

# Masterplan of S'pore's underground spaces ready by next year

It will provide the first comprehensive look at subterranean spaces and their potential uses

**Ng Jun Sen**  
Political Correspondent

An underground masterplan that maps out Singapore's underground spaces and their potential uses is set to be unveiled next year.

It will be released as part of the next Master Plan guiding Singapore's development in the medium term, said Urban Redevelopment Authority (URA) chief planner Hwang Yu-Ning.

This subterranean masterplan will provide the first comprehensive look at what lies tens and hundreds of metres underground.

Ms Hwang said the URA is working towards having a more complete 3D map of the underground spaces and infrastructure here.

National Development Minister Lawrence Wong told The Straits Times that the Government has to take stock of what is underground, including pipes and power grids.

"We have to take stock and have a good database of information, and are compiling it as a central repository so we have a good basis plan," he said.

Then National Development Minister Khaw Boon Wan had raised the idea of a plan for Singapore's subterranean development in a blog post in September 2013.

Ms Hwang, who is also URA's acting deputy chief executive, cited underground oil storage as a way to use underground space and free up surface land for other uses.

Already, the Government has made the necessary legislative changes empowering it to acquire stratas of underground space under private land in 2015, paving the way for a future underground metropolis. The authorities also have to plan

for new items at the district and national levels.

Government agencies are already actively pursuing some ideas, including relocating common utilities found above ground, such as refuse systems and electrical substations, underground.

National water agency PUB is studying if underground water storage is viable on a large scale.

On Jurong Island, hazardous petrochemical materials are stored in the 130m-deep Jurong Rock Caverns, freeing up more than 60ha, or 84 football fields, of development space on the island.

But Jurong Island consists mostly of reclaimed and island land managed under a single agency. Bringing that scale of project to the mainland has far more complications.

Currently, details of what lies underground are known only to each relevant agency.

The Energy Market Authority, for example, keeps track of where its power grids are laid around the country, while PUB manages its own database of its water pipes.

When a developer tries to build underground, it can be difficult to figure out whether there is scope to do so as the information is spread out, said Institute of Real Estate Studies director Sing Tien Foo.

Said the National University of Singapore associate professor: "With more emphasis in future on building our infrastructure underground, it is critical for the developer, building consultants and the public to know and have access to this information."

While the URA intends for anyone to be able to see a complete map of what lies underneath, Ms Hwang noted that not everyone can access this information freely.

## Finding space for the future

To use our space more efficiently, the Government is looking to launch its Underground Master Plan in 2019. Here are some subterranean ideas that are being explored.

### Substations

Electrical substations, which are essential for providing electricity to estates, currently occupy small tracts of land at the ground level, even though they are connected to the underground cabling network. To save space, these can be housed underground, and can still be serviced through access points with a smaller footprint.

### Bus interchange

The new Bidadari housing estate will be home to Singapore's first underground air-conditioned bus interchange below Housing Board flats. Slated for completion by 2019, it will sit below a carpark and a garden, and will likely cater to five bus services.

### Road and rail networks

To enhance our living environments, future major road and rail networks, especially those that will cut through built-up areas, will be located underground. This reduces the impact of noise and dust on homes.

### Deep Tunnel Sewerage System

This is a network of tunnels that operates on gravity, and transports sewage and waste water across the island to two centralised water reclamation plants.

### Jurong Rock Caverns

The Jurong Rock Caverns under Jurong Island is for petrochemical storage. In phase one, its five caverns are as high as nine storeys, saving approximately 60ha of land.

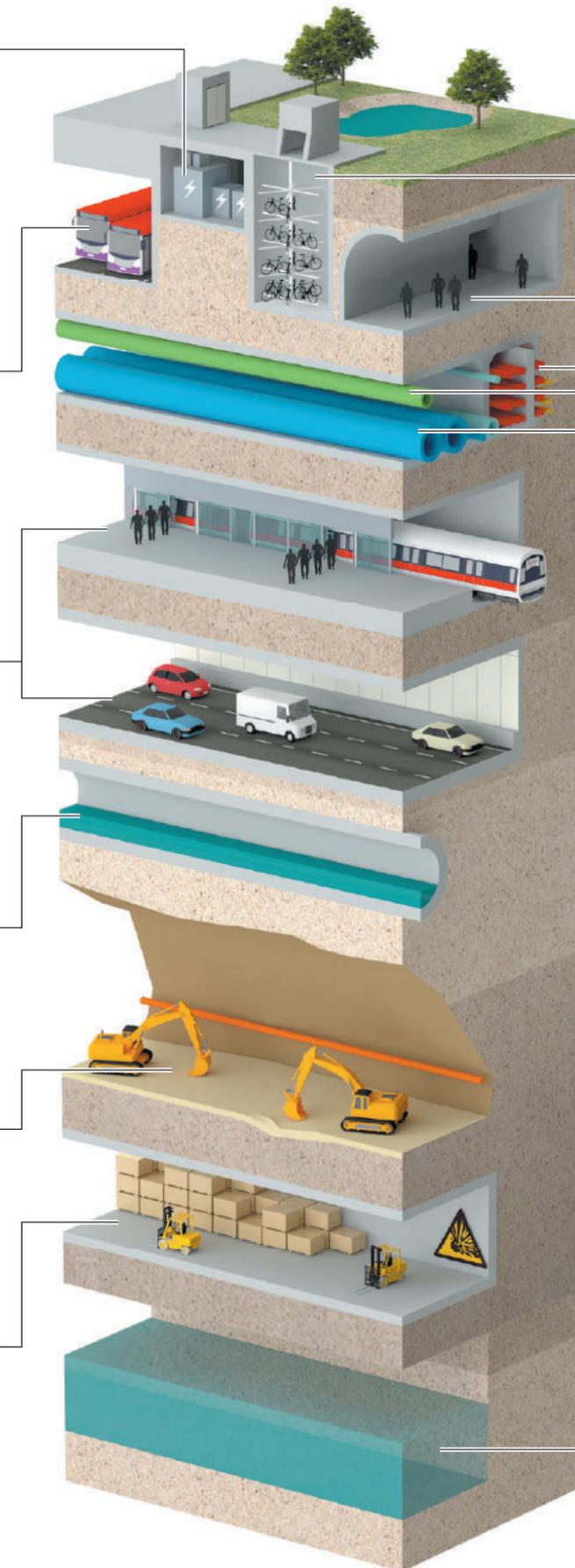
### Ammunition facility

The underground ammunition facility built under a quarry in Mandai in 2008 stores ammunition and explosives. It frees up land about half the size of Pasir Ris town.

NOTE: Illustration not drawn to scale

This is due to security concerns.

"If we share too much, we are concerned about the security threat of having unsavoury people use this information. We are still thinking how precise and how much information we want to make avail-



### SecureMyBike

In Admiralty, the Land Transport Authority completed the first automated underground bicycle parking space, known as SecureMyBike. Users can leave their bikes at kiosks located above ground, which then houses them in storage cells extending up to 10m underground.

### Pedestrian links

Underground pedestrian links make it easier to connect between buildings or cross busy streets. For a more extensive underground pedestrian network, the Urban Redevelopment Authority offers an incentive scheme to co-fund the construction of selected linkages in Orchard Road and the Central Business District.

### Common Services Tunnel

More than just space-saving measures, underground pipes are less prone to external wear and tear. The Common Services Tunnel in Marina Bay is a creative way of housing all utilities together. This frees up land, with lesser maintenance disruptions on the roads.

### Waste disposal

In housing estates, trash can be carried away to a centralised bin centre through a suction force via underground pipes, using pneumatic waste conveyance systems. Such a waste disposal network can be seen in an HDB estate in Yuhua, removing the need for refuse workers to manually collect waste from each block.

### Air-conditioning pipes

Chilled water used for air-conditioning could be supplied centrally through an underground network of pipes, known as a district cooling system. This is already done in Marina Bay, and the authorities are looking to implement them in the Punggol Digital District.

### Reservoirs

Water can be stored in underground reservoirs, with the national water agency PUB currently looking into an idea that can free up significant parcels of land for development. The 17 reservoirs currently occupy 3,700ha, or around 5 per cent of Singapore's total land.

Source: URA STRAITS TIMES GRAPHICS

able to the public," she said.

Mr Tony Khoo, president of the Singapore chapter of the International Facility Management Association, hailed the emphasis on underground utilities to save space, though he noted that they will be

far costlier than their terrestrial counterparts.

He also pointed out how an underground water pipe rupture today often leads to an entire stretch of road being dug up, disrupting traffic and residents. "This is why these

facilities must be designed for easy maintainability, with ample access points above ground, to make sure that they are really sustainable in the long term," said Mr Khoo.

ngjunsen@sph.com.sg