

UAS SERVICES



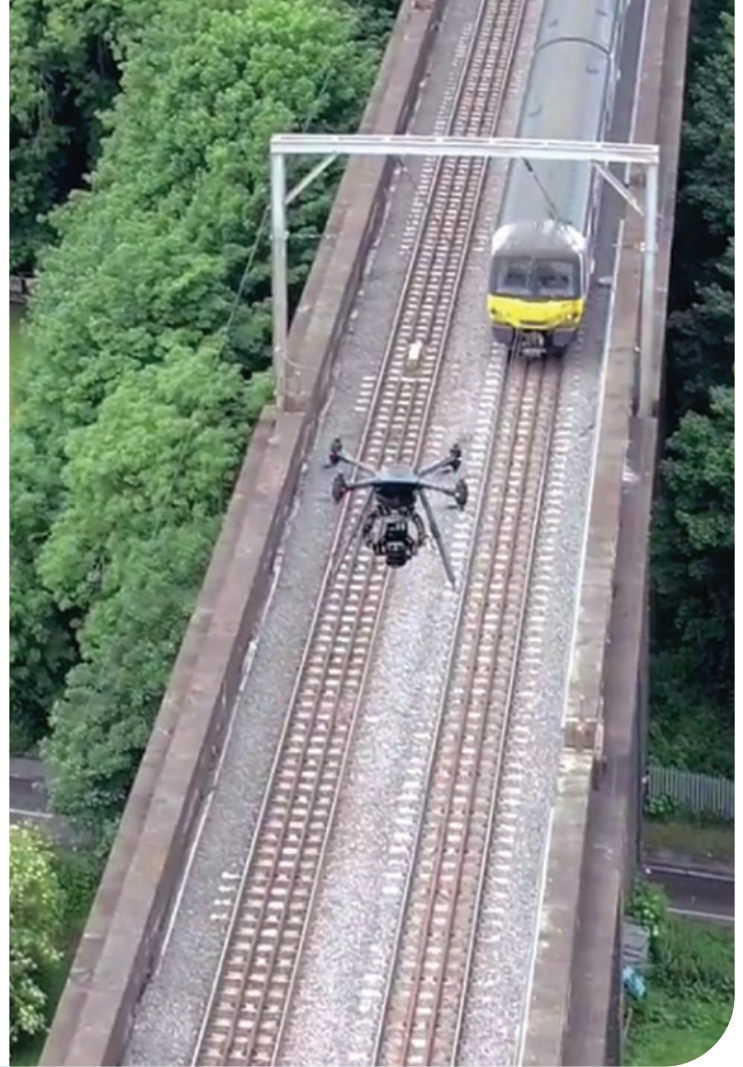
Aerial surveys and inspection for the property, rail
and infrastructure markets using Uncrewed Aerial Systems (UASs)

www.plowmancraven.co.uk

Why **Walk** **When You** **Can Fly?**

Plowman Craven is continuing to push boundaries through a dedicated UAS division that uses the latest drone technology to provide high-accuracy surveying and inspection services to the property, rail and infrastructure markets.

Whether it's a busy stretch of live railway, the roof of an historic building or an entire property portfolio, our highly-trained teams safely capture ultra high-resolution imagery and survey-grade data to a sub-5mm accuracy level that is unmatched in the industry – all in a fraction of the time taken by traditional methods.



Key Benefits

Rapid data capture | Survey-grade accuracy
Inaccessible locations | Improved safety
Less manpower | More cost-effective
More & better data capture | Wide range of deliverables

Why **Plowman** **Craven?**

With more than 60 years' surveying experience and a commitment to innovation, our expertise is unmatched.

Our investment in pilot training and the very latest drone technology is underpinned by robust survey principles and a comprehensive understanding of photogrammetry. This enables us to provide enhanced geospatial data that can be seamlessly integrated into existing workflows throughout a project lifecycle.

With enhanced permissions from the Civil Aviation Authority (CAA) to fly at low levels, even in congested areas – and being one of the few companies in the UK to have been awarded an Operational Safety Case (OSC) – Plowman Craven is able to deploy UASs at even the most inaccessible, hazardous or large-scale sites.





Measurement & Surveying Solutions

Topographical surveys | Rail track measurement
 Measured & Condition surveys | Property inspections
 Health & Safety assessments | Site visualisations
 Conservation, Ecological & Heritage surveys |
 Planning & Rights of Light |
 Building Information Modelling (BIM)

Our Work

Urban | Rural | Coastal | Industrial
 Property developments | Historic buildings |
 Inaccessible rooftops | Tall buildings | Construction sites
 Railways | Bridges | Ports | Waterways | Highways |
 Power stations | Wind turbines | Renewable energy



Permission
 No 2703

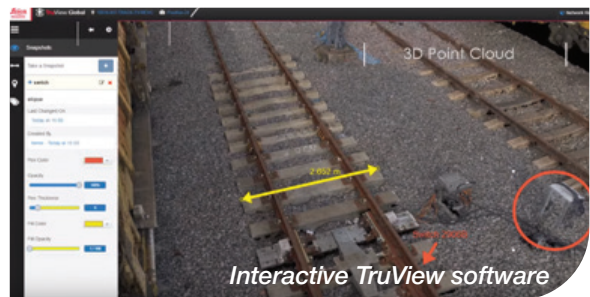
UAS FAQs...

Why use UASs?

They are much quicker, safer and more efficient for collecting large amounts of data or for areas that are inaccessible such as rooftops or railways. Using UASs is also much more cost-effective for clients and produces a greater depth of information, such as high-resolution photography. Crucially, the data produced achieves an accuracy that is comparable to traditional laser scanning.

How is the data produced?

We use hundreds of overlapping, high-resolution photographs as a basis for creating a 3D point cloud rather than a laser scanner - this is called photogrammetry. The data then feeds into BIM workflows, enabling the production of 3D models and traditional CAD survey drawings. Before we fly we install control points on the ground to enable absolute geospatial accuracy.



Why is survey knowledge important?

It's not easy to produce survey-grade data that is comparable or even superior to traditional laser scanning using photogrammetry, so using an established surveying company that understands the fundamentals of capturing, controlling and processing data is crucial. Many companies fly UASs but very few can match the accuracy we're able to produce.

What sort of preparation is needed?

Before we're even on site we plan meticulously, looking at things like weather, airspace, the hazards and the potential risks to people or property. When we're there, we're looking for suitable take-off and landing locations as well as possible sources of interference such as GPS blocking from buildings, magnetic interference and wind turbulence in and around buildings. Of course, very detailed equipment checks are always conducted before every flight. There's a lot to consider so our training and procedures are vital.

Property & Construction

The use of UASs is now common-place in the property and construction markets where there are a wide range of applications for this exciting new technology.



Our UAS property and construction survey services cover everything from listed buildings and Central London offices to historic Universities and residential housing estates.

Projects include:

- **Smithfield Poultry Market**
- **The All England Lawn Tennis Club (Wimbledon)**
- **Finsbury Square**
- **Clapham Park**
- **Royal Brompton Hospital**
- **Houses of Parliament**

Working closely with our Property Development and Property Management teams, our UAS division captures highly-accurate geospatial survey data and high-resolution imagery from even the most challenging or inaccessible locations - with drone surveys taking a fraction of the time of traditional survey methods.

Project Profile

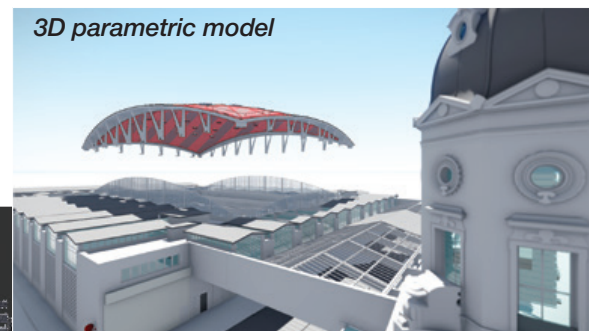
Surveying the iconic Poultry Market at London's Smithfield presented a significant challenge, with a requirement from the City of London Corporation to scan and model the entire building, including the iconic domed roof.

Our UAS team was deployed to the site and was able to survey the roof, canopies and all connected structures in 12 ten-minute flights that captured more than 500 high-resolution images.

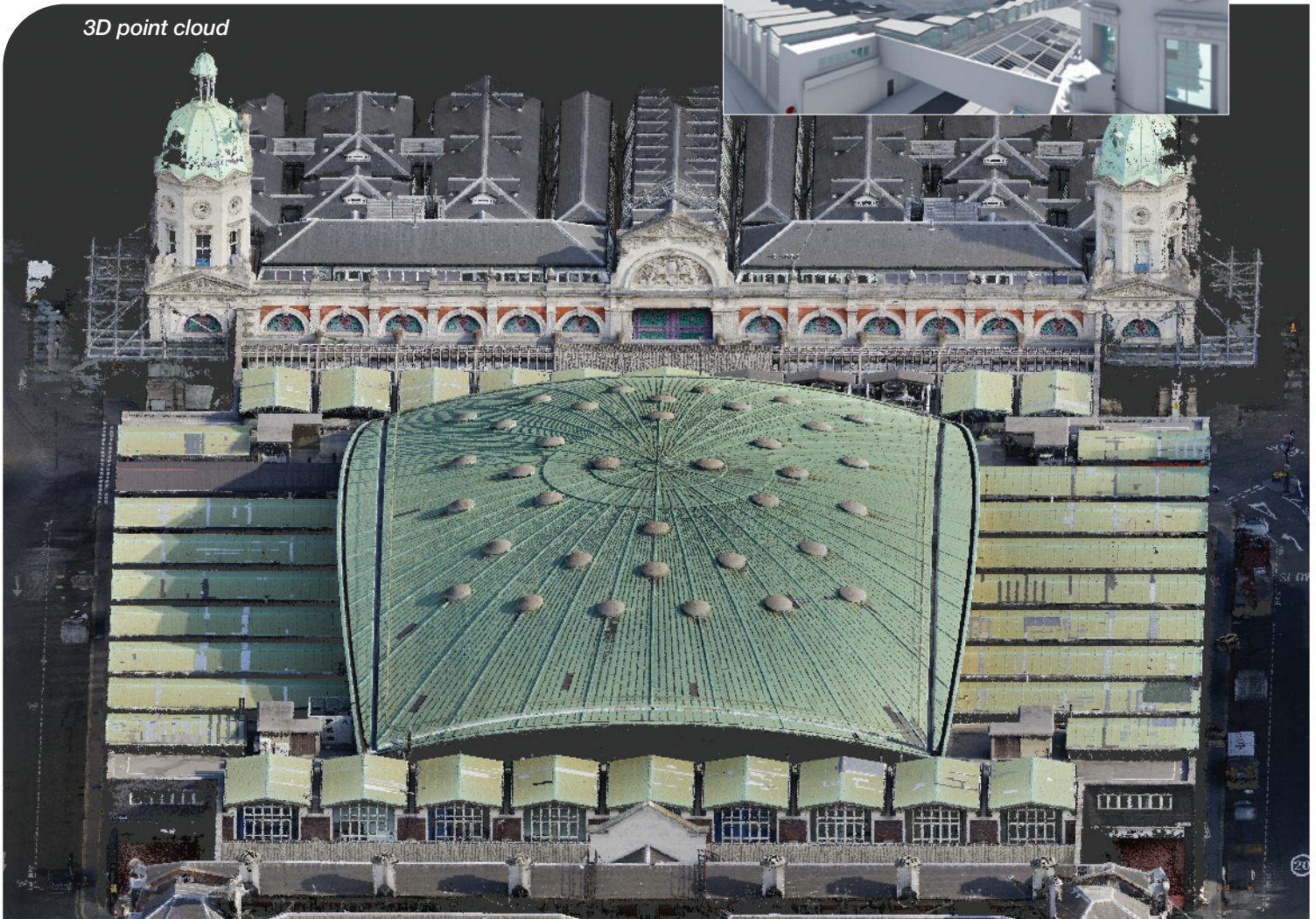
The UAS survey delivered geospatial data of the external structures along with interactive panoramic imagery of the roof that enabled a full condition survey to be supplied. All the data collected was then seamlessly integrated with the internal laser scans and 360° photography to create the required client deliverables.

Deliverables

- High-resolution imagery
- Orthophoto
- 3D point cloud
- Building Information Modelling (BIM)
- TruView
- Condition survey



3D point cloud



Rail & Infrastructure

Vogel Freedom is a “game-changing” surveying tool that boasts revolutionary high accuracy capabilities.

The accuracy of Vogel Freedom surpasses any other method of data capture in a fraction of the time taken by traditional surveys and, as the platform completely eliminates the need to access the rail track, there is no need for possessions or line blocks. The result is a shorter programme, significant savings in cost and a dramatic reduction in worker exposure to risk.

Vogel Freedom has been developed by industry experts to provide exceptional surveying results. It is the next generation in infrastructure drone surveying and a highly sophisticated upgrade to our Vogel R3D drone-based system.

It is also perfectly suited to infrastructure surveying where access is difficult, including bridges, viaducts, highways, waterways, ports, oil rigs, power stations and wind turbines.



Equipment

Vogel Freedom features a state-of-the-art UAS platform and a 100-megapixel camera which captures overlapping aerial images of an entire site, alongside post-processed kinematic GNSS observations and precise inertial measurement unit data. This data is then transformed into 3D data using bespoke workflows and software algorithms.

3D point cloud



Proven track record

Plowman Craven has a proven track record in undertaking drone rail surveys over live networks. Having won a place on Network Rail's coveted UAS Framework we have continually invested in next generation drone capabilities, completing surveys on primary and secondary control networks consistent with Network Rail standards. Vogel Freedom meets Network Rail's Band 1 accuracy requirements and is suitable for track alignment and topographical surveys at all GRIP stages, without the need for trackside survey control points.

Why use Vogel Freedom?

Able to cover even the busiest and most inaccessible areas of the rail network from a working height of 25m, Vogel Freedom captures track condition and measurement data from a position of safety even during traffic hours, making it perfect for track alignment and topographical surveys at all GRIP stages.

Tangible Benefits

- **Low Risk** – removes the need to physically access the track
- **Low Cost** – eliminates expensive possessions and line blocks
- **High Speed** – rapid mobilisation, shortens programmes
- **High Value** – enhanced deliverables to supplement surveys
- **High Accuracy** – proven to deliver sub-5mm accuracy

Enhanced Deliverables

- Track alignments for P-way design
- Topographical surveys
- Coloured 3D point clouds
- Orthophotos
- Desktop site inspections
- Data online portal



Full footprint photo



Medium zoom photo



High zoom photo

"We developed Vogel Freedom in response to ever-increasing industry challenges and needs. It removes previous limitations to surveying and can add substantial value, particularly in the current economic climate, where cost-effective solutions have never been more important, all while improving workers' safety and ensuring a safe and efficient rail service for customers."

Tom Avery, Commercial Manager - Infrastructure, Plowman Craven.

Planning & Permissions

Plowman Craven takes UAS flying very seriously, conducting all projects in strict observation of all required safety standards.

Pre-Flight Preparation

NATS – National Air Traffic Service – we always contact before flying to alert them to our presence

NOTAM – Notice to Airmen – an alert issued to the CAA alerting other air users to our activities

RAMS – Risk Assessment Method Statements to ensure ground and air space is safe to operate in



Key Information

PFAW – Permission for Aerial Work awarded by Civil Aviation Authority (CAA) – Licence No. 2703

OSC – Operational Safety Case – Enhanced permissions awarded to us by the CAA that enable us to fly lower than other survey companies

Pilot Expertise

All our pilots have completed external training and obtained their Remote Pilot Licence from a CAA-approved training provider. Pilots also complete our own internal training programme that covers proficiency, emergency handling, and ground support to ensure the utmost competency. The programme observes the most stringent health and safety standards, beyond those specified by the CAA.

Safety First

All pilots hold an EASA Class 2 medical certificate, in line with standard aviation practice for commercial airlines. At least one member of every project team will have completed St John Ambulance Emergency First Aid at Work training. Plowman Craven operates with an absolute minimum of two personnel on site – one of whom is responsible for ensuring that the public and nearby properties are not put at any risk.

Equipment Reliability

Plowman Craven operates its fleet of aircraft in the same manner that a commercial charter airline would, with full maintenance schedules, procedures and checklists. All of our drones boast industry-leading safety features including triple-redundant autopilots, multiple rotors for redundancy, dual communications links, emergency return-to-home and blocking against electromagnetic and RF interference.

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