

# CAPABILITY STATEMENT

SPATIAL SERVICES

**CMS**  
SURVEYORS



# ABOUT US.

**CMS Surveyors is a dynamic, multidisciplinary surveying firm with a remarkable 22-year legacy in Sydney and regional NSW.**

Our approach to work is based on quality and integrity. We are trusted to deliver the highest standard of service to our clients across spatial, cadastral, and construction surveying.

We have worked on some of Sydney's most high-profile construction projects such as Crown Hotel Barangaroo, Western Sydney Airport, and Salesforce Tower Circular Quay.

Our clients include government authorities, infrastructure and engineering companies, educational institutions, utility companies, architects, builders, developers, and engineers, as well as solicitors, real estate agents and individual property owners.

## **Quality, safety, and environment.**

Our core values are aligned with our best practice methods, which results in being certified to the international standards ISO 9001:2015 Quality Management and ISO 45001:2018 OH&S Management Systems.

We also meet the international standard of ISO 14001:2015 Environment Management System and make sustainable choices part of our everyday work.



# CMS SURVEYORS SPATIAL SERVICES

Capturing and interpreting data is what we do best. At CMS Surveyors we've adopted the latest technology in scanning, modelling, and visualisation so we can support your project with the most valuable and accurate survey data possible.

3D Point Clouds, reality meshes, and their subsequent digital product derivatives (including Building Information Modelling (BIM)) are now embraced as standard tools for architects, designers and engineers seeking a flexible, efficient, collaborative, and innovative workflow.



CMS Surveyors Spatial Team



# Our Technology

It's our mission to keep abreast of the latest technology available to create point clouds and reality meshes – whether its terrestrial laser scanning, mobile LiDAR, photogrammetry, structure from motion (SfM), Simultaneous Localisation and Mapping (SLAM) we're using or testing it all so that we can provide our clients with the most appropriate survey information.

Our survey-grade Leica P40 Laser Scanner is capable of capturing 1 million points per second, at an incredible level of detail, to an accuracy of less than 3mm, and has a range of over 250m. Using surveying procedures to register the data enables collection of accurate and clean datasets that cannot be matched by any other technology.

Our fleet of Leica RTC360s sacrifice range for speed and usability – they can capture 2 million points per second at a range of up to 130m; they're smaller, faster and are able to register multiple scans together on the fly. This minimises site time (and disruption), increases site coverage and allows us to capture data from places where the larger P40 would be unwieldy.



Both these terrestrial laser scanners are capable of capturing 360° dome scans in under 5 minutes which allows sites to be surveyed at a speed and level of detail that has never previously been possible. They can also capture colour photographs at the same time, colourising the 3D point clouds to create both a colourised point cloud and a 'street-view' style dataset allowing later virtual site walks.

We also have an Unmanned Aerial Vehicle with a LiDAR sensor payload (DJI Mavic 3 with a CHCNAV Alpha 450 Lidar) a.k.a a laser scanning drone. This enables us to capture huge areas with unmatched speed and the ability to 'see' through vegetation allowing us to capture more accurate ground terrain information than is possible with aerial photogrammetry in vegetated areas.

That said, we also utilise terrestrial and aerial photogrammetry techniques where suitable and have experience with SLAM and SfM. Each job has its own unique challenges and no one tool or technology is suitable for them all. We need to know them all; All you need to know is you'll get the best.

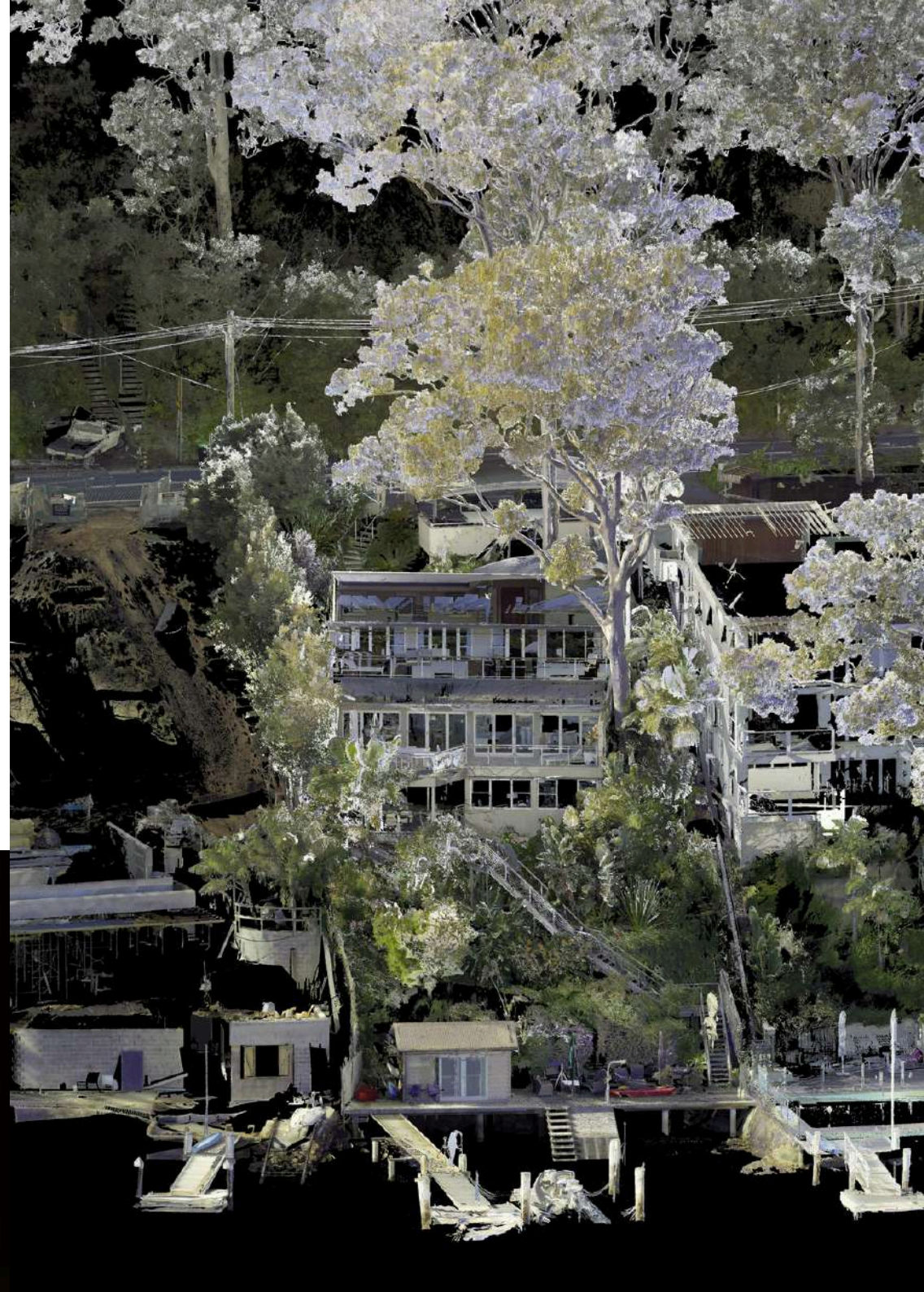


# The Point Cloud

All the tools we use are in the quest for the 3D point cloud; the dense collection of 3D points in space that all other survey deliverables can be created from. This data, which is akin to a 3D photograph, serves as a digital record of the site.

The point cloud enables interactive virtual site exploration allowing the user to move through the site in real time, checking views, measuring features and getting a feel for the scale, colours and materials of the surveyed features. We can provide this point cloud in several formats, including:

- Via our online point cloud viewing portal
- Recap (.rcp) Format (for use in Autodesk software including Revit, 3DS Max and AutoCAD)
- E57 (most common format supported by most point cloud software and ArchiCAD)
- Leica Trueview
- .laz, .las (for vectorworks and other software).

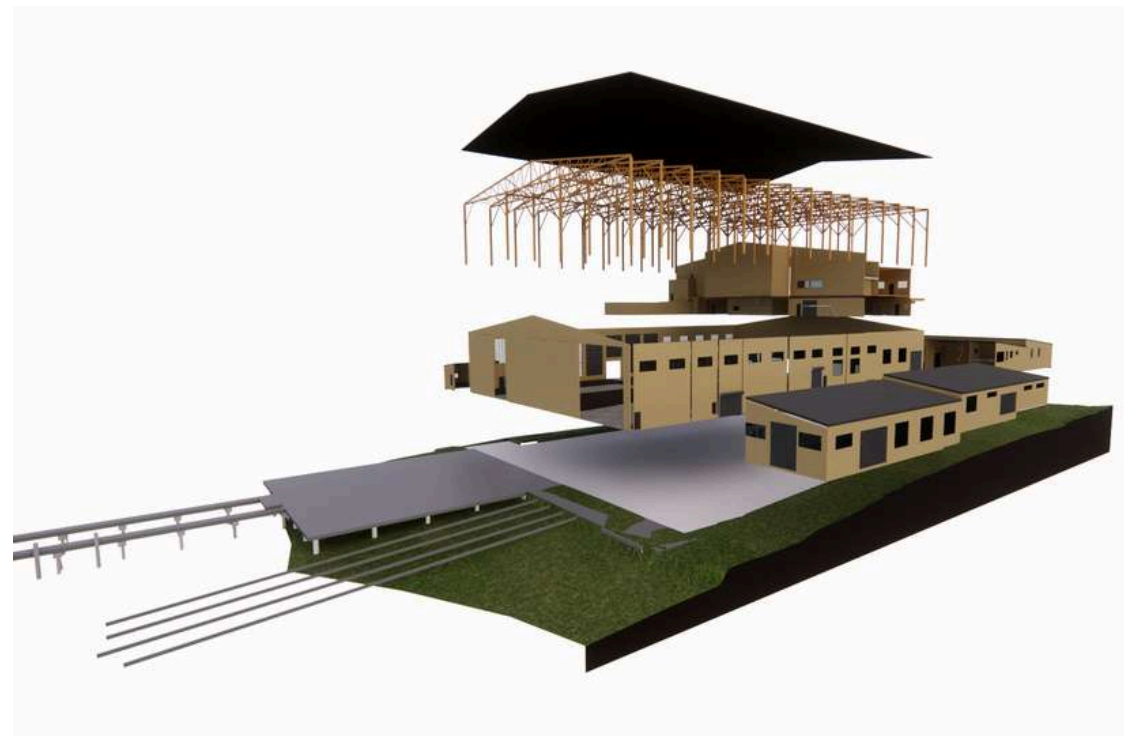
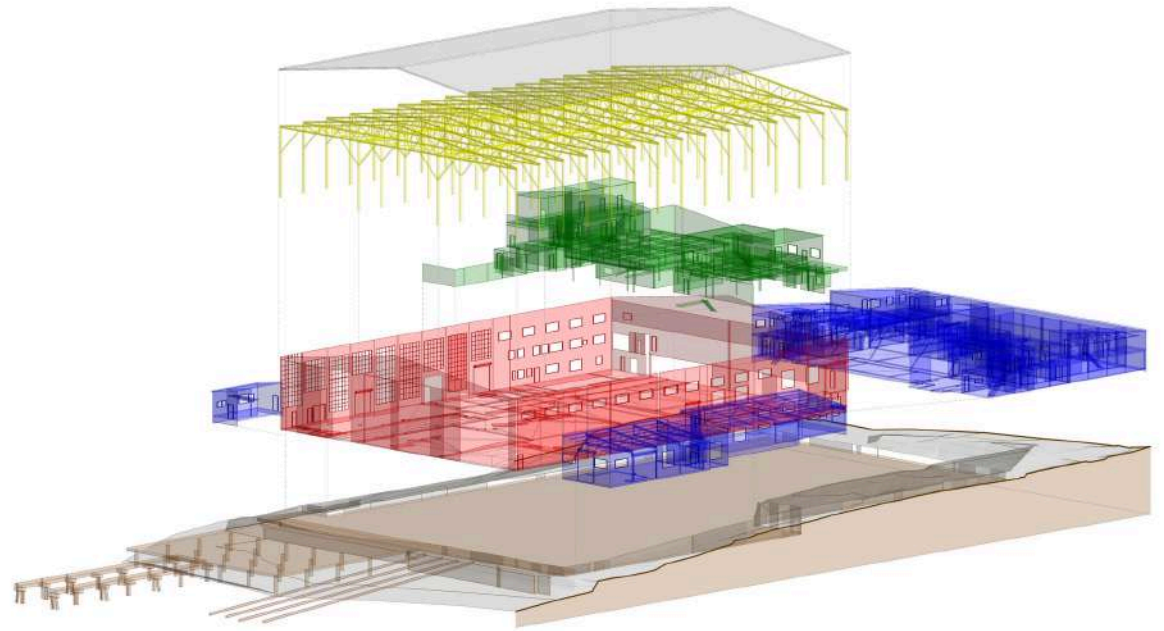


# The Point Cloud

The point cloud data is the final source of 'truth' however file sizes can be large and getting the most out of the information generally requires experience and access to speciality software. We have the expertise and resources to create a variety of products from the point cloud we collect, and deliver this to you in your preferred format.

- Point clouds provide an ideal reference for creation of other products
- A small project may be hundreds of Megabytes, a large project may be hundreds of Gigabytes
- Point clouds can be loaded into Revit, Navisworks, Autocad or other CAD packages to serve as a reference for design.
- Point clouds can be converted into other forms which may be more useful for your project or outcome.

To get the most out of our point cloud data, and the 3D reality meshes that can be generated from them, we utilise many off-the-shelf and customised software packages such as Cyclone, Recap, Revit, Autocad, ArchiCAD, 3D Reshaper, Agisoft Metashape, RealityCapture, Meshlab, Cloudcompare, 3DS Max and many more.



# The Visual Impact of your project

It's essential to have a comprehensive understanding of how your project will integrate into its surrounding environment. How you correctly communicate that impact can make or break a client relationship (or a budget) which is why a survey-data based visual impact assessment is the only way to ensure that you're designing within all the required guidelines.

A visual impact assessment enables you to:

- Facilitate informed decision-making with clients and stakeholders
- Help stakeholders and the public visualise the future built environment and foster a more transparent and collaborative design process.
- Ensure that the aesthetic impact of a new building aligns with the existing landscape.
- Design within zoning regulations.
- See the effects of a project on the visual character of a neighborhood, cityscape, or natural environment.

We'll consider factors such as scale, materials, and architectural style so you'll have the confidence to move forward with your project without disrupting the visual harmony or cultural context of the structures surroundings.

Using building information modeling (BIM) our spatial team will construct detailed 3D models and renders which simulate the proposed structure in its real-world setting (complete with accurate geographical and environmental data).

These visualizations are then compiled into a comprehensive report that includes images, diagrams, and analyses, providing a visual narrative of the proposed development's impact.





## BIM and 3D Models

Using the Point Cloud we can build a virtual model of the site to exact specifications you require.

This could mean anything from generating a textured/colourised 3D mesh to manually modelling every bespoke detail as accurately as possible using custom parametric objects and families for use in a building information model.

Key to the quality of our deliverables is the fact that the surveyor responsible for the field capture will then work closely with our 3D modelling team to ensuring that you are provided with a model that is appropriate, complete, and satisfies the brief.

- The Level of Detail (LoD) can be varied to meet scope/budget
- Accurate and complete parametric models can be created for Building Information Models
- Models can be used to generate sections, floor plans, structural analysis models, shadow diagrams, view analysis and clash detection
- Models can be rendered to produce high quality realistic visuals and can be used in 3D drawing and visualisation software Products can be supplied in specific software formats such as RVT, IFC, DWG, NWD for use in Revit, Archicad, 3DS Max, Autocad and more.



## Shadow and Solar studies

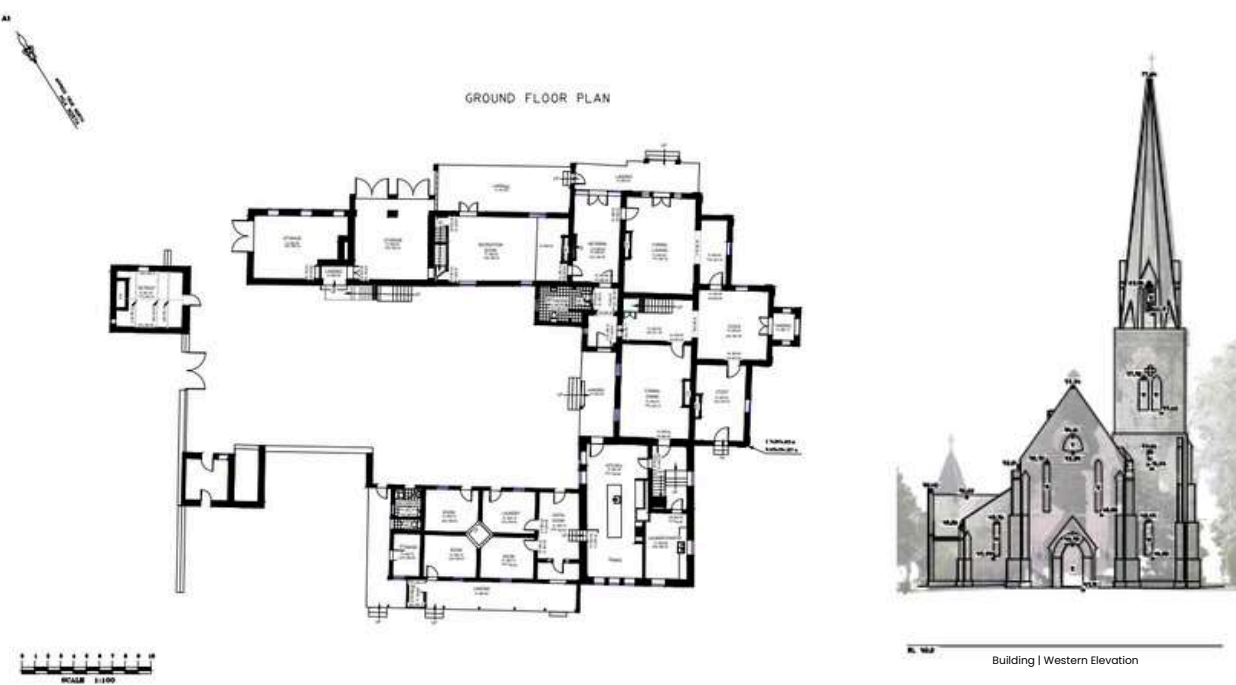
Point clouds allow shadow and solar studies to be carried out at a very highest available level of accuracy and detail.

Old style solar and shadow studies were difficult, time consuming, and can be completely incorrect due to the omission of other environmental factors such as surrounding buildings, structures, trees and ground surface deviations.

Using a laser scanner we are able to capture the shadow study area in high accuracy and detail, while automatically taking into account the surrounding environment. We can then selectively remove existing objects and/or add in design elements for the most complete simulation of shadows/light possible

- More efficient, economical and accurate
- Predict the path of a proposed objects shadows over the existing environment or over other proposed structures for any location, time and date required.
- This information can be presented as a sequence of images, a video, or can be extracted to CAD linework.





## Elevations and Floor Plans

### Is a full 3D model beyond the scope or budget of your project?

Our spatial team can potentially reduce costs by extracting sections and floor plans directly from the point cloud to capture the detail you need on a drawing – either as 2D or 3D line drawings, ‘heat map’ style floor/wall deviation plans, or long/cross sections through a site.

These sections or plans can be used for building height analysis, context studies, building fitout diagrams or 2D Architectural drawings.

- Ideal for delivering a final product on paper
- Relatively quick (and thus inexpensive) to produce
- Effectively communicates the ‘bulk and scale’ of a streetscape
- Can quickly communicate important elevation information such as building heights, balcony levels, window sizes and more.

## Streetscape

Point clouds are particularly suitable for producing streetscapes for use in visual impact studies for proposed developments.

A point cloud can be viewed as a true orthogonal projection, removing the need to painstakingly model an entire street for this purpose. The ortho-photo can be traced over and used to accurately determine heights and annotate additional information.



## Visual Impact Studies

Easily assess and communicate the aesthetic effects of a proposed development on its surroundings. We'll use accurate survey data through scanning and 3D Modelling to create virtual views of your new structure or project, visually integrated into the existing environment, and considering factors like scale, design, and the overall impact on the landscape or urban context.

- Clearly communicate with your clients and other stakeholders through visual as-built examples
- Take into account neighbouring buildings, structures and natural features.
- View your structure from different points on and around the site



## Rendered Flythroughs

Using a scanned point cloud and model we can pre-render a high-quality flythrough for video playback. This can be used in a video presentation for client or public consultation, heritage/historical use or simply to supplement other products supplied from the point cloud.

- High quality visual medium; ideal as a presentation tool
- No special software or expertise required; makes a point cloud accessible to all
- Flight paths can enable views and movement through the space that a real camera or person could not achieve



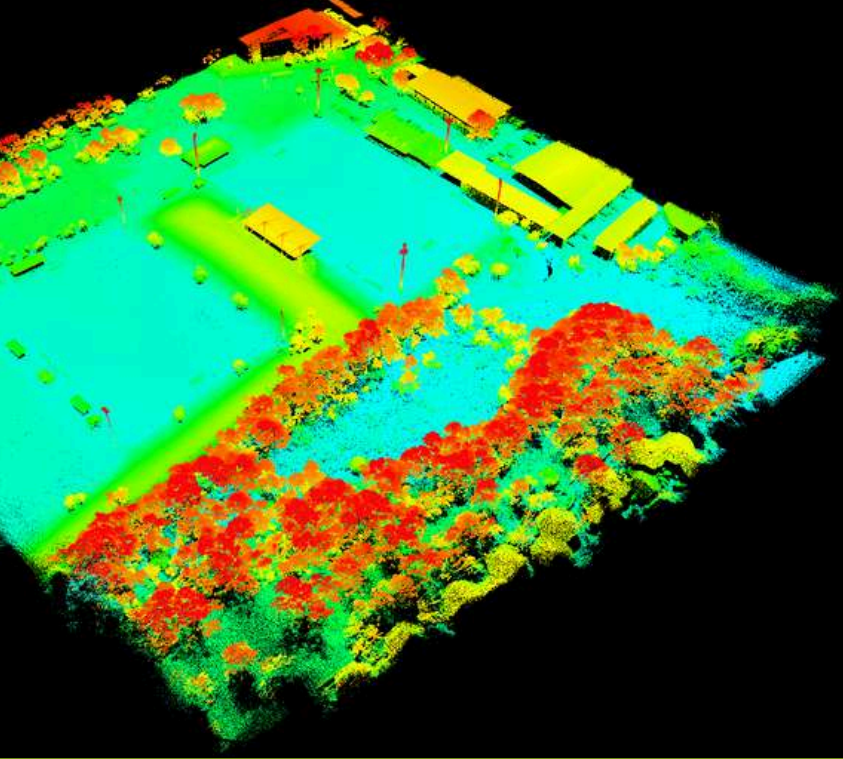


## Geometric Information

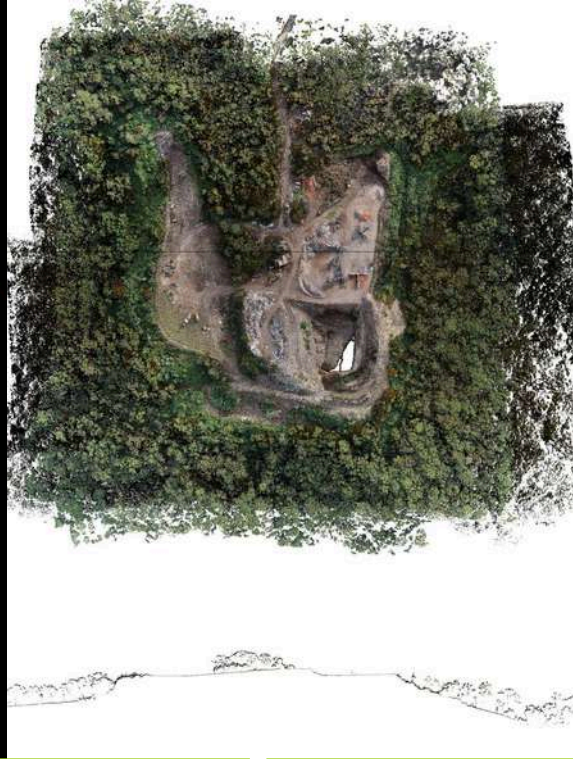
Using the scan cloud we can extract geometric information to determine characteristics such as beam sizes/thicknesses, pipe diameters, bend radii and more.

This is particularly useful in situations where access to the feature is difficult (due to height or confined spaces) or where the geometry would be too complex to accurately measure using traditional techniques.

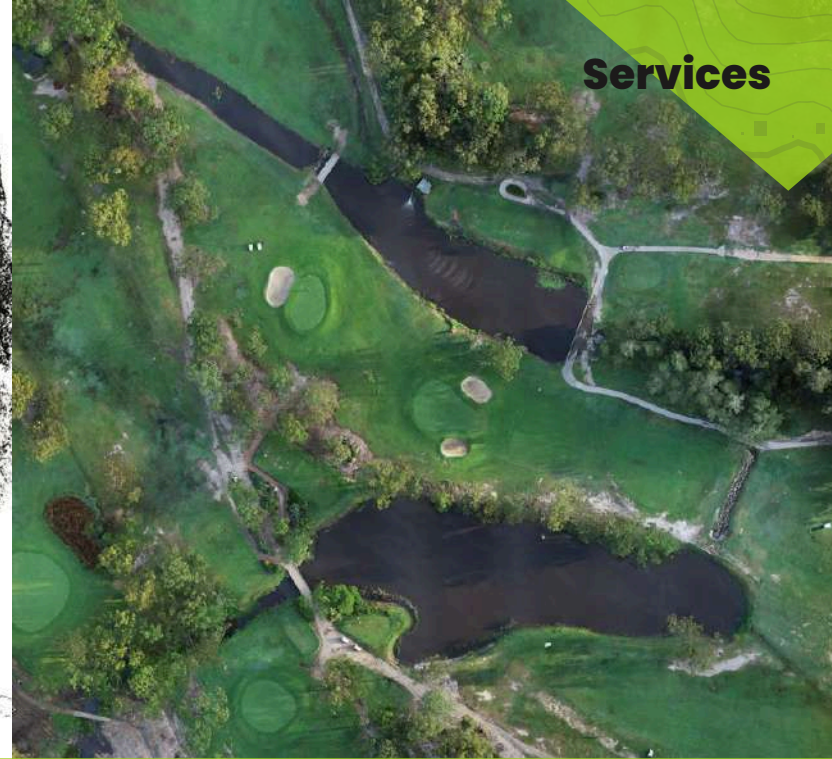
- Ideal for Mechanical/Electrical/Plumbing data capture
- Can accurately determine pipe centreline vectors, pipe, and duct sizes
- Quick to collect information in the field vs traditional surveying methods = less plant downtime
- Information needs to be extracted and presented either on paper, in intelligent 3D models or in reports.
- Floor slab analysis.



**Drone Based Lidar**



**Photogrammetry**



Drone-based LiDAR (Light Detection and Ranging) technology is a highly effective and precise way of capturing field data.

Drones equipped with LiDAR sensors can efficiently cover large and inaccessible areas, producing highly detailed and precise topographic maps, terrain models, and point clouds.

- Reduces the time and cost associated with traditional surveying methods
- Enhances data collection in challenging terrains
- Allows for frequent and up-to-date monitoring
- Extremely versatile and can be applied to a wide range of building, environmental and planning projects.

Photogrammetry uses overlapping images to measure and map physical objects and environments.

- Suitable for a diverse range of projects, particularly those that require data collection from vast areas or hard to reach soaces.
- Captures detailed and accurate representations of landscapes, structures, and objects.
- Non-intrusive data capture minimizes the impact on the environment during surveying.
- Can contributes to streamlined workflows and enhanced decision-making in fields such as urban planning, agriculture, and resource management.





## We're here to help.

Get in touch with our friendly team of experts to discuss your project.

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