From an orchard to a sophisticated centralised sewerage

Known as the Langat CSTP, the facility sits on a 7.3ha of land and would be ready to serve thousands of households with its sophisticated technology before the year closes

by AFIQ AZIZ

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Pic by Muhd Amin Naharul

IT WAS once hectares of an orchard before the government — through the Water, Land and Natural Resources Ministry or KATS, previously known as KeTTHA — decided to pump in RM1.5 billion to build a centralised sewage treatment plant in Sungai Balak, Kajang, Selangor.

Known as the Langat Centralised Sewage Treatment Plant (Langat CSTP), the facility sits on a 7.3ha of land and would be ready to serve thousands of households from 60.9 sq km, or 6,090ha of catchment area, with its sophisticated technology before the year closes.

The construction began in November 2015, developed by MMC Pembetungan Langat Sdn Bhd (MMC PLSB), and has now entered the testing and commissioning (T&C) stage.

The facility inaugurated the initial flow last month, receiving about 60,000 population equivalent (PE) liquid into the treatment plant.

The T&C phase is expected to reach an optimum level by year-end when 230,000 PE of liquid is set to flow into the Langat CSTP entry point from homes all over Kajang and Cheras in Selangor.

In the long run, the plant is able to accept sewage inflow of 207,000 cu m a day or 920,000 PE into its eight streams, from the total catchment area which includes Cheras Batu 11, Cheras Jaya, Desa Baiduri, as well as Kajang 1 and 3.

This, said project director Mohd Abdul Fatah Endut, would be enough to cater to a huge population growth over the next two decades.

This huge over three-fold capacity can be attributed to MMC PLSB's collaboration with the Tokyo Metropolitan Government.

Mohd Abdul Fatah added that through this partnership, MMC PLSB has incorporated the deep aeration method with a step-feed multistage denitrification process within the plant.

As a result, the government managed to save two other pieces of land which were originally proposed for a similar development.

An artist's impression of the plant. There will be 16 badminton courts, 2 basketball courts, 2 sepak takraw courts, 2 futsal courts and 1 community hall for public events at Langat CSTP, accessible via a separate entrance to ensure public safety

Langat CSTP Capacity and Technology

Langat CSTP is the pioneer in capitalising this Japanese technology in Malaysia.

"When we first started in 2015, there was a proposal that we should have three CSTPs to cater to about the same capacity.

"However, with this technology, we could save the other two sides of land that could be utilised by the government for other purposes," Mohd Abdul Fatah told *The Malaysian Reserve*.

He said the Sewerage Non-River Project technology is expected to release Class 1 water quality effluent back to the Langat River, after reducing a significant ammonia level which is absorbed during the intake. The process is estimated to complete within nine days.

"Originally, the three CSTPs were suggested mainly due to the extensive ammonia level in the Langat River, but we believe that by building up just a single plant, it is viable enough to cover the decommissioning of 232 small treatment plants," the MMC Engineering Services Sdn Bhd CEO said.

Of the total small sewage treatment plants, MMC PLSB is in charge of reconsolidating 164 of them. The construction company is tasked to connect these "last manholes" at these facilities via 105km of pipes called the "main trunks".

About 90% of the main trunks are expected to be tunnelled underground, via the pipe jacking system.

This trunk is connected by 1,174 manholes above ground along the line, made for the maintaining pur-

poses. Each pipeline varies from 80m to 300m, depending on the diameter sizes.

This, Mohd Abdul Fatah said, is a very complex process.

It starts with a huge shaft excavation whether by "Sheet Pile Cofferdam" or "Cast in-situ Caisson" technique, allowing enough room to bring the sewer down.

"Sewers range from as small as 225mm and can go up to 2,100mm in diameters, which are almost the height of a one-storey building. So, we have to dig down to 19m in depth, equivalent to a six-storey building under the ground," he said.

When Pipe Jacking Hits Hard Soil

The pipe jacking stretches over 105km in length, equivalent to reaching Melaka in just two hours from the city centre. This is also an easier task for MMC PLSB to just place the pipe above ground.

However, having a huge sewer pipe on the ground may not be the best option as it requires greater land acquisition, an eyesore and to some extent, could potentially cause odour pollution.

In the digging process, MMC PLSB uses micro-tunnel boring machine (MTBM) equipment, where drilling operations are performed automatically, depending on the sewer pipe sizes.

This machine could "jack" more than three pipes a day, but in certain conditions, it could not penetrate even half the distance. Typically, the length of one sewer pipe is about three metres.

"Initially, we estimated about 2km of rocks, but eventually, we came across more than 10km of rocks. So, we needed to do some adjustments as the tunnel boring machine (TBM) system could not be used to cut rocks.

"Then, we need to take the jacking machine which is the same size as the pipes out of the shaft.

If it gets stuck in the middle of the tunnel, a small "rescue shaft" would have to be drilled just to remove the TBM's cutter head and bring down a different driller to break the rocks.

"The worst part is, we do not know when these rock drives would end," Mohd Abdul Fatah explained.

The TBM is designed to only break normal soil. The rock cutter, on the other hand, would be very slow although it could be applied to dig soil, as it is designed to drill harder materials.

He added that the engineering construction firm has already faced over 500m of rock drive, which took them three months to cut.

Mohd Abdul Fatah said this is very counterproductive, but MMC PLSB must complete this by 2021 before handing over the whole project to Indah Water Konsortium Sdn Bhd which will operate the Langat CSTP.

To achieve this, the company had invested millions of ringgit to import a custom-made TBM from German manufacturer, Herrenknecht AG, which is expected to speed up the remaining 18km tunnelling drive.

"We estimate another 3km of rock drive, so hopefully, this machine has what it takes as the strength could go up to 300MPa of torque," Mohd Abdul Fatah said.

On top of that, the project has achieved nine million man-hours without a lost-time injury mark, which was featured in The Malaysia Book of Records.

In total, 10.5 million hours have been recorded in the construction period.

At the peak time, over 2,300 workers are involved in the construction which is mainly working on the tunnelling process.

(From left) **Department of Occupational, Safety and Health DG Ibrahim Md Dol, Mohd Abdul Fatah, MMC PLSB director Chee Weng Loon and project director Azhar Kasa at the certificate presentation marking the 9m man-hours achieved without lost-time injury. In total, 10.5m hours have been recorded in the construction period**

The MMC Langat 2 Water Treatment Plant. The Sewerage Non-River Project technology is expected to release Class 1 water quality effluent back to the Langat River

Pic by Razak Ghazali

Ready to Serve the Community Holistically

The Langat CSTP facility is almost completed.

Soon enough, it will not only welcome tens of thousands of cu m of liquids channelled from households, but also offer the community with a recreational and sports complex, which is being built on top of the sewerage plant.

There will be 16 badminton courts, two basketball courts, two sepak takraw courts, two futsal courts and one community hall for public events, accessible via a separate entrance to ensure public safety.

"We are trying to change people's perception that they can come to a sewerage facility and enjoy their activities under one roof.

"This is totally different compared to the existing plants which process sewage openly and produce unwelcoming odours," Mohd Abdul Fatah said.