

# City Talk



The third airport runway is an example of an improved method of reclamation.

## LET'S NOT GO OFF THE DEEP END ON RECLAMATION

My last article on reclamation focused on historical developments here and the social need for it. To continue, let me describe some of its technical aspects.



### Nuts and bolts

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Starting with the simplest form, reclamation is done by tipping sand or gravel onto the seabed.

However, most seabeds are formed by deposits from rivers and streams, and the muddy seabed is soft and unstable.

Furthermore, previous indiscriminate dumping could involve toxic materials and heavy metals in the waste, which, when disturbed, could pollute seawater in the area, with disastrous consequences.

Engineers have therefore devised a variety of methods for safe reclamation.

The traditional method of tipping any rubbish and earth may be the cheapest method, but it has a few shortcomings.

It offers little control over what is tipped onto the seabed, as this could include materials that have different densities, and worse still, materials with toxic content.

Also, it will take a long time for the fill to settle and consolidate before the reclaimed land can be built on.

The site will also be susceptible to differential settlement, which may affect the stability of structures built on it.

An improvement on this direct tipping is by removing the marine deposit before filling.

This is obviously more effective from a structural perspective, as the filling material will be resting on more solid ground, but there is still a danger of contamination when marine deposits are disturbed.

Dredging them is prohibited in light of knowledge of the threat to sea creatures, and this method can only be applied when it is quite certain that the marine deposits are harmless to their surroundings.

A much improved method presently used is called controlled fill replacement.

A layer of inert soil is used to cover the marine deposit to ensure that it cannot be

disturbed, before further tipping activities would be allowed. This ensures minimal pollution.

But as the marine deposits have a far lower density than the tipping materials due to the large water content, vertical drains need to be formed to speed up the consolidation process.

Such a reclamation method usually takes about 10 years to settle – though with the additional provision of vertical drains, we may be able to reduce this time frame to about three years.

A further improved method, as used in the third runway of our airport, is by capping the marine deposits with an inert earth layer first.

Cement is then slowly injected into the mud, forming clusters to increase stiffness.

This is known as deep cement mixing.

The much enhanced stiffness ensures a strong foundation for structures to be built on, and minimizes undue disturbances to marine deposits that may be contaminated.

It allows a quicker construction process, but involves higher construction costs. However, in the interests of preventing pollution and shortening the construction period, it would still be the most efficient and reliable way to reclaim land involving contaminated soil.

Sound engineering design and construction methods ensure that we can create land for our essential needs, while protecting the environment.

We must live and let live, and maintain a necessary balance of needs and protection for humans and flora and fauna, for, like us, they do have the right to exist in this world.

Veteran engineer Edmund Leung Kwong-ho casts an expert eye over Hong Kong's iconic infrastructure