CASE STUDY

Ballarat Airport

Infrastructure Upgrade

Bonacci Group Pty Ltd
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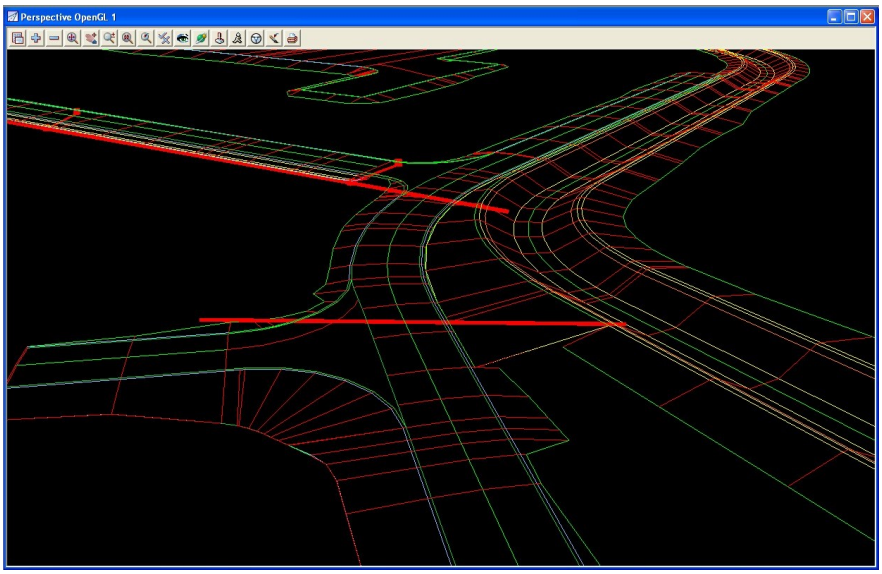
CLIENT: City of Ballarat

SCOPE:

Hydraulic analysis in order to resolve historical overland flooding of airport operations.

12d DIMENSIONS:

- Hydraulics



Road and channel interface

Project Summary

The Ballarat Airport Infrastructure Upgrade Project involved hydraulic analysis to resolve historical overland flooding of airport operations. This study formed the basis of the civil design response, with a view to providing protection during a 1in100 Year storm event. Civil design involved liaison with Airport planning authorities and agreement on the pavement make-up for both aircraft and vehicles. It was critical to create a new hardstand in a previously flood-prone part of the Airport, and as a consequence 'value add' to the overall Airport facility.

Background

The Airport is home to several flight training schools and is also used for such things as fire and medical services, aerial agriculture, charter services, recreational flying, aircraft maintenance. The Infrastructure Upgrade project consisted of detail design and costing of the following elements:

- 450m of Access Road
- 2 Road Intersections
- 1 Court head
- 850 m^2 of Carpark
- 750 m^2 of Building Pad
- 1.6 ha of Apron and taxiway
- 1.3 ha of Retarding Basin
- 700m of Floodway Main Channel
- Construction of embankment at the perimeter of retarding basin and the main channel to accommodate
  - ⇒ 200mm freeboard
  - ⇒ 516m of Permanent Swale
  - ⇒ 320m of Pipe Drain

Challenges

- Interfacing with upstream and downstream components of the main channel and the access road
- Retarding Basin with a pilot channel design at fixed Reduced Level (RL)

The Solution

The main channel and the access road were designed first, then separate TINs created. After that, modifiers such as fixed fall to strings, width to strings, fixed fall to TINs, *etc*. were used from Access Road to Main Channel and vice versa, to model the interface. This aspect was also challenging, in that both surfaces and strings (Access Road and Main Channel) were used against each other to create an 'optimised' model.

A TIN was created with the design fixed RL. The pilot channel was modelled. Modifiers were used to interface with fixed RL tin. Because of curvilinear pilot channel geometry, strings were intersected at the concave side of the curve. 12d Model has the flexibility to perform tasks automatically and in circumstances as described above, strings can be drawn manually at desired interval, grades, height, *etc.*

Result

Detailed design of all the above elements using 12d documentation, and finalising schedule of quantities within a 4-week program, was achieved. The use of 12d Model software enabled all deliverables to be met with accuracy. Another remarkable aspect was the ability to provide a 3D model to the civil contractor and the Airport authority and not have a single construction issue arise.

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.

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12d Model

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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.

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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?

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- **Used in over 55 countries worldwide.**
- **Friendly support & training from industry experts.**

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