	51. Pucusana	4,510	4,239	271	4,781	4,494	287	5,068	4,764	304
		52. Sta Maria del Mar	224	155	69	237	164	73	251	173	78
		53. San Bartolo	3,693	3,582	111	3,988	3,868	120	4,307	4,178	129
		54. Punta Negra	3,143	3,049	94	3,331	3,231	100	3,531	3,425	106
		55. Punta Hermosa	4,263	4,007	256	4,519	4,248	271	4,790	4,503	287
		56. Lurín	42,714	37,161	5,553	45,704	39,762	5,942	48,904	42,546	6,358
		57. Pachacamac	25,807	21,033	4,774	27,614	22,643	4,971	29,547	24,524	5,023
		58. Villa M. Del Triunfo	304,305	304,305	0	316,477	316,477	0	329,136	329,136	0
		59. Villa el Salvador	303,574	303,574	0	315,717	315,717	0	328,346	328,346	0
		60. S. J. Miraflores	331,287	331,287	0	341,226	341,226	0	351,463	351,463	0
		Sub total South Cone	**1,023,520**	**1,012,392**	**11,128**	**1,063,594**	**1,051,831**	**11,763**	**1,105,343**	**1,093,058**	**12,285**
Pampas Concón Topará		San V. De Cañete *	3,753	0	3,753	3,828	0	3,828	3,904	0	3,904
		Grocio Prado *	471	0	471	480	0	480	490	0	490
		Sub total Concón-Topará	**4,224**	**0**	**4,224**	**4,308**	**0**	**4,308**	**4,394**	**0**	**4,394**
Total			**1,214,434**	**1,155,872**	**58,563**	**1,258,346**	**1,199,006**	**59,340**	**1,304,038**	**1,244,021**	**60,017**

Note of explanation

TC: Annual rate of growth % (1940-1993)

(1) Only 13% of the rural population has ben considered within Cañete River Basin

(2) All urban population and 89% of the district rural population have been considered within Cañete River Basin

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* This population comprises 47% of San Vicente District rural population and 28% of Grocio Prado District rural population. After year 2010 also is included the immigrant population to be settled of Concón-Topará irrigation System

SEDAPAL proyection in the "Master Plan of Drinking Water and Severage Systems of Lima and Callao" Volume III

TABLE 3.3 (2/3)

TOTAL POPULATION PROJECTION APPLYING THE GEOMETRIC GROWTH METHOD USING THE HISTORICAL RATE OF GROWTH AND ITS BREAKDOWN IN URBAN AND RURAL POPULATION FOR THE CAÑETE RIVER BASIN CORRIDOR LURIN-CAÑETE (LIMA SOUTH CONE AND AXIS CHILCA-CAÑETE) AND PAMPAS CONCON-TOPARÁ

Zone		Year	2005			2010			2015		
		District	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural
Cañete River Basin		1. San Lorenzo de Quinti (1)	41	0	41	34	0	34	28	0	28
		2. Tanta (2)	568	482	86	591	511	80	615	540	75
		3. Huancaya	413	293	121	382	274	108	353	256	97
		4. Tomas	929	657	272	917	672	245	905	685	220
		5. Vitis	288	272	15	271	256	15	255	240	14
		6. Miraflores	413	292	121	394	284	111	376	275	102
		12. Carania	238	186	52	219	172	47	202	159	43
		13. Alis	4,264	4,143	122	4,753	4,658	95	5,298	5,223	74
		14. Laraos	1,135	695	440	1,104	682	422	1,074	669	406
		19. Tauripampa (3)	641	579	62	627	570	57	613	561	52
		20. Ayauca	1,094	259	835	1,073	252	821	1,053	245	808
		21. Yauyos	1,995	1,485	511	1,991	1,503	489	1,987	1,520	468
		22. Colonia	1,428	951	477	1,373	980	393	1,320	999	321
		23. Putinza	450	397	53	448	404	44	445	409	36
		24. Huantán	878	827	52	851	807	44	824	787	38
		25. Catahuasi	1,663	215	1,447	1,886	160	1,726	2,140	117	2,023
		26. Tupe	443	232	212	374	206	168	315	183	132
		27. Cacra	819	142	677	770	123	647	724	107	617
		28. Hongos	447	356	92	435	342	93	423	329	94
		29. Lincha	404	61	344	368	52	315	334	45	289
		30. Viñac	1,631	277	1,354	1,600	285	1,315	1,570	294	1,276
		31. Chocos	669	258	411	624	246	378	581	234	348
		32. Huangáscar	624	327	298	556	298	258	494	271	223
		33. Madean	790	190	600	754	173	580	719	158	561
		34. Azángaro	629	140	490	601	134	467	574	129	445
		35. Zuñiga	1,292	334	958	1,298	318	980	1,304	303	1,001
		36. Pacaran	1,890	946	944	2,045	1,005	1,040	2,203	1,063	1,140
		37. Lunahuaná (4)	5,135	1,972	3,163	5,587	2,257	3,330	6,047	2,570	3,477
		38. S Vicente de cañete (5)	37,131	30,848	6,283	41,617	35,015	6,602	46,629	39,699	6,930
		39. Nuevo Imperial	16,019	13,975	2,044	17,274	15,753	1,521	18,626	17,510	1,116
		40. Imperial	39,834	38,126	1,709	44,106	42,653	1,452	48,834	47,603	1,232
		41. San Luis	12,765	10,584	2,181	13,937	11,884	2,053	15,217	13,291	1,926
		42. Quilmana	15,649	8,484	7,165	17,910	9,984	7,926	20,497	11,737	8,760
		43. Cerro Azul	6,677	4,033	2,643	7,401	4,362	3,039	8,203	4,712	3,491
		Sub total River Basin	**159,290**	**123,018**	**36,272**	**174,169**	**137,273**	**36,896**	**190,782**	**152,921**	**37,862**
Corridor Lurin Cañete	Axis Chilca Cañete	44. Asia	4,462	2,717	1,745	4,922	3,134	1,788	5,428	3,603	1,825
		45. Coayllo (6)	312	250	62	304	248	56	296	246	50
		46. Mala	26,963	23,049	3,914	31,167	27,191	3,977	36,028	31,997	4,031
		48. Sta Cruz de Flores (7)	2,178	1,683	495	2,256	1,767	489	2,337	1,853	484
		49. San Antonio	3,350	2,458	891	3,577	2,559	1,018	3,820	2,659	1,161
		50. Chilca (8)	18,567	18,063	505	22,393	21,833	560	26,998	26,376	622
		Sub total Axis	**55,831**	**48,220**	**7,611**	**64,619**	**56,731**	**7,888**	**74,907**	**66,734**	**8,173**
	Lima South Cone	51. Pucusana	6,623	6,292	331	8,453	8,030	423	10,789	10,357	432
		52. Sta Maria del Mar	369	262	107	568	403	165	835	610	225
		53. San Bartolo	6,041	5,920	121	8,472	8,303	169	11,883	11,764	119
		54. Punta Negra	4,615	4,523	92	6,032	5,911	121	7,884	7,805	79
		55. Punta Hermosa	6,410	6,090	321	8,579	8,150	429	11,480	11,021	459
		56. Lurín	68,590	60,359	8,231	91,789	80,774	11,015	122,834	109,322	13,512
		57. Pachacamac	41,441	35,018	6,423	55,457	47,693	7,764	74,214	64,566	9,648
		58. Villa M. Del Triunfo	363,393	363,393	0	401,215	401,215	0	442,974	442,974	0
		59. Villa el Salvador	362,520	362,520	0	400,251	400,251	0	441,910	441,910	0
		60. S. J. Miraflores	388,043	388,043	0	428,431	428,431	0	461,542	461,542	0
		Sub total South Cone	**1,248,045**	**1,232,419**	**15,626**	**1,409,247**	**1,389,162**	**20,085**	**1,586,345**	**1,561,872**	**24,473**
Pampas Concón Topará		San V. De Cañete *	4,310	0	4,310	11,256	0	11,256	16,140	0	16,140
		Grocio Prado *	541	0	541	2,850	0	2,850	4,434	0	4,434
		Sub total Concón-Topará	**4,851**	**0**	**4,851**	**14,106**	**0**	**14,106**	**20,574**	**0**	**20,574**
Total			**1,468,018**	**1,403,657**	**64,361**	**1,662,141**	**1,583,165**	**78,975**	**1,872,609**	**1,781,526**	**91,083**

Note of explanation

TC: Annual rate of growth % (1940-1993)

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SEDAPAL proyection in the "Master Plan of Drinking Water and Severage Systems of Lima and Callao" Volume III

TABLE 3.3 (3/3)

TOTAL POPULATION PROJECTION APPLYING THE GEOMETRIC GROWTH METHOD USING THE HISTORICAL RATE OF GROWTH AND ITS BREAKDOWN IN URBAN AND RURAL POPULATION FOR THE CAÑETE RIVER BASIN CORRIDOR LURIN-CAÑETE (LIMA SOUTH CONE AND AXIS CHILCA-CAÑETE) AND PAMPAS CONCON-TOPARÁ

Zone		Year	2020			2025			2030			TC (%)
		District	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	
Cañete River Basin		1. San Lorenzo de Quinti (1)	24	0	24	20	0	20	16	0	16	-1.35
		2. Tanta (2)	640	571	69	666	602	64	692	633	59	0.76
		3. Huancaya	326	239	87	301	223	78	278	208	70	-1.57
		4. Tomas	894	697	197	882	707	175	871	715	156	-0.26
		5. Vitis	240	226	14	225	212	13	212	199	13	-1.21
		6. Miraflores	359	266	93	343	258	85	327	249	78	-0.93
		12. Carania	186	147	39	171	136	35	157	125	32	-1.65
		13. Alis	5,905	5,847	58	6,581	6,536	45	7,335	7,300	35	2.19
		14. Laraos	1,045	656	389	1,017	643	374	990	631	359	-0.55
		19. Tauripampa (3)	599	552	47	585	542	43	572	533	39	-0.55
		20. Ayauca	1,033	238	795	1,013	232	782	994	225	769	-0.38
		21. Yauyos	1,983	1,536	447	1,979	1,552	427	1,976	1,568	408	-0.04
		22. Colonia	1,268	1,009	259	1,219	1,011	208	1,172	1,006	165	-0.79
		23. Putinza	442	413	29	439	416	23	437	418	19	-0.12
		24. Huantán	798	766	32	773	746	27	749	726	23	-0.63
		25. Catahuasi	2,428	84	2,344	2,755	60	2,695	3,126	43	3,083	2.56
		26. Tupe	266	162	104	224	143	81	189	125	64	-3.36
		27. Cacra	681	92	589	640	80	561	602	69	533	-1.22
		28. Hongos	412	317	95	400	304	96	389	292	97	-0.55
		29. Lincha	304	39	265	277	33	243	252	29	223	-1.88
		30. Viñac	1,540	303	1,238	1,511	311	1,200	1,483	320	1,162	-0.38
		31. Chocos	542	222	320	505	211	294	471	201	270	-1.4
		32. Huangáscar	440	247	193	392	224	167	349	204	144	-2.31
		33. Madean	685	143	542	653	130	523	623	118	505	-0.95
		34. Azángaro	548	123	424	523	119	404	499	114	386	-0.92
		35. Zuñiga	1,310	288	1,022	1,316	274	1,042	1,322	260	1,062	0.09
		36. Pacaran	2,361	1,118	1,243	2,518	1,169	1,349	2,673	1,217	1,456	** 1.46
		37. Lunahuaná (4)	6,508	2,903	3,605	6,969	3,255	3,714	7,421	3,621	3,800	** 1.56
		38. S Vicente de cañete (5)	52,225	44,960	7,265	58,473	50,864	7,609	65,445	57,484	7,961	2.14
		39. Nuevo Imperial	20,085	19,274	811	21,657	21,072	585	23,353	22,932	421	1.52
		40. Imperial	54,070	53,028	1,043	59,868	58,987	881	66,287	65,543	744	2.06
		41. San Luis	16,614	14,814	1,800	18,139	16,462	1,677	19,804	18,245	1,559	1.77
		42. Quilmana	23,458	13,785	9,673	26,847	16,176	10,671	30,726	18,964	11,761	2.74
		43. Cerro Azul	9,093	5,086	4,007	10,079	5,485	4,594	11,172	5,909	5,263	2.08
		Sub total River Basin	**209,312**	**170,151**	**39,161**	**229,963**	**189,175**	**40,788**	**252,962**	**210,228**	**42,734**	**1.84**
Corridor Lurin Cañete	Axis Chilca Cañete	44. Asia	5,987	4,129	1,858	6,604	4,718	1,885	7,284	5,376	1,908	1.98
		45. Coayllo (6)	288	243	45	280	239	40	272	236	36	-1.48
		46. Mala	41,646	37,570	4,077	48,141	44,026	4,115	55,648	51,502	4,146	2.94
		48. Sta Cruz de Flores (7)	2,421	1,943	478	2,507	2,035	472	2,596	2,131	465	0.64
		49. San Antonio	4,079	2,757	1,322	4,356	2,854	1,502	4,652	2,949	1,703	1.32
		50. Chilca (8)	32,541	31,851	690	39,211	38,446	765	47,236	46,388	849	3.73
		Sub total Axis	**86,962**	**78,493**	**8,469**	**101,099**	**92,319**	**8,780**	**117,688**	**108,581**	**9,107**	**3.01**
	Lima South Cone	51. Pucusana	13,770	13,219	551	17,574	16,871	703	21,900	21,024	876	5.06
		52. Sta Maria del Mar	1,314	959	355	2,069	1,552	517	3,040	2,280	760	8.49
		53. San Bartolo	16,667	16,500	167	22,835	22,607	228	30,558	30,252	306	6.83
		54. Punta Negra	10,062	9,961	101	13,026	12,896	130	16,625	16,459	166	5.34
		55. Punta Hermosa	14,652	14,066	586	18,700	17,952	748	22,751	21,841	910	5.37
		56. Lurín	156,771	139,526	17,245	190,736	169,755	20,981	232,059	206,533	25,526	5.43
		57. Pachacamac	94,718	83,352	11,366	115,239	102,563	12,676	140,206	126,185	14,021	5.43
		58. Villa M. Del Triunfo	489,079	489,079	0	539,983	539,983	0	596,185	596,185	0	2.12
		59. Villa el Salvador	487,904	487,904	0	538,686	538,686	0	594,753	594,753	0	2.12
		60. S. J. Miraflores	497,212	497,212	0	522,574	522,574	0	549,231	549,231	0	1.59
		Sub total South Cone	**1,782,149**	**1,751,779**	**30,370**	**1,981,422**	**1,945,438**	**35,984**	**2,207,308**	**2,164,743**	**42,565**	**2.43**
Pampas Concón Topará		San V. De Cañete *	19,676	0	19,676	23,580	0	23,580	26,962	0	26,962	6.36
		Grocio Prado *	5,540	0	5,540	6,760	0	6,760	7,786	0	7,786	9.16
		Sub total Concón-Topará	**25,216**	**0**	**25,216**	**30,340**	**0**	**30,340**	**34,748**	**0**	**34,748**	**6.81**
Total			**2,103,640**	**2,000,423**	**103,216**	**2,342,824**	**2,226,932**	**115,891**	**2,612,706**	**2,483,552**	**129,153**	**2.42**

Note of explanation

TC: Annual rate of growth % (1940-1993)

(1) Only 13% of the rural population has ben considered within Cañete River Basin

(2) All urban population and 89% of the district rural population have been considered within Cañete River Basin

(3) All urban population and 51% of the district rural population have been considered within Cañete River Basin

(4) All urban population and 77% of the district rural population have been considered within Cañete River Basin

(5) All urban population and 53% of the district rural population have been considered within Cañete River Basin

(6) All urban population and 10% of the district rural population have been considered within Cañete River Basin

(7) All urban population and 75% of the district rural population have been considered within Cañete River Basin

(8) All urban population and 32% of the district rural population have been considered within Cañete River Basin

* This population comprises 47% of San Vicente District rural population and 28% of Grocio Prado District rural population. After year 2010 also is included the immigrant population to be settled of Concón-Topará irrigation System

** These rates of growth (1.46% and 1.56%) are the result to apply the proyected rate of growth by INEI for the period 1999-2000 (1.78%) as well as the national tendency of rate of growth for the period 2001-2030 (1.68% to 1.20%)

SEDAPAL proyection in the "Master Plan of Drinking Water and Severage Systems of Lima and Callao" Volume III

Table 3.4. PROJECTION OF POPULATION IN METROPOLITAN LIMA PER DISTRICTS
1998-2030 Period (In inhabitants)

DISTRICT	1998	2000	2005	2010	2015	2020	2025	2030
LIMA PROVINCE								
Ancón	15,752	17,698	23,685	31,695	42,415	55,435	70,751	90,298
Ate Vitarte	332,401	366,472	445,869	516,884	570,682	599,792	614,300	618,019
Barranco	39,864	40,665	41,692	42,745	43,824	44,931	45,156	45,269
Breña	87,031	87,119	87,337	87,555	87,774	87,994	88,214	88,435
Carabayllo	130,285	143,639	174,759	202,594	223,680	235,090	241,026	247,112
Chaclacayo	38,066	39,604	41,624	42,676	43,753	44,858	45,083	45,196
Chorillos	243,770	248,669	254,949	261,386	267,987	274,754	276,130	276,821
Cienegilla	10,968	12,093	14,712	17,056	20,257	23,483	27,224	31,560
Comas	447,931	461,469	497,134	522,492	549,145	577,157	591,731	606,673
El Agustino	165,222	171,897	180,665	185,227	189,904	194,700	195,675	196,165
Independencia	193,969	194,163	194,649	195,136	195,624	196,114	196,605	197,097
Jesús María	65,286	66,599	68,280	70,005	71,772	73,585	75,443	75,821
La Molina	106,898	124,686	159,135	193,612	224,449	247,810	260,451	273,736
La Victoria	226,996	227,223	227,792	228,362	228,934	229,507	230,081	230,657
Lima Cercado	339,986	340,326	341,178	342,031	342,887	343,745	344,606	345,468
Lince	60,723	61,944	63,508	65,112	66,756	68,441	68,784	68,956
Los Olivos	284,482	307,695	356,703	393,829	413,918	424,370	435,086	446,073
Lurigancho	113,877	118,478	127,634	137,498	144,512	151,883	159,631	167,774
Lurín	42,714	48,904	68,590	91,789	122,834	156,771	190,736	232,059
Magdalena	48,390	49,363	50,609	51,887	53,197	54,541	54,814	54,951
Miraflores	86,438	88,175	90,402	92,685	95,025	97,424	99,884	102,407
Pachacamac	25,807	29,547	41,441	55,457	74,214	94,718	115,239	140,206
Pucusana	4,510	5,068	6,623	8,453	10,789	13,770	17,574	21,900
Pueblo Libre	74,662	76,163	78,086	80,058	82,079	84,152	84,574	84,785
Puente Piedra	134,066	153,492	215,280	288,093	367,688	469,274	658,181	880,794
Punta Hermosa	4,263	4,790	6,410	8,579	11,480	14,652	18,700	22,751
Punta Negra	3,143	3,531	4,615	6,032	7,884	10,062	13,026	16,625
Rimac	190,098	190,288	190,764	191,242	191,720	192,200	192,681	193,163
S. J. Lurigancho	709,461	752,667	831,005	895,229	940,894	988,889	1,039,333	1,092,349
S.J. Miraflores	331,287	351,463	388,043	428,431	461,542	497,212	522,574	549,231
San Bartolo	3,693	4,307	6,041	8,472	11,883	16,667	22,835	30,558
San Borja	113,282	117,859	126,967	133,444	140,251	143,793	147,423	148,162
San Isidro	62,515	63,772	65,382	67,200	68,897	70,636	72,420	74,147
San Luis	48,116	48,164	48,285	48,406	48,527	48,648	48,770	48,892
San Martin de Porres	413,603	426,105	459,036	494,512	519,737	546,249	574,113	603,398
San Miguel	124,103	126,597	129,794	133,071	136,432	139,877	140,577	140,929
Santa Anita	140,629	155,043	179,737	203,356	224,522	247,890	267,048	280,670
Santa María del Mar	224	251	369	568	835	1,314	2,069	3,040
Santa Rosa	14,046	15,192	17,612	20,417	23,669	27,439	31,810	36,876
Santiago de surco	238,326	277,983	322,259	355,800	392,832	433,718	478,859	515,868
Surquillo	88,875	88,964	89,187	89,410	89,634	89,858	90,083	90,308
V. Salvador	303,574	328,346	362,520	400,251	441,910	487,904	538,686	594,753
Villa María del Triunfo	304,305	329,136	363,393	401,215	442,974	489,079	539,983	596,185
SUBTOTAL	**6,413,637**	**6,765,609**	**7,443,756**	**8,089,952**	**8,689,722**	**9,290,385**	**9,927,967**	**10,606,137**
CALLAO PROVINCE								
Callao	411,211	423,640	445,250	467,962	491,833	516,921	543,289	571,003
Bellavista	73,163	73,236	73,419	73,603	73,787	73,972	74,157	74,342
C de la Legua	38,615	39,782	41,811	43,944	46,185	48,541	51,017	53,620
La Perla	63,222	63,285	63,443	63,602	63,761	63,921	64,081	64,241
La Punta	6,604	6,612	6,631	6,650	6,661	6,697	6,739	6,756
Ventanilla	123,557	133,639	158,722	188,512	223,893	265,914	315,823	375,098
SUBTOTAL	**716,371**	**740,194**	**789,276**	**844,272**	**906,120**	**975,966**	**1,055,106**	**1,145,060**
TOTAL METROPOLITAN LIMA	**7,130,008**	**7,505,802**	**8,233,031**	**8,934,224**	**9,595,842**	**10,266,351**	**10,983,073**	**11,751,197**

Source: INEI up to year 2015 and for 2016-2030 was made by Greeley and Hansen-Latin Consult

Table 3.5 DOMESTIC USE UNIT WATER DEMAND FOR SERVICE AREA OTHER THAN LIMA SOUTH CONE

POPULATION GROUP	Unit Water Demand (l/p/d)								
	1998	1999	2000	2005	2010	2015	2020	2025	2030
I. Up to 2,000	60	61	62	67	72	77	82	87	92
II. 2,001 to 5,000	100	101	102	107	112	117	122	127	132
III. 5,001 to 10,000	130	131	132	137	142	147	152	157	162
IV. 10,001 to 20,000	160	161	162	167	172	177	182	187	192
V. 20,001 to 50,000	180	182	184	194	204	214	224	234	244
VI. 50,001 and more	210	212	214	224	234	244	254	264	274

As for population group I,II,III and IV it has been considered 1 l/p/d as annual unit water demand increment
As for population group V and VI it has been considered 2 l/p/d as annual unit water demand increment
Year 1998 has been considered as the basic year for unit water demand

TABLE 3.6. ACTIVE PROJECTION OF THE UNIT WATER CONSUMPTION FOR METROPOLITAN LIMA PER SECTOR AND PER DISTRICT
Period 1998-2030
(L/P/D)

DISTRICT	YEAR							
	1998	2000	2005	2010	2015	2020	2025	2030
CARABAYLLO	239	180	188	171	201	209	215	227
COMAS	274	206	196	198	198	199	190	202
INDEPENDENCIA	249	178	186	177	190	194	176	197
LOS OLIVOS	289	197	208	197	209	210	199	213
PUENTE PIEDRA	213	169	165	150	164	164	158	161
RIMAC	282	182	208	181	212	216	179	219
SAN MARTIN DE PORRAS	303	223	215	210	216	217	211	218
S.C. COMAS	**273**	**207**	**199**	**196**	**199**	**199**	**197**	**198**
BELLAVISTA	390	236	294	235	293	304	233	302
CALLAO	284	204	210	203	213	212	207	213
C. DE LA LEGUA	313	217	207	197	206	214	169	209
LA PERLA	342	137	245	136	244	243	135	256
LA PUNTA	392	0	391	0	389	387	0	384
VENTANILLA	231	129	185	183	181	182	164	180
S.C. CALLAO	**292**	**222**	**217**	**215**	**215**	**215**	**213**	**212**
BREÑA	387	298	287	197	295	295	294	303
JESUS MARIA	490	259	380	370	373	376	344	387
LA VICTORIA	388	266	284	265	294	297	300	307
LIMA CERCADO	429	330	324	328	335	342	326	353
MAGDALENA	446	350	359	333	357	364	315	362
PUEBLO LIBRE	393	227	299	216	305	298	306	306
SAN MIGUEL	376	273	293	260	298	296	246	300
S.C. BREÑA	**410**	**311**	**310**	**313**	**318**	**321**	**322**	**331**
ATE VITARTE	268	212	202	201	201	203	197	210
CHACLACAYO	272	218	228	202	237	231	192	249
CIENEGUILLA	315	0	294	0	341	368	317	383
EL AGUSTINO	235	151	177	140	182	186	177	194
LA MOLINA	428	277	326	312	323	328	332	338
LURIGANCHO	243	146	217	189	227	233	216	237
SAN LUIS	431	179	322	178	320	320	177	336
SANTA ANITA	252	167	187	170	189	188	162	191
S.C. ATE VITARTE	**283**	**225**	**221**	**218**	**226**	**229**	**230**	**237**
S. J. LURIGANCHO	230	184	175	174	177	179	175	182
S.C. S.J. LURIGANCHO	**230**	**184**	**175**	**174**	**177**	**179**	**175**	**182**
BARRANCO	368	212	290	202	296	288	191	305
CHORRILLOS	255	174	203	198	206	211	188	218
LINCE	526	279	354	265	362	366	251	376
MIRAFLORES	490	392	449	373	455	461	433	464
SAN BORJA	389	367	361	324	357	361	352	362
SAN ISIDRO	525	406	489	386	502	502	477	513
STGO. SURCO	348	311	314	291	310	307	289	305
SURQUILLO	321	291	300	290	308	317	288	325
S.C. SURQUILLO	**363**	**315**	**315**	**312**	**318**	**318**	**318**	**322**
LURIN	243	177	202	188	204	204	181	201
PACHACAMAC	201	0	188	156	175	173	150	173
PUCUSANA	383	0	261	0	240	251	0	237
S. J. MIRAFLORES	248	197	187	181	189	189	182	192
VILLA MARIA	233	184	176	172	177	178	176	181
V. SALVADOR	211	158	164	151	170	174	176	179
S.C. V. EL SALVADOR	**231**	**182**	**178**	**175**	**181**	**183**	**184**	**186**
SAN BARTOLO	355	296	417	389	389	356	346	345
PUNTA HERMOSA	461	399	393	385	403	360	352	347
PUNTA NEGRA	417	361	273	328	251	262	253	198
SANTA MARIA	386	344	234	304	207	501	318	217
ANCON	250	252	266	291	296	297	298	292
SANTA ROSA	280	252	250	226	251	240	228	232
NOT ADM. BY SEDAPAL	**315**	**189**	**294**	**228**	**299**	**296**	**271**	**285**
METROPOLITAN LIMA	**297**	**236**	**227**	**226**	**228**	**228**	**228**	**228**

Table 3.7. Active Projection of the Unit Water Consumption for Metropolitan Lima per Sector

(l/p/d)

Sector	1998	2000	2005	2010	2015	2020	2025	2030
C. S. COMAS	256	204	196	196	197	197	197	197
C. S. CALLAO	272	217	208	208	209	209	209	209
C. S. BREÑA	378	302	289	289	290	290	290	290
C. S. ATE VITARTE	264	211	202	202	203	203	203	203
C. S. S.J. LURIGANCHO	217	173	166	166	167	167	167	167
C. S. SURQUILLO	336	268	257	257	258	258	258	258
C. S. V. EL SALVADOR	218	174	167	167	168	168	168	168
NOT ADM. BY SEDAPAL	293	234	224	224	225	225	225	225

Prepared by JICA Study Team

TABLE 3.8

PROJECTION OF TOTAL DRINKING WATER NECESSITY PRODUCTION FOR DOMESTIC USE IN THE CAÑETE RIVER BASIN PAMPAS CONCON-TOPARA, CHILCA-CAÑETE AXIS AND LIMA SOUTH CONE FOR THE PERIOD 1998-2030 CONSIDERING SERVICE COVERAGE (*) AND TOTAL WATER LOSSES

Drinking Water Production per Year in (1000 m^3/year)

Zone		Year	1998	1999	2000	2005	2010	2015	2020	2025	2030
		District	**total**	**total**	**total**	**total**	**total**	**total**	**total**	**total**	**total**
Cañete River Basin		1. San Lorenzo de Quinti	1.4	1.4	1.4	1.1	0.9	0.8	0.8	0.7	0.7
		2. Tanta	14.4	14.8	15.1	15.0	15.5	18.4	21.7	25.4	29.4
		3. Huancaya	12.4	12.4	12.4	10.9	10.0	10.6	11.1	11.5	11.8
		4. Tomas	25.4	25.8	26.1	24.5	24.1	27.1	30.3	33.6	37.0
		5. Vitis	8.4	8.5	8.5	7.6	7.1	7.6	8.1	8.6	9.0
		6. Miraflores	11.8	11.9	12.0	10.9	10.4	11.3	12.2	13.1	13.9
		12. Carania	7.2	7.2	7.2	6.3	5.8	6.0	6.3	6.5	6.7
		13. Alis	160.9	166.4	171.9	177.4	192.9	301.2	369.6	451.2	548.2
		14. Laraos	31.7	32.0	32.4	29.9	29.0	32.2	35.5	38.8	42.1
		19. Tauripampa	17.7	17.9	18.2	16.9	16.5	18.4	20.3	22.3	24.3
		20. Ayauca	30.2	30.6	30.9	28.8	28.2	31.6	35.0	38.6	42.3
		21. Yauyos	53.7	54.6	55.5	52.6	52.3	59.6	67.3	75.4	84.0
		22. Colonia	40.6	40.9	41.2	37.6	36.1	39.6	43.0	46.5	49.8
		23. Putinza	12.2	12.4	12.6	11.9	11.8	13.3	15.0	16.7	18.6
		24. Huantán	24.7	24.9	25.2	23.1	22.4	24.7	27.1	29.5	31.9
		25. Catahuasi	37.4	39.0	40.7	43.8	49.6	95.7	121.1	152.2	190.0
		26. Tupe	15.1	14.9	14.6	11.7	9.8	9.4	9.0	8.5	8.0
		27. Cacra	24.0	24.1	24.2	21.6	20.2	21.7	23.1	24.4	25.6
		28. Hongos	12.5	12.6	12.8	11.8	11.4	12.7	14.0	15.3	16.6
		29. Lincha	12.4	12.4	12.3	10.7	9.7	10.0	10.3	10.5	10.7
		30. Viñac	45.0	45.6	46.1	42.9	42.0	47.1	52.2	57.6	63.1
		31. Chocos	19.8	19.9	19.9	17.6	16.4	17.4	18.4	19.2	20.0
		32. Huangáscar	19.7	19.6	19.5	16.4	14.6	14.8	14.9	14.9	14.8
		33. Madean	22.7	22.9	23.0	20.8	19.8	21.5	23.2	24.9	26.5
		34. Azángaro	18.0	18.2	18.3	16.6	15.8	17.2	18.6	19.9	21.2
		35. Zuñiga	34.5	35.1	35.7	34.0	34.1	39.1	44.4	50.2	56.2
		36. Pacaran	45.1	46.6	48.3	49.8	53.7	66.0	80.1	96.0	113.7
		37. Lunahuaná	173.4	178.5	183.7	185.0	228.4	275.5	328.4	387.7	452.9
		38. S Vicente de cañete	2,417.8	2,501.9	2,588.7	2,690.7	2,949.4	3,704.2	4,622.9	6,404.8	7,878.3
		39. Nuevo Imperial	952.1	978.4	1,005.0	1,003.4	1,028.9	1,240.1	1,478.6	2,182.0	2,604.9
		40. Imperial	2,706.7	2,797.0	2,889.7	2,952.4	3,214.1	4,003.1	5,607.1	6,854.3	8,334.6
		41. San Luis	625.3	642.4	659.9	786.5	830.0	973.6	1,176.3	1,412.2	1,685.9
		42. Quilmana	753.9	780.5	808.0	842.7	928.3	1,310.2	1,646.1	2,199.0	2,727.5
		43. Cerro Azul	258.8	266.8	275.0	280.8	302.5	373.7	522.0	632.7	836.8
		Sub total River Basin	**8,647.1**	**8,917.8**	**9,195.9**	**9,493.5**	**10,241.8**	**12,855.5**	**16,514.1**	**21,384.5**	**26,037.1**
Corridor Lurin Cañete	Axis Chilca Cañete	44. Asia	144.1	149.1	154.3	160.2	175.1	218.8	271.4	334.3	483.8
		45. Coayllo	8.7	8.8	8.9	8.2	8.0	8.9	9.8	10.7	11.6
		46. Mala	1,474.2	1,530.3	1,588.3	1,922.3	2,187.2	2,849.5	3,687.0	4,741.2	6,777.3
		48. Sta Cruz de Flores	55.7	57.0	58.3	57.4	59.3	70.1	82.1	131.2	149.8
		49. San Antonio	123.6	126.4	129.3	126.9	131.4	155.9	184.0	216.0	252.4
		50. Chilca	1,003.0	1,048.3	1,095.7	1,199.0	1,640.4	2,216.2	2,974.8	3,969.6	5,269.1
		Sub total Axis	**2,809.2**	**2,919.9**	**3,034.9**	**3,473.9**	**4,201.3**	**5,519.5**	**7,209.0**	**9,402.9**	**12,943.9**
	Lima South Cone (**)	51. Pucusana	607.4	611.2	614.8	619.6	929.4	1,239.4	1,549.2	1,859.0	2,478.7
		52. Sta Maria del Mar	30.4	30.6	30.7	31.0	92.9	93.0	309.8	309.8	309.8
		53. San Bartolo	607.4	611.2	614.8	1,239.2	1,549.0	2,168.9	2,788.6	3,718.1	4,957.5
		54. Punta Negra	607.4	611.2	614.8	619.6	929.4	929.5	1,239.4	1,549.2	1,549.2
		55. Punta Hermosa	911.1	916.8	922.1	1,239.2	1,549.0	2,168.9	2,478.7	3,098.4	3,718.1
		56. Lurín	4,859.1	4,889.8	4,918.1	6,815.8	8,674.7	11,464.1	14,872.4	18,280.6	21,998.7
		57. Pachacamac	2,429.5	2,592.6	2,766.4	3,717.7	4,647.1	6,196.8	7,746.0	9,605.1	11,464.1
		58. Villa M. Del Triunfo	32,191.3	30,597.5	28,893.9	31,290.8	33,149.6	36,871.1	41,208.9	45,546.7	50,504.1
		59. Villa el Salvador	29,154.4	27,841.0	26,434.8	29,122.1	30,981.0	35,012.1	39,659.7	44,307.3	49,884.4
		60. S. J. Miraflores	37,657.8	35,336.9	32,889.8	35,628.1	37,487.0	40,899.0	44,307.3	46,786.0	49,574.6
		Sub total South Cone	**109,055.7**	**104,039.0**	**98,700.2**	**110,323.2**	**119,989.3**	**137,042.8**	**156,160.0**	**175,060.3**	**196,439.3**
Pampas Concón-Topará			189.1	194.8	200.6	204.0	885.6	1,714.2	2,336.5	3,109.6	3,919.9
Sub total Pampas Concón-Topará			**189.1**	**194.8**	**200.6**	**204.0**	**885.6**	**1,714.2**	**2,336.5**	**3,109.6**	**3,919.9**
TOTAL (MCM)			**120.70**	**116.07**	**111.13**	**123.49**	**135.32**	**157.13**	**182.22**	**208.96**	**239.34**

* The service coverage it was taken as 65% (1998) to 95% (2030) for those districts within in the Cañete River Basin, Chilca-Cañete Axis and Pampas Concon-Topara

** Source : Master Plan of drinking Water and Severage System of Lima and Callao. Sedapal 1998

TABLE 3.9

PROJECTION OF TOTAL DRINKING WATER NECESSITY PRODUCTION FOR INDUSTRIAL USE IN THE CAÑETE RIVER BASIN PAMPAS CONCON-TOPARA, CHILCA-CAÑETE AXIS AND LIMA SOUTH CONE FOR THE PERIOD 1998-2030 CONSIDERING SERVICE COVERAGE (*) AND TOTAL WATER LOSSES

Drinking Water Production per Year in (1000 m^3/year)

Zone		Year	1998	1999	2000	2005	2010	2015	2020	2025	2030
		District	**total**	**total**	**total**	**total**	**total**	**total**	**total**	**total**	**total**
Cañete River Basin		1. San Lorenzo de Quinti	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		2. Tanta	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		3. Huancaya	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		4. Tomas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		5. Vitis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		6. Miraflores	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		12. Carania	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		13. Alis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		14. Laraos	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		19. Tauripampa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		20. Ayauca	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		21. Yauyos	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		22. Colonia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		23. Putinza	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		24. Huantán	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		25. Catahuasi	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		26. Tupe	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		27. Cacra	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		28. Hongos	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		29. Lincha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		30. Viñac	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		31. Chocos	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		32. Huangáscar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		33. Madean	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		34. Azángaro	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		35. Zuñiga	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		36. Pacaran	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		37. Lunahuaná	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		38. S Vicente de cañete	207.74	215.53	223.57	235.24	260.72	330.76	416.61	588.15	728.20
		39. Nuevo Imperial	81.83	85.00	88.19	91.74	98.89	120.66	145.11	215.97	258.70
		40. Imperial	261.13	270.35	279.83	290.74	317.59	396.61	557.17	682.07	830.29
		41. San Luis	0.00	0.00	0.00	69.48	74.61	91.59	111.53	134.83	161.96
		42. Quilmana	0.00	0.00	0.00	0.00	0.00	80.88	103.79	219.90	272.75
		43. Cerro Azul	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Sub total River Basin	**550.70**	**570.88**	**591.59**	**687.19**	**751.82**	**1020.51**	**1334.20**	**1840.92**	**2251.90**
Corridor Lurin Cañete	Axis Chilca Cañete	44. Asia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		45. Coayllo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		46. Mala	130.37	135.73	141.30	175.76	202.46	266.59	348.13	451.23	652.43
		48. Sta Cruz de Flores	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		49. San Antonio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		50. Chilca	99.13	103.62	108.31	118.57	162.57	219.76	295.14	394.04	523.30
		Sub total Axis	**229.50**	**239.35**	**249.61**	**294.33**	**365.03**	**486.35**	**643.26**	**845.27**	**1175.72**
	Lima South Cone (**)	51. Pucusana	23.3	19.5	16.0	11.1	16.7	22.1	27.6	33.1	44.2
		52. Sta Maria del Mar	1.2	1.0	0.8	0.6	1.7	1.7	5.5	5.5	5.5
		53. San Bartolo	23.3	19.5	16.0	22.2	27.8	38.6	49.7	66.2	88.3
		54. Punta Negra	23.3	19.5	16.0	11.1	16.7	16.6	22.1	27.6	27.6
		55. Punta Hermosa	35.0	29.2	23.9	22.2	27.8	38.6	44.2	55.2	66.2
		56. Lurín	186.7	155.9	127.7	122.1	155.4	204.2	264.9	325.6	391.8
		57. Pachacamac	93.3	82.7	71.8	66.6	83.3	110.4	138.0	171.1	204.2
		58. Villa M. Del Triunfo	1236.8	975.6	750.0	560.6	593.9	656.7	734.0	811.3	899.6
		59. Villa el Salvador	1120.2	887.7	686.2	521.7	555.0	623.6	706.4	789.2	888.5
		60. S. J. Miraflores	1446.9	1126.7	853.7	638.3	671.6	728.5	789.2	833.3	883.0
		Sub total South Cone	**4190.09**	**3317.31**	**2561.93**	**1976.47**	**2149.65**	**2440.97**	**2781.48**	**3118.12**	**3498.92**
Pampas Concón-Topará			0	0	0	0	88.56	171.42	233.65	310.96	391.99
Sub total Pampas Concón-Topará			**0**	**0**	**0**	**0**	**88.56**	**171.42**	**233.65**	**310.96**	**391.99**
TOTAL (MCM)			**4.97**	**4.13**	**3.40**	**2.96**	**3.36**	**4.12**	**4.99**	**6.12**	**7.32**

* The service coverage it was taken as 65% (1998) to 95% (2030) for those districts within in the Cañete River Basin, Chilca-Cañete Axis and Pampas Concon-Topara

** Source : Master Plan of drinking Water and Severage System of Lima and Callao. Sedapal 1998

TABLE 3.10

PROJECTION OF TOTAL DRINKING WATER NECESSITY PRODUCTION FOR TOURISM USE IN THE CAÑETE RIVER BASIN PAMPAS CONCON-TOPARA, CHILCA-CAÑETE AXIS AND LIMA SOUTH CONE FOR THE PERIOD 1998-2030 CONSIDERING SERVICE COVERAGE (*) AND TOTAL WATER LOSSES

Drinking Water Production per Year in (1000 m³/year)

Zone		Year	1998	1999	2000	2005	2010	2015	2020	2025	2030
		District	Total	Total	Total	Total	Total	Total	Total	Total	Total
Cañete River Basin		1. San Lorenzo de Quinti	1.60	1.60	1.60	1.41	1.31	1.40	1.48	1.57	1.66
		2. Tanta	1.60	1.60	1.60	1.41	1.31	1.40	1.48	3.14	3.31
		3. Huancaya	1.60	1.60	1.60	1.41	1.31	1.40	1.48	1.57	1.66
		4. Tomas	1.60	1.60	1.60	1.41	2.62	2.79	2.96	3.14	3.31
		5. Vitis	1.60	1.60	1.60	1.41	1.31	1.40	1.48	1.57	1.66
		6. Miraflores	1.60	1.60	1.60	1.41	1.31	1.40	1.48	1.57	1.66
		12. Carania	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		13. Alis	3.21	3.21	3.21	5.63	10.46	13.95	19.27	25.11	33.14
		14. Laraos	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		19. Tauripampa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		20. Ayauca	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		21. Yauyos	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		22. Colonia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		23. Putinza	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		24. Huantán	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		25. Catahuasi	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		26. Tupe	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		27. Cacra	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		28. Hongos	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		29. Lincha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		30. Viñac	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		31. Chocos	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		32. Huangáscar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		33. Madean	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		34. Azángaro	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		35. Zuñiga	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		36. Pacaran	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		37. Lunahuaná	8.02	12.83	20.85	23.95	36.62	51.62	66.71	84.76	102.72
		38. S Vicente de cañete	56.15	86.62	147.58	159.17	211.90	306.94	386.91	485.01	603.08
		39. Nuevo Imperial	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		40. Imperial	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		41. San Luis	20.85	30.48	51.33	54.94	70.63	100.45	123.04	150.68	182.25
		42. Quilmana	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		43. Cerro Azul	74.32	82.73	96.04	101.20	124.02	163.17	223.89	280.62	363.27
		Sub total River Basin	**172.17**	**225.50**	**328.64**	**353.35**	**462.79**	**645.91**	**830.20**	**1,038.74**	**1,297.71**
Corridor Lurin Cañete	Chilca Cañete Axis	44. Asia	6.41	11.23	17.65	19.72	24.85	36.28	44.47	54.94	66.27
		45. Coayllo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		46. Mala	38.50	60.96	104.27	115.51	158.27	237.18	308.34	398.68	511.95
		48. Sta Cruz de Flores	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		49. San Antonio	4.81	8.02	14.44	14.09	18.31	25.11	29.65	36.10	43.08
		50. Chilca	25.67	40.10	68.98	80.29	113.80	177.19	241.63	324.91	434.08
		Sub total Axis	**75.39**	**120.31**	**205.33**	**229.60**	**315.23**	**475.76**	**624.09**	**814.62**	**1,055.38**
	Lima South Cone	51. Pucusana	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		52. Sta Maria del Mar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		53. San Bartolo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		54. Punta Negra	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		55. Punta Hermosa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		56. Lurín	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		57. Pachacamac	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		58. Villa M. Del Triunfo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		59. Villa el Salvador	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		60. S. J. Miraflores	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Sub total South Cone	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Pampas Concón-Topará			8.02	11.23	19.25	21.13	71.94	135.33	186.78	251.14	319.76
Sub total Pampas Concón-Topará			**8.02**	**11.23**	**19.25**	**21.13**	**71.94**	**135.33**	**186.78**	**251.14**	**319.76**
TOTAL (MCM)			**0.26**	**0.36**	**0.55**	**0.60**	**0.85**	**1.26**	**1.64**	**2.10**	**2.67**

* The service coverage it was taken as 65% (1998) to 95% (2030) for those districts within in the Cañete River Basin, Chilca-Cañete Axis and Pampas Concon-Topara

Table 3.11. Projection of Water Production in Thousand of Cubic Meter and Million of Cubic Meter *

Year	Drinking Water Production in Thousand of Cubic Meter per Month													TOTAL
	TYPE \ MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AGU	SEP	OCT	NOV	DEC	(MMC)
1998	Domestic	10,508	10,922	11,074	10,611	10,056	9,755	9,437	9,699	9,553	9,239	9,773	10,075	**120.70**
	Industrial	425	439	446	432	415	407	397	407	400	386	404	411	**4.97**
	Tourism	26	51	51	20	15	13	13	13	13	13	13	15	**0.26**
	Total	**10,959**	**11,412**	**11,571**	**11,063**	**10,486**	**10,175**	**9,846**	**10,119**	**9,966**	**9,638**	**10,190**	**10,502**	**125.93**
1999	Domestic	10,114	10,513	10,655	10,206	9,669	9,373	9,066	9,316	9,179	8,884	9,399	9,697	**116.07**
	Industrial	353	364	369	358	344	338	330	338	333	322	336	341	**4.13**
	Tourism	36	71	71	29	21	18	18	18	18	18	18	21	**0.36**
	Total	**10,503**	**10,948**	**11,096**	**10,593**	**10,035**	**9,729**	**9,414**	**9,672**	**9,530**	**9,224**	**9,753**	**10,059**	**120.56**
2000	Domestic	9,694	10,076	10,209	9,775	9,257	8,966	8,671	8,907	8,780	8,505	8,999	9,292	**111.13**
	Industrial	290	299	303	294	284	279	273	279	275	267	277	282	**3.40**
	Tourism	55	111	111	44	33	28	28	28	28	28	28	33	**0.55**
	Total	**10,040**	**10,486**	**10,623**	**10,114**	**9,574**	**9,273**	**8,972**	**9,214**	**9,083**	**8,799**	**9,304**	**9,607**	**115.09**
2005	Domestic	10,691	11,112	11,261	10,785	10,215	9,899	9,574	9,836	9,693	9,385	9,930	10,249	**122.63**
	Industrial	326	336	340	331	319	314	307	314	309	300	312	316	**3.82**
	Tourism	60	121	121	48	36	30	30	30	30	30	30	36	**0.60**
	Total	**11,077**	**11,569**	**11,722**	**11,164**	**10,570**	**10,243**	**9,911**	**10,180**	**10,033**	**9,715**	**10,272**	**10,601**	**127.06**
2010	Domestic	11,725	12,188	12,346	11,821	11,193	10,839	10,482	10,766	10,614	10,283	10,882	11,239	**134.38**
	Industrial	366	377	382	371	358	353	345	353	348	337	350	356	**4.30**
	Tourism	85	170	170	68	51	42	42	42	42	42	42	51	**0.85**
	Total	**12,176**	**12,734**	**12,898**	**12,260**	**11,602**	**11,234**	**10,869**	**11,162**	**11,004**	**10,663**	**11,275**	**11,645**	**139.52**
2015	Domestic	13,734	14,277	14,454	13,830	13,086	12,655	12,235	12,560	12,392	12,022	12,726	13,162	**157.13**
	Industrial	350	358	362	354	343	339	333	339	335	327	337	341	**4.12**
	Tourism	126	251	251	101	75	63	63	63	63	63	63	75	**1.26**
	Total	**14,209**	**14,887**	**15,067**	**14,284**	**13,504**	**13,057**	**12,631**	**12,962**	**12,790**	**12,412**	**13,126**	**13,579**	**162.51**
2020	Domestic	15,957	16,590	16,783	16,047	15,172	14,651	14,160	14,528	14,346	13,938	14,759	15,289	**182.22**
	Industrial	423	433	437	428	416	411	404	411	407	398	409	414	**4.99**
	Tourism	164	328	328	131	98	82	82	82	82	82	82	98	**1.64**
	Total	**16,545**	**17,351**	**17,548**	**16,606**	**15,687**	**15,145**	**14,646**	**15,021**	**14,835**	**14,418**	**15,250**	**15,801**	**188.85**
2025	Domestic	18,343	19,072	19,276	18,415	17,394	16,766	16,197	16,605	16,416	15,978	16,927	17,569	**208.96**
	Industrial	518	528	534	523	510	504	497	504	499	489	502	507	**6.12**
	Tourism	210	421	421	168	126	105	105	105	105	105	105	126	**2.10**
	Total	**19,071**	**20,021**	**20,231**	**19,106**	**18,030**	**17,375**	**16,799**	**17,215**	**17,020**	**16,572**	**17,534**	**18,203**	**217.18**
2030	Domestic	21,054	21,894	22,111	21,107	19,918	19,168	18,510	18,964	18,766	18,296	19,390	20,161	**239.34**
	Industrial	619	631	637	625	610	604	595	604	598	587	601	607	**7.32**
	Tourism	267	535	535	214	160	134	134	134	134	134	134	160	**2.67**
	Total	**21,941**	**23,060**	**23,282**	**21,945**	**20,689**	**19,905**	**19,239**	**19,702**	**19,498**	**19,017**	**20,125**	**20,929**	**249.33**

* Drinking Water service coverage it was set for Lima Districts ranging from 85% (1998) to 98% (2030) and Districts in Cañete River Basin Chilca-Cañete Axis and Concón-Topará ranging from 65% (1998) to 95% (2030)

Table 3.12. Projection of Water Production by District in Thousand of Cubic Meter

Drinking Water Production per Year in (1000 m^3/year)

Zone		Year / District	1998	1999	2000	2005	2010	2015	2020	2025	2030
Cañete River Basin		1. San Lorenzo de Quinti (1)	3.0	3.0	3.0	2.5	2.2	2.2	2.3	2.3	2.3
		2. Tanta (2)	16.0	16.4	16.7	16.4	16.8	19.8	23.2	28.5	32.7
		3. Huancaya	14.0	14.0	14.0	12.3	11.3	12.0	12.5	13.0	13.5
		4. Tomas	27.0	27.4	27.7	25.9	26.7	29.9	33.3	36.8	40.4
		5. Vitis	10.0	10.1	10.1	9.0	8.4	9.0	9.6	10.2	10.7
		6. Miraflores	13.4	13.5	13.6	12.3	11.7	12.7	13.7	14.6	15.6
		12. Carania	7.2	7.2	7.2	6.3	5.8	6.0	6.3	6.5	6.7
		13. Alis	164.1	169.6	175.1	183.1	203.4	315.1	388.9	476.3	581.4
		14. Laraos	31.7	32.0	32.4	29.9	29.0	32.2	35.5	38.8	42.1
		19. Tauripampa (3)	17.7	17.9	18.2	16.9	16.5	18.4	20.3	22.3	24.3
		20. Ayauca	30.2	30.6	30.9	28.8	28.2	31.6	35.0	38.6	42.3
		21. Yauyos	53.7	54.6	55.5	52.6	52.3	59.6	67.3	75.4	84.0
		22. Colonia	40.6	40.9	41.2	37.6	36.1	39.6	43.0	46.5	49.8
		23. Putinza	12.2	12.4	12.6	11.9	11.8	13.3	15.0	16.7	18.6
		24. Huantán	24.7	24.9	25.2	23.1	22.4	24.7	27.1	29.5	31.9
		25. Catahuasi	37.4	39.0	40.7	43.8	49.6	95.7	121.1	152.2	190.0
		26. Tupe	15.1	14.9	14.6	11.7	9.8	9.4	9.0	8.5	8.0
		27. Cacra	24.0	24.1	24.2	21.6	20.2	21.7	23.1	24.4	25.6
		28. Hongos	12.5	12.6	12.8	11.8	11.4	12.7	14.0	15.3	16.6
		29. Lincha	12.4	12.4	12.3	10.7	9.7	10.0	10.3	10.5	10.7
		30. Viñac	45.0	45.6	46.1	42.9	42.0	47.1	52.2	57.6	63.1
		31. Chocos	19.8	19.9	19.9	17.6	16.4	17.4	18.4	19.2	20.0
		32. Huangáscar	19.7	19.6	19.5	16.4	14.6	14.8	14.9	14.9	14.8
		33. Madean	22.7	22.9	23.0	20.8	19.8	21.5	23.2	24.9	26.5
		34. Azángaro	18.0	18.2	18.3	16.6	15.8	17.2	18.6	19.9	21.2
		35. Zuñiga	34.5	35.1	35.7	34.0	34.1	39.1	44.4	50.2	56.2
		36. Pacaran	45.1	46.6	48.3	49.8	53.7	66.0	80.1	96.0	113.7
		37. Lunahuaná (4)	181.4	191.3	204.6	208.9	265.0	327.1	395.1	472.4	555.6
		38. S Vicente de cañete (5)	2,681.7	2,804.1	2,959.8	3,085.1	3,422.0	4,341.9	5,426.4	7,477.9	9,209.6
		39. Nuevo Imperial	1,034.0	1,063.4	1,093.1	1,095.1	1,127.8	1,360.8	1,623.7	2,398.0	2,863.6
		40. Imperial	2,967.9	3,067.4	3,169.6	3,243.1	3,531.7	4,399.7	6,164.2	7,536.4	9,164.8
		41. San Luis	646.1	672.9	711.2	910.9	975.2	1,165.7	1,410.9	1,697.7	2,030.1
		42. Quilmana	753.9	780.5	808.0	842.7	928.3	1,391.1	1,749.9	2,418.9	3,000.2
		43. Cerro Azul	333.1	349.5	371.1	382.0	426.6	536.9	745.9	913.4	1,200.0
		Sub total River Basin	**9,370.0**	**9,714.2**	**10,116.1**	**10,534.0**	**11,456.4**	**14,521.9**	**18,678.5**	**24,264.2**	**29,586.7**
Corridor Lurin Cañete	Axis Chilca Cañete	44. Asia	150.5	160.4	172.0	180.0	199.9	255.1	315.9	389.2	550.1
		45. Coayllo (6)	8.7	8.8	8.9	8.2	8.0	8.9	9.8	10.7	11.6
		46. Mala	1,643.1	1,727.0	1,833.9	2,213.5	2,547.9	3,353.3	4,343.5	5,591.1	7,941.7
		48. Sta Cruz de Flores (7)	55.7	57.0	58.3	57.4	59.3	70.1	82.1	131.2	149.8
		49. San Antonio	128.4	134.4	143.7	141.0	149.7	181.0	213.6	252.1	295.5
		50. Chilca (8)	1,127.7	1,192.1	1,273.0	1,397.9	1,916.7	2,613.2	3,511.5	4,688.5	6,226.4
		Sub total Axis	**3,114.1**	**3,279.6**	**3,489.8**	**3,997.8**	**4,881.5**	**6,481.6**	**8,476.4**	**11,062.8**	**15,175.0**
	Lima South Cone (*)	51. Pucusana	630.7	630.7	630.7	630.7	946.1	1,261.4	1,576.8	1,892.2	2,522.9
		52. Sta Maria del Mar	31.5	31.5	31.5	31.5	94.6	94.6	315.4	315.4	315.4
		53. San Bartolo	630.7	630.7	630.7	1,261.4	1,576.8	2,207.5	2,838.2	3,784.3	5,045.8
		54. Punta Negra	630.7	630.7	630.7	630.7	946.1	946.1	1,261.4	1,576.8	1,576.8
		55. Punta Hermosa	946.1	946.1	946.1	1,261.4	1,576.8	2,207.5	2,522.9	3,153.6	3,784.3
		56. Lurín	5,045.8	5,045.8	5,045.8	6,937.9	8,830.1	11,668.3	15,137.3	18,606.2	22,390.6
		57. Pachacamac	2,522.9	2,675.2	2,838.2	3,784.3	4,730.4	6,307.2	7,884.0	9,776.2	11,668.3
		58. Villa M. Del Triunfo	33,428.2	31,573.1	29,643.8	31,851.4	33,743.5	37,527.8	41,942.9	46,357.9	51,403.7
		59. Villa el Salvador	30,274.6	28,728.7	27,121.0	29,643.8	31,536.0	35,635.7	40,366.1	45,096.5	50,773.0
		60. S. J. Miraflores	39,104.6	36,463.7	33,743.5	36,266.4	38,158.6	41,627.5	45,096.5	47,619.4	50,457.6
		Sub total South Cone	**113,245.8**	**107,356.3**	**101,262.1**	**112,299.7**	**122,138.9**	**139,483.7**	**158,941.4**	**178,178.4**	**199,938.2**
Pampas Concón-Topará			197.1	206.0	219.9	225.2	1,046.1	2,021.0	2,757.0	3,671.7	4,631.7
Sub total Pampas Concón-Topará			**197.1**	**206.0**	**219.9**	**225.2**	**1,046.1**	**2,021.0**	**2,757.0**	**3,671.7**	**4,631.7**
TOTAL (MMC)			**125.93**	**120.56**	**115.09**	**127.06**	**139.52**	**162.51**	**188.85**	**217.18**	**249.33**

(*) Information taken from " Master Plan of Drinking Water and Sewerage Sistems of Lima and Callao", SEDAPAL, 1998

Table 3.13. Projection of Water Production by District in m^3/s

Drinking Water Production in (m^3/s)

Zone		Year / District	1998	1999	2000	2005	2010	2015	2020	2025	2030
Cañete River Basin		1. San Lorenzo de Quinti (1)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
		2. Tanta (2)	0.0005	0.0005	0.0005	0.0005	0.0005	0.0006	0.0007	0.0009	0.0010
		3. Huancaya	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004
		4. Tomas	0.0009	0.0009	0.0009	0.0008	0.0008	0.0009	0.0011	0.0012	0.0013
		5. Vitis	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003
		6. Miraflores	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0005	0.0005
		12. Carania	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
		13. Alis	0.0052	0.0054	0.0056	0.0058	0.0064	0.0100	0.0123	0.0151	0.0184
		14. Laraos	0.0010	0.0010	0.0010	0.0009	0.0009	0.0010	0.0011	0.0012	0.0013
		19. Tauripampa (3)	0.0006	0.0006	0.0006	0.0005	0.0005	0.0006	0.0006	0.0007	0.0008
		20. Ayauca	0.0010	0.0010	0.0010	0.0009	0.0009	0.0010	0.0011	0.0012	0.0013
		21. Yauyos	0.0017	0.0017	0.0018	0.0017	0.0017	0.0019	0.0021	0.0024	0.0027
		22. Colonia	0.0013	0.0013	0.0013	0.0012	0.0011	0.0013	0.0014	0.0015	0.0016
		23. Putinza	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0005	0.0005	0.0006
		24. Huantán	0.0008	0.0008	0.0008	0.0007	0.0007	0.0008	0.0009	0.0009	0.0010
		25. Catahuasi	0.0012	0.0012	0.0013	0.0014	0.0016	0.0030	0.0038	0.0048	0.0060
		26. Tupe	0.0005	0.0005	0.0005	0.0004	0.0003	0.0003	0.0003	0.0003	0.0003
		27. Cacra	0.0008	0.0008	0.0008	0.0007	0.0006	0.0007	0.0007	0.0008	0.0008
		28. Hongos	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0005	0.0005
		29. Lincha	0.0004	0.0004	0.0004	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003
		30. Viñac	0.0014	0.0014	0.0015	0.0014	0.0013	0.0015	0.0017	0.0018	0.0020
		31. Chocos	0.0006	0.0006	0.0006	0.0006	0.0005	0.0006	0.0006	0.0006	0.0006
		32. Huangáscar	0.0006	0.0006	0.0006	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
		33. Madean	0.0007	0.0007	0.0007	0.0007	0.0006	0.0007	0.0007	0.0008	0.0008
		34. Azángaro	0.0006	0.0006	0.0006	0.0005	0.0005	0.0005	0.0006	0.0006	0.0007
		35. Zuñiga	0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0014	0.0016	0.0018
		36. Pacaran	0.0014	0.0015	0.0015	0.0016	0.0017	0.0021	0.0025	0.0030	0.0036
		37. Lunahuaná (4)	0.0058	0.0061	0.0065	0.0066	0.0084	0.0104	0.0125	0.0150	0.0176
		38. S Vicente de cañete (5)	0.0850	0.0889	0.0939	0.0978	0.1085	0.1377	0.1721	0.2371	0.2920
		39. Nuevo Imperial	0.0328	0.0337	0.0347	0.0347	0.0358	0.0431	0.0515	0.0760	0.0908
		40. Imperial	0.0941	0.0973	0.1005	0.1028	0.1120	0.1395	0.1955	0.2390	0.2906
		41. San Luis	0.0205	0.0213	0.0226	0.0289	0.0309	0.0370	0.0447	0.0538	0.0644
		42. Quilmana	0.0239	0.0247	0.0256	0.0267	0.0294	0.0441	0.0555	0.0767	0.0951
		43. Cerro Azul	0.0106	0.0111	0.0118	0.0121	0.0135	0.0170	0.0237	0.0290	0.0381
		Sub total River Basin	**0.2971**	**0.3080**	**0.3208**	**0.3340**	**0.3633**	**0.4605**	**0.5923**	**0.7694**	**0.9382**
Corridor Lurin Cañete	Axis Chilca Cañete	44. Asia	0.0048	0.0051	0.0055	0.0057	0.0063	0.0081	0.0100	0.0123	0.0174
		45. Coayllo (6)	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0004
		46. Mala	0.0521	0.0548	0.0582	0.0702	0.0808	0.1063	0.1377	0.1773	0.2518
		48. Sta Cruz de Flores (7)	0.0018	0.0018	0.0019	0.0018	0.0019	0.0022	0.0026	0.0042	0.0048
		49. San Antonio	0.0041	0.0043	0.0046	0.0045	0.0047	0.0057	0.0068	0.0080	0.0094
		50. Chilca (8)	0.0358	0.0378	0.0404	0.0443	0.0608	0.0829	0.1114	0.1487	0.1974
		Sub total Axis	**0.0987**	**0.1040**	**0.1107**	**0.1268**	**0.1548**	**0.2055**	**0.2688**	**0.3508**	**0.4812**
	Lima South Cone (*)	51. Pucusana	0.0200	0.0200	0.0200	0.0200	0.0300	0.0400	0.0500	0.0600	0.0800
		52. Sta Maria del Mar	0.0010	0.0010	0.0010	0.0010	0.0030	0.0030	0.0100	0.0100	0.0100
		53. San Bartolo	0.0200	0.0200	0.0200	0.0400	0.0500	0.0700	0.0900	0.1200	0.1600
		54. Punta Negra	0.0200	0.0200	0.0200	0.0200	0.0300	0.0300	0.0400	0.0500	0.0500
		55. Punta Hermosa	0.0300	0.0300	0.0300	0.0400	0.0500	0.0700	0.0800	0.1000	0.1200
		56. Lurín	0.1600	0.1600	0.1600	0.2200	0.2800	0.3700	0.4800	0.5900	0.7100
		57. Pachacamac	0.0800	0.0848	0.0900	0.1200	0.1500	0.2000	0.2500	0.3100	0.3700
		58. Villa M. Del Triunfo	1.0600	1.0012	0.9400	1.0100	1.0700	1.1900	1.3300	1.4700	1.6300
		59. Villa el Salvador	0.9600	0.9110	0.8600	0.9400	1.0000	1.1300	1.2800	1.4300	1.6100
		60. S. J. Miraflores	1.2400	1.1563	1.0700	1.1500	1.2100	1.3200	1.4300	1.5100	1.6000
		Sub total South Cone	**3.5910**	**3.4042**	**3.2110**	**3.5610**	**3.8730**	**4.4230**	**5.0400**	**5.6500**	**6.3400**
Pampas Concón-Topará			0.0062	0.0065	0.0070	0.0071	0.0332	0.0641	0.0874	0.1164	0.1469
Sub total Pampas Concón-Topará			**0.0062**	**0.0065**	**0.0070**	**0.0071**	**0.0332**	**0.0641**	**0.0874**	**0.1164**	**0.1469**
TOTAL			**3.9931**	**3.8228**	**3.6494**	**4.0289**	**4.4242**	**5.1531**	**5.9885**	**6.8866**	**7.9063**

(*) Information taken from " Master Plan of Drinking Water and Sewerage Sistems of Lima and Callao", SEDAPAL, 1998

Table 3.14 Projection of Water Productin in Thusand of Cubic Meter and MCM (*)

Year	Drinking Water production in Thousand of Cubic Meter per Month													TOTAL
	TYPE/MONTH	ENE	FEB	MAR	ABR	MAY	JUN	JUL	AGO	SET	OCT	NOV	DIC	(MMC)
1998	Domestic	10,522	10,936	11,088	10,624	10,069	9,767	9,449	9,712	9,565	9,251	9,786	10,088	**120.86**
	Industrial	915	915	915	915	915	915	915	915	915	915	915	915	**10.98**
	Tourism	26	51	51	20	15	13	13	13	13	13	13	15	**0.26**
	Total	**11,462**	**11,902**	**12,054**	**11,560**	**10,999**	**10,695**	**10,377**	**10,640**	**10,493**	**10,179**	**10,714**	**11,019**	**132.10**
2000	Domestic	9,565	9,943	10,072	9,644	9,132	8,844	8,553	8,785	8,660	8,390	8,878	9,169	**109.63**
	Industrial	826	826	826	826	826	826	826	826	826	826	826	826	**9.91**
	Tourism	55	111	111	44	33	28	28	28	28	28	28	33	**0.55**
	Total	**10,446**	**10,879**	**11,009**	**10,514**	**9,991**	**9,697**	**9,406**	**9,638**	**9,514**	**9,244**	**9,732**	**10,028**	**120.10**
2005	Domestic	10,645	11,065	11,212	10,738	10,170	9,855	9,531	9,792	9,651	9,344	9,887	10,205	**122.09**
	Industrial	926	926	926	926	926	926	926	926	926	926	926	926	**11.11**
	Tourism	60	121	121	48	36	30	30	30	30	30	30	36	**0.60**
	Total	**11,631**	**12,111**	**12,259**	**11,712**	**11,132**	**10,811**	**10,487**	**10,748**	**10,606**	**10,300**	**10,842**	**11,166**	**133.81**
2010	Domestic	11,607	12,066	12,222	11,701	11,079	10,727	10,374	10,655	10,505	10,179	10,771	11,126	**133.01**
	Industrial	1,008	1,008	1,008	1,008	1,008	1,008	1,008	1,008	1,008	1,008	1,008	1,008	**12.10**
	Tourism	85	170	170	68	51	42	42	42	42	42	42	51	**0.85**
	Total	**12,700**	**13,244**	**13,400**	**12,777**	**12,138**	**11,778**	**11,424**	**11,705**	**11,555**	**11,229**	**11,822**	**12,185**	**145.96**
2015	Domestic	13,458	13,990	14,161	13,548	12,817	12,393	11,980	12,297	12,135	11,776	12,466	12,896	**153.92**
	Industrial	1,194	1,194	1,194	1,194	1,194	1,194	1,194	1,194	1,194	1,194	1,194	1,194	**14.33**
	Tourism	126	251	251	101	75	63	63	63	63	63	63	75	**1.26**
	Total	**14,777**	**15,436**	**15,607**	**14,843**	**14,087**	**13,650**	**13,237**	**13,555**	**13,392**	**13,033**	**13,723**	**14,166**	**169.50**
2020	Domestic	15,526	16,143	16,327	15,609	14,754	14,242	13,763	14,119	13,946	13,554	14,354	14,875	**177.21**
	Industrial	1,383	1,383	1,383	1,383	1,383	1,383	1,383	1,383	1,383	1,383	1,383	1,383	**16.59**
	Tourism	164	328	328	131	98	82	82	82	82	82	82	98	**1.64**
	Total	**17,073**	**17,854**	**18,038**	**17,123**	**16,235**	**15,707**	**15,228**	**15,584**	**15,410**	**15,019**	**15,819**	**16,356**	**195.45**
2025	Domestic	17,763	18,470	18,663	17,825	16,831	16,215	15,663	16,054	15,876	15,461	16,381	17,012	**202.21**
	Industrial	1,584	1,584	1,584	1,584	1,584	1,584	1,584	1,584	1,584	1,584	1,584	1,584	**19.01**
	Tourism	210	421	421	168	126	105	105	105	105	105	105	126	**2.10**
	Total	**19,557**	**20,474**	**20,667**	**19,577**	**18,541**	**17,904**	**17,352**	**17,743**	**17,565**	**17,150**	**18,070**	**18,722**	**223.32**
2030	Domestic	20,310	21,121	21,323	20,349	19,196	18,461	17,825	18,258	18,074	17,633	18,690	19,447	**230.69**
	Industrial	1,806	1,806	1,806	1,806	1,806	1,806	1,806	1,806	1,806	1,806	1,806	1,806	**21.67**
	Tourism	267	535	535	214	160	134	134	134	134	134	134	160	**2.67**
	Total	**22,383**	**23,462**	**23,664**	**22,368**	**21,163**	**20,401**	**19,765**	**20,197**	**20,014**	**19,573**	**20,630**	**21,413**	**255.03**

* Drinking water coverage were taken as 85%(1998) to 98%(2030) for Lima districts and 65%(1998) to 95%(2030) for Canete river basin and others.

TABLE 3.15. PROJECTION OF WATER PRODUCTION BY DISTRICT IN THOUSAND OF CUBIC METER (*)

Drinking Water Production in (1000m^3/year)

ZONE	YEAR / DISTRICT	1998	2000	2005	2010	2015	2020	2025	2030
Canete River Basin	1. San L. de Quinti	3.0	3.0	2.5	2.2	2.2	2.3	2.3	2.3
	2. Tanta	16.0	16.7	16.4	16.8	19.8	23.2	28.5	32.7
	3. Huancaya	14.0	14.0	12.3	11.3	12.0	12.5	13.0	13.5
	4. Tomas	27.0	27.7	25.9	26.7	29.9	33.3	36.8	40.4
	5. Vitis	10.0	10.1	9.0	8.4	9.0	9.6	10.2	10.7
	6. Miraflores	13.4	13.6	12.3	11.7	12.7	13.7	14.6	15.6
	12. Carania	7.2	7.2	6.3	5.8	6.0	6.3	6.5	6.7
	13. Alis	164.1	175.1	183.1	203.4	315.1	388.9	476.3	581.4
	14. Laraos	31.7	32.4	29.9	29.0	32.2	35.5	38.8	42.1
	19. Tauripampa	17.7	18.2	16.9	16.5	18.4	20.3	22.3	24.3
	20. Ayauca	30.2	30.9	28.8	28.2	31.6	35.0	38.6	42.3
	21. Yauyos	53.7	55.5	52.6	52.3	59.6	67.3	75.4	84.0
	22. Colonia	40.6	41.2	37.6	36.1	39.6	43.0	46.5	49.8
	23. Putinza	12.2	12.6	11.9	11.8	13.3	15.0	16.7	18.6
	24. Huantán	24.7	25.2	23.1	22.4	24.7	27.1	29.5	31.9
	25. Catahuasi	37.4	40.7	43.8	49.6	95.7	121.1	152.2	190.0
	26. Tupe	15.1	14.6	11.7	9.8	9.4	9.0	8.5	8.0
	27. Cacra	24.0	24.2	21.6	20.2	21.7	23.1	24.4	25.6
	28. Hongos	12.5	12.8	11.8	11.4	12.7	14.0	15.3	16.6
	29. Lincha	12.4	12.3	10.7	9.7	10.0	10.3	10.5	10.7
	30. Viñac	45.0	46.1	42.9	42.0	47.1	52.2	57.6	63.1
	31. Chocos	19.8	19.9	17.6	16.4	17.4	18.4	19.2	20.0
	32. Huangáscar	19.7	19.5	16.4	14.6	14.8	14.9	14.9	14.8
	33. Madean	22.7	23.0	20.8	19.8	21.5	23.2	24.9	26.5
	34. Azángaro	18.0	18.3	16.6	15.8	17.2	18.6	19.9	21.2
	35. Zuñiga	34.5	35.7	34.0	34.1	39.1	44.4	50.2	56.2
	36. Pacaran	45.1	48.3	49.8	53.7	66.0	80.1	96.0	113.7
	37. Lunahuaná	181.4	204.6	208.9	265.0	327.1	395.1	472.4	555.6
	38. S V. de cañete	2,681.7	2,959.8	3,085.1	3,422.0	4,341.9	5,426.4	7,477.9	9,209.6
	39. Nuevo Imperial	1,034.0	1,093.1	1,095.1	1,127.8	1,360.8	1,623.7	2,398.0	2,863.6
	40. Imperial	2,967.9	3,169.6	3,243.1	3,531.7	4,399.7	6,164.2	7,536.4	9,164.8
	41. San Luis	646.1	711.2	910.9	975.2	1,165.7	1,410.9	1,697.7	2,030.1
	42. Quilmana	753.9	808.0	842.7	928.3	1,391.1	1,749.9	2,418.9	3,000.2
	43. Cerro Azul	333.1	371.1	382.0	426.6	536.9	745.9	913.4	1,200.0
	Subtotal River Basin	**9,370.0**	**10,116.1**	**10,534.0**	**11,456.4**	**14,521.9**	**18,678.5**	**24,264.2**	**29,586.7**
Corridor Lurin Cañete — Axis Chilca Cañete	44. Asia	150.5	172.0	180.0	199.9	255.1	315.9	389.2	550.1
	45. Coayllo	8.7	8.9	8.2	8.0	8.9	9.8	10.7	11.6
	46. Mala	1,643.1	1,833.9	2,213.5	2,547.9	3,353.3	4,343.5	5,591.1	7,941.7
	48. Sta C.de Flores	55.7	58.3	57.4	59.3	70.1	82.1	131.2	149.8
	49. San Antonio	128.4	143.7	141.0	149.7	181.0	213.6	252.1	295.5
	50. Chilca	1,127.7	1,273.0	1,397.9	1,916.7	2,613.2	3,511.5	4,688.5	6,226.4
	Subtotal Axis	**3,114.1**	**3,489.8**	**3,997.8**	**4,881.5**	**6,481.6**	**8,476.4**	**11,062.8**	**15,175.0**
Lima South Cone	51. Pucusana	479.4	443.9	575.3	701.9	990.1	1,268.8	1,619.3	2,017.9
	52. Sta M.del Mar	32.0	29.6	43.0	63.3	93.7	148.1	233.1	342.5
	53. San Bartolo	527.6	507.3	703.8	943.6	1,460.5	2,056.8	2,818.0	3,771.1
	54. Punta Negra	449.0	415.9	537.7	671.8	884.7	1,241.7	1,607.5	2,051.6
	55. Punta Hermosa	609.1	564.2	746.8	955.5	1,410.9	1,808.2	2,307.7	2,807.6
	56. Lurín	4,972.9	4,691.3	6,525.2	8,347.4	11,272.2	14,445.4	17,575.1	21,382.7
	57. Pachacamac	3,004.5	2,834.4	3,942.4	5,043.3	6,810.4	8,727.6	10,618.5	12,919.1
	58. Villa M. Del Triunfo	35,428.1	31,573.5	34,570.8	36,486.8	40,650.6	45,065.5	49,755.9	54,934.6
	59. Villa el Salvador	35,343.0	31,497.8	34,487.7	36,399.1	40,552.9	44,957.2	49,636.4	54,802.6
	60. S. J. Miraflores	38,569.5	33,715.3	36,915.8	38,961.9	42,354.5	45,814.9	48,151.8	50,608.1
	Subtotal South Cone	**119,415.2**	**106,273.2**	**119,048.6**	**128,574.5**	**146,480.5**	**165,534.2**	**184,323.4**	**205,637.9**
Pampas Concón-Topará		197.1	219.9	225.2	1,046.1	2,021.0	2,757.0	3,671.7	4,631.7
Sub total Pampas		**197.1**	**219.9**	**225.2**	**1,046.1**	**2,021.0**	**2,757.0**	**3,671.7**	**4,631.7**
TOTAL (MMC)		**132.10**	**120.10**	**133.81**	**145.96**	**169.50**	**195.45**	**223.32**	**255.03**

* Drinking water coverage was taken as 65%(1998) to 95%(2030)

TABLE 3.16. PROJECTION OF WATER PRODUCTION BY DISTRICTS IN M3/S(*)

Drinking Water Production in (m^3/s)

ZONE		YEAR / DISTRICT	1998	2000	2005	2010	2015	2020	2025	2030
Canete River Basin		1. San L. de Quinti	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
		2. Tanta	0.0005	0.0005	0.0005	0.0005	0.0006	0.0007	0.0009	0.0010
		3. Huancaya	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004
		4. Tomas	0.0009	0.0009	0.0008	0.0008	0.0009	0.0011	0.0012	0.0013
		5. Vitis	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003
		6. Miraflores	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0005	0.0005
		12. Carania	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
		13. Alis	0.0052	0.0056	0.0058	0.0064	0.0100	0.0123	0.0151	0.0184
		14. Laraos	0.0010	0.0010	0.0009	0.0009	0.0010	0.0011	0.0012	0.0013
		19. Tauripampa	0.0006	0.0006	0.0005	0.0005	0.0006	0.0006	0.0007	0.0008
		20. Ayauca	0.0010	0.0010	0.0009	0.0009	0.0010	0.0011	0.0012	0.0013
		21. Yauyos	0.0017	0.0018	0.0017	0.0017	0.0019	0.0021	0.0024	0.0027
		22. Colonia	0.0013	0.0013	0.0012	0.0011	0.0013	0.0014	0.0015	0.0016
		23. Putinza	0.0004	0.0004	0.0004	0.0004	0.0004	0.0005	0.0005	0.0006
		24. Huantán	0.0008	0.0008	0.0007	0.0007	0.0008	0.0009	0.0009	0.0010
		25. Catahuasi	0.0012	0.0013	0.0014	0.0016	0.0030	0.0038	0.0048	0.0060
		26. Tupe	0.0005	0.0005	0.0004	0.0003	0.0003	0.0003	0.0003	0.0003
		27. Cacra	0.0008	0.0008	0.0007	0.0006	0.0007	0.0007	0.0008	0.0008
		28. Hongos	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0005	0.0005
		29. Lincha	0.0004	0.0004	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003
		30. Viñac	0.0014	0.0015	0.0014	0.0013	0.0015	0.0017	0.0018	0.0020
		31. Chocos	0.0006	0.0006	0.0006	0.0005	0.0006	0.0006	0.0006	0.0006
		32. Huangáscar	0.0006	0.0006	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
		33. Madean	0.0007	0.0007	0.0007	0.0006	0.0007	0.0007	0.0008	0.0008
		34. Azángaro	0.0006	0.0006	0.0005	0.0005	0.0005	0.0006	0.0006	0.0007
		35. Zuñiga	0.0011	0.0011	0.0011	0.0011	0.0012	0.0014	0.0016	0.0018
		36. Pacaran	0.0014	0.0015	0.0016	0.0017	0.0021	0.0025	0.0030	0.0036
		37. Lunahuaná	0.0058	0.0065	0.0066	0.0084	0.0104	0.0125	0.0150	0.0176
		38. S V. de cañete	0.0850	0.0939	0.0978	0.1085	0.1377	0.1721	0.2371	0.2920
		39. Nuevo Imperial	0.0328	0.0347	0.0347	0.0358	0.0431	0.0515	0.0760	0.0908
		40. Imperial	0.0941	0.1005	0.1028	0.1120	0.1395	0.1955	0.2390	0.2906
		41. San Luis	0.0205	0.0226	0.0289	0.0309	0.0370	0.0447	0.0538	0.0644
		42. Quilmana	0.0239	0.0256	0.0267	0.0294	0.0441	0.0555	0.0767	0.0951
		43. Cerro Azul	0.0106	0.0118	0.0121	0.0135	0.0170	0.0237	0.0290	0.0381
		Subtotal River Basin	**0.2971**	**0.3208**	**0.3340**	**0.3633**	**0.4605**	**0.5923**	**0.7694**	**0.9382**
Corredor Lurin Cañete	Axis Chilca Cañete	44. Asia	0.0048	0.0055	0.0057	0.0063	0.0081	0.0100	0.0123	0.0174
		45. Coayllo	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0004
		46. Mala	0.0521	0.0582	0.0702	0.0808	0.1063	0.1377	0.1773	0.2518
		48. Sta C.de Flores	0.0018	0.0019	0.0018	0.0019	0.0022	0.0026	0.0042	0.0048
		49. San Antonio	0.0041	0.0046	0.0045	0.0047	0.0057	0.0068	0.0080	0.0094
		50. Chilca	0.0358	0.0404	0.0443	0.0608	0.0829	0.1114	0.1487	0.1974
		Sub total Axis	**0.0987**	**0.1107**	**0.1268**	**0.1548**	**0.2055**	**0.2688**	**0.3508**	**0.4812**
	Lima South Cone	51. Pucusana	0.0152	0.0141	0.0182	0.0223	0.0314	0.0402	0.0513	0.0640
		52. Sta M.del Mar	0.0010	0.0009	0.0014	0.0020	0.0030	0.0047	0.0074	0.0109
		53. San Bartolo	0.0167	0.0161	0.0223	0.0299	0.0463	0.0652	0.0894	0.1196
		54. Punta Negra	0.0142	0.0132	0.0170	0.0213	0.0281	0.0394	0.0510	0.0651
		55. Punta Hermosa	0.0193	0.0179	0.0237	0.0303	0.0447	0.0573	0.0732	0.0890
		56. Lurín	0.1577	0.1488	0.2069	0.2647	0.3574	0.4581	0.5573	0.6780
		57. Pachacamac	0.0953	0.0899	0.1250	0.1599	0.2160	0.2768	0.3367	0.4097
		58. Villa M. Del Triunfo	1.1234	1.0012	1.0962	1.1570	1.2890	1.4290	1.5778	1.7420
		59. Villa el Salvador	1.1207	0.9988	1.0936	1.1542	1.2859	1.4256	1.5740	1.7378
		60. S. J. Miraflores	1.2230	1.0691	1.1706	1.2355	1.3431	1.4528	1.5269	1.6048
		Sub total South Cone	**3.7866**	**3.3699**	**3.7750**	**4.0771**	**4.6449**	**5.2491**	**5.8449**	**6.5207**
Pampas Concón-Topará			0.0062	0.0070	0.0071	0.0332	0.0641	0.0874	0.1164	0.1469
Sub total Pampas			**0.0062**	**0.0070**	**0.0071**	**0.0332**	**0.0641**	**0.0874**	**0.1164**	**0.1469**
TOTAL (M3/S)			**4.1887**	**3.8083**	**4.2429**	**4.6283**	**5.3750**	**6.1976**	**7.0815**	**8.0870**

* Drinking water service coverage was taken as 65%(1998) to 95%(2030)

TABLE 3.17

ACTIVE PROJECTION OF WATER DEMAND OF METROPOLITAN LIMA PER SERVICE CENTER AND DISTRICTS

1998-2030 Period

(m3/s)

DISTRICT	YEAR							
	1998	2000	2005	2010	2015	2020	2025	2030
CARABAYLLO	0.444	0.390	0.456	0.529	0.587	0.616	0.632	0.648
COMAS	1.526	1.253	1.297	1.363	1.440	1.513	1.552	1.591
INDEPENDENCIA	0.661	0.527	0.508	0.509	0.513	0.514	0.516	0.517
LOS OLIVOS	0.969	0.835	0.931	1.027	1.085	1.113	1.141	1.170
PUENTE PIEDRA	0.457	0.417	0.562	0.752	0.964	1.230	1.726	2.310
RIMAC	0.648	0.517	0.498	0.499	0.503	0.504	0.505	0.506
SAN MARTIN DE PORRAS	1.409	1.157	1.198	1.290	1.363	1.432	1.505	1.582
S.C. COMAS	**6.114**	**5.096**	**5.448**	**5.969**	**6.454**	**6.924**	**7.576**	**8.323**
BELLAVISTA	0.265	0.212	0.203	0.204	0.205	0.206	0.206	0.207
CALLAO	1.489	1.224	1.233	1.296	1.368	1.438	1.511	1.588
C. DE LA LEGUA	0.140	0.115	0.116	0.122	0.128	0.135	0.142	0.149
LA PERLA	0.229	0.183	0.176	0.176	0.177	0.178	0.178	0.179
LA PUNTA	0.022	0.017	0.017	0.017	0.017	0.017	0.017	0.017
VENTANILLA	0.447	0.386	0.439	0.522	0.623	0.740	0.879	1.043
S.C. CALLAO	**2.591**	**2.136**	**2.184**	**2.336**	**2.519**	**2.713**	**2.933**	**3.184**
BREÑA	0.438	0.350	0.336	0.337	0.339	0.340	0.341	0.341
JESUS MARIA	0.328	0.268	0.263	0.269	0.277	0.284	0.291	0.293
LA VICTORIA	1.142	0.913	0.876	0.878	0.884	0.886	0.888	0.890
LIMA CERCADO	1.711	1.368	1.312	1.316	1.324	1.327	1.330	1.333
MAGDALENA	0.243	0.198	0.195	0.200	0.205	0.211	0.212	0.212
PUEBLO LIBRE	0.376	0.306	0.300	0.308	0.317	0.325	0.326	0.327
SAN MIGUEL	0.624	0.509	0.499	0.512	0.527	0.540	0.543	0.544
S.C. BREÑA	**4.862**	**3.913**	**3.782**	**3.820**	**3.872**	**3.912**	**3.931**	**3.941**
ATE VITARTE	1.168	1.029	1.199	1.390	1.542	1.621	1.660	1.670
CHACLACAYO	0.134	0.111	0.112	0.115	0.118	0.121	0.122	0.122
CIENEGUILLA	0.039	0.034	0.040	0.046	0.055	0.063	0.074	0.085
EL AGUSTINO	0.581	0.483	0.486	0.498	0.513	0.526	0.529	0.530
LA MOLINA	0.376	0.350	0.428	0.521	0.606	0.670	0.704	0.740
LURIGANCHO	0.400	0.333	0.343	0.370	0.390	0.410	0.431	0.453
SAN LUIS	0.169	0.135	0.130	0.130	0.131	0.131	0.132	0.132
SANTA ANITA	0.494	0.435	0.483	0.547	0.607	0.670	0.722	0.758
S.C. ATE VITARTE	**3.360**	**2.911**	**3.220**	**3.615**	**3.963**	**4.213**	**4.372**	**4.491**
S. J. LURIGANCHO	2.049	1.733	1.836	1.978	2.091	2.198	2.310	2.428
S.C. S.J. LURIGANCHO	**2.049**	**1.733**	**1.836**	**1.978**	**2.091**	**2.198**	**2.310**	**2.428**
BARRANCO	0.178	0.145	0.143	0.146	0.150	0.154	0.155	0.155
CHORRILLOS	1.090	0.887	0.872	0.894	0.920	0.944	0.948	0.951
LINCE	0.272	0.221	0.217	0.223	0.229	0.235	0.236	0.237
MIRAFLORES	0.387	0.315	0.309	0.317	0.326	0.335	0.343	0.352
SAN BORJA	0.507	0.420	0.434	0.456	0.482	0.494	0.506	0.509
SAN ISIDRO	0.280	0.227	0.224	0.230	0.237	0.243	0.249	0.255
STGO. SURCO	1.066	0.992	1.102	1.217	1.349	1.489	1.644	1.772
SURQUILLO	0.397	0.317	0.305	0.306	0.308	0.309	0.309	0.310
S.C. SURQUILLO	**4.176**	**3.524**	**3.607**	**3.789**	**4.001**	**4.202**	**4.391**	**4.540**
LURIN	0.124	0.113	0.152	0.204	0.275	0.351	0.427	0.519
PACHACAMAC	0.075	0.068	0.092	0.123	0.166	0.212	0.258	0.314
PUCUSANA	0.012	0.011	0.013	0.017	0.024	0.031	0.039	0.049
S. J. MIRAFLORES	0.961	0.814	0.863	0.952	1.032	1.112	1.169	1.228
VILLA MARIA	0.883	0.762	0.808	0.892	0.991	1.094	1.207	1.333
V. SALVADOR	0.881	0.760	0.806	0.890	0.988	1.091	1.205	1.330
S.C. V. EL SALVADOR	**2.936**	**2.529**	**2.734**	**3.078**	**3.476**	**3.890**	**4.304**	**4.773**
SAN BARTOLO	0.013	0.012	0.016	0.023	0.036	0.050	0.068	0.092
PUNTA HERMOSA	0.015	0.014	0.017	0.023	0.034	0.044	0.056	0.068
PUNTA NEGRA	0.011	0.010	0.013	0.016	0.022	0.030	0.039	0.050
SANTA MARIA	0.001	0.001	0.001	0.002	0.002	0.004	0.006	0.008
ANCON	0.061	0.055	0.071	0.094	0.127	0.166	0.212	0.270
SANTA ROSA	0.055	0.047	0.053	0.061	0.071	0.082	0.095	0.110
NOT ADM. BY SEDAPAL	**0.157**	**0.139**	**0.171**	**0.220**	**0.292**	**0.376**	**0.476**	**0.599**
METROPOLITAN LIMA (M3/S)	**26.25**	**21.98**	**22.98**	**24.80**	**26.67**	**28.43**	**30.29**	**32.28**

TABLE 3.18

ACTIVE PROJECTION OF TOTAL DRINKING WATER NECESSITY PRODUCTION IN METROPOLITAN LIMA PER SERVICE CENTER AND DISTRICT CONSIDERING SERVICE COVERAGE (*) AND TOTAL WATER LOSSES
1998-2030 Period

(m3/s)

DISTRICT	YEAR							
	1998	2000	2005	2010	2015	2020	2025	2030
CARABAYLLO	0.565	0.512	0.619	0.686	0.763	0.805	0.826	0.847
COMAS	1.942	1.646	1.760	1.768	1.874	1.977	2.027	2.079
INDEPENDENCIA	0.841	0.692	0.689	0.660	0.668	0.672	0.674	0.675
LOS OLIVOS	1.233	1.097	1.263	1.333	1.412	1.454	1.491	1.528
PUENTE PIEDRA	0.581	0.547	0.762	0.975	1.255	1.608	2.255	3.018
RIMAC	0.824	0.679	0.675	0.647	0.654	0.659	0.660	0.662
SAN MARTIN DE PORRAS	1.793	1.520	1.625	1.674	1.773	1.872	1.967	2.067
S.C. COMAS	**7.779**	**6.693**	**7.394**	**7.743**	**8.399**	**9.047**	**9.900**	**10.876**
BELLAVISTA	0.337	0.278	0.276	0.264	0.267	0.269	0.270	0.270
CALLAO	1.894	1.607	1.673	1.681	1.780	1.879	1.975	2.076
C. DE LA LEGUA	0.178	0.151	0.157	0.158	0.167	0.176	0.185	0.195
LA PERLA	0.291	0.240	0.238	0.228	0.231	0.232	0.233	0.234
LA PUNTA	0.028	0.023	0.023	0.022	0.022	0.022	0.022	0.022
VENTANILLA	0.569	0.507	0.596	0.677	0.811	0.967	1.148	1.363
S.C. CALLAO	**3.297**	**2.806**	**2.963**	**3.030**	**3.278**	**3.545**	**3.833**	**4.160**
BREÑA	0.557	0.460	0.456	0.437	0.441	0.444	0.445	0.446
JESUS MARIA	0.418	0.352	0.356	0.349	0.361	0.371	0.381	0.382
LA VICTORIA	1.453	1.200	1.189	1.140	1.150	1.158	1.160	1.163
LIMA CERCADO	2.176	1.797	1.781	1.707	1.722	1.734	1.738	1.742
MAGDALENA	0.310	0.261	0.264	0.259	0.267	0.275	0.276	0.277
PUEBLO LIBRE	0.478	0.402	0.408	0.400	0.412	0.424	0.427	0.428
SAN MIGUEL	0.794	0.668	0.678	0.664	0.685	0.705	0.709	0.711
S.C. BREÑA	**6.187**	**5.139**	**5.132**	**4.955**	**5.039**	**5.111**	**5.136**	**5.150**
ATE VITARTE	1.486	1.352	1.627	1.803	2.007	2.118	2.169	2.182
CHACLACAYO	0.170	0.146	0.152	0.149	0.154	0.158	0.159	0.160
CIENEGUILLA	0.049	0.045	0.054	0.059	0.071	0.083	0.096	0.111
EL AGUSTINO	0.739	0.634	0.659	0.646	0.668	0.687	0.691	0.693
LA MOLINA	0.478	0.460	0.581	0.675	0.789	0.875	0.920	0.966
LURIGANCHO	0.509	0.437	0.466	0.480	0.508	0.536	0.564	0.592
SAN LUIS	0.215	0.178	0.176	0.169	0.171	0.172	0.172	0.173
SANTA ANITA	0.629	0.572	0.656	0.709	0.789	0.875	0.943	0.991
S.C. ATE VITARTE	**4.275**	**3.823**	**4.370**	**4.690**	**5.157**	**5.504**	**5.713**	**5.868**
S. J. LURIGANCHO	2.607	2.276	2.492	2.566	2.722	2.872	3.019	3.173
S.C. S.J. LURIGANCHO	**2.607**	**2.276**	**2.492**	**2.566**	**2.722**	**2.872**	**3.019**	**3.173**
BARRANCO	0.227	0.191	0.194	0.190	0.196	0.202	0.203	0.203
CHORRILLOS	1.387	1.165	1.184	1.160	1.198	1.233	1.239	1.242
LINCE	0.346	0.290	0.295	0.289	0.298	0.307	0.309	0.309
MIRAFLORES	0.492	0.413	0.420	0.411	0.425	0.437	0.448	0.460
SAN BORJA	0.645	0.552	0.589	0.592	0.627	0.645	0.662	0.665
SAN ISIDRO	0.356	0.299	0.304	0.298	0.308	0.317	0.325	0.333
STGO. SURCO	1.356	1.302	1.496	1.579	1.755	1.946	2.149	2.315
SURQUILLO	0.506	0.417	0.414	0.397	0.401	0.403	0.404	0.405
S.C. SURQUILLO	**5.313**	**4.629**	**4.895**	**4.916**	**5.207**	**5.490**	**5.738**	**5.932**
LURIN	0.158	0.149	0.207	0.265	0.357	0.458	0.557	0.678
PACHACAMAC	0.095	0.090	0.125	0.160	0.216	0.277	0.337	0.410
PUCUSANA	0.015	0.014	0.018	0.022	0.031	0.040	0.051	0.064
S. J. MIRAFLORES	1.223	1.069	1.171	1.235	1.343	1.453	1.527	1.605
VILLA MARIA	1.123	1.001	1.096	1.157	1.289	1.429	1.578	1.742
V. SALVADOR	1.121	0.999	1.094	1.154	1.286	1.426	1.574	1.738
S.C. V. EL SALVADOR	**3.735**	**3.322**	**3.711**	**3.994**	**4.523**	**5.082**	**5.624**	**6.236**
SAN BARTOLO	0.017	0.016	0.022	0.030	0.046	0.065	0.089	0.120
PUNTA HERMOSA	0.019	0.018	0.024	0.030	0.045	0.057	0.073	0.089
PUNTA NEGRA	0.014	0.013	0.017	0.021	0.028	0.039	0.051	0.065
SANTA MARIA	0.001	0.001	0.001	0.002	0.003	0.005	0.007	0.011
ANCON	0.078	0.072	0.096	0.123	0.165	0.217	0.277	0.353
SANTA ROSA	0.070	0.062	0.071	0.079	0.092	0.107	0.124	0.144
NOT ADM. BY SEDAPAL	**0.199**	**0.183**	**0.232**	**0.285**	**0.380**	**0.491**	**0.622**	**0.782**
METROPOLITAN LIMA (M3/S)	**33.39**	**28.87**	**31.19**	**32.18**	**34.70**	**37.14**	**39.58**	**42.18**

* Service coverage was considered for districts of Lima Province ranging from 83% (1998) to 98% (2030)

TABLE 3.19

ACTIVE PROJECTION OF TOTAL DRINKING WATER NECESSITY PRODUCTION IN METROPOLITAN LIMA PER SERVICE CENTER AND DISTRICT CONSIDERING SERVICE COVERAGE (*) AND TOTAL WATER LOSSES
1998-2030 Period

(1000m^3/year)

DISTRICT	YEAR							
	1998	2000	2005	2010	2015	2020	2025	2030
CARABAYLLO	17,812	16,155	19,512	21,623	24,070	25,401	26,043	26,700
COMAS	61,240	51,900	55,507	55,767	59,093	62,361	63,936	65,551
INDEPENDENCIA	26,519	21,837	21,733	20,827	21,051	21,190	21,243	21,296
LOS OLIVOS	38,894	34,606	39,827	42,035	44,541	45,853	47,011	48,198
PUENTE PIEDRA	18,329	17,263	24,037	30,749	39,566	50,705	71,116	95,169
RIMAC	25,990	21,401	21,299	20,412	20,631	20,767	20,819	20,871
SAN MARTIN DE PORRAS	56,547	47,923	51,253	52,781	55,928	59,022	62,032	65,197
S.C. COMAS	**245,330**	**211,086**	**233,169**	**244,194**	**264,879**	**285,299**	**312,200**	**342,982**
BELLAVISTA	10,628	8,762	8,699	8,337	8,424	8,479	8,501	8,522
CALLAO	59,733	50,682	52,757	53,005	56,149	59,255	62,278	65,455
C. DE LA LEGUA	5,609	4,759	4,954	4,977	5,273	5,564	5,848	6,147
LA PERLA	9,184	7,571	7,517	7,204	7,279	7,327	7,346	7,364
LA PUNTA	876	722	717	688	694	701	705	707
VENTANILLA	17,948	15,988	18,807	21,352	25,560	30,482	36,203	42,998
S.C. CALLAO	**103,978**	**88,484**	**93,453**	**95,563**	**103,379**	**111,809**	**120,881**	**131,192**
BREÑA	17,569	14,505	14,378	13,779	13,904	13,996	14,031	14,066
JESUS MARIA	13,179	11,089	11,241	11,017	11,369	11,704	12,000	12,060
LA VICTORIA	45,824	37,832	37,502	35,939	36,265	36,505	36,596	36,688
LIMA CERCADO	68,633	56,663	56,169	53,828	54,316	54,675	54,812	54,949
MAGDALENA	9,769	8,219	8,332	8,166	8,427	8,675	8,719	8,740
PUEBLO LIBRE	15,072	12,681	12,855	12,599	13,002	13,385	13,452	13,486
SAN MIGUEL	25,053	21,078	21,368	20,942	21,612	22,248	22,360	22,416
S.C. BREÑA	**195,099**	**162,066**	**161,846**	**156,270**	**158,895**	**161,189**	**161,969**	**162,405**
ATE VITARTE	46,865	42,631	51,307	56,857	63,280	66,781	68,396	68,810
CHACLACAYO	5,367	4,607	4,790	4,694	4,852	4,994	5,020	5,032
CIENEGUILLA	1,546	1,407	1,693	1,876	2,246	2,615	3,031	3,514
EL AGUSTINO	23,295	19,996	20,789	20,375	21,058	21,678	21,786	21,841
LA MOLINA	15,071	14,504	18,312	21,297	24,888	27,591	28,999	30,478
LURIGANCHO	16,055	13,782	14,687	15,125	16,024	16,911	17,773	18,680
SAN LUIS	6,784	5,603	5,556	5,325	5,381	5,416	5,430	5,444
SANTA ANITA	19,827	18,036	20,683	22,369	24,896	27,600	29,733	31,250
S.C. ATE VITARTE	**134,811**	**120,566**	**137,817**	**147,919**	**162,626**	**173,586**	**180,169**	**185,049**
S. J. LURIGANCHO	82,219	71,787	78,583	80,925	85,829	90,577	95,198	100,054
S.C. S.J. LURIGANCHO	**82,219**	**71,787**	**78,583**	**80,925**	**85,829**	**90,577**	**95,198**	**100,054**
BARRANCO	7,153	6,008	6,104	5,982	6,176	6,358	6,390	6,406
CHORRILLOS	43,742	36,741	37,325	36,581	37,767	38,879	39,074	39,172
LINCE	10,896	9,152	9,298	9,112	9,408	9,685	9,733	9,758
MIRAFLORES	15,511	13,028	13,235	12,971	13,392	13,786	14,134	14,491
SAN BORJA	20,327	17,414	18,588	18,676	19,765	20,348	20,861	20,966
SAN ISIDRO	11,218	9,422	9,572	9,405	9,710	9,995	10,248	10,492
STGO. SURCO	42,766	41,073	47,180	49,794	55,361	61,374	67,761	72,998
SURQUILLO	15,948	13,145	13,057	12,513	12,632	12,715	12,747	12,779
S.C. SURQUILLO	**167,561**	**145,984**	**154,359**	**155,035**	**164,211**	**173,141**	**180,949**	**187,062**
LURIN	4,973	4,691	6,525	8,347	11,272	14,445	17,575	21,383
PACHACAMAC	3,005	2,834	3,942	5,043	6,810	8,728	10,619	12,919
PUCUSANA	479	444	575	702	990	1,269	1,619	2,018
S. J. MIRAFLORES	38,569	33,715	36,916	38,962	42,355	45,815	48,152	50,608
VILLA MARIA	35,428	31,574	34,571	36,487	40,651	45,065	49,756	54,935
V. SALVADOR	35,343	31,498	34,488	36,399	40,553	44,957	49,636	54,803
S.C. V. EL SALVADOR	**117,798**	**104,756**	**117,017**	**125,940**	**142,631**	**160,279**	**177,357**	**196,665**
SAN BARTOLO	528	507	704	944	1,460	2,057	2,818	3,771
PUNTA HERMOSA	609	564	747	955	1,411	1,808	2,308	2,808
PUNTA NEGRA	449	416	538	672	885	1,242	1,607	2,052
SANTA MARIA	32	30	43	63	94	148	233	343
ANCON	2,465	2,283	3,022	3,866	5,213	6,841	8,731	11,143
SANTA ROSA	2,198	1,960	2,247	2,490	2,909	3,386	3,926	4,551
NOT ADM. BY SEDAPAL	**6,280**	**5,760**	**7,301**	**8,991**	**11,972**	**15,482**	**19,623**	**24,667**
METROPOLITAN LIMA (MCM)	**1,053**	**910**	**984**	**1,015**	**1,094**	**1,171**	**1,248**	**1,330**

* Service coverage was considered for districts of Lima Province ranging from 83% (1998) to 98% (2030)

Table 6.1 Alternative 1a. Demand and Supply Balance (*)

Year	1998	2000	2001	2002	2003	2005	2006	2007	2008	2010	2011	2012	2013	2015	2016	2017	2018	2020	2021	2022	2023	2025	2026	2027	2028	2030
Cañete River Water Transmission	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.50	2.50	2.50	5.00	5.00	5.00	5.00
Huascacocha Reservoir	-	-	-	-	-	-	-	-	-	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Chillón River Development	-	-	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Marca II	-	-	-	-	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78
Marca III	-	-	-	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09
Yuracmayo	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78
Lurín River 90%	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Rimac River 90%	10.22	11.12	11.72	12.22	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01
Lurín River New Wells	-	-	-	-	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Wells	11.51	9.74	8.85	7.46	6.08	5.30	5.17	5.13	5.09	5.01	2.27	2.72	3.17	4.09	4.54	4.99	5.44	6.36	6.85	4.84	5.34	6.35	4.37	4.89	5.41	6.49
Total Sources	**23.59**	**22.72**	**22.53**	**26.73**	**32.22**	**31.44**	**31.31**	**31.27**	**31.23**	**31.15**	**31.52**	**31.97**	**32.42**	**33.34**	**33.79**	**34.24**	**34.69**	**35.61**	**36.10**	**36.59**	**37.09**	**38.10**	**38.62**	**39.14**	**39.66**	**40.74**
Lima South Plant Stage 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.50	2.50	2.50	2.50
Lima South Plant Stage 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Chillon Plant Stage 2	-	-	-	-	-	-	-	-	-	-	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80
Chillon Plant Stage 1	-	-	-	-	-	-	0.10	0.10	0.10	0.10	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Huachipa Plant Stage 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Huachipa Plant Stage 1	-	-	-	-	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
W/S upper Rimac	-	-	-	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Atarjea Plant	12.00	12.90	13.50	14.00	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50
Lurin River New Wells	-	-	-	-	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Wells	11.51	9.74	8.85	7.46	6.08	5.30	5.17	5.13	5.09	5.01	2.27	2.72	3.17	4.09	4.54	4.99	5.44	6.36	6.85	4.84	5.34	6.35	4.37	4.89	5.41	6.49
Total Drinking Water Supply	**23.51**	**22.64**	**22.35**	**23.46**	**31.88**	**31.10**	**31.07**	**31.03**	**30.99**	**30.91**	**31.37**	**31.82**	**32.27**	**33.19**	**33.64**	**34.09**	**34.54**	**35.46**	**35.95**	**36.44**	**36.94**	**37.95**	**38.47**	**38.99**	**39.51**	**40.59**
Water Demand 100% cov. + UNW	**27.45**	**24.80**	**24.08**	**26.16**	**31.62**	**31.10**	**31.07**	**31.03**	**30.99**	**30.91**	**31.37**	**31.82**	**32.27**	**33.19**	**33.64**	**34.09**	**34.54**	**35.46**	**35.95**	**36.44**	**36.94**	**37.95**	**38.47**	**38.99**	**39.51**	**40.59**
Superavit(Deficit) of Drinking Wate	**(3.94)**	**(2.16)**	**(1.73)**	**(2.7)**	**0.26**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

(*) Numbers to make this table were taken from "Master Plan of Drinking Water and sewerage Systems of Lima and Callao", SEDAPAL 1998.

Table 6.2 Alternative 2. Demand and Supply Balance (*)

Year	1998	1999	2000	2002	2003	2004	2005	2006	2007	2008	2009	2011	2012	2013	2014	2015	2016	2017	2019	2020	2021	2022	2023	2024	2025	2026	2028	2029	2030
Mantaro (Carispacha) Water Transmission	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.94	2.94	2.94	2.94	5.00	5.00	5.00	5.00
Huascacocha Reservoir	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Chillón River Development	-	-	-	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Marca II	-	-	-	-	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78
Marca III	-	-	-	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09
Yuracmayo	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78
Lurín River 90%	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Rimac River 90%	10.22	10.52	11.12	12.22	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01
Lurín River New Wells	-	-	-	-	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Wells	11.30	10.20	9.10	7.00	5.11	4.69	4.59	4.55	4.52	4.48	4.44	4.85	5.31	5.76	3.63	4.09	4.54	4.99	5.90	6.36	6.85	4.14	4.64	5.14	5.65	4.17	5.21	5.75	6.29
Total Sources	**23.38**	**22.58**	**22.08**	**26.88**	**31.86**	**31.44**	**31.34**	**31.30**	**31.27**	**31.23**	**31.19**	**31.60**	**32.06**	**32.51**	**32.88**	**33.34**	**33.79**	**34.24**	**35.15**	**35.61**	**36.10**	**36.33**	**36.83**	**37.33**	**37.84**	**38.42**	**39.46**	**40.00**	**40.54**
Huachipa Plant Stage 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.00	2.00	2.00	2.00
Huachipa Plant Stage 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
Lima South Plant	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chillon Plant Stage 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80
Chillon Plant Stage 1	-	-	-	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Huachipa Plant Stage 1	-	-	-	-	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
W/S upper Rimac	-	-	-	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Atarjea Plant	12.00	12.30	12.90	14.00	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50
Lurin River New Wells	-	-	-	-	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Wells	11.30	10.20	9.10	7.00	5.11	4.69	4.59	4.55	4.52	4.48	4.44	4.85	5.31	5.76	3.63	4.09	4.54	4.99	5.90	6.36	6.85	4.14	4.64	5.14	5.65	4.17	5.21	5.75	6.29
Total Drinking Water Supply	23.30	22.50	22.00	23.71	31.62	31.20	31.10	31.06	31.03	30.99	30.95	31.36	31.82	32.27	32.73	33.19	33.64	34.09	35.00	35.46	35.95	36.44	36.94	37.44	37.95	38.47	39.51	40.05	40.59
Water Demand 100% cov. + UNW	27.45	26.09	24.80	26.16	31.62	31.20	31.10	31.07	31.03	30.99	30.95	31.37	31.82	32.27	32.73	33.19	33.64	34.09	35.00	35.46	35.95	36.44	36.94	37.44	37.95	38.47	39.51	40.05	40.59
Superavit(Deficit) of Drinking Water	(4.15)	(3.59)	(2.80)	(2.45)	0.00	0.00	0.00	(0.01)	0.00	0.00	0.00	(0.01)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

(*) Numbers to make this table were taken from "Master Plan of Drinking Water and sewerage Systems of Lima and Callao", SEDAPAL 1998.

Table 6.3 Proposed Water Sources Development Projects for Alternatives 1a and 2 up to Year 2030

(m^3/s)

	Alternative 2	Alternative 1a	Status
Rimac Basin			
Rimac River	13.01	13.01	Operated
Yuracmayo dam	1.78	1.78	Operated
Marca III	10.87	10.87	Under Construction
Marca II			Consultants Selection
Mantaro-Carispacha	5.00	-	To be operated in 2022
Cañete	-	5.00	To be operated in 2022
Sub Total	**30.66**	**30.66**	
Chillón Basin			
Chillón River	0.61	0.61	To be operated in 2002
Chillón Recharge/Extraction	0.10	0.10	To be operated in 2000
Huascacocha dam	2.50	2.50	To be Operated in 2014
Sub Total	**3.21**	**3.21**	
Lurin Basin			
Lurin River	0.08	0.08	Operated
New Wells	0.30	0.30	To be Operated in 2003
Sub Total	**0.38**	**0.38**	
Wells	6.49	6.49	Operated
Sub Total	**6.49**	**6.49**	
Total	**40.74**	**40.74**	

Table 6.4 Water Production Capacity (2005)

	Alternative 2	Alternative 1a	Status
Rimac Basin			
Atarjea Plant	20.00	20.00	Operated
Huachipa Plant *1	5.00	5.00	Operated
Sub Total	**25.00**	**25.00**	
Chillón Basin			
Chillón River *2	0.61	0.61	On-going
Wells *3	1.00	1.00	On-going
Sub total	**1.61**	**1.61**	
Lurin Basin			
Lurin River	0.08	0.08	Operated
New Wells	0.30	0.30	2003
Sub Total	**0.38**	**0.38**	
Wells	6.49	6.49	Operated
Sub Total	**6.49**	**6.49**	
Total	**33.48**	**33.48**	
2005 Avg. Daily Demand	29.67	29.67	OK
2015 Avg. Daily Demand	33.05	33.05	OK
2030 Avg. Daily Demand	40.68	40.68	NO

Notes: *1 Already Committed for Supervision and Construction by OECF

*2 Invitation for concession project was issued. Capacity is limited by river flow

*3 Included in the Chillón project. Total capacity of facilites is 1.3 m^3/sec.

Table 6.5 Water Demand in Metropolitan Lima

Year	Consumption m^3/s	Service Coverage %	Actual Consumption m^3/s	Efficiency Ratio %	Avg. Daily Demand m^3/s	Adjusted Avg. Daily Demand m^3/s
1998	24.502	88.000	21.562	66.870	32.244	32.29
1999	21.914	88.000	19.284	66.870	28.839	30.05
2000	20.548	88.000	18.082	66.870	27.041	27.80
2001	20.168	89.400	18.030	67.496	26.713	28.17
2002	20.493	90.800	18.608	68.122	27.315	28.55
2003	20.872	92.200	19.244	68.748	27.992	28.92
2004	21.253	93.600	19.893	69.374	28.675	29.30
2005	21.635	95.000	20.553	70.000	29.362	29.67
2006	22.004	95.460	21.005	71.000	29.585	29.86
2007	22.374	95.920	21.461	72.000	29.807	30.06
2008	22.744	96.380	21.921	73.000	30.028	30.25
2009	23.114	96.840	22.384	74.000	30.248	30.45
2010	23.485	97.300	22.851	75.000	30.468	30.64
2011	23.841	97.360	23.212	75.000	30.949	31.12
2012	24.198	97.420	23.574	75.000	31.432	31.60
2013	24.556	97.480	23.937	75.000	31.916	32.09
2014	24.915	97.540	24.302	75.000	32.403	32.57
2015	25.275	97.600	24.668	75.000	32.891	33.05
2016	25.635	97.680	25.040	75.000	33.387	33.55
2017	25.997	97.760	25.415	75.000	33.886	34.05
2018	26.361	97.840	25.792	75.000	34.389	34.54
2019	26.727	97.920	26.171	75.000	34.895	35.04
2020	27.093	98.000	26.551	75.000	35.402	35.54
2021	27.469	98.000	26.920	75.000	35.893	36.04
2022	27.844	98.000	27.287	75.000	36.383	36.54
2023	28.226	98.000	27.661	75.000	36.882	37.05
2024	28.610	98.000	28.038	75.000	37.384	37.55
2025	29.000	98.000	28.420	75.000	37.893	38.05
2026	29.391	98.000	28.803	75.000	38.404	38.58
2027	29.789	98.000	29.193	75.000	38.924	39.10
2028	30.190	98.000	29.586	75.000	39.448	39.63
2029	30.598	98.000	29.986	75.000	39.981	40.15
2030	31.013	98.000	30.393	75.000	40.524	40.68

Table 6.6 Assessment Matrix

Criteria	Alternative 1a	Alternative 2
Tecnical		
Viability	B	B
Technology	B	B
Maintenance	C	B
Operation	B	C
Guarantee	C	A
Construction	B	B
Control	B	B
Flexibility	C	A
Environmental		
Effects	C	B
Vulnerability	C	B
Social		
Social	C	B
Economic-Financial		
Investment	C	A
Net Present Value	C	A
Overall Assessment	**C**	**A**

A = Favorable, B = Indifferent, C = Unfavorable

Table 6.7 Demand and Supply Balance After Year 2015

(m3/s)

Operation Year / Item	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Avg. Daily Demand	33.05	33.55	34.05	34.54	35.04	35.54	36.04	36.54	37.05	37.55	38.05	38.58	39.10	39.63	40.15	40.68
Total Sources up to Year 2015 (*)and after	33.24	35.74	35.74	35.74	35.74	35.74	38.24	38.24	38.24	38.24	38.24	40.74	40.74	40.74	40.74	40.74
New Surface Sources																
Huascacocha		2.50														
Mantaro-Carispacha Stage I or Cañete Stage I							2.50									
Mantaro-Carispacha Stage II or Cañete Stage II												2.50				
Superavit (Deficit)	0.19	2.19	1.69	1.20	0.70	0.20	2.20	1.70	1.19	0.69	0.19	2.16	1.64	1.11	0.59	0.06
New Treatment Plant																
Chillón		2.50														
Huachipa Stage II or Flor de Nieve Stage I							2.50									
Huachipa Stage II or Flor de Nieve Stage II												2.50				

(*) Rimac River Basin : 13.01 m^3/s
Yuracmayo Reservoir : 1.78 m^3/s
Marca II + Marca III : 10.87 m^3/s
Chillón Development : 0.71 m^3/s (0.61 + 0.10)
Lurín : 0.38 m^3/s
Wells : 6.49 m^3/s
Total : 33.24 m^3/s

TABLE 8.1 PERMITS AND LICENSES FOR SURFACE AND GROUNDWATER USES IN CAÑETE RIVER BASIN AND LURIN-CAÑETE CORRIDOR

Surface Water / User Name	Operating Unit	Source of development (river,stream, well, spring)	Type of exploitation		Area	Use						Legal System		Date of Resolution	Volume granted M3/sec Or MCM	Remarks
			Public	Private		S	L	I	H	M	O	Type of Resolution	No. of Resolut.			
1996																
1) SEDAPAL	Water for Lima	Cañete River	X		Upper Basin	X						Administr. Resolution	015-96	09/05/96	128 MCM	
2) Cementos Lima	Hydropower Plant "El Plantanal"	Cañete River		X	Chavin				X			Administr. Resolution	066-96	18/11/96		Hydropower studies
3) Union Minera SA	Hydropower "Llapay"	Cañete River		X	Llapay/Chuco				X			Administr. Resolution	017-96	14/05/96	0.040	License
4) Cia. Minera San Valentin	Huacayriyoc Lagoon	Huacayriyoc Lagoon		X	Pacocha Laraos				X			Administr. Resolution	016-96	14/05/96	0.008	License
5) Megac Minera cul. O H S.A.	Amable María	Cañete River		X	San Luis				X			Administr. Resolution	012-96	27/03/96	0.003	License
1997																
6) Cia. Minera San Valentin	Huacayriyoc Lagoon	Huacayriyoc Lagoon		X	Huacayriyoc Lagoon				X			Administr. Resolution	029-97	04/06/97	0.015	Licence
7) Carnilac SA	Cerro Alegre	Cañete River		X	Cerro Alegre				X			Administr. Resolution	028-97	14/05/97		License to carry out studies
1998																
8) Cia. Minera San Valentin	Hydropower Plant "Llapay"	Lagoon		X	Laraos				X			Administr. Resolution	065-98	17/07/98	9.00	Hydropower
9) Cia. Minera San Valentin	Huacayriyoc Lagoon	Lagoon		X		X				X		Administr. Resolution	066-98	17/07/98	0.03	License
10) Cementos Lima	Hydropower Plant Morro de Arica and El Platanal	Cañete River		X	Yauyos					X		Administr. Resolution	097-98	13/09/98	37.6	License
1999																
11) Provicrey	San Vicente	Cañete River		X	San Vicente	X						Administr. Resolution	013-99	17/03/99	0.050	License
12) Cementos Lima	Conco-Topará	Cañete River		X	Chincha Alta		X								378 MCM	License under process

S = Population Supply
L = Livestock
I = Agriculture – Irrigation
H = Hydropower
M = Mining
O = Others

TABLE 8.2 PERMITS AND LICENSES FOR SURFACE AND GROUNDWATER USES IN CAÑETE RIVER BASIN AND LURIN-CAÑETE CORRIDOR

Surface Water / User Name	Operating Unit	Source of development (river,stream, well, spring)	Type of exploitation		Sector	Use						Legal System		Date of Resolution	Volume granted M^3/sec Or MCM	Remarks
			Public	Private		S	L	I	H	M	O	Type of Resolution	No. of Resolution			
1996																
1) EMAPACSA	Lunahuana	Spring	X		Lunahuana	X						Administr. Resolution	041-96	20/08/96	0.015	License
2) EMAPACSA	Quilmana	Well	X		Quilmaná	X						Administr. Resolution	040-96	20/08/96	0.050	License
3) EMAPACSA	San Luis and Cerro Azul	Well	X		Tupac Amaru	X						Administr. Resolution	039-96	20/08/96	0.025	License
4) EMAPACSA	San Luis and Cerro Azul	Well	X		Compradores	X						Administr. Resolution	038-96	20/08/96	0.040	License
5) EMAPACSA	Nuevo Imperial	Well	X		Almenares	X						Administr. Resolution	037-96	20/08/96	0.020	License
6) EMAPACSA	San Vicente	Well	X		San Tuslio	X						Administr. Resolution	034-96	20/08/96	0.012	License
7) EMAPACSA	San Vicente	Well	X		San Vicente	X						Administr. Resolution	033-96	20/08/96	0.018	License
8) EMAPACSA	San Vicente	Well	X		San Vicente	X						Administr. Resolution	032-96	20/08/96	0.058	License
9) EMAPACSA	San Vicente	Well	X		San Antonio	X						Administr. Resolution	042-96	20/08/96	0.018	License
10) EMAPACSA	Mala	Well	X		Mala	X						Administr. Resolution	043-96	20/08/96	0.028	License
1998																
11) ItaloComde	Spring	Spring		X	Laraos	X			X			Administr. Resolution	041-98	27/07/98	0.020	License
Ricse	Larao Puquio															
1999																
12) Roxana Febres Robinson	Pacaran	Spring		X	Pacaran	X						Administr. Resolution	021-99	05/05/99	0.004	License

S = Population Supply
L = Livestock
I = Agriculture – Irrigation
H = Hydropower
M = Mining
O = Other