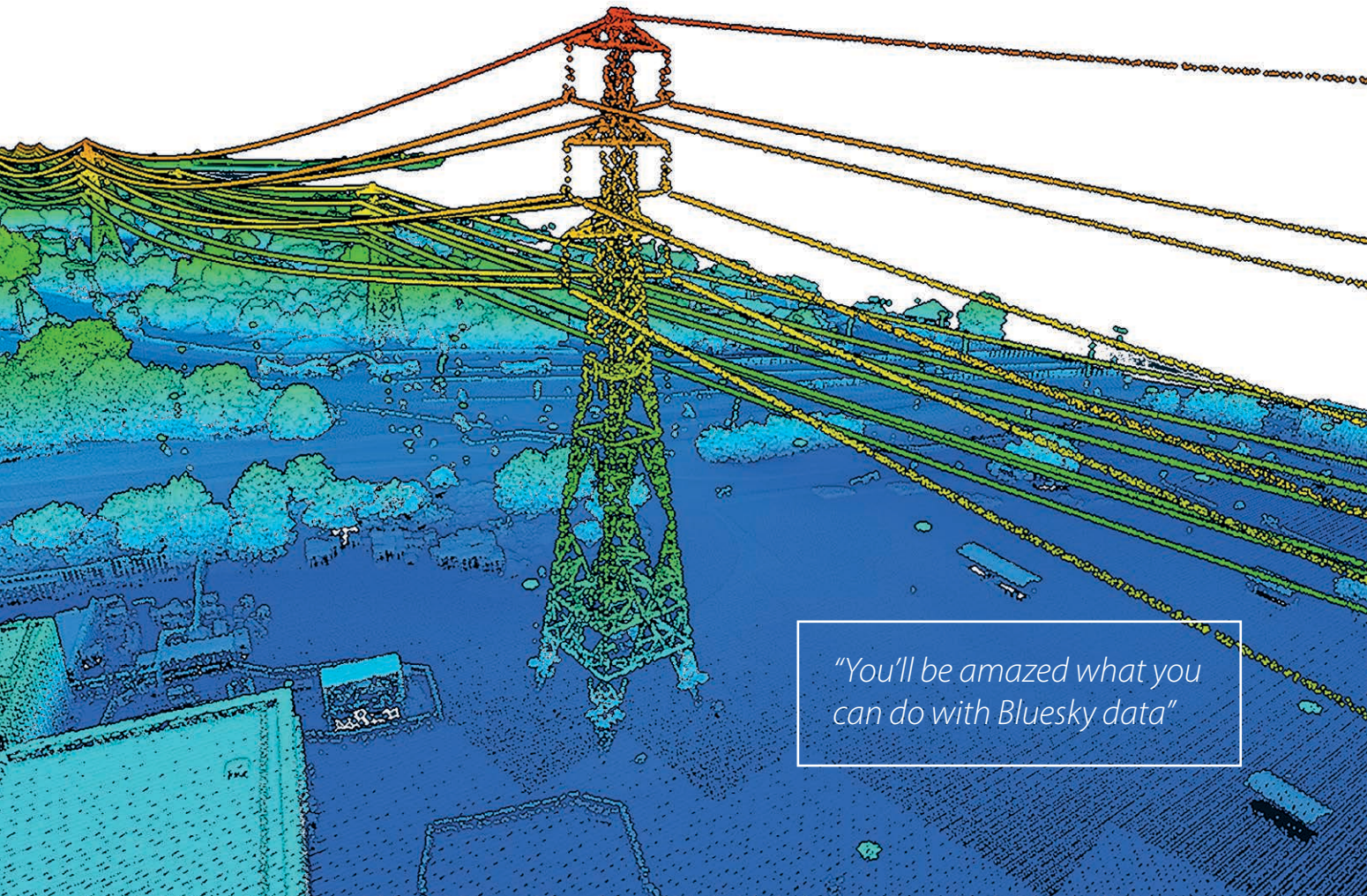
Bluesky Solutions for

Utilities

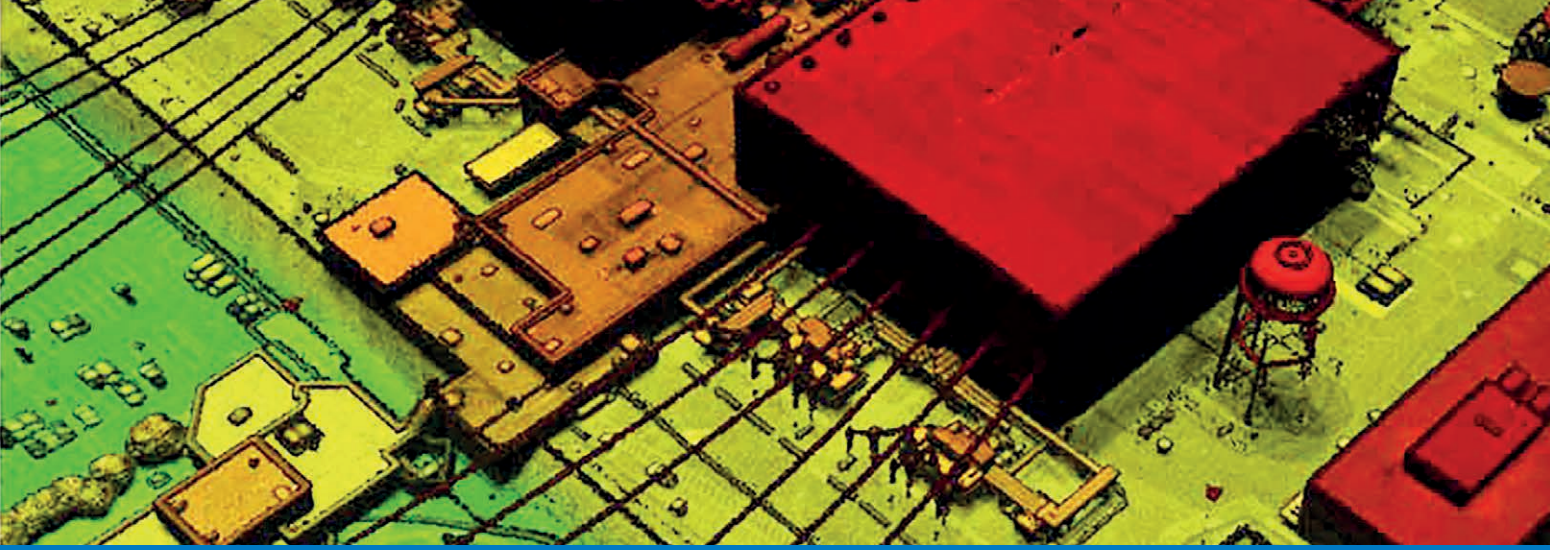


Bluesky is a UK based aerial survey and geographic data company that can offer specialist services to the utilities sector. Bluesky uses the very latest technology to ensure its products, including LiDAR and aerial photography, are second to none. The company has unrivalled expertise in wide area LiDAR capture of entire regions and network areas, for DNOs, water companies and renewables organisations, and has successfully completed the largest LiDAR survey undertaken in the UK for a DNO to monitor vegetation infestation on the OHLs. Bluesky's data is also used extensively in flood mapping, wind farm site identification and risk analysis, including underground pipe damage from tree roots.

Bluesky operates multiple sensors including a state of the art Geiger-mode LiDAR sensor and also the world's first sensor for the simultaneous capture of LiDAR, thermal and aerial photography data, and as such is in the enviable position of being able to provide customers with unique and cost-effective solutions.

Bluesky prides itself on its friendly customer service, pioneering and agile approach to developing new products and services including National Tree Map™ and Air Quality Mapping and is considered a leader in its field.

Welcome to our world…



Geiger-mode LiDAR

Bluesky is delighted to announce a long term partnership with Harris Corporation to utilise their Geiger-mode LiDAR for data acquisition.

The Geiger-mode LiDAR is setting new industry standards in LiDAR data collection producing data for a range of organisations, including utilities. Using the innovative Geiger-mode LiDAR sensor and with Bluesky's cutting-edge production capabilities, we will produce higher-quality 3D height and elevation products faster and more affordably than ever before.

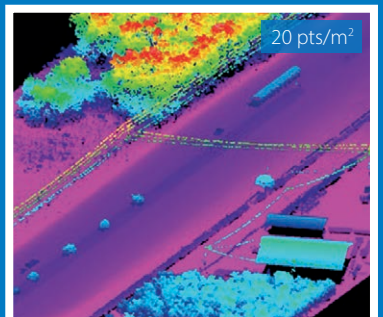
Geiger-mode LiDAR is an emerging technology that enables the rapid collection of LiDAR data at higher resolutions with greater efficiency than traditional linear-mode LiDAR. To date, Geiger-mode LiDAR has been used only in the government domain, but is now being made commercially available for wide area data acquisition.

This state-of-the-art technology, together with Bluesky's uniquely developed automated production techniques and market expertise, will enable us to deliver superior-quality LiDAR-based data and derived products at highly cost-effective prices to our customers. Access to this high-quality, affordable elevation data creates new opportunities for agencies and companies to better address a wide range of application needs, including flood mapping, land use planning and land management, transmission line monitoring, pipeline design and maintenance, transportation engineering and planning, urban modelling, asset management, and forestry.

Benefits:

- Ten times faster data collection than traditional linear-mode LiDAR
- Resolution of 2 points per metre to >100 points per metre
- Cost-effective, high-resolution, wide-area mapping

HARRIS

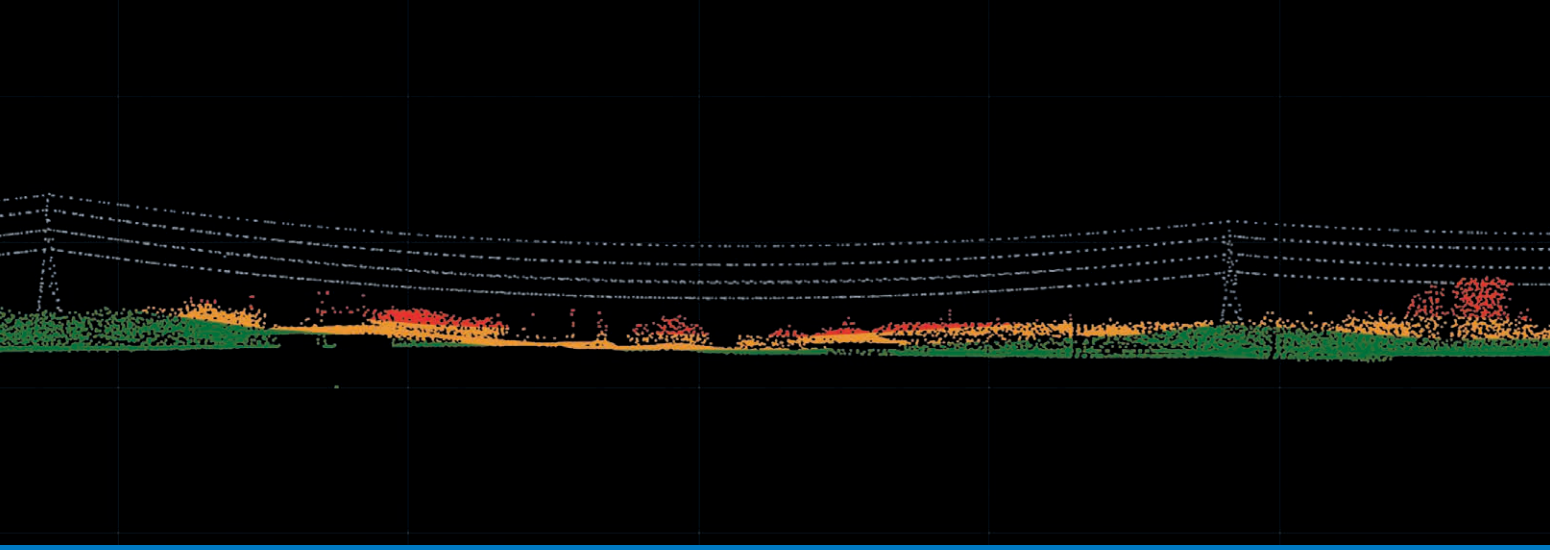


Vegetation Encroachment

tree species
growth rates
ENA Technical Specs 43–8
shutdown
risk categories
Live zone
vicinity zone
tree work category
outage
cutting cycle

One of the main challenges facing Distribution Network Operators (DNOs) and other overhead line managers is the encroachment of vegetation onto the conductors or cables; it is a significant challenge to monitor vegetation growth over many tens of thousands of kms of network. This is compounded by the fact that overhead powerlines are often in remote or difficult to access locations, and the vegetation growth also makes the challenge a dynamic one. Bluesky has developed an innovative solution, already successfully being used in the industry, to map, measure and monitor entire network areas, saving millions of pounds of unnecessary tree cutting. This hugely efficient approach uses airborne LiDAR (Laser scanners) to accurately measure the 3D position of vegetation and the overhead conductors. Then, using sophisticated algorithms the length and severity of the encroachment for every metre of line, to the side, above and below, is determined. Combined with existing customer data, this enables comprehensive, intelligent, multi-year cutting plans to be compiled, resulting in a truly risk based approach.

Regular surveys allow for continual monitoring and growth rate prediction providing a universal audit tool, ensuring those sections that needed cutting, have been cut. Ultimately this service reduces outages due to storm fallen trees leading to huge savings for DNOs and other overhead line operators, such as telecoms and rail.



Tree Cutting Analysis

Reducing shutdowns

Cutting costs

Health and safety

Reducing CI's

Risk-based approach

Reducing CML's

Live line working

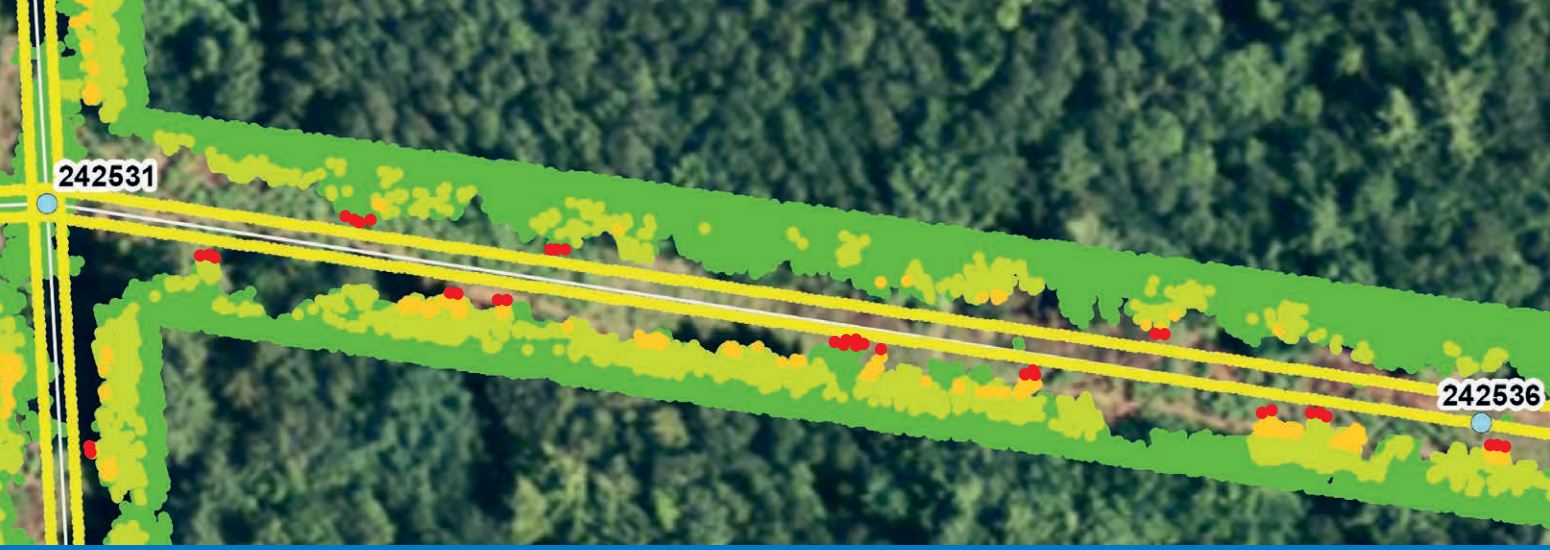
Prioritised work programmes

No. of customers

In conjunction with our partner, ADAS, we are able to provide intelligent, risk based cutting plans based on the analysis of the LiDAR survey. ADAS is the UK's largest independent provider of agricultural, arboricultural and environmental consultancy, rural development services and policy advice. ADAS has a unique combination of insight and practical experience, especially in the utilities and overhead line sector, underpinned by robust, informed, science-based information.

As well as undertaking a desk based study, ADAS has experts in the collection of field measurements used to verify the accuracy of the LiDAR analysis results, providing the level of provenance expected for inclusion as an auditing tool. It can also assist with other arboriculture aspects, such as wayleaves and tree surveys.

ADAS



ETR 132

Abnormal weather conditions
Line strike probability
Climate change
Storms
ESQCR
Weather
Falling distance
Arboricultural risk assessment
Resilience
Improving network resilience
Risk based approach
Crown reductions

Electricity Distribution Network Operators (DNOs) have a duty to keep overhead powerlines clear of vegetation to safeguard the public and to protect electricity supplies to their customers. In addition to this, in severe weather conditions, trees can cause considerable disruption to electricity supplies therefore the industry regulators require all DNOs to also make a significant proportion of their networks resilient to damage from falling trees and windborne branches. In doing this, they will be expected to comply with a guidance document produced by the Energy Networks Association - ETR 132.

In order to determine which spans are clear and which spans to target in order to make a circuit resilient, Bluesky has developed an innovative method using LiDAR and the digitised span data to determine whether a tree can hit the conductors or not. This cost effective and efficient process has already proved highly successful instantly providing a snap shot of the resilience of entire networks. This would be inclusive of all the HV spans as well as the EHV spans.

Research is continuing into developing the ETR 132 product further to consider climate, wind, soil and tree health and growth rates when modelling events.

Land Use Analysis

Asset risks
Assets
Safety risk
ACD's
Anti-climbing devices
Asset database
Access

Electricity Safety, Quality and Continuity Regulations 2002 require that DNOs ensure the safety of the public near their assets, particularly poles and towers. For this, understanding the land use in the proximity of the pole and underneath the span is crucial. Accessible poles and spans over recreational areas pose a significant risk to the public.

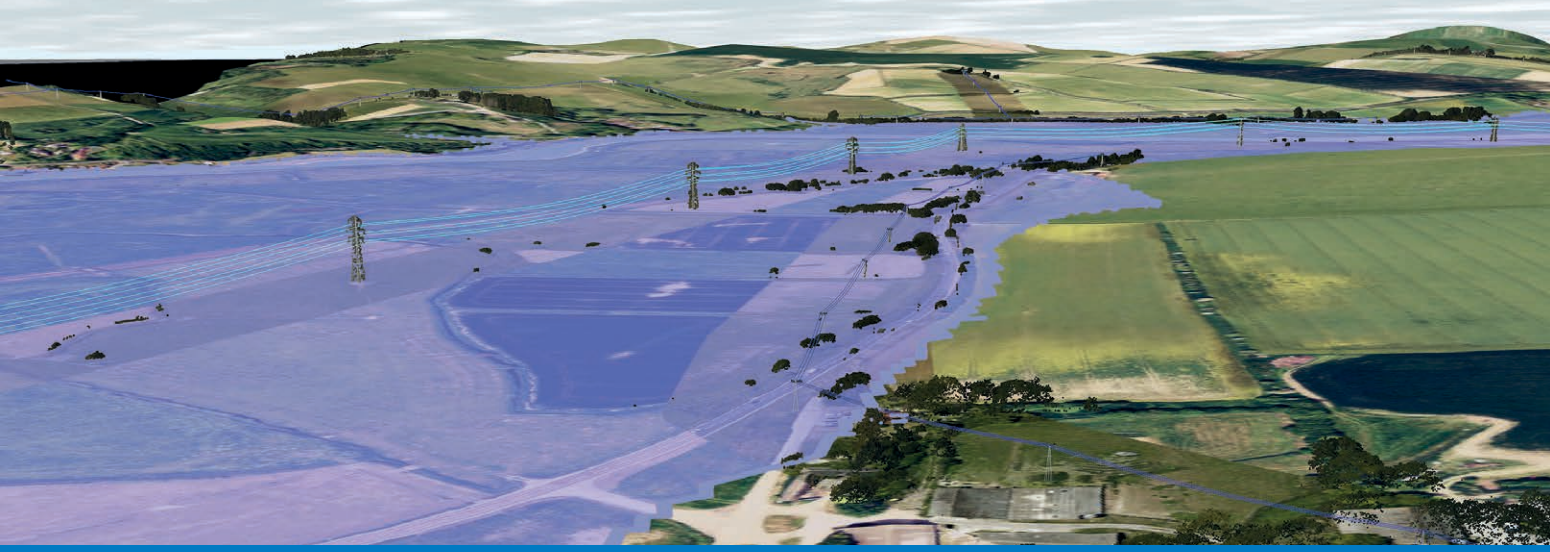
As a premier aerial survey company Bluesky has many years' experience in the acquisition, processing and interpretation of aerial photography and can effectively asses the land use for each individual pole, tower and span over an entire network via a coding mechanism. This gives DNOs huge intelligence, allowing them to accurately locate the assets that pose a risk to the public and mitigate appropriately.

Clearance & Leaning Poles

Climbable trees
Swathe
Risk of outages
Vicinity zone
Live zone
Safety
ESQCR
Consenting
Continuity of supply
ENA technical specs 43–8

Using LiDAR data Bluesky is able to determine the distance between overhead cables and the ground or other objects lying beneath. This 'clearance' analysis helps to address an important and potentially life threatening issue. Inadequate conductor clearances pose a huge health and safety risk, so the ability to easily and accurately identify the clearance for every conductor provides DNOs the intelligence they require to ensure legal requirements are being met. An automatically generated clearance report identifies spans with potentially hazardous clearance distances and prioritises site visits based on risk. Used in collaboration with land-use data this provides a powerful risk reduction tool.

Leaning poles are a common problem for DNOs, especially in certain soil types, and can affect the clearance of the cable as well as pose other safety issues. The Bluesky LiDAR solution can measure the location of the top and bottom of the pole making it a simple process to calculate the offset from vertical. DNO asset managers can have a full report of all significantly leaning poles without having to leave the office.



Other Services

Solar suitability analysis

Pipes

Underground assets

Flooding

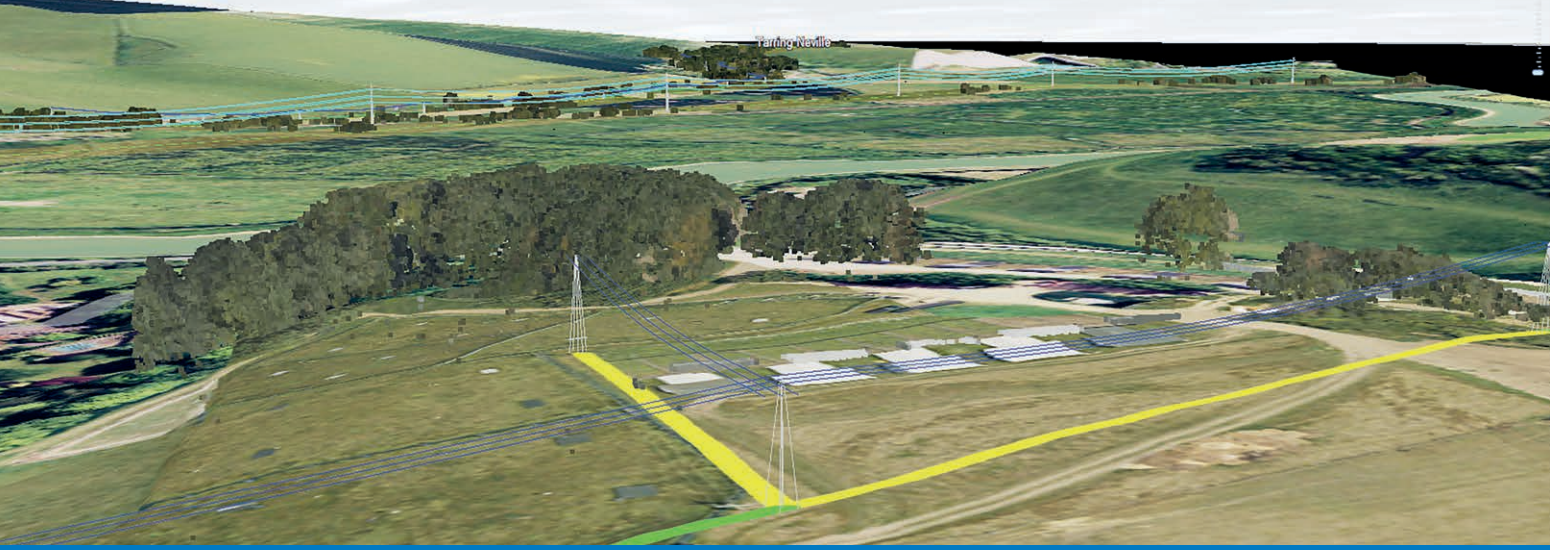
Wind farm

Power station 3D modelling

As well as services for overhead cables, Bluesky also offers a range of other services to help utilities manage their other assets. Working with Cranfield University and using the unique National Tree Map™, we have produced the Enhanced Natural Perils Data (ENPD), which indicates ground and soil risk to underground assets, in particular water pipes. Skyline 3D viewing software has an underground mode which enables organisations to view their assets in the correct geographic location, even if under the ground.

Flooding is a risk that can affect many utility assets; Bluesky can provide a range of data, including LiDAR and existing flood mapping that can aid in the risk assessment, planning and siting of assets.

LiDAR is also becoming the de facto data type for wind farm and solar farm planning. A new high density LiDAR survey is a highly cost effective way to map the lie of the land, during the planning process. Resulting terrain models can be then used for modelling, line of sight evaluation, and also visual impact. The data can include just the ground, or the ground with the trees and buildings to give more realism and accuracy to the modelling.



Skyline 3D Viewer

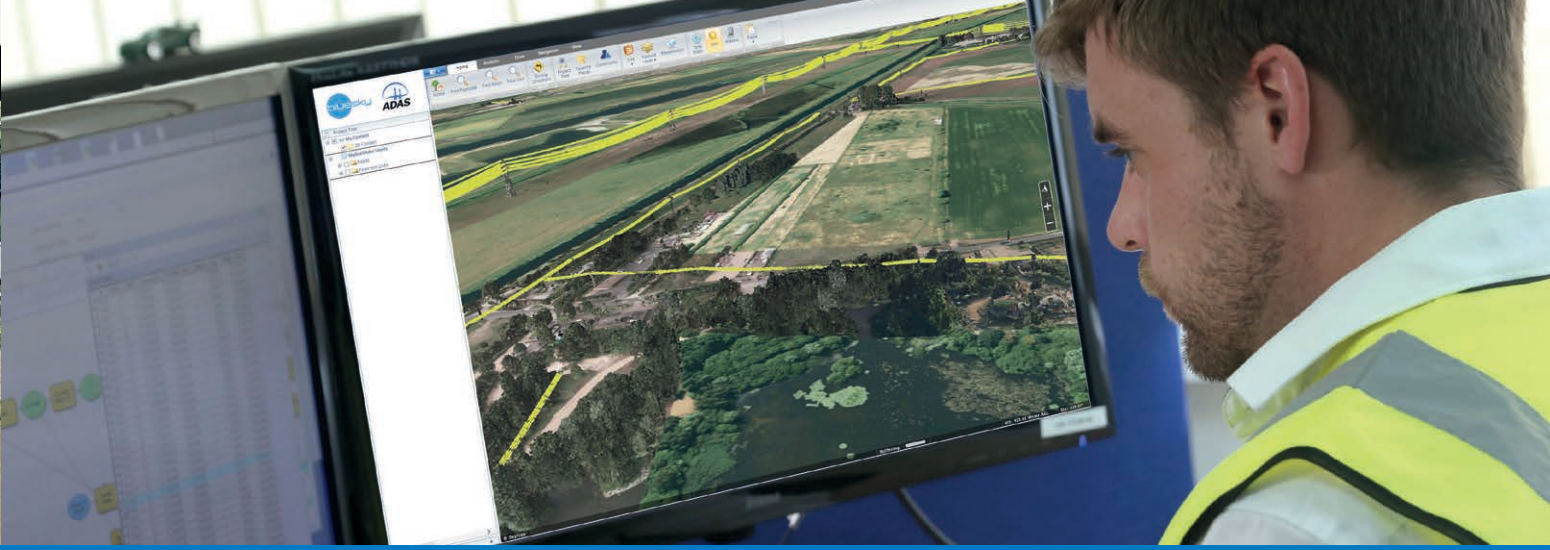
Skyline Software is one of the most powerful geospatially enabled virtual worlds available. It enables utility organisations to view and query all of their asset data on real terrain and in a fully interactive 3D environment, then serve this up over the internet to the users within the organisation or even the wider public, through an easy-to-use and familiar web browser interface. Utilities can use Skyline to share data for asset management, clearance, resiliance, maintenance, planning, environment and security to name but a few applications. Skyline even has an underground mode allowing users to view pipes and cables beneath ground level. 3D models can be photorealistic and queryable, through links to asset databases and gazetters. All common GIS data and formats can be included and visualised.

Case Study

One major UK DNO is using a Skyline solution provided by Bluesky to aid their tree cutting teams. The system is an online 3D web portal that covers the entire network area and shows the position of every pole, tower and conductor in its correct location. It also contains dense LiDAR data of all vegetation along a 100m corridor either side of the lines. Users can search for any asset and zoom directly to it to assess the vegetation that requires cutting. This enables the managers to measure in 3D the distance between the vegetation and the line at any point. The system also enables managers to assist with shutdown requests and clearance issues, as well as land use and proximity to buildings. Millions of pounds have been saved, and the whole organisation can work more effectively.

"Bluesky offers the full Skyline service, including model building, data fusion, hosting, management and training. All of your data in one amazing easy to use, cost effective 3D world. We are viewing the future."

James Eddy
Technical Director, Bluesky International Ltd.



Environmental Management

Proposal Design And Evaluation

Visualisation

Clearance

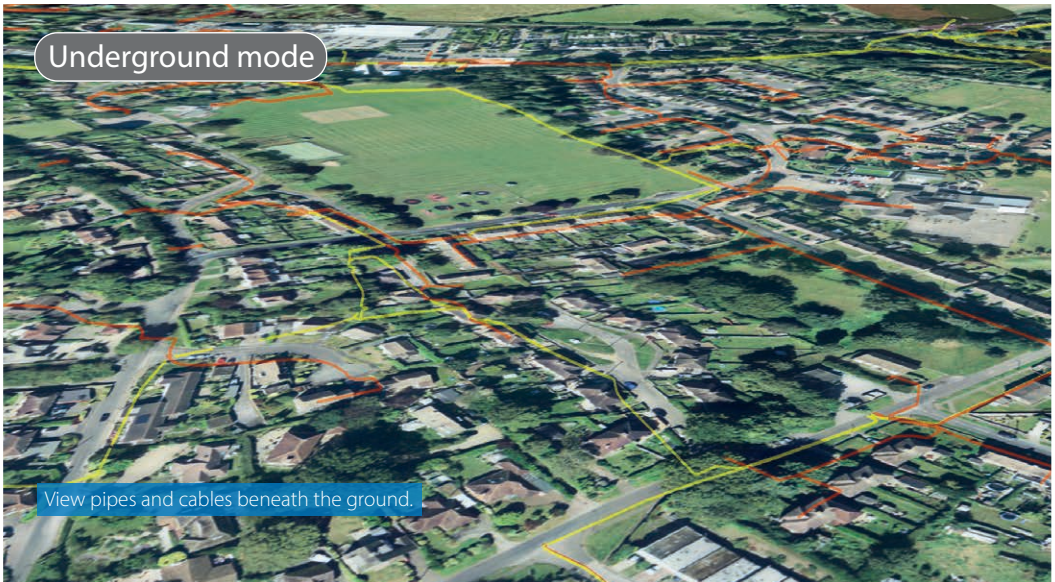
Underground Assets

Asset Management

Shutdowns

Safety

Resilience



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