SITECH

CASE STUDY

GREENVALE RESERVOIR

Adopting model-based engineering at the beginning of a complex dam upgrade helps Thiess to eliminate rework and significantly increase productivity.

THE PROJECT

The Greenvale Dam, 20 kilometres outside of Melbourne city, was built in 1971 to supply Melbourne's Northern and Western suburbs with water. Currently, Greenvale is Melbourne's most urbanised large dam with residential development on three sides. Given the growth in the area surrounding the dam, a risk assessment was carried out in 2009 and showed that remedial work needed to be done to bring the dam into line with modern safety guidelines. As a result, in 2014 Melbourne Water contracted Thiess to manage a major upgrade to ensure the sustainability of the dam and ongoing public safety.

The project involved first strengthening the existing reservoir walls by installing new filter zones and earth fill on the downstream embankment. Next the team had to extract 200,000 cubic metres of material for stockpiling, infill 160,000 tonnes of sand into excavated trenches and place this against the final trimmed batters. All the material then needed to be compacted into layers forming different zones.

If you want everything to work completely seamlessly on a site like this, the data is what will bring it all together.

Greg Shepherd, *Data Services, SITECH CS*

THE CHALLENGE

The nature of the site was particularly challenging – limited space, steep batters and multiple machines on the site. As always, health and safety was paramount, which meant that, if surveyors and engineers were to be out on the site, operations would have been stopping and starting constantly.

Garry Plautz, General Superintendant for the project, says, "There was no room to move. Traditional methods would have seen pegs everywhere but you couldn't have had pegs out there if you wanted to, the machine operators would have run all over them."

"It would have also been a huge health and safety hazard to have people out in the vicinity of large plant. If someone had to go out and measure the batter, they'd have stepped out into an area with a lot of machinery; it just wasn't going to work."

With all the machines on site already fitted out with 3D Machine control, the team was part of the way there. But, to reduce the need for people on the ground, the team needed 3D models of the site to drive the activity of the machines directly from the office.

THE SOLUTION

A long working relationship with Greg Shepherd, Head of the Data Services team at SITECH Construction Systems (CS), saw Garry ask for his advice. SITECH's recommendation was to use Business Centre – Heavy Construction Edition (TBC-HCE) software from Trimble to build surface models of the entire site.

Greg Shepherd says: "If you want everything to work completely seamlessly on a site like this, the data is what will bring it all together. Engineers build their plans in sections but they aren't sewn together across the whole site, so there can be clashes and inconsistencies when it all comes together. If these are the plans that guide the construction, when a clash comes up, everything has to stop and things need to be recalculated before the team can keep going."

"With BC-HCE, we can take the engineering data and build a 3D constructible model and the software will tell you straight away if there are clashes in the data. We're doing all of this before the project even starts so there is no stopping and starting. Once the constructible model is built and approved by design engineers, this is fed directly into the machine which just does what the model tells it to do. There's no error."

"The other thing you can do is load 'avoidance zones' into the model like gas pipes, fibre optic cables, even culturally significant zones. If the machine is operating off the plan, as soon as it goes close to one of these zones an alarm will go off and let the operator know what's there."

SITECH CS was awarded the contract and got to work at Greenvale Reservoir. The first step in the workflow was to carry out an initial site survey. This information was given to the SITECH team to build 47 individual, complex surface models using BC-HCE software from Trimble.

Once the models were built ,they were loaded directly from the office into the technology on the machines so the operators were able to see exactly what they needed to do and their position relative to the design. The models out of BC-HCE built by SITECH CS were able to work seamlessly with the other non-Trimble technology on the site.

THE OUTCOME

Garry says, "Engaging the SITECH CS team early in the project to develop a 3D constructible model meant that, by the time we started, we knew we had the plan right and we wouldn't need to stop and start throughout the project to rework it. Throughout the project we were also able to instantly calculate a cost-to-complete the project earthworks. We did this using Trimble's VisionLink software and a grader installed with Trimble 3D machine control."

Garry continues, "For both the client and the project team, the biggest benefit was to health and safety. With so many machines in such a small space, to have people out on site doing things manually would have been very dangerous. Everyone would have had to go through rigorous training and machines would have had to stop every time someone was in the vicinity. It would have been incredibly disruptive.

"Because we were able to continue work without interrupting the machines, we were also able to deliver the job months ahead of schedule and with cost savings."

Melbourne Water have been so impressed with the health and safety aspects of the project, Garry was asked to present at their annual conference about the technology innovations on the project.

The complete Trimble Connected Site