

## Vientiane water supply system and development plans for improvement

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*Vientiane Capital City is in the process of improving its social and economic conditions according to the development plans of the government in line with the National Growth and Poverty Eradication Strategy (NGPES). Vientiane Water Supply Company (commonly known as Nam Papa Vientiane) currently serves central and fringe areas of the capital city. Nam Papa Vientiane has plans to increase the quantity and quality of services in near future to meet the increasing water demands and ensure sustainable development and hygienic living environments for the citizens of Vientiane Capital City.*

### Background

The Vientiane Water Supply Company (VWSC), a State-owned Enterprise, formerly known as Nam Papa Lao, was established in 1959 and was turned into a business enterprise following the new economic roadmap of the Lao People's Democratic Republic (Lao PDR), introduced in 1986.

The development of the water supply system in Vientiane Capital City started from the construction of Kaolieo water treatment plant in 1964. This was followed by rehabilitation and expansion of the scheme in 1983. An additional water treatment plant was constructed at Chinaimo in 1980, which was rehabilitated and expanded in 1996. The total production of both treatment plants is 100,000 cubic meters per day. In 1988, the utility became a self-sustaining enterprise as part of the public works improvements.

The Vientiane Water Supply company is responsible for the management and operation of the water supply system. The management and operation systems of Nam Papa are based on commercial principles. Human resources development is one of the main challenges faced by Nam Papa. The shortage of skilled manpower and the insufficient number of technical staff for water supply utilities in the country to implement development plans need to be addressed. Presently, an average of 200 staff from the provinces throughout the country joins the various annual training courses at VWSC's training center to try to improve the technical and management skills of the staff.

### Water resources

The Mekong River has abundant water throughout the year to serve the Kaolieo and Chinaimo water treatment plants. In the rainy season, turbidity of the Mekong River goes up to 1500-2000 NTU. In some years, the turbidity is over 4000 NTU (1996). In the dry season the turbidity goes down to 15-20 NTU.

Nam Ngum River, one of the largest tributaries of the

Mekong River, will be a main water source for the future treatment plants as per the urban development and water supply expansion plans.

Although the level of the Nam Ngum River fluctuates by season, water is available all year round from this source. In Vientiane Capital City, groundwater resources have not yet been investigated as a potential source of water supplies. Groundwater has not yet been considered as a source of water supply system because there are plenty of shallow wells and deep wells mainly used for private purposes by remote residents. In the near future all of potential water resources will be examined for water supply development.

### Vientiane capital city population

The past population trend of Vientiane Capital City was estimated by using the average growth rate. The 25-year population increase ratio from 1985 to 2000, was 3.05%, and the total population was nearly 600,000 persons in 2000 as shown in Table 1 below.

**Table 1: Past Population Trend in Vientiane City<sup>1</sup>**

Year	1985	1990	1995	1999	2000
Population	381,000	464,000	532,000	583,000	599,000
Average Increase Ratio from 1985 to 2000					3.05%

**Table 2: Future Populations and Served Population**

Year	2000	2005	2010	2015	2020
Population	599,000	687,084	788,165	902,716	1,034,521
Served Population	215,522	275,567	370,269	466,981	564,648
Population in Service Area	297,575	380,342	499,737	586,710	662,441

### Future population forecast

Based on population growth rate from 1995 to 2000, future population of the city up to year 2020 is estimated at well over one million. According to the action plan for expansion of water supply, the served population and population in service areas are compared and shown in the Table 2.

### Future service area

Expansion of the service area (Refer Figure 1) is planned in three steps based on priority of water needs as follows:

Step 1: Year 2004 to 2007

Installation of pipelines, distribution network and connection in domestic areas.

Step 2: Year 2008 to 2012

Installation of pipelines, distribution network in commercial areas.

Step 3: Year 2012 onwards

Installation of pipelines, distribution network in outer fringe – in remote rural areas.

### Water Demand

Domestic water consumption per capita is approximately 174

lpcd, which might be rather high compared to that of other Southeast Asian countries. Future domestic water demand is significantly increasing based on the served population and per capita water consumption. The future water demand of the served population is calculated from total population and service ratio of respective villages. Understanding the rather higher per capita water consumption, the VWSC is implementing a 'Water Saving Campaign' to achieve a water conscious society and to reduce wastage for the effective use of the water supply system depending on Non Domestic Water Demand, is anticipated to increase in line with the urban development plan of Vientiane Capital City, new industrial zones planned in the eastern and central parts of the city (covering about 3,000 ha). So water demand for existing and new industrial areas will increase with a higher rate (refer Figure 2).

### Water Tariff

The average water rate is verified, taking into account the cost recovery policy. In general, the water rate is set by means of applying the Long Run Average Cost (LRAC) methodology. From the past experience of VWSC, the financial opportunity cost of capital was considered to be 3.5%, as the lowest financial cost. As a result, the LRAC was calculated at US\$ 0.26/m<sup>3</sup>. Thus, the rate of US\$ 0.26/m<sup>3</sup> was considered as

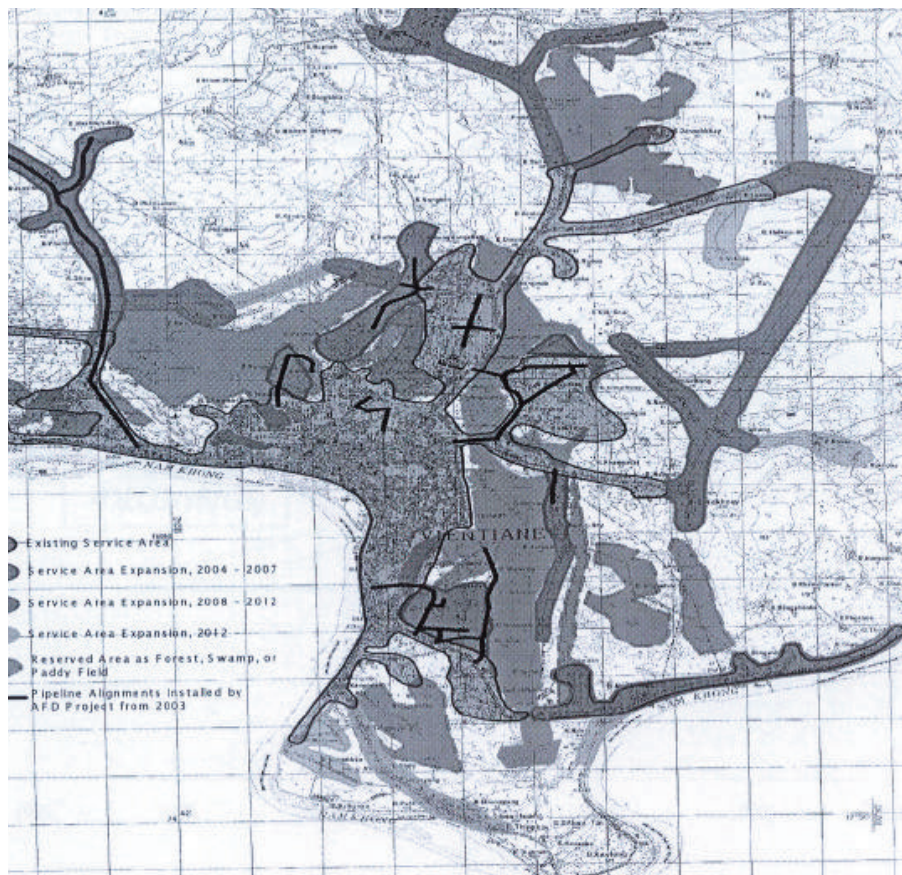


Figure 1. Location of existing and future service areas

most applicable for expansion of the water supply system, from the view point of affordability and consumers needs, and the financial status of VWSC.

Water tariff for non-domestic water consumers is to be set at twice the level of domestic consumers, based on the present structure. For the poor sector, which accounts for nearly 20% of the population of Vientiane City, the water tariff is 3% of the household disposable income (disposable income is around 640,000 Kip as of 2003). For the average household consumer, the water tariff is 3.5% of the household disposable income (around 1,600,000 Kip as of 2003). The average cost for domestic users was calculated at US\$ 0.17/m<sup>3</sup>. Incidentally, VWSC also applies the new tariff to government offices. The average tariff is set at 950 Kip/m<sup>3</sup>. The transitions of the water tariff as an illustration of water tariff changes for domestic users are shown in Table 3 and Figure 3.

### Water Loss in Vientiane Water Supply System

Leak detection and reduction of unaccounted water is another challenge faced by VWSC. The percentage of unaccounted for water loss is now 28.47%, reduced from earlier years though the water production has increased considerably. Table 4 shows the water production, water sales, water losses and number of connections made over the period 1999 to 2003. The data clearly indicates that the performance of NWSC

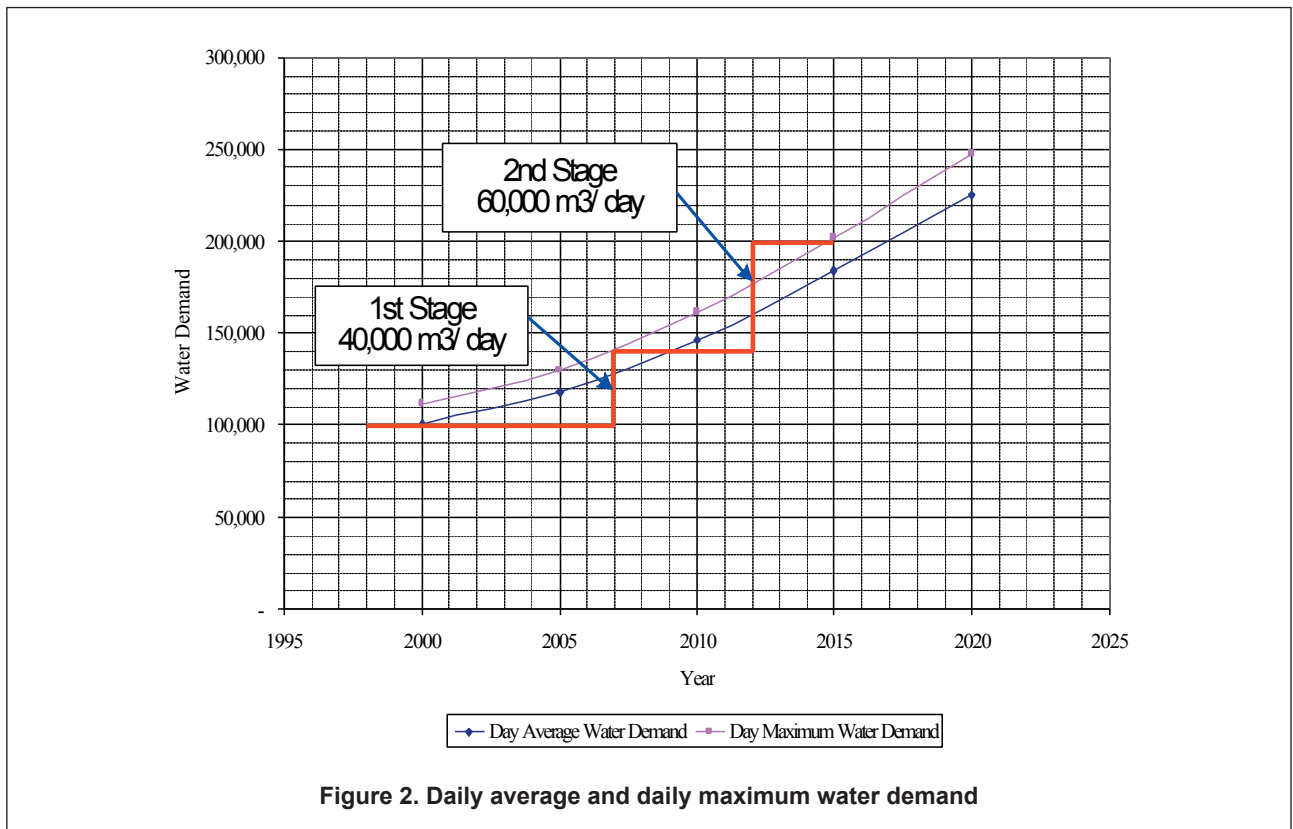
**Table 3. Transition of Water Tariff Revision: 1994 - 2004**

Effective Period: From	Through	Average Unit Rate
January 1994	April 1995	92 Kip/m <sup>3</sup>
May 1995	June 1996	135 Kip/m <sup>3</sup>
July 1996	May 1998	162 Kip/m <sup>3</sup>
June 1998	May 2001	195 Kip/m <sup>3</sup>
April 2001	October 2002	387 Kip/m <sup>3</sup>
November 2002	March 2004	550 Kip/m <sup>3</sup>
March 2004	June 2004	750 Kip/m <sup>3</sup>
July 2004	Present	950 Kip/m <sup>3</sup>

is improving over the years although there is still plenty of scope for further improvements.

### Human resources development

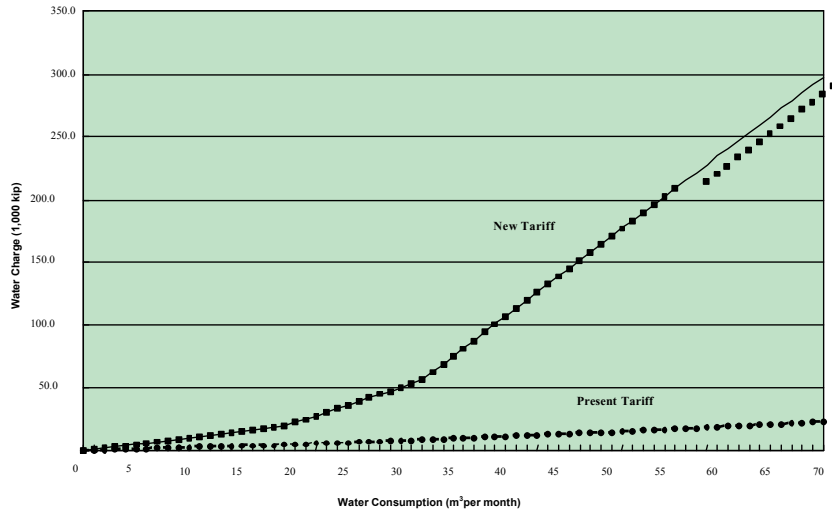
Water supply is indispensable for citizen's life, urban activities and industrial development. To achieve a stable and sustainable services, Nam Papa effectively utilizes various resources that constitute an effective management of water supply. Trained staff will assure that a water utility's ability could survive and grow. Providing training for staff is a managerial responsibility, with both utility management and staff having a clear voice in determining what will be done, how it will be done, how the results and impacts are evaluated. Water work and technology has expanded con-



**Figure 2. Daily average and daily maximum water demand**

**Table 4: Water Losses**

	1999	2000	2001	2002	2003
Water Production (M <sup>3</sup> )	31,526,073	36,273,290	36,867,221	36,273,290	43,837,630
Water Sales (M <sup>3</sup> )	21,943,494	24,992,460	27,513,899	24,992,460	31,354,982
Water Losses (M <sup>3</sup> )	9,582,579	11,280,830	9,353,322	11,280,830	12,482,648
No. of Connection	37,160	39,507	42,052	43,093	46,314
% Water Losses	30.40	31.10	25.37	31.10	28.47



**Figure 3. The illustration of water tariff for domestic users**

sumer demand and environment quality. Newer and more sophisticated testing and monitoring procedures have led to more stringent regulations and controls. All of these effect how well a utility will survive. To conclude, workforce efficiency and effectiveness is the key to the survival and growth of VWSC.

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