

CLIENT: Major Projects

SCOPE:

Produce information suitable for the land resumption process, which required plans for the Notices of Intention to Resume and final survey plans for registration and title transfer.

12d DIMENSIONS:

- Customisation

# CLEM7 and Legacy Way

## Volumetric Land Resumption



## Project Summary

This 12d Model component here outlined was used across three major tunnelling projects - CLEM7, Legacy Way, and (to a lesser extent) the early stages of the Airport Link. The requirement was to produce information suitable for the land resumption process, which required plans for the Notices of Intention to Resume as well as final survey plans for registration and title transfer.

## The Challenge

Problems faced included the calculation of hundreds of volumetric resumption lots for major road tunnels. CLEM7 had approximately 330 volumetric resumptions, and Legacy Way had approximately 420 volumetric resumptions.

The acquisition of the volumetric parcels had to be achieved so that the tunnel constructors had access to construct the tunnel, and the tunnel operators could be granted title to the tunnel to satisfy their bankers and be able to charge a toll. There was considerable risk to the Brisbane City Council if access to the land was not available for the constructors, and/or if the operators could not be given a lease at the completion of construction.

The information required included the xyz locations, bearings and distances; volumes, areas, surface levels; and average depths of the volumetric parcels.

There was a risk that for various reasons the calculations may have to be repeated and plans redrawn.

The team needed a consistent process that was applied to all land parcels, and was repeatable.

At the very least, they needed results that would be defensible and reproducible.

Several survey suppliers were engaged to draft the plans, so it was necessary to be able to manage the files so they could be processed collectively and

## 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](http://www.12d.com).



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separated so the relevant information could be distributed to the relevant supplier.

## The Solution

The problem was solved by the writing a macro (approximately 2500–3000 lines of code) to calculate the intersections of the tunnel resumption envelope with the surface cadastral lots. The surface cadastre was surveyed, reinstated and connected to the coordinate system that was used for the tunnel construction. This macro could calculate all the information necessary to produce survey plans of each lot along the entire length of a tunnel in minutes. The macro calculates the information for an individual volumetric resumption as a 12d model and produces a summary report of all the parcels calculated and an individual report for each parcel.

It was necessary to relate the volumetric resumption lots to the surface terrain to calculate depths to the volumetric lot. This was achieved by using a surface TIN created from LiDAR data.

The resumption calculation macro was supported by other macros to load the surveyed cadastral parcels, check the parcels for overlap or gaps and to load and check attribute information. Output of .12da files and 3D .dwg files was done using a 'bulk' writer macro to manage the writing of the data to sub folders for each survey plan supplier.

The macro proved its worth when the volumetric land requirements were delivered well before the due dates.

The flexibility provided by the macro was demonstrated when one of the projects changed the resumption requirements after one set of calculations had been completed, and the process had to be redone and the information issued a second time. The recalculation caused minimum delay to the project.

A by-product of the process was the ability to graphically track the progress of the supply of plans.

Using the attributes it was quite easy to colour code plans by their status, e.g. 'no plan', 'proposal plan commissioned', 'proposal plan delivered', 'survey plan commissioned', 'survey plan delivered'.

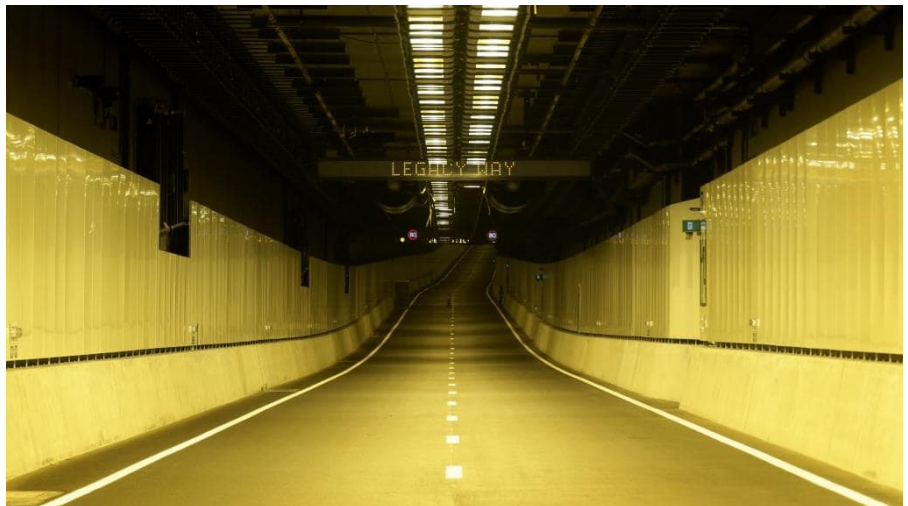


Image source: The Courier Mail

## Result

The innovation demonstrated in these projects allowed the team to combine the functionality of 12d Model (such as TIN manipulation, string manipulation, volume calculation, database manipulation, macro coding *etc.*), to produce a result that does not fit into the standard range of 12d outputs and make their work on these projects much easier.





### 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.

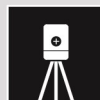
Comprehensive tools for the survey, design and construction of access roads, railways, earthworks and services allow for the coordinated design and management of mining infrastructure from within 12d Model.



### 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.

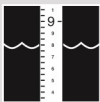
Accurate 3D modelling and the ability to share data between users allow teams to quickly and easily coordinate designs.



### 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.**

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