

DTSS2 TODAY

Issue 7: June 2022



Tuas Nexus Team @ Singapore International Water Week (17 to 21 Apr 2022)

PROJECT PROGRESS

As we cross into the second half of 2022, the Deep Tunnel Sewerage System Phase 2 (DTSS 2) project continues its steady progress and is at 63.1% completion.

To date, DTSS 2 has witnessed a total of 12 Tunnel Boring Machine (TBM) breakthroughs, with at least 6 more TBMs expected to complete their drive by end-2022. Corrosion Protection Lining (CPL) works have begun for all 5 tunnel contracts and casting work will commence shortly.

To date, more than half of Tuas Water Reclamation Plant's contracts, amounting to more than S\$2 billion, have been awarded. Key construction activities such as piling, yard piping and structural foundation works continue across the whole site, and some superstructure elements have started to take shape.

DTSS PHASE 2



63.1%

Overall Progress

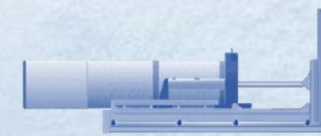


47.5 million

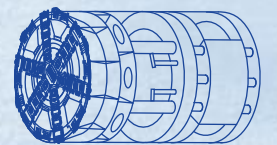
Total Man-hours (Overall)



Domestic Used Water
650,000m³/d
Industrial Used Water
150,000m³/d



Link Sewer
Internal Diameter:
0.3 to 3m



Tunnel Internal Diameter:
3 to 6m

CONVEYANCE

Link Sewer



39%
Construction
Progress

6.3 km
Length Jacked

Tunnel



42.9 km
Length Tunnelled

7.6 km
Length of CPL
completed

14/20
TBM
Drives

19/19
TBMs in
Operation

12/20
TBM
Breakthroughs



50/50
Active Sites



68.2%
Construction
Progress



34 million
Man-hours worked

Tuas WRP

Foundation and piling works are on-going throughout the site. Concurrently, Mechanical, Electrical, Instrumentation, Control and Automation (MEICA) engineering and procurement works are in progress.

Contract 3E

Liquids Modules Odour Control Facilities

Tender closed on 12 May 2022 and is currently under evaluation.

Contract 3D2

Domestic Liquids Module 2 – MEICA

Contract was awarded to UESH Holdings Pte. Ltd. on 21 March 2022.

Contract 4A

Biosolids Building and Digesters

Structural works for the digesters and holding tanks, as well as column works for the Biosolids building are ongoing.

Contract 2B

Product Water Pumping and Facilities

Bored piling and load testing works for the storage tanks and product water pumping station are ongoing.



10 million
Man-hours worked



10/17
Contracts awarded



17.2%
Construction progress

SEALING OF TUAS NEXUS TIME CAPSULE

Tuas Nexus Booth @ Singapore International Water Week, 18 Apr 2022



Caption: (From L-R) Ms Nunthinee Sundaramurthi, Principal Engineer, PUB; Mr Desmond Tan, Minister of State, Ministry of Home Affairs & Ministry for Sustainability and the Environment, Singapore; Mr Ng Joo Hee, Chief Executive, PUB; Ms Grace Fu, Minister for Sustainability and the Environment, Singapore; Mr Luke Goh, Chief Executive Officer, NEA; Dr Amy Khor, Senior Minister of State, Ministry for Sustainability and the Environment, Singapore; Mr Stanley Loh, Permanent Secretary (Sustainability and the Environment), Singapore; and Mr Albert Chieng, Executive Engineer, NEA.



Caption: (From L-R) Ms Nunthinee Sundaramurthi, Principal Engineer, PUB and Mr Albert Chieng, Executive Engineer, NEA.

A time capsule containing several symbolic items, including a bottle of NEWater, was sealed to commemorate the construction of Tuas Nexus – the world’s first integrated waste and water treatment facility planned from ground-up. Tuas Nexus, comprising PUB’s Tuas WRP and NEA’s Integrated Waste Management Facility, will harness the synergies of the water-energy-waste nexus to help forge a more sustainable Singapore. The time capsule will be opened in 2032 after Tuas Nexus becomes fully operational.

EXPERIENTIAL LEARNING JOURNEY TO DTSS 2

Executive Development & Growth Exchange Programme (EDGE) Visit, 24 May 2022



Caption: Ms Nunthinee Sundaramurthi, Principal Engineer (PUB) referring to a scaled model of TWRP to explain how it works.



Caption: Mr Simon Yim and Mr Venkatesa Perumal, Senior Engineers (PUB) taking the group on a walk along the interior of the Industrial Tunnel and sharing on the scale and challenges of a mega-project such as DTSS 2.

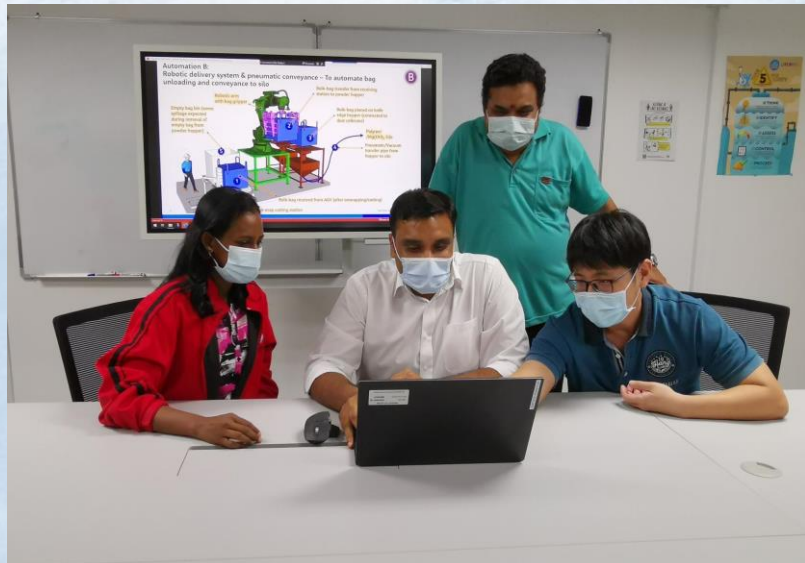


For the very first time, Tuas WRP hosted an external group visit on 24 May 2022 in collaboration with the Centre for Liveable Cities (CLC), for participants of the 21st Executive Development & Growth Exchange (EDGE) programme. They gained insights on Singapore's underground superhighway for used water management and were brought on a experiential learning journey into the makings of a mega-project.

TUAS NEXUS – A PIONEERING INNOVATION

The Tuas Nexus project was conceived in 2014 to meet Singapore's long-term used water treatment and solid waste management needs. This inter-agency facility leverages the synergies between water, waste and energy, to maximise resource recovery whilst reducing carbon and land footprint. When fully completed, it will be energy self-sufficient and set the standard for Singapore's waste management.

We had the opportunity to chat with Nunthinee, who is PUB's Smart and ICA (Instrumentation, Control and Automation) lead for Tuas WRP, and is responsible for fully automating the plant to improve resource and manpower efficiencies and enhance site safety and security using technology.



Caption: (From L-R) Ms Nunthinee Sundaramurthi, Principal Engineer, PUB; Mr. Karthick Genesh, Process Mechanical Engineer, Jacobs; Mr Raviravichandiran Sougumaran, Resident Engineer, Jacobs; and Mr Benjamin Tan, Senior Engineer, PUB

What is it like working on an iconic project like the Tuas Nexus?

The Tuas Nexus project brings about several firsts for Singapore – first fully energy self-sufficient greenfield facility, first integrated facility to treat four different waste streams, first to close the water loop by reclaiming industrial used water.

As a pioneering facility, the project has its challenges. There is no proven model for us to reference. It is a large-scale, multi-faceted, inter-agency endeavour which requires the project teams from PUB and NEA to collaborate closely every step of the way. Now that physical construction is underway in earnest, it is thrilling to see the initial designs coming to reality on site.

“ One exciting initiative is the integration of a robotic arm into our work process, ...hence freeing up plant personnel for higher value activities.

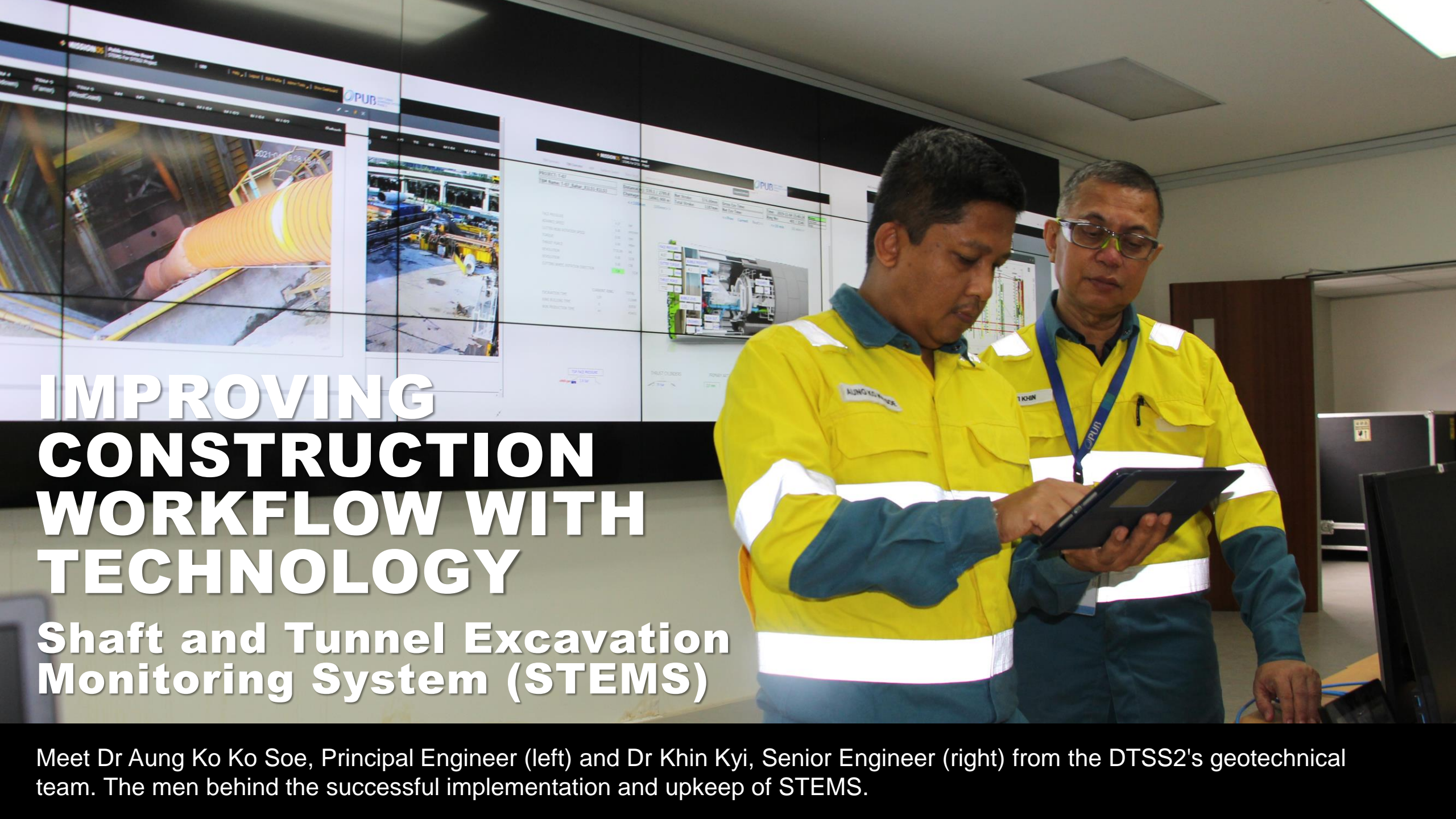
Nunthinee Sundaramurthi
Principal Engineer, PUB

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Can you share with us what's next for you on this project?

Given that this is a long-term project, we need to strike the right balance between designing early, which could leave us with an obsolete system, and delaying design, which could result in sub-optimal systems. Further complicating matters is that the project will be implemented through multiple contract packages to leverage on the industry's expertise. This means that the various systems would need to be implemented across different phases before being integrated together. This has been a challenging yet rewarding role.

One exciting initiative that we have in the pipeline for Tuas WRP is the integration of a robotic arm into our work process. We have identified the robotic arm as a suitable replacement for a laborious and repetitive task, hence freeing up plant personnel for higher value activities. It has been a pleasant surprise to see robots, which were once deemed futuristic, pervading our day-to-day life. I am excited to see what else is in store for the plant.



IMPROVING CONSTRUCTION WORKFLOW WITH TECHNOLOGY

Shaft and Tunnel Excavation Monitoring System (STEMS)

Meet Dr Aung Ko Ko Soe, Principal Engineer (left) and Dr Khin Kyi, Senior Engineer (right) from the DTSS2's geotechnical team. The men behind the successful implementation and upkeep of STEMS.

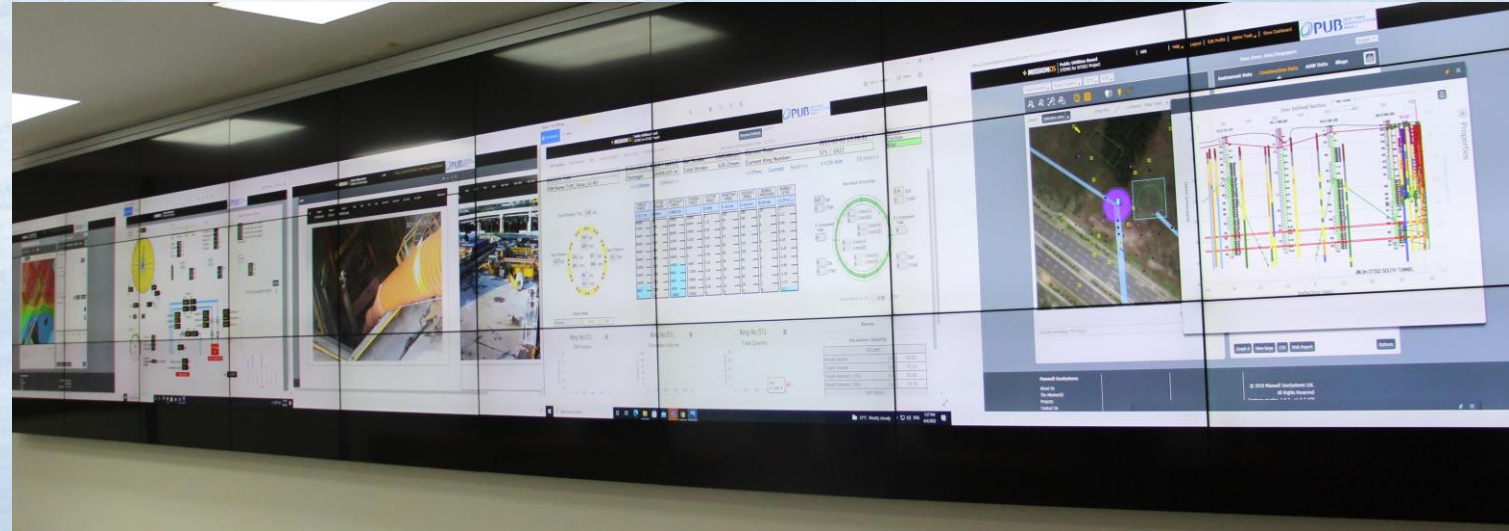
SHAFT AND TUNNEL EXCAVATION MONITORING SYSTEM (STEMS)

What is STEMS?

STEMS is a web-based integrated data management system which is designed to streamline continuous data flow from TBMs and pipe-jacking machines, and integrate with various other monitoring readings, soil investigation data and construction information. After processing, quality engineering data is delivered swiftly for analysis. The system also computes and presents detailed construction progress and completion status of every shaft excavation and TBM drive.

With STEMS, how does it enhance the working relationship between man and machine?

Dr Khin Kyi: With the help of STEMS, we reduced the manpower and time needed for the multi-data collation, combined analysis, and preparation on reports, etc. In addition, STEMS can perform some predictions, auto data auditing, and quarantine functions which can be useful for Engineers to carry out analysis and provides easy access to data precision and geotechnical interpretation.



How does STEMS solve pain points in a large construction project like DTSS 2?

Dr Aung: DTSS 2 construction is so extensive and a major portion of the tunnel alignment sits underneath the heavily utilized expressway corridor. Many of its excavation sites are located near existing structures which require close and efficient monitoring to ensure that works are carried out safely and inconveniences are minimized.

STEMS is able to integrate real-time and non-real-time monitoring data directly from their sources via a web server, thus delivering quality engineering data to users instantly in easily understandable formats for early risk identification.

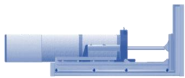
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