
CASE STUDY:

Hamilton City Council Wastewater Treatment Plant





WHAT IS BIM?

Building Information Modelling (BIM) is a digital representation of the physical and functional characteristics of a built asset – everything from bridges to buildings. A building information model is a shared knowledge resource for information about a facility, forming a reliable basis for decisions during its life-cycle; defined as existing from earliest conception to demolition.

The key principle is that BIM is not any single act or process. It is not creating a 3D model in isolation from others or utilising computer-based fabrication. It involves being aware of the information needs of others as you undertake your part of the process.

Smartening up asset management

Tech wizardry adds new dimensions to asset information model for Hamilton City Council's wastewater treatment plant

Wastewater treatment plants aren't heralded for their aesthetic appeal. But that doesn't mean the people tasked with their management can't work with a rich multi-dimensional picture of their assets.

Hamilton City Council is adding new brush strokes to the art of asset modelling, using drones to capture site-wide geometry, laser scanners for building and asset geometry, and mobile devices linking virtual objects to barcoded assets.

By today's industry standards, buildings conceived and built in the pre-digital age, when designers used pens and tracing paper, might be considered old. And while buildings of that era occasionally possess magical qualities, they're usually a headache to manage, because important asset information lays buried in legacy systems or under stacks of paper. But as much as scratchy data defines the gap between today's BIM processes and asset management practices of old, a new wave of digital wizardry is bringing old buildings and their management into the modern age.

The council's Pukete Wastewater Treatment Plant was built in 1975, with a \$28m upgrade in 2002 providing secondary and tertiary treatment.

Parvati Patel, an asset engineer in the City Waters team, was on a mission to modernise the facility's asset information. However, a lack of as-built information, uncertain accuracy of existing data, and time consuming location of asset information for new works and maintenance made her job harder.

"BIM is often discussed for new builds and assets, but in reality the majority of asset owners own many more assets than they build each year. If we can leverage BIM technologies to operate and maintain existing assets we will capture far more value in the long run."

GLENN JOWETT, SENIOR ASSOCIATE – BIM DELIVERY LEAD, BECA

PROJECT DETAILS

DURATION

2017 – ongoing.
BIM processes spearhead the council’s move to more advanced asset management practices for the Pukete Wastewater Treatment Plant.

PROJECT PARTNERS

Beca



BIM USES

The New Zealand BIM Handbook Appendix D defines 21 distinct BIM Uses. For this project the primary BIM Uses include:

- Record modelling**
- Asset management**
- Building maintenance scheduling**
- Building systems analysis**

The council’s decision to adopt more advanced asset management practices turned the spotlight on processes for collecting and centralising data, with a view to dynamic information modelling. The move addressed immediate concerns relating to the risk of contractors digging up services, health and safety, and potentially expensive design rework when assets were located in places that no one expected to find them.

“We need to know what we have, how to maintain it, and what it will cost to keep it running,” said Patel. “We must have good information.” With an eye to the future, Patel and partner Beca scoped out a BIM framework to develop a data model that would ultimately integrate with the council’s asset management system.

The process

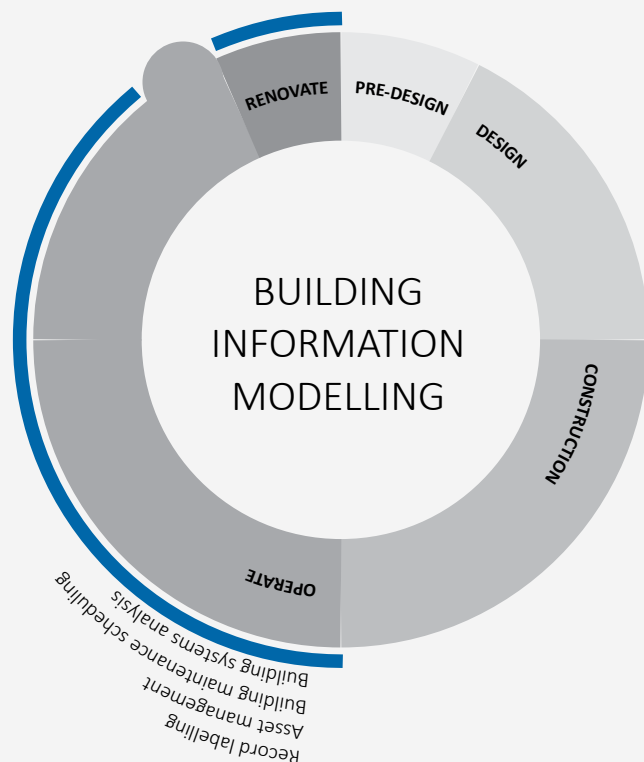
Pushing aside 2D drawings, the project team launched a drone to scan the entire plant site producing a photo-realistic 3D point cloud of hard surfaces, including building shells and ground features. Next came process areas inside buildings. Here, the survey team used Lidar (light detection and ranging) laser scanning to generate a 3D point cloud of building interiors and assets. Combining point clouds with modelling software led to the creation of a detailed model of the aeration blower, RAS, and MCC rooms, including plant and equipment, and building shell architecture.

WHAT IS A BIM USE?

“BIM Use – a unique task or procedure on a project which can benefit from the application and integration of BIM into that process.”

THE NEW ZEALAND BIM HANDBOOK.

THIS CASE STUDY HIGHLIGHTS THE VALUE OF USING BIM IN THE OPERATION AND RENOVATION STAGES OF THE PROJECT LIFE CYCLE.



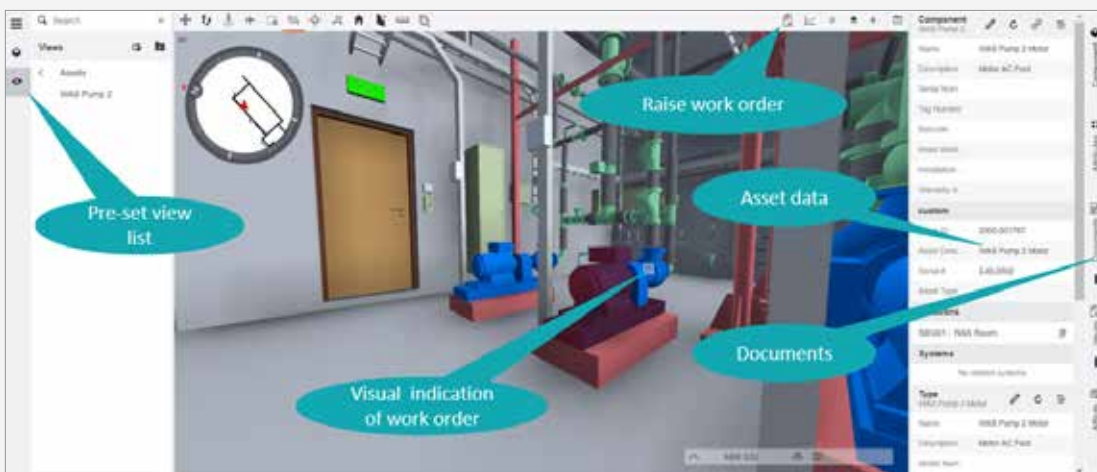
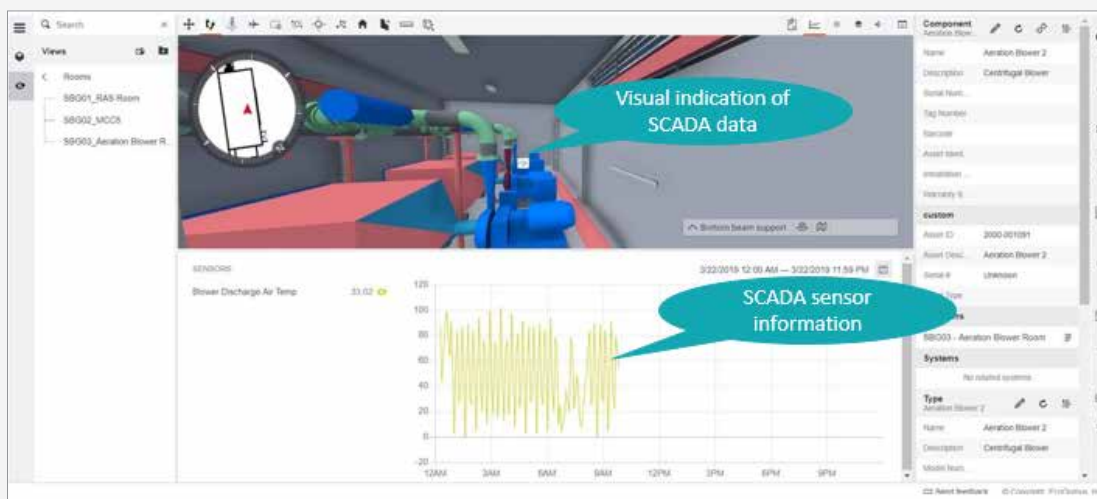
Migrating the model to a cloud-based building lifecycle management platform set the scene for the addition of data, with key asset data fields attributed to elements within the model. Operation and maintenance information, including process and instrumentation diagrams, process flow diagrams, operations manuals, and warranties, were attached to the model, centralising asset information to create a single source of ‘truth’ for operation and maintenance activities.

And in a move to bridge reality with virtual worlds of 3D modelling, BIM technicians linked existing barcodes on plantroom equipment to profiles embedded in the model. Now, contractors onsite have the opportunity to use a barcode scanning app on their tablets to confirm they’re working on the correct piece of equipment.

Challenges and constraints

Information about a ‘living’ asset constantly evolves. For example, the make, model, and serial number of a pump will be known and uploaded to the model, but developments such as recent repairs or maintenance can be overlooked. As council buildings and assets age, asset managers must maintain a watching brief to keep the model up-to-date.

Ultimately, the model will integrate with the council’s asset management database and financial systems, with the cloud-based lifecycle BIM platform automating the flow of information between the model and supporting applications.



Results and benefits

At the broadest level, the council's BIM model is a platform for digital asset management, providing functions to visualise and interrogate more detailed information about its assets.

Managing contractors will soon be recast as an exact science, with the 3D model confirming the identity of equipment, its location, and important asset data – before works starts. The model also serves as a tool to run contractor safety inductions.

Consultants undertaking design work benefit from a clearer picture of related elements, working with detailed information about ground slope, surface areas, and the position of connecting assets. Whereas 2D models put designers in the ballpark, 3D models show everything in 360 degree glory, identifying clashes with other assets or, for example, if a pipe will fit into a wall space.

“To say that we've got these assets, with these attributes, and all the information is linked to the correct asset onsite, is great – it removes confusion,” said Patel. “Aggregating this kind of information in a visual format makes it easy to access and cross reference – and much simpler for people to find what they need.”

Along the way the council has also notched up a few unexpected wins. When rain washed away spray-paint marks indicating ground penetration work, a quick review of imaging captured by the drone put everyone back in the picture. And when a contractor removed a mound of earth dug from a trench, imaging put an exact figure on the volume of earth, helping verify removal costs.

The pace of work has also picked up, now that everyone is working with reliable information – and the days of collecting new survey data at the beginning of each new project are over.

Cost considerations

Patel said the case for developing a BIM model focused on non-financial benefits, including a better way to manage assets, with more informed maintenance and less design rework.

Nevertheless, the model was developed with costs in mind, which helped put boundaries to the scope of its development.

“Costs associated with developing the model should be proportionate to client needs,” said Glenn Jowett, senior associate and BIM delivery lead at Beca.





“You’ve got to understand why you’re developing something and what it will be used for. Why document every nut and bolt in steel work when all you need to know is what’s there and its position?”

He said that despite misconceptions about BIM’s applicability to existing assets, the project demonstrated the value of digitising and centralising asset information using BIM.

“BIM is often discussed for new builds and assets, but in reality the majority of asset owners own many more assets than they build each year,” said Jowett. “If you can leverage BIM technologies to operate and maintain existing assets you will capture far more value in the long run.”

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