A true water megastructure — the Langat 2 Water Treatment Plant

Massive urbanisation and rapid industrialisation weigh on the need to deliver more treated water, and Langat 2 Water Treatment Plant, when completed, will be the country's largest such facility

Pic by Razak Ghazali

by AFIQ AZIZ

MALAYSIANS consume between 220 litres and 240 litres of water daily, 30% more than the 150 litres recommended by the international organisation, the United Nations. Some reports even suggest that Malaysians on average use up to 300 litres of treated water daily.

This figure, if it is true, will make Malaysia the country that consumes the highest amount of water in Asia and in some cases, surpassing the water usage of advanced countries like the US and Australia which use an average about 100 litres per person daily.

The total water demand for the Klang Valley, including Selangor and Putrajaya, has increased 300% to 4,500 million litres per day (MLD) in 2013, compared to just 1,500 MLD 20 years ago.

The main reason behind the rise in demand is the population explosion. Klang Valley's population has doubled to 7.8 million people from 4.2 million residents 20 years ago. Massive urbanisation, rapid industrialisation and the opening of new developments have also weighed on the need to deliver more treated water.

The answer to the problem — the Langat 2 Water Treatment Plant (Langat 2) which, when completed, will be the country's largest such facility.

During its initial operation, expected next year, the plant will process and distribute about 350 MLD a day. When it is fully operational and at its maximum capacity, the plant will deliver 1,130 MLD of treated water to millions of people in the Klang Valley.

The water treated from this state-of-the-art facility will be channelled through thousands of kilometres of complex piping systems to residents in Hulu Langat, Ampang, AU3, Kuala Lumpur, Cheras, Sungai Besi, Bukit Jalil, Petaling and Puchong.

Construction of the Langat 2 Water Treatment Plant began in 2014 on a massive 48.5ha site. The plant is located next to the Langat 1 Water Treatment Plant which is currently producing 470 MLD of treated water.

The development of the Langat 2 project is spearheaded by MMC Corp Sdn Bhd, Salcon Bhd and Ahmad Zaki Resources Bhd. The facility is expected to be delivered to Pengurusan Air Selangor Sdn Bhd after operational tests and commissioning next year.

The Complexities of Treating Water

Many Malaysians take for granted the availability of treated water. Many others think the process of treating millions of litres of water is an easy process.

But the whole process from the sourcing of the raw water to treating and later distributing to millions of households, offices and industrial areas is a complex task. Besides the thousands of kilometres of water distribution networks, the water treatment process is the heart of the operation.

The cleaning of water involves various stages from the mixing of the required chemicals in the correct amount to putting the water through various treatment processes. Various chemicals are added to remove harmful elements from the raw water.

MMC Engineering Sdn Bhd CEO Mohd Abdul Fatah Endut said the plant will be able to receive 1,200 million litres of raw water daily and deliver 1,130 MLD of treated water to consumers.

He said the supply will cater to the need of 4.5 million people or almost half the residents in the Klang Valley.

"The raw water will be sourced from Semantan River in Pahang connected by more than 70km of pipes. About 3,000 MLD will flow from the river and one-third of the water will enter plant and be channelled to the aerator to remove any sludge," he told *The Malaysian Reserve.*

From Murky 'Teh Tarik' to Crystal Clear

Langat 2 project director Tan Tee Giap said there are many stages of changing the raw water into treated water which can be safely consumed.

The aeration process, which is a critical initial stage of any water treatment process, will remove dissolved gases and oxidises dissolved metals such as iron, hydrogen sulphide and volatile organic chemicals from the raw water before the next stage.

Beside scrubbing gases and releasing them, the process will help remove dissolved metals through oxidation. The oxidised component will then be removed by filtration or flotation.

He said the water will also be treated to reduce acidity and improve oxygen levels, while metals like iron, manganese and hydrogen sulphide will then be put through a filtration system.

"The initial phases of the treatment processes are aimed to consolidate the sludge. The heavier solid will drop to the bottom and only waters will flow to the next sections, mixing chamber and clarifiers," he said.

Before entering the mixing chamber, the treated water will go through the pre-chlorine process by mixing polyaluminum chloride and polymer.

"At this stage, the colour of the water is still very much influenced by the sludge which we often refer to the 'teh tarik' colour. But the sludgy coloured water will become clear water after the clarifier phase. This is where you will truly appreciate the work of a water treatment plant," Tan said.

"During this phase, we could physically see water changing from light brown to crystal clear. But is not ready to be consumed. There are still organisms in this 'clear' water," he said. The next stage will see the water being mixed with intermediate chlorine and sodium silicofluoride.

The post-lime or lime softening process then, undertaken by using calcium hydroxide or limewater, will soften the water and remove calcium and magnesium ions.

Tan said hydrated lime is added to the water to raise the pH level and reduce solubility.

"Finally, the water will be stored in clear water tank that is the size of eight football fields. The tank is about 10m high or equivalent to a three-storey building.

He said presently, the Enggang Balancing Reservoir, which is 1.4km away from the plant, is ready and capable of channelling 325 MLD of water to the existing Langat Reservoir next to Langat 2.

"When the Sungai Besi, Bukit Jalil, and Petaling reservoir networks are completed in the future, the remaining 805 MLD of treated water can be enjoyed by consumers in those districts," Tan said.

A plant with similar capacity is expected to be built within the complex in the future, making Langat 2 the country's single-largest water treatment facility in the country with the production capacity of 2,260 MLD of treated water.

Mohd Abdul Fatah said the construction of Langat 2 took five years, involving 1.2 million manhours. During a peak time, 2,000 workers were involved in the construction to create one of the country's megastructures.