

Hornsby Shire Council

Hornsby Quarry

12d DIMENSIONS:

- Design



Project Summary

In early 2001, Hornsby Shire Council took ownership of Hornsby Quarry following its closure by Boral, creating a need to decide what to do with the space. In 2014, the NSW State Government announced the construction of the M1 tunnel extension (NorthConnex) linking the M1 to the M2, and this provided Council with an opportunity to fill the quarry with clean material and create a recreational facility.

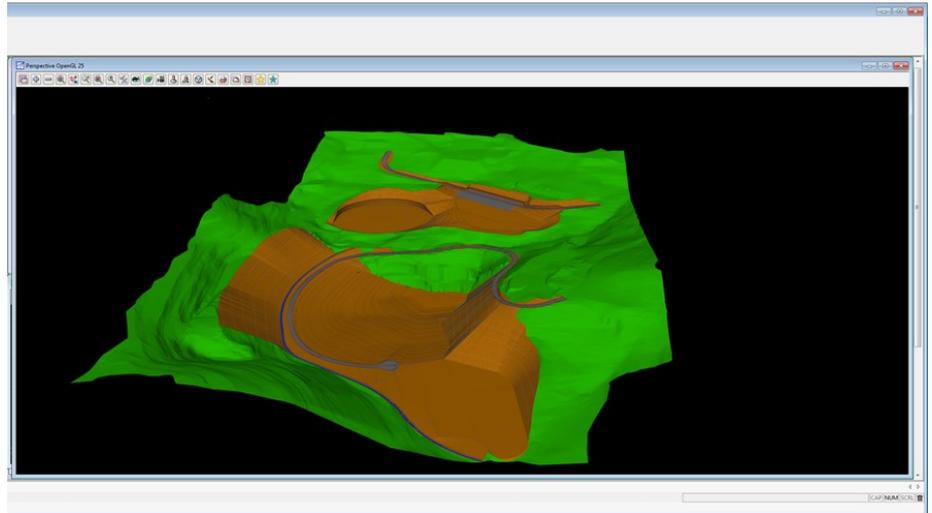
For more information

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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Hornsby Quarry



Combined TINs (to highlight how design fits with existing)

The Challenge

The overall challenge of what to do with a 3.5 million cubic metre hole in the ground was not insignificant. Many years ago, this could have been turned into a landfill or tip site, but with today's environmental responsibilities this was obviously not an option.

A design solution had to be undertaken, and the volume of material required to fill the quarry excavation to a suitable level had to be investigated. There were many geotechnical, environmental and engineering issues involved - e.g. slope instability, preservation of the geological features, areas of sensitive vegetation, and providing suitable access to the finished surfaces.

Preliminary conceptual designs were undertaken, with the constraints taken into consideration and early volume calculations performed, but during the early design stages the volume of material likely to be provided from the tunnel excavation was not known. One of the biggest design problems was providing a finished design level that would not only make the area functional and retain some of the

existing topography (too low and it would still look like a quarry hole and have little functionality, too high and the area would look like a billiard table) but also suit the volume of material likely to be provided from the tunnel excavation.

According to Roads and Maritime Services NSW (RMS), the construction of NorthConnex produced around 2.6 million cubic metres of spoil. Hornsby Quarry was one of six sites identified in the NorthConnex Environmental Impact Statement as having the necessary capacity to receive spoil material generated by the project.

Once the NorthConnex team was able to provide Council with the estimate of the volume from the tunnel, a considerable shortfall was found, so designs had to be reworked or additional material sourced from the surrounding area through possible reshaping of the quarry walls or lowering the Old Man's Valley area.

Again, designs were reworked and volume calculations were undertaken to try and achieve a suitable balanced result.

The quarry was filled by NorthConnex during 2018 (see attached photo). The fill material was

spread and compacted to a level finish. Another detailed survey of the site was undertaken, and with the use of 12d Model software, volumes were calculated to determine the total volume of fill that was imported into the site. The accuracy of this was very important as the funding agreement between Council, RMS, and NorthConnex relied upon the quantity of fill placed in the quarry (measured in cubic metres).

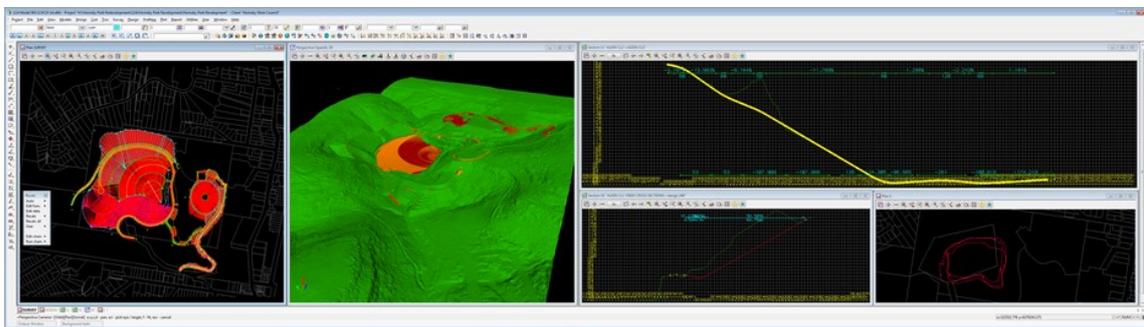
The Solution

Through using 12d Model, numerous designs and finished levels were able to be explored and tested to provide the most suitable and balanced solution. Information was able to be extracted and documented in reports to Council.

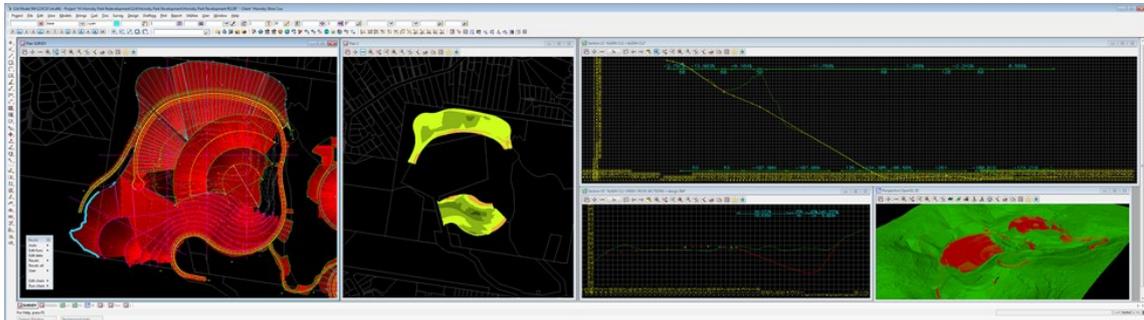
12d Model's visualisations/flyovers/drive-throughs made communicating designs to non-technical people, and to Council, a breeze. These were prepared and presented Council at workshops to assist in explaining design options and give a better understanding of issues involved as well as showing them what the final design may look like.

The Result

A functional recreational facility of great benefit to the greater Hornsby community was created. Transport for NSW managed the beneficial reuse of more than one million cubic metres of spoil from NorthConnex at Hornsby Quarry - an environmentally sustainable use for the spoil. 12d Model was integral to many stages of this complicated process.



Screenshots of work in progress



Hornsby Quarry in 2005



Hornsby Quarry in March.2018



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.

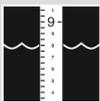
Accurate 3D modelling and the ability to share data between users allow teams to quickly and easily coordinate designs.



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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