

COMPANY

Water Supplies Department, HKSAR Government

PROJECT

Improvement of water supply to Sheung Shui and Fanling

LOCATION

Sheung Shui and Fanling, New Territories, Hong Kong

TYPE

Water Supply

SCHEDULED TIME OF COMPLETION

2020

BIM Helps New Reservoir Blend With the Landscape



水務署

Water Supplies Department

About Water Supplies Department, HKSAR Government

Water Supplies Department (WSD) is responsible for supplying fresh water and seawater (for flushing) for consumption by Hong Kong's population of 7.3 million for domestic and non-domestic use. In 2015, the WSD supplied 973 million cubic metres (Mm³) of fresh water. In the same year, WSD supplied 274 Mm³ of seawater for flushing. As of March 2016, WSD administered 2.91 million water accounts.

The Project

In order to cope with the increasing water demand within the Sheung Shui and Fanling supply zone and to enhance the reliability of water supply to the areas, a new service reservoir with a storage capacity of 24 000 cubic metres and associated water mains must be constructed. The proposed works also require laying about 4.2 Kilometres of fresh water mains, with the diameter ranging from 100 millimetres (mm) to 700mm. The project is our first in-house project adopting BIM workflow without any assistance from BIM consultants.

The Challenges

In Hong Kong, designing alignments of large-diameter water mains to fit in the limited underground space available without conflicting with the existing facilities is always a big challenge. Traditionally, we only prepare 2D alignment plans and longitudinal profiles for the water mains. We have difficulties in identifying clashes with congested and unorganised utilities, especially at the chambers, by making reference to just lines and levels.

The proposed service reservoir is in the vicinity of burial grounds. During a public consultation, local villagers and District Council members raised their concerns regarding fung shui and visual impact arising from the proposed service reservoir.

The Solution

In designing the proposed water mains, we used Civil3D to build BIM models for the existing utilities, including water mains. Through adopting Civil3D and Navisworks in this project, we migrated from 2D into the more reliable 3D design, which helps identify clashes that are not easily visualised in the 2D environment.

In the proposed service reservoir design, we can easily present the advantages of our proposed option over the alternatives by using Civil3D. Together with the powerful functions of InfraWorks and 3ds Max in 3D visualisation and presentation, we have successfully convinced stakeholders that the proposed landscaping works can make the service reservoir blend in with the terrain, resulting in insignificant fung shui impact.

The Benefits

We note time savings during the design stage in the following:

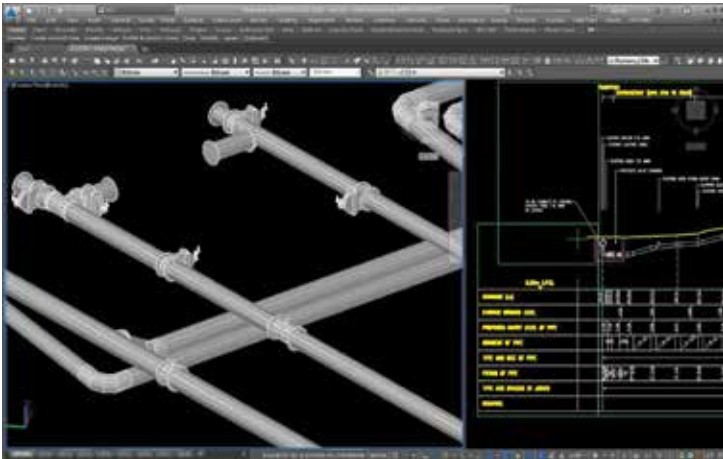
- (a) Parametric model of the proposed service reservoir enables rapid evaluation of different options;
- (b) Automatic updating of the 2D drawings (contract drawings) for any changes in the 3D model;
- (c) Errors or clashes can be easily identified via 3D visualisation, thereby saving time in case of design changes and the time wasted for abortive works or re-works during construction;
- (d) 3D simulation for project presentation enables prompt achievement of public consensus;
- (e) Effective communication and collaboration between various stakeholders expedites problem solving; and
- (f) Automatic regeneration of longitudinal profiles and update of chainage for any changes in the alignments of water mains.

Better with BIM

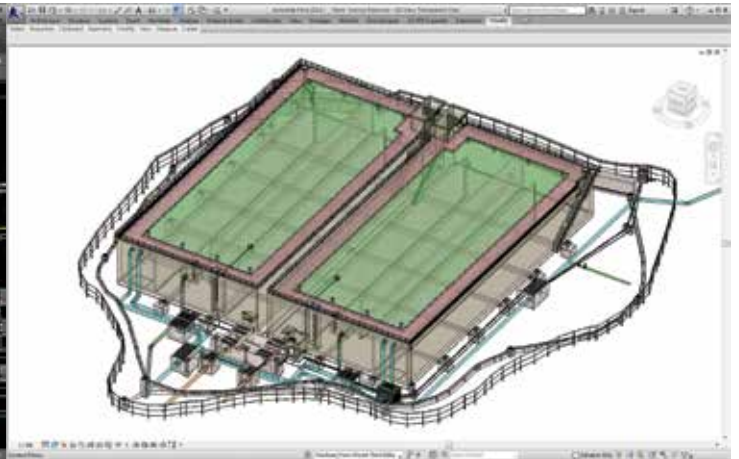
We are exploring options for automating the design process, for shorter processing times and reduction of errors for each design change. For example, we are examining the feasibility of exporting the BIM model for structural analysis, and software for taking off and preparation of bills of quantities. Our ultimate goal is to create a workflow in which the structural analysis, taking off and bills of quantities can be automatically updated in response to any changes in the BIM model.



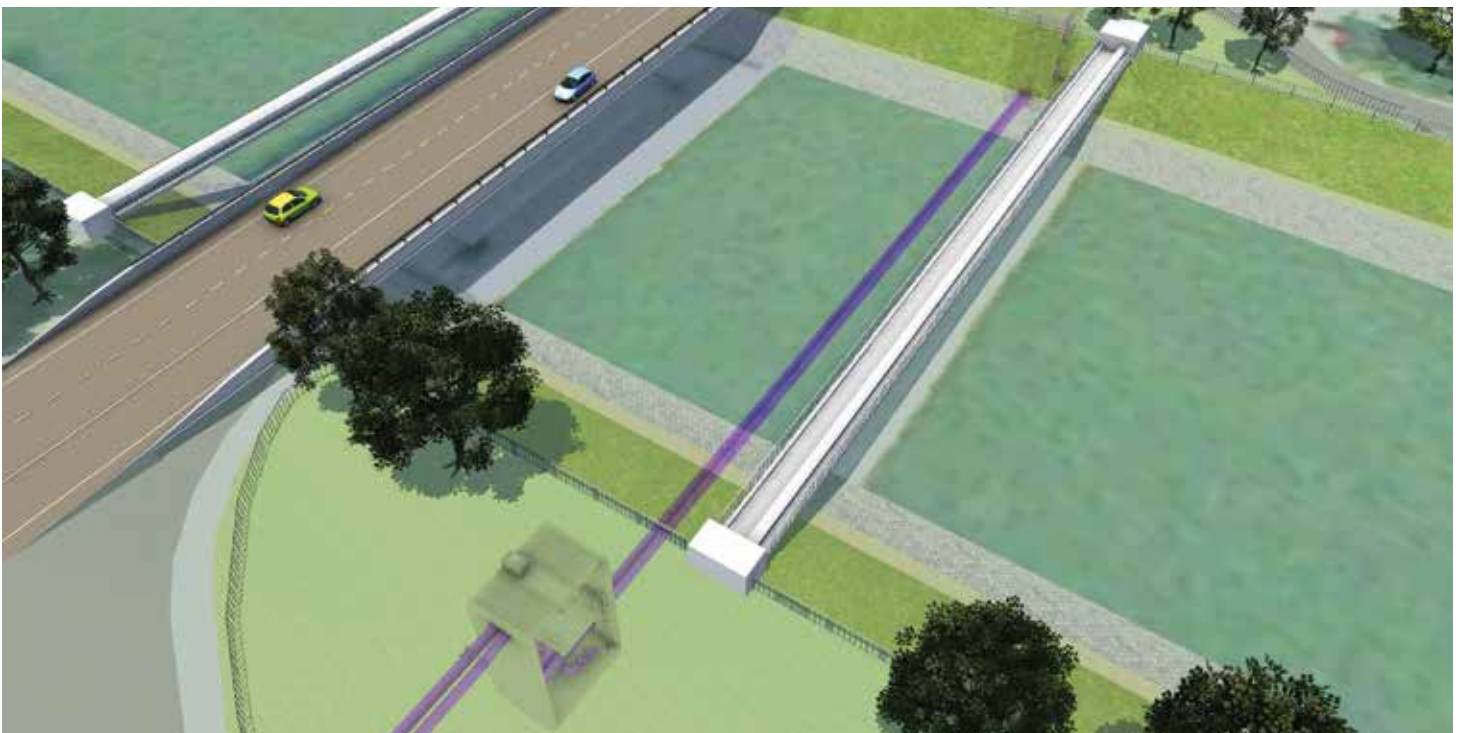
Proposed Table Hill No.2 Fresh Water Service Reservoir
Image courtesy of Water Supplies Department, HKSAR Government



Longitudinal Profile of Proposed Water Mains
Image courtesy of Water Supplies Department, HKSAR Government



Proposed Table No.2 Fresh Water Service Reservoir
Image courtesy of Water Supplies Department, HKSAR Government



Proposed Pipe Jacking across Ng Tung River
Image courtesy of Water Supplies Department, HKSAR Government