Brisbane City Council

Peter Murray
Senior Engineering Surveyor

PROJECT OWNERS:

- Brisbane City Council

PROJECT DATE: 2011

SCOPE:

To analyse the surface after the 2011 floods in Brisbane, to better understand the impacts of any future flooding
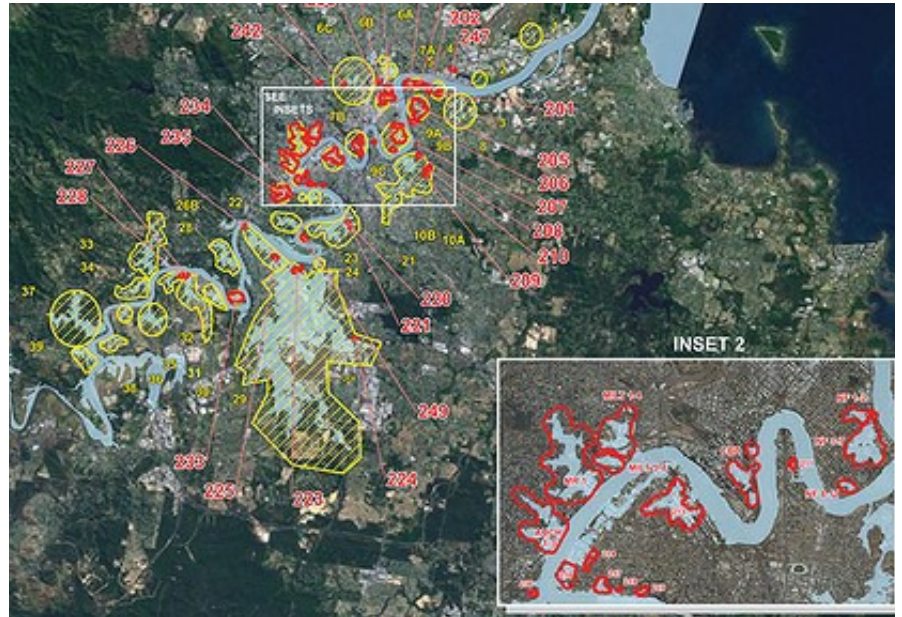
12d DIMENSIONS:

- Land Development, Surveying

Project Summary

Following the January 2011 flood in Brisbane, there was a need to create a surface of the flood. This was needed to try and explain the behaviour of the flood and to inform the Council for future planning.

For more information

To find out more about how you can create better designs faster with the 12d Model solution for civil engineering design, visit www.12d.com.

Americas: Vancouver
E: americas.sales@12d.com
P: +1 206 905 1464

Australasia: Sydney
P: sales@12d.com
M: +61 2 9970 7117

Europe: London
E: sales@12d.co.uk
P: +44 845 051 0372

Flood Surface Construction

Brisbane 2011

Image Source: Brisbane City Council

The Challenge

More than 100 surveyed levels were taken of the maximum flood height along the extent of the river. The intent was to apply these heights to the 'centreline' of the river to produce a profile. Heights would then be able to be interpolated between the surveyed levels.

When the profile was produced, the profile did not fall as expected from upstream to downstream and generally did not look 'right'. There were areas where the downstream levels were higher than upstream. Initially, survey errors were suspected. The errors that could have arisen were from mistaken identification of the flood height or basic surveying errors. Problems with the surveyed levels were eliminated. The problem was how to explain the obvious inconsistencies and produce a rational flood surface.

The Solution

After analysing the survey information and discussing potential solutions with hydraulic engineers, it was determined that the best option was to attempt to model the super-elevation effect that occurs when the faster moving water on the outside of a bend is higher than the slower moving water on the inside of the bend. The water is assumed to be 'level' outside the banks of the river.

To test the proposition, strings were digitised along each bank of the river, and the surveyed levels were applied to the end of the strings and the string graded. Initial trials proved to be encouraging but the number of surveyed points did not give a satisfactory result. The solution was to use LiDAR data and the Nearmap image taken within 24 hours of the flood peak. From the image it was possible to see the flood extent and at these locations, ground elevations were extracted from the LiDAR data to supplement the surveyed levels. This solution proved to be satisfactory.

Once the bank strings were created and graded, they were paralleled out until they were outside the extent of the flood. Creeks and gullies were enclosed by a string and graded from start to end.

Result

These strings were tinned and the resulting contours reflected the super-elevation effect. The flood surface tin was intersected with the terrain surface created from LiDAR data to produce an extent of the peak flood level. The correlation between the extent of the peak flood level and the Nearmap image particularly in areas where there were no surveyed levels or levels extracted from LiDAR confirmed the value of the process.

The ability to use the modelling tools within 12d Model to develop a tin which was not created by direct measurement such as survey or by rules such as a road design was invaluable to this project.

12d° Model

Roads and Highways

12d Model's design option is the smarter solution for the design, modification and maintenance of Road and Highway projects.

Enjoy advanced 3D tools to design local and major roads, intersections, roundabouts, highways, interchanges and much more.

Ports and Dredging

12d Model is the solution for port infrastructure and dredging, easily managing the very large datasets and complex volume calculations often required by these projects.

A complete range of flexible and customisable volume calculation tools allow teams to extract and present the information quickly and easily.

Land Development

12d Model is the most versatile solution for the creation of sustainable land development projects, including residential, commercial and industrial developments, recreational areas, landfills, and agriculture projects.

Easily manage all aspects of your land development project from earthwork quantities, road design utilities and drainage design.

Airport Infrastructure

12d Model provides a solution for the design, construction and analysis of new airports, as well as the upgrade and maintenance of existing runways and airport infrastructure.

Easily manage large airport infrastructure projects and share data across multi-disciplinary teams.

Rail

12d Track has been specifically designed for the survey, design and construction of light, heavy and high speed rail projects.

Extensive railway tools in 12d Track allow the rail designer to quickly and easily design their projects. These options are built on the existing 3D modelling and design tools available in 12d Model.

Mining Infrastructure

12d Model's powerful set of exploration, site investigation, survey and analysis tools are crucial for the initial design, construction and ongoing operation of mining projects.

Comprehensive tools for the survey, design and construction of access roads, railways, earthworks and services allow for the coordinated design and management of mining infrastructure from within 12d Model.

Drainage, Sewer and Utilities

12d Model provides comprehensive tools for the design, analysis and optimisation of stormwater and sewer projects using rational, dynamic (hydrograph) and 2d drainage methods.

Powerful clash detection management allows for efficient 3D modelling of service networks such as gas, electricity, telecommunications and water prior to construction.

Surveying

12d Model is a complete surveying package providing the tools to manage all facets of surveyed data including LIDAR, topographical, as-built, conformance, traversing, geodetics, data mapping, labelling and much more.

The 12d Field option runs on a ruggedized tablet and gives the user access to full 12d Model functionality, allowing you to take the entire project into the field with the most comprehensive pick-up and set-out tools.

Oil and Gas

12d Model assists with the design, construction and mapping of oil and gas pipelines, original site exploration and the wide range of infrastructure required for oil and gas projects.

Accurate 3D modelling and the ability to share data between users allow teams to quickly and easily coordinate designs.

Construction

12d Model is the ultimate software for construction with powerful set-out options, direct interfaces to machine control and detailed conformance reporting and auditing.

Manage 3D data and control volumes, quantities and progress claims with 12d Model. Set-out your project and undertake conformance and as-built surveys live on-site using 12d Field.
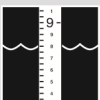
Rivers, Dams and Hydrology

12d Model handles very large datasets and interfaces with a wide range of analysis packages, making it perfect for flood studies and the management of rivers and dams.

12d has partnered with industry leading analysis software, allowing users to apply 2D drainage analysis from within 12d Model.

Environmental

12d Model's ability to handle very large datasets combined with flexible and comprehensive 3D analysis and modeling tools make it perfect for a wide variety of environmental projects.

Existing workflows can adopt 12d Model easily as it allows users to directly interface with GIS systems and most software packages and file formats.

Why Choose 12d?

- Powerful data processing & intelligent functionality.
- Modular, easy to update & completely customisable.
- Seamless integration with major industry software and hardware.
- Used in over 55 countries worldwide.
- Friendly support & training from industry experts.

AMERICAS: Vancouver
E Americas.sales@12d.com
P +1 206 905 1464

AUSTRALASIA: Sydney
E sales@12d.com
P +61 2 9970 7117

EUROPE: London
E sales@12d.co.uk
P +44 845 051 0372

12d Model