

# AERIAL PHOTOGRAPHY & TOPOGRAPHICAL SURVEYS

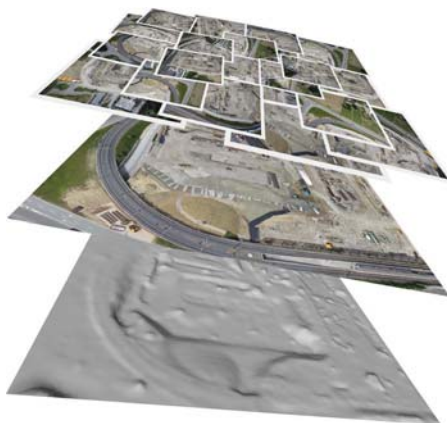
“75% cheaper than traditional aerial topography, 100% less carbon”

We source the most advanced technology to bring affordable environmental solutions for our clients.

As a licensed UAV survey company we can safely capture the information required and use our in-house GIS team to interrogate and process the data before handing a package over that works for your industry.

Applications include:

- Topographic surveys
- Quarry/landfill volumetric surveys
- Construction progress photography
- Flood risk surveys
- Forestry and agriculture monitoring
- As-built surveys & data validation
- Marketing images
- Livestock and asset counting



“UAV is rapidly becoming the tool of choice for surveying for its environmental, access and cost benefits”

Aerial Photography - Full Ortho-Mosaic aerial imagery 3 - 10 cm resolution.

Digital Elevation Models created to give 3D visualisations. Reconstructed using a bundle block adjustment for up to 6cm accuracy.

In-house GIS analysis of data exportable to ArcGIS, MapInfo, Google Earth and AutoCAD packages.

- facebook/KaarbonTech
- www.twitter.com/KaarbonTech
- sales@kaarbontech.co.uk
- 0800 804 8844



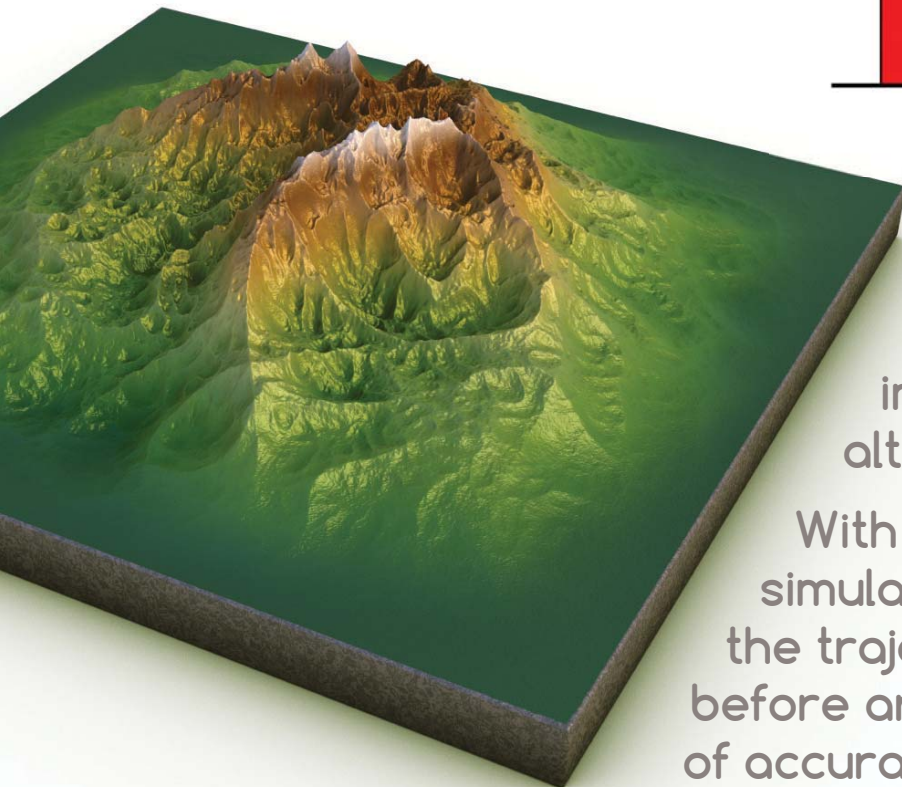
www.kaarbontech.co.uk

# AERIAL PHOTOGRAPHY & TOPOGRAPHICAL SURVEYS

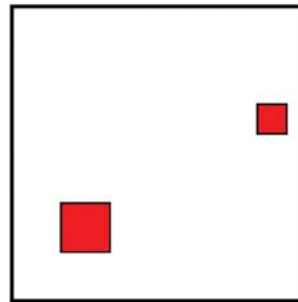
The software searches for matching points by analysing all uploaded images. Those matching points and approximate values of the image position and orientation are used to reconstruct the exact position and orientation of the camera for every acquired image.

Based on this reconstruction the matching points are verified and their 3D co-ordinates calculated. The georeference system is WGS84, based on GPS measurements from the autopilot during the flight.

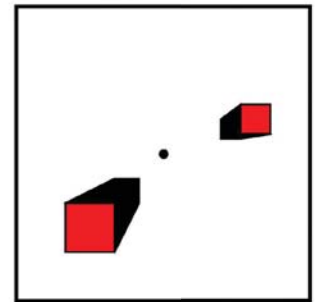
Those 3D points are interpolated to form a triangulated irregular network in order to obtain the DEM (Digital Elevation Model). This DEM is used to project every image pixel and calculate the georeferenced orthomosaic.



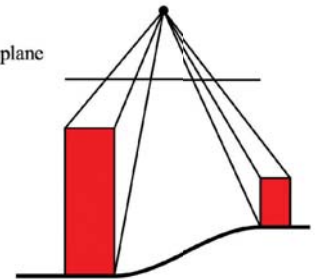
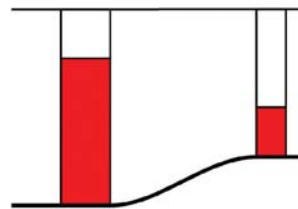
Orthographic view



Perspective view



Datum plane



Areas from 1.5 to 10km<sup>2</sup> can be mapped in a single flight depending on image resolution and flight altitude.

With the ability to plan, simulate, monitor and control the trajectory of the UAV both before and during flight, high levels of accuracy can be achieved.

-  facebook/KaarbonTech
-  www.twitter.com/KaarbonTech
-  sales@kaarbontech.co.uk
-  0800 804 8844



[www.kaarbontech.co.uk](http://www.kaarbontech.co.uk)

# AERIAL PHOTOGRAPHY & TOPOGRAPHICAL SURVEYS

## TOPOGRAPHICAL SURVEYS

Utilising UAVs to collect 3D coordinated data creates 2D or 3D graphical representations of the surface features, indicating their relative position and height. The level of detail is usually specified by the client and surveys are related to any grid co-ordinates required. They show natural and man-made features such as roads, buildings, trees and boundaries.

All significant features including levels in the form of spot heights or contours and any other information can be collected. Drawings are layered using typical GIS principles with colours and linetypes to make the drawing easier to read. Typical outputs for this sector are AutoCAD DWG/DXF or Acrobat PDF.



## QUARRY/LANDFILL VOLUMETRIC SURVEYS

The value of earthworks forms a significant part of any construction work so it is imperative to have accurate costings before and during the construction process. By comparing design information to existing and proposed land formations, earthwork calculations can be worked out to enable accurate costings to be made. At this stage of work, allowances can be made in the final design to make the most of any cut/fill imbalance.

In most cases, this information is presented as a written report and supported by a detailed drawing showing isopachyte contours.

On a much simpler scale, volume surveys can be carried out on stockpiles, open excavations and backfilled areas to give quantities of cut or fill, or carried out as a monitoring exercise to show deformation.

## CONSTRUCTION PROGRESS

Monitoring the progress of construction project for public updates, case studies or internal reporting can be made economical through aerial surveying.

Regular visits to site by our team can be planned or called on an ad-hoc basis. Monitoring progress from the sky can highlight important facts and show clear progress reports.



-  [facebook/KaarbonTech](https://www.facebook.com/KaarbonTech)
-  [www.twitter.com/KaarbonTech](https://www.twitter.com/KaarbonTech)
-  [sales@kaarbontech.co.uk](mailto:sales@kaarbontech.co.uk)
-  0800 804 8844



[www.kaarbontech.co.uk](http://www.kaarbontech.co.uk)

# AERIAL PHOTOGRAPHY & TOPOGRAPHICAL SURVEYS



## FLOOD RISK SURVEYS

UAV technology can be used in a reactive situation like flooding. Monitoring the affect of flooding from the sky gives an accurate representation of damaged areas.

Our experience in working with flood data can export this information in a format suitable for existing utility or local authority systems. Typically ArcGIS, MapInfo and Infonet

Typical applications include;

- Land movement
- Tidal zone areas

## FORESTRY & AGRICULTURE MONITORING

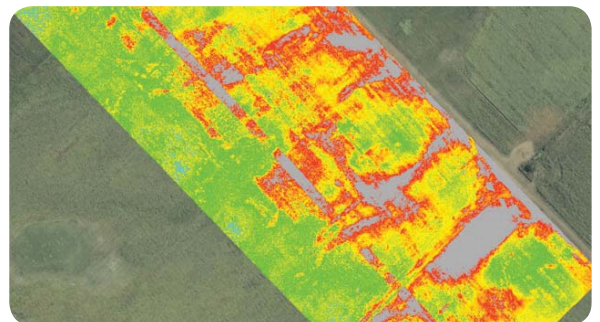
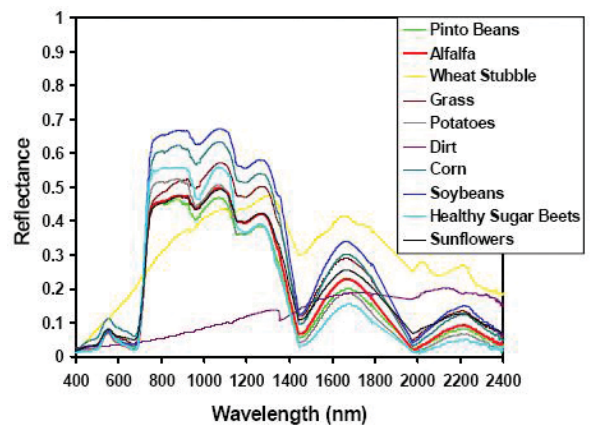
The ability to monitor crop development and forestry changes is crucial for management. By providing a cost effective solution to monitoring through UAV more frequent updates can be obtained without excessive spend.

The ability to choose the time of observation is also important in agricultural applications, and particularly for deriving suitable information to support crop yield prediction.

Typical applications include;

- Storm and fire damage
- Soil analysis
- Tree growth
- Crop analysis

Use of NDVI (Normalised Difference Vegetation Index) has been common practice for many years to measure and monitor plant growth (vigor), vegetation cover, and biomass production. Using UAVs to collect this data provides a cost effective solution for up to date view of any given area.

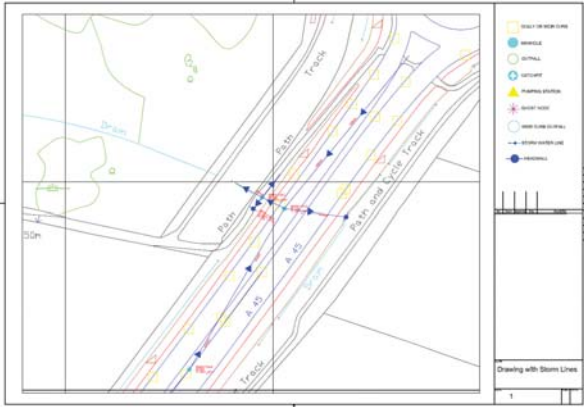


- facebook/KaarbonTech
- www.twitter.com/KaarbonTech
- sales@kaarbontech.co.uk
- 0800 804 8844



www.kaarbontech.co.uk

# AERIAL PHOTOGRAPHY & TOPOGRAPHICAL SURVEYS



Data to be validated from existing as-built drawings



High Quality imagery used for validation



## MARKETING IMAGES

From exclusive property sales to ship launches and event marketing, aerial imagery is a great way of capturing marketing material. The use of UAV's in this sector have also made it much more cost effective.

## AS-BUILT SURVEYS & DATA VALIDATION

Data validation from the sky or ground is a valuable way of checking as-built drawings and inventory information. We improve the completeness and correctness of third party or customer data sets by filling in missing data fields of attributable information, catching and modifying inaccurate data already filled in and pinpointing the geographic locations of all entities in the data sets.

Data verification and validation includes the following;

- Attribution completeness
- Attribution currency
- Positional accuracy
- Scale and accuracy
- Comparison against multiple sources
- Removal of duplicate or erroneous records
- Providing of Metadata regarding all changes

## LIVESTOCK & ASSET COUNTING

UAVs have been used widely in wildlife population monitoring. UAV can have several advantages over manned aircraft for wildlife surveys, including reduced ecological footprint, increased safety and the ability to collect high-resolution geo-referenced imagery that can document the presence of species without the use of a human observer.