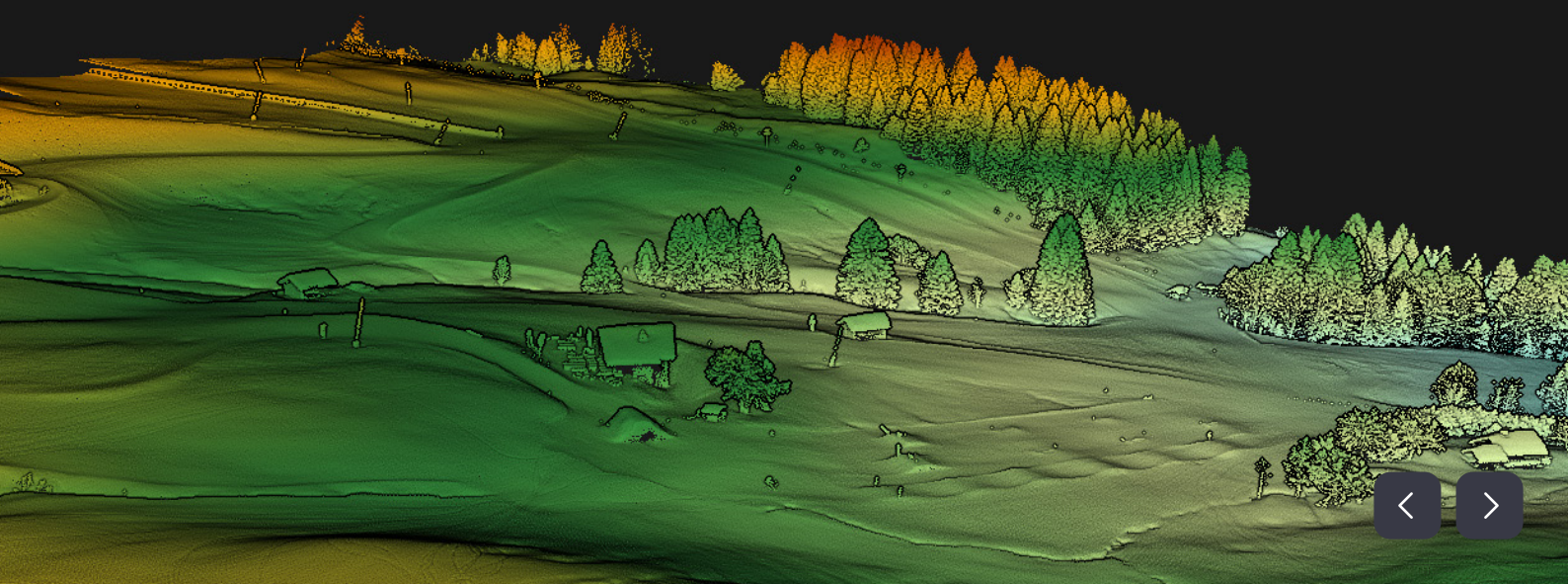
Real-World Applications and Solutions

Surveyor Ultra Success Stories Catalog.

Welcome to the **Surveyor Ultra Success Stories Catalog**, where we showcase real-world examples of how this system has been used to solve a wide range of challenges in various industries.

Each case study in this catalog provides a detailed analysis of a specific project, outlining the methodology used, the challenges faced, and the results achieved. Our aim is to highlight the potential of LiDAR technology as a powerful tool for data collection, analysis, and decision-making in a diverse range of applications.



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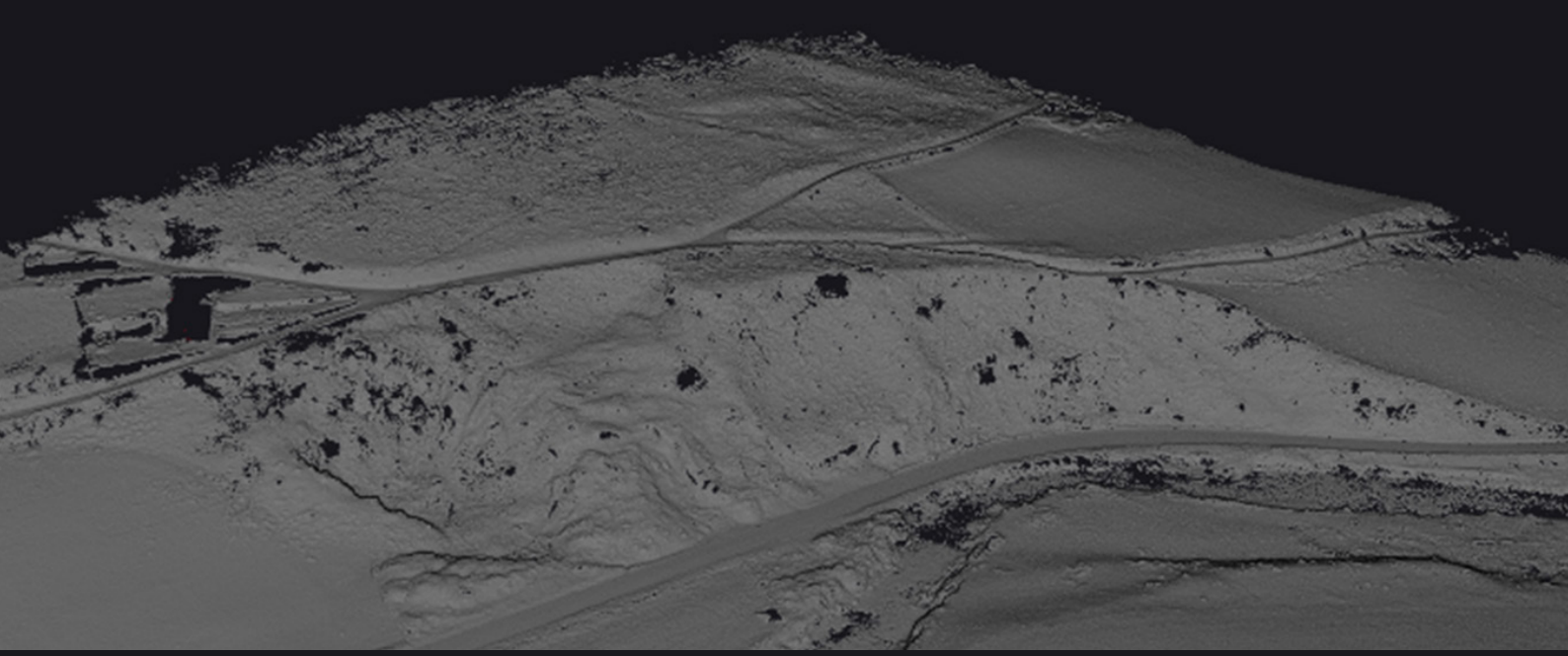


YellowScan | Designed to innovate.

Using LiDAR for Landslide Identification in North Wales

ENVIRONMENTAL RESEARCH

Challenge.

A National Forestry organization approached OR3D GEO to assess landslide risks within a large woodland In North Wales. Terrain instability and erosion are common in this area, where dense vegetation and challenging terrain have made traditional surveying methods ineffective for collecting accurate elevation data and monitoring ground movement.

A key challenge was getting accurate elevation data to create elevation models, essential for identifying potential large-scale landslides in the future. Accurate elevation models are essential for understanding terrain morphology, predicting landslide risks, and implementing mitigation strategies. Without precise data, identifying subtle shifts in the land and estimating potential landslide debris becomes challenging. To tackle this issue, OR3D GEO relied on YellowScan's LiDAR technology for the precision needed to overcome these obstacles, as it can penetrate dense vegetation and accurately map the terrain, enabling more effective monitoring and risk management.

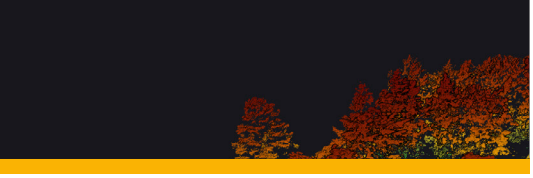
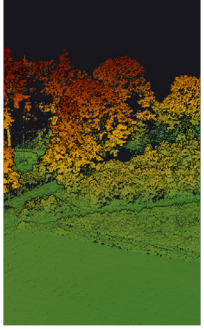
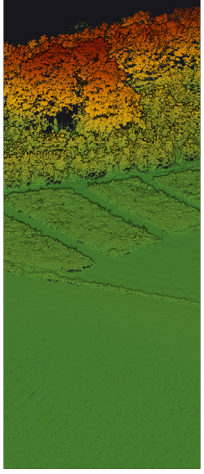
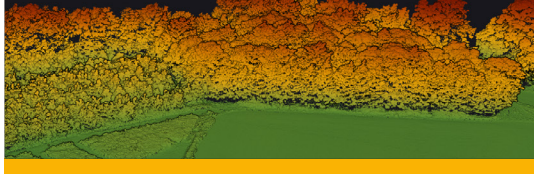
INTEGRATION
DJI M300

SOLUTION
Surveyor Ultra

> *YellowScan's Surveyor Ultra allowed us to capture precise elevation data in dense woodland where traditional methods failed. This clarity was essential to assess landslide risks accurately and offer our customer actionable insights for effective land management".*

James Earl
OR3D GEO

Company: OR3D GEO
Website: https://www.or3d.co.uk/
Country: UK

SUCCESS STORY

Solution.

Want to learn more about the Yellowscan Navigator LiDAR solution?

Scan this QR CODE

OR3D GEO selected the YellowScan Surveyor Ultra LiDAR system for this project. This system's high pulse rate of 640,000 lines per second and capability to capture three echoes per shot delivered exceptional precision, with distance measurement accuracy of +/- 25mm and precision of +/- 30mm. These specifications enabled precise mapping even in densely vegetated, rugged environments.

They used this system to capture detailed elevation data across the entire woodland area, as the high-speed laser pulses can penetrate dense tree canopies and debris, allowing for accurate measurements of the forest floor and the underlying terrain features.

Digital Terrain Model (DTM) in colour

Mission parameters.

- **Survey Size :** 60 hectares
- **Flight Duration :** One 30-minute flight at 50 meters altitude
- **Data Transmission :** Real-time, live data using Starlink
- **LiDAR Returns :** Up to 3 echoes per shot

Castle Mill tree intensity values

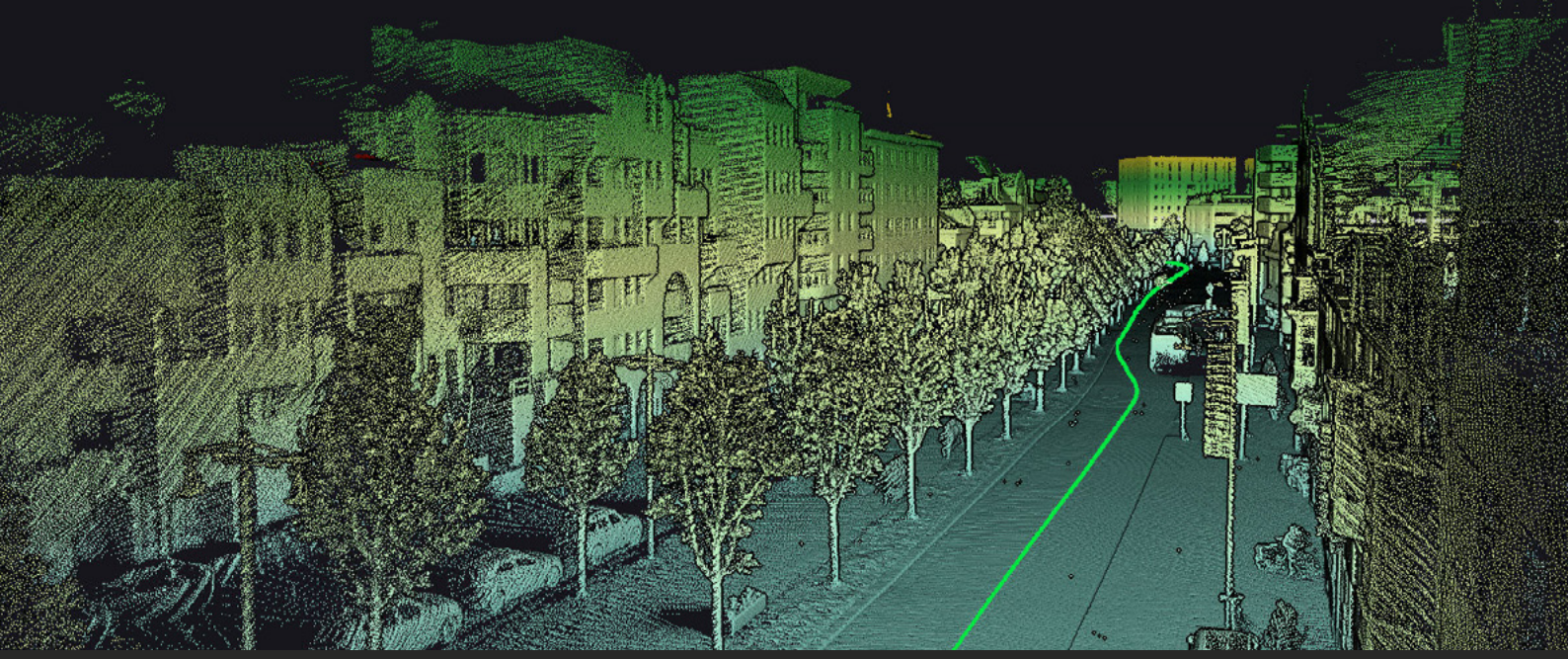
Results.

High Density Pointcloud : 300 pts/sqm

OR3D GEO successfully identified high-risk areas susceptible to landslides. The precise topographic mapping allowed them to pinpoint steep slopes and areas showing signs of previous erosion or potential drainage issues. This valuable data supported the development of effective mitigation strategies to protect the forested landscape from future geological hazards.

The YellowScan Surveyor Ultra helped OR3D GEO collect accurate data in challenging environments. This data provided useful information to the National Forestry organization, enabling them to make informed decisions about land management and conservation for the future.

Surveyor Ultra mounted on a DJI M300



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SUCCESS STORY

Urban Tree Management with LiDAR

FORESTRY

Challenge.

Our customer PXL BIO-Research offers practice-oriented solutions in urban greenery management based on innovative research. In this context, they noticed an increasing demand from municipalities, urban planners and urban foresters for tools and expertise related to the digital inventory of urban green. Both updating tree inventories and assessing the condition of trees are time-consuming processes, often influenced by a certain level of subjectivity. An efficient and standardized method to collect information about the characteristics and quality of the urban tree community is a prerequisite for quick and targeted interventions.

The mission aimed to update the tree inventory of the city of Hasselt in Belgium and to explore the potential of LiDAR technology to monitor the impact of management activities such as tree pruning in collaboration with local tree managers from De Beer & De Vos. To this end, relevant tree characteristics include the total number of trees, tree position, tree height, diameter at breast height, crown diameter, crown volume and branchless stem height.

INTEGRATION
DJI M300

INTEGRATION
CAR + Fly & Drive

SOLUTION
Surveyor Ultra

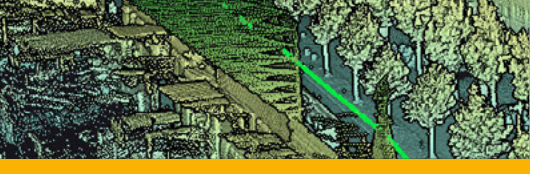
Discontinued second generation.
New generation now available!

> *We opted for the Surveyor Ultra system after an in-depth discussion with YellowScan. It soon became clear that this system in combination with the Fly&Drive option, was the best fit for our applications.*
> *We benefited from the versability and complementarity of our Yellowscan Surveyor Ultra. We are able to drive when flying is too challenging and fly when driving is not feasible.'*

Sam Ottoy
Project Manager at PXL University College

PXL UNIVERSITY COLLEGE

Company: PXL University College
Website: www.pxl.be
Country: Belgium



SUCCESS STORY

Solution.

Want to learn more about the Yellowscan Surveyor Ultra LiDAR solution?

Scan this QR CODE

Besides an accurate and high-performing LiDAR-system, this project required a platform which is applicable in an urban setting. This environment is often difficult and inefficient to access with UAVs due to airspace and privacy restrictions. An approach based on mobile mapping is therefore more appropriate.

The YellowScan Surveyor Ultra v2 is a versatile, multi-platform LiDAR sensor which can be mounted on a car using the YellowScan Fly & Drive pod. By using it as a mobile mapping system, they combined high-resolution laser scanning with precise positioning to collect georeferenced point clouds which were used for individual tree detection.

YellowScan Surveyor Ultra integrated for mobile and airbone mapping

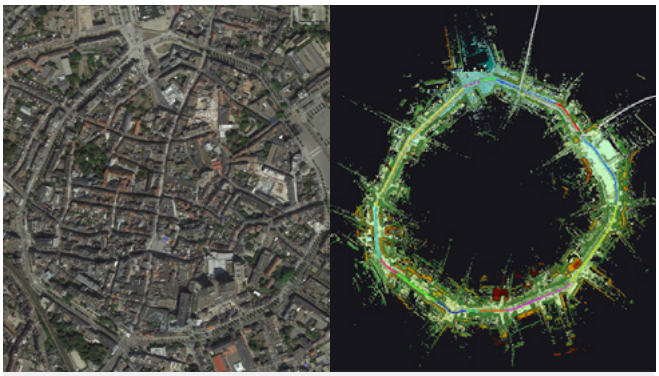
Mission parameters.

- **Survey size:** All street trees on the side of a 2.5 km road (527 trees)
- **Duration:** Planning 1 day, acquisition 2 times 0.5 day, processing 1 day
- **Number of drives:** 2 Drives
- **Speed:** 50 km/h
- **Equipment:** YellowScan Fly & Drive pod, YellowScan Surveyor Ultra V2 LiDAR system, YellowScan CloudStation, post-processing in R-software

Results.

Point density: 1610 points / m² (125,68 million points covering an area of 78076 m²).

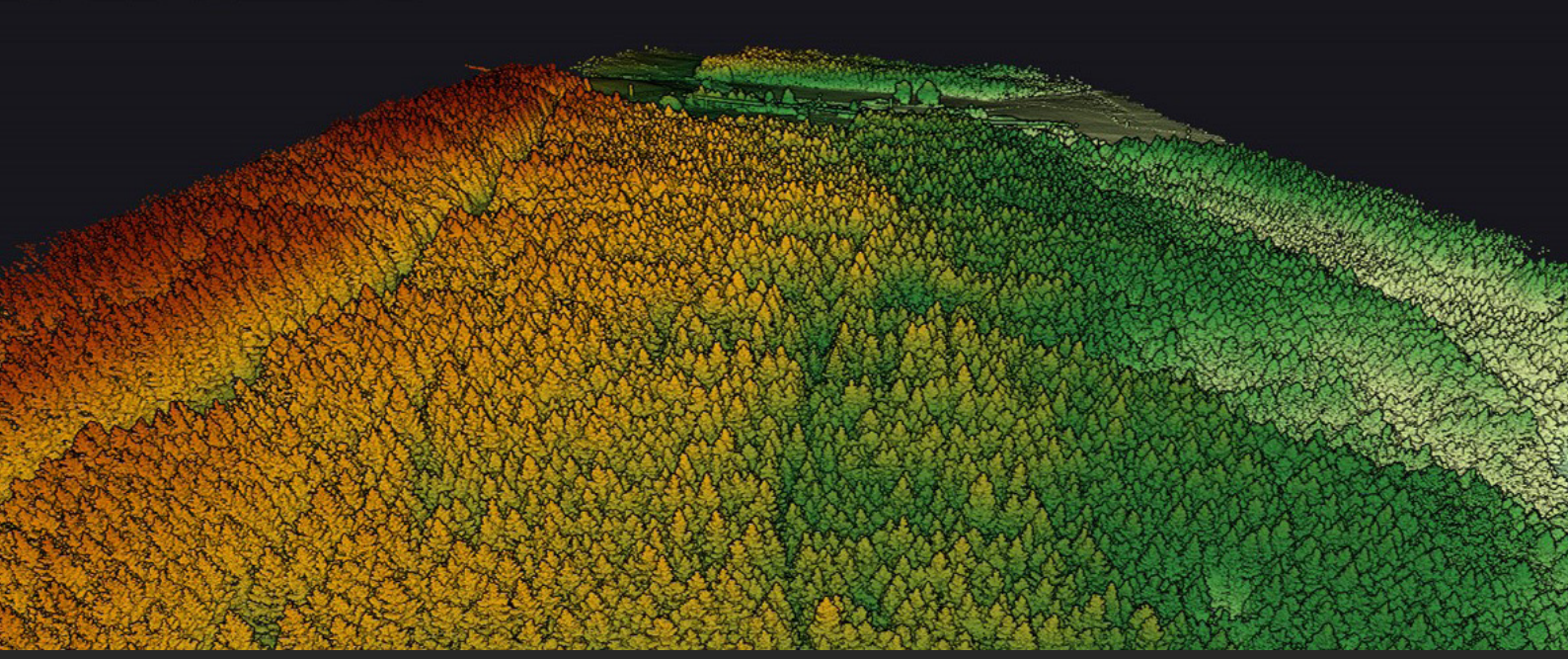
The results showed it is possible to acquire detailed information about the relevant tree characteristics: not only about the position of each tree, but also about the tree height and even diameter at breast height, crown diameter, branchless stem height and crown volume. The accuracy of the outcome was validated based on 52 manually measured trees. In addition, by repeating the same drive mission after pruning a subset of the visited trees, we were able to quantify the differences in crown volume and thus the pruning intensity. This information will allow greenery managers in future to monitor the effects of management activities and link this with data about tree health.



The town of Hasseltand and the pointcloud of Groene Boulevard

One of the main deliverables was a vectorial dataset expressing the location of each tree and its characteristics. In addition, a detailed digital twin (3D point cloud) of each individual tree was generated and allows for a follow-up of the evolution in time (in relation with growth or management).

Manually visiting and measuring each tree would have taken about two days per session, totaling four days for pre- and post-pruning assessments. For characteristics like crown projection and volume, high accuracy is crucial to properly quantify the impact of management activities. Collecting this detailed data manually would have taken significantly longer.



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SUCCESS STORY

Mapping Mountainous Regions as Part of Forestry Management Surveys

FORESTRY

Challenge.

Following a successful research and development collaboration with a government agency, our customer GeoAerospace obtained a contract to perform airborne LiDAR capture in various forestry sites along the secluded west coast of Ireland.

Their primary objective was to acquire high-quality airborne LiDAR data, as it is crucial for mapping remote mountainous regions as part of forestry management surveys. This data plays a vital role in generating accurate terrain models for hydrological analysis, enabling the mapping, identification, and quantification of river channels concealed beneath dense canopy cover.

Given the distinctive terrain characteristics, the survey presented significant challenges to access the sites using conventional survey aircraft. The vast scale of the areas and the rugged, remote mountainous terrain made ground-based surveys impractical.

INTEGRATION
DJI M300

SOLUTION
Surveyor Ultra

Discontinued first generation.
New generation now available!

> *The sites presented several challenges in terms of access to high mountainous valleys for our survey aircraft, so having access to high-quality drone-based LiDAR data enabled us to deliver the required data of equal standard/accuracy with greater point density. The deployment speed of our YellowScan LiDAR system is often faster than that of our survey aircraft. This swift deployment is crucial in time-critical survey scenarios.*

Fearghus Foyle
CEO - GeoAerospace

GeoAerospace

Organisation: GeoAerospace
Website: www.geoaerospace.com
Country: Ireland

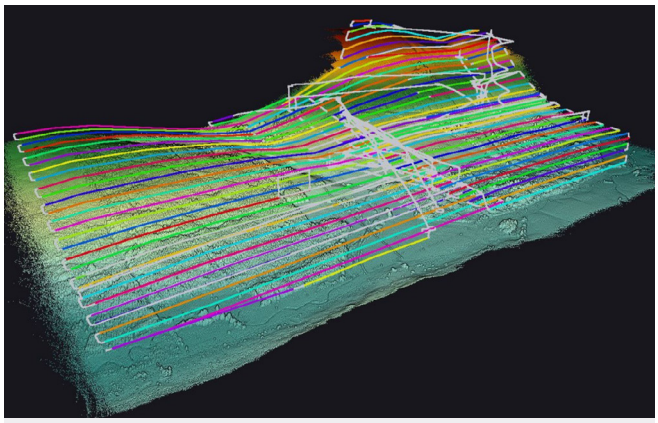
SUCCESS STORY

Solution

Want to learn more about the new generation Surveyor Ultra LiDAR solution?

Scan this QR CODE

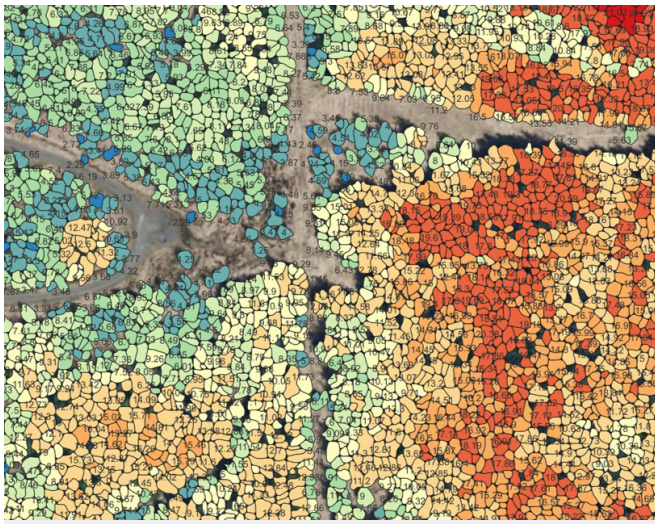
In response, GeoAerospace was given the task of collecting LiDAR data across multiple sites with their YellowScan Surveyor Ultra. The goal was to generate terrain models and assess the hydrological morphology at each location. To tackle the complexities of the environment and adverse weather, drone surveys using automated terrain-following were used at specific sites. This approach ensured accurate and homogenous data collection as well as analysis under challenging circumstances.



flight plan of the area (around 300 hectares/750 acres)

As part of their long-term business strategy, GeoAerospace aims to provide added value to their clients through the data they collect. They effectively used the vegetation penetration property of LiDAR, and the multi-echo capability, to map in detail the vegetation levels and then incorporating it into forestry inventory processes, offering an additional service to their clients.

This initiative proved to be very successful in establishing streamlined workflows for generating tree maps, enabling detailed forestry inventory assessments at scale, on thousands of individual trees. Key attributes such as tree height and crown spread were accurately measured, providing valuable insights to support effective forestry management.



Tree Map with tree height and crown diameter for 1000's of individual trees

Mission parameter.

- **Survey size:** Several sites - all approximately 300 hectares (750 acres)
- **Duration:**
  - 1-2 days of flight planning (per site) due to the complexity of access to each take-off and landing point and to secure landowner permissions
  - 1-2 days on site (per site) due to mobilization and access issues to various locations to maintain line-of-sight operations
- **Number of flights:** Approx. 8 x 20-minute flights per site
- **Flight speed and altitude:** 70m AGL (terrain following via UGCS) 10m/s
- **Equipment:** Yellowscan Surveyor Ultra LiDAR system
- **Drone:** DJI M300
- **Trajectory Correction:** PPK using CORS station operated by Ordinance Survey Ireland




SUCCESS STORY

Results

Want to learn more about the new generation Surveyor Ultra LiDAR solution?

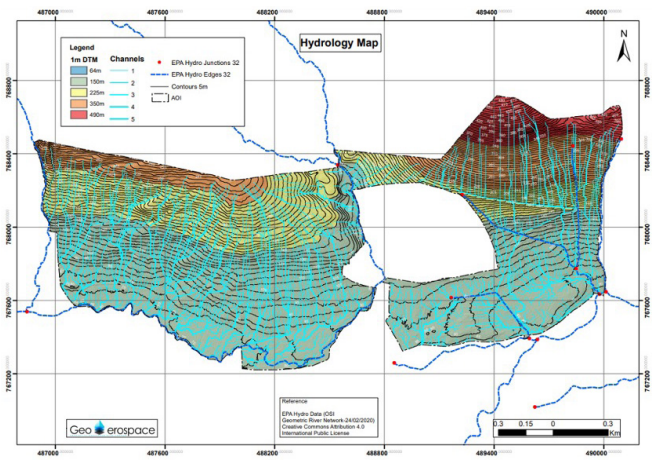
Scan this QR CODE

- **Point density:** 200+ points per meter
- **Accuracy:** 5cm

Digital Surface Model & Digital Terrain Model (5cm GSD)

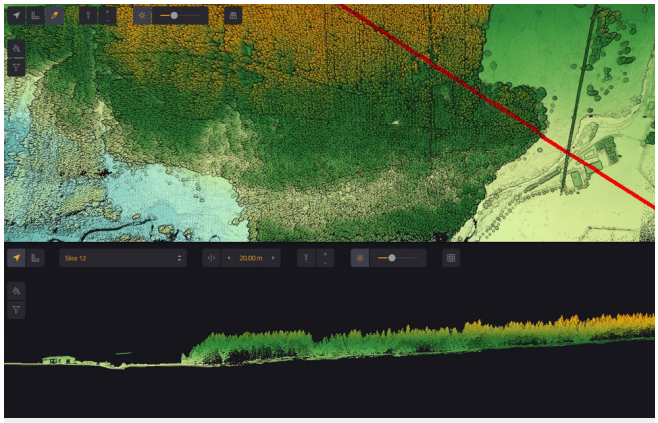
The aerial LiDAR data provided valuable data that would have been challenging to obtain using alternative methods due to the large size and remote, densely forested locations of each site. This data was acquired in a cost-efficient and timely manner.

Apart from the standard pointcloud, contours, DSM (Digital Surface Model), and DTM (Digital Terrain Model), GeoAerospace were also able to provide client-specific deliverables derived from the LiDAR data. These included a suite of additional maps such as slope, aspect, elevation & hydrology.



Hydrology Map showing elevation in relation to stream typology

The high-quality LiDAR data and dense pointclouds enabled a thorough analysis of the terrain underneath the canopy, leading to precise hydrological assessments of the landscape. Compared to alternative methods like ground-based surveys, their approach significantly reduced acquisition time, cost, and on-site duration.



Cross section through forestry

Given the requirement to fly their survey aircraft at 500m (1500ft), within the range of the aircraft's LiDAR, and the challenges posed by navigating mountainous terrain, it was deemed unsafe to fly the aircraft into the valleys.

Fortunately, according to GeoAerospace, having access to excellent drone-based LiDAR data allowed them to deliver data of equal accuracy and standards, but with a higher point density. They also put the emphasis on the exceptional efficiency with which their YellowScan LiDAR solution and CloudStation deliver data, meeting the high standards set by many of their clients.

They further highlight that, although specific support wasn't requested for this project, YellowScan consistently provides efficient, timely, and high-standard support.

YellowScan | Designed to innovate.

SUCCESS STORY

Building the digital twin of the Chain Bridge in Budapest

CONSTRUCTION & ENGINEERING

INTEGRATION
DJI M600

SOLUTION
Surveyor

Discontinued first generation.
New generation now available!

Business need.

How did data captured by drones help create a digital twin of the Széchenyi Chain Bridge?

This project, led by our customer Ventus-Tech in Hungary, aimed to establish a baseline and record the status of the bridge before its restoration started. The scan of the present state of the bridge will serve as a baseline to compare its status after the restoration is done, where a final scan will be performed.

Ventus-Tech's main goal was to showcase the capabilities of state-of-the-art sensors and post-processing solutions, to help the workflow of construction companies, and to raise awareness related of BIM-solutions.

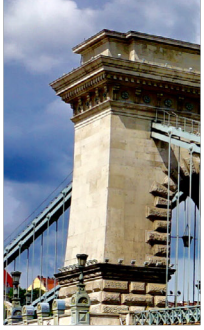
They wanted to meet the requirements of the modern age and create a solution that could be integrated into BIM systems, by taking up this opportunity to work on the Chain Bridge, which is a national symbol of innovation in Hungary.

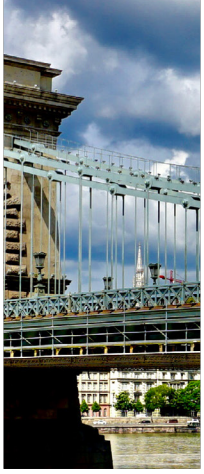
> *The value of a digital twin cannot be connected to a single stage of construction, it can be utilized at pricing, design, construction and even at operation stages. Thanks to the YellowScan Surveyor, we were able to succesfully complete this project!*

Balint Vanek
Chief Technology Officer
Ventus-Tech

VENTUS TECH

Company: Ventus-Tech Ltd.
Website: www.ventustech.hu
Country: Hungary





SUCCESS STORY

Solution

Want to learn more about the new generation Surveyor Ultra LiDAR solution?

Scan this QR CODE

Challenge.

In order to survey all parts of the bridge, various sensors and unmanned vehicles were needed. A rotary wing drone with an RGB camera was used to take top and side views using RTK GPS, and a LiDAR sensor, the YellowScan Surveyor, was mounted on a drone to map the bridge. A static ground laser scanner and a robotic boat were also used to take RGB camera images of the bridge's underside, as well as a multibeam sonar to scan the riverbed to remove bombs and debris.

Flying legally in the heart of the city center was no easy task. Ventus-Tech had to get special permission from the aviation authorities. The decision stated that the Carmelite Monastery (Prime Minister's Office) and the Sandor Palace (President's Office) had to be kept at a safe distance of 150m. They were also not allowed to fly over the Ministry of Interior. With this information in mind, they planned their flight route and complied with the city's request.

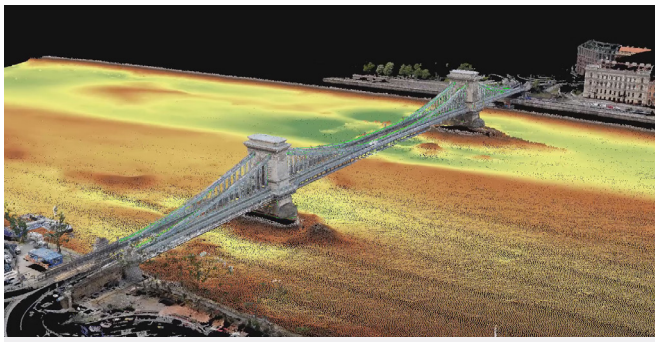
Solution.

The use of a LiDAR system was essential to carry out this task, Ventus-Tech therefore chose the YellowScan Surveyor. This system was ideal for this project due to its versatility, ease of use, and 360 degrees laser scanner. It is also ideally suited for urban surveys subject to strict flying regulations requiring extra-lightweight payloads.

YellowScan Surveyor mounted on a DJI M600

Mission parameters.

- **Survey size:** 60m x 420m
- **Duration:** 30 days flight permit, 2 days for the flights (LiDAR, photogrammetry), 1 day for the boat, 1 day for the sonar, 16 days vectorization and post-processing
- **Number of flights:** 3 (1 LiDAR / 2 Photogrammetry)
- **Flight speed & altitude:** 4 m/s, 40m above the road surface, 55m above the water
- **Equipment:** DJI M600 Pro, YS Surveyor, RGB Sony a6400 camera with Zeiss Ventum 21mm lenses and a static laser scanner
- **Main target:** the bridge itself (60m high by 40m long)



LiDAR pointcloud of the Chain Bridge

Results.

The point density was 100points/m^2 and the accuracy was under 5cm, which gave Ventus-Tech a complete pointcloud with a high level of detail. Some parts of the structure, where aerial scans were not possible, were augmented with TLS scans, and the photogrammetry pointcloud was adjusted based on the ALS results.

Ventus-Tech indicated that the data quality obtained was excellent and that they have now developed a workflow to seamlessly combine data from different sources.

YellowScan | Designed to innovate.

SUCCESS STORY

How Digital Terrain Models helped find under vegetation archaeological features

ARCHAEOLOGY

Business challenge.

GeoAerospace, an Irish geospatial Data-as-a-Service provider, was contracted to provide high density LiDAR and high resolution orthophotography maps of Holy Island, a historic monastery on an island in Lough Derg, Ireland. The final data would become part of an archaeological assessment of the monastery.

Gaining access for a survey team and associated equipment to survey the island was a challenge, so aerial surveys were preferred in this case. Using remote sensing drone technology reduced any requirement to set foot on the island and enabled the aerial survey to be comepleted safely from the mainland.

Solution.

Typically, this type of archaeological survey is carried out by 'boots on the ground' i.e., surveyors & engineers travelling to the island by boat and surveying the landscape and buildings using traditional methods. The project could have been done with photogrammetry alone, but a Digital Terrain Model was required to penetrate the vegetation and help identify any archaeological features under the canopy, so LiDAR was the preferred method for this site.

INTEGRATION
DJI M300

SOLUTION
Surveyor Ultra

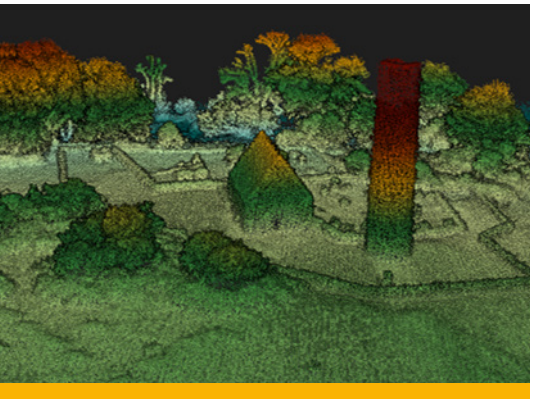
Discontinued first generation.
New generation now available!

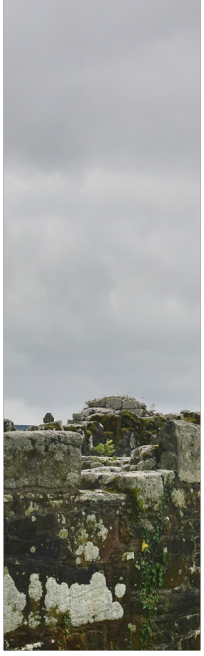
> *Working with the Yellowscan support team allowed us to greatly improve our data acquisition and processing workflows. We have validated the Yellowscan Surveyor Ultra data by measuring against high quality terrestrial scanner data. This showed accuracies in x, y and z of +/-5cm and has allowed us to validate the quality of our data, which is critical to meeting our client requirements.*

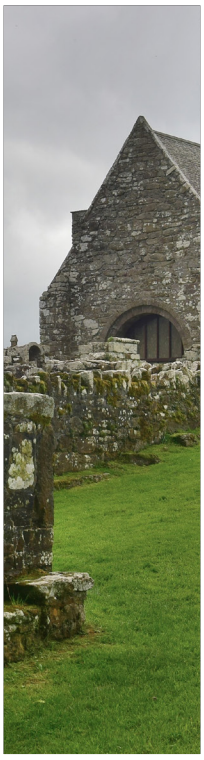
Fearghus Foyle
CEO
GeoAerospace

GeoAerospace

Organisation: GeoAerospace
Website: www.geoaerospace.com
Country: Ireland







SUCCESS STORY

Solution

Want to learn more about the new generation Surveyor Ultra LiDAR solution?

Scan this QR CODE

Acquisition.

The speed at which the Surveyor Ultra enables high quality data acquisition over inaccessible sites, allows the drone team to capture multiple sites in a single day. Historically, this type of survey work could take days to complete but with advanced aerial sensors like the Surveyor Ultra, time on site is significantly reduced.

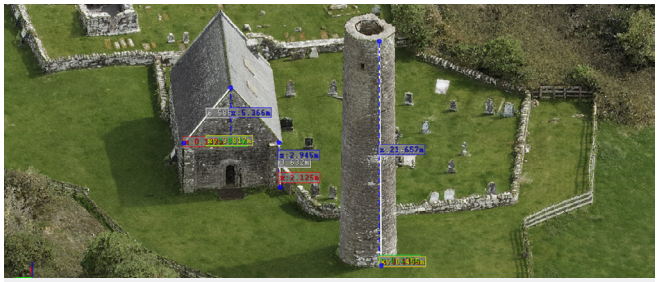
In this case of this particular 50-hectare site, the drone team were on site for less than 2hrs between set up, data acquisition and shut down. Not only does this rapid acquisition enable companies increase operational efficiency, but it also allows public sites to remain open, or to reopen quickly should they have to close during the survey.

Mission parameters.

- **Flight altitude:** 70m AGL - Overlap: 50%
- **Swath width:** 40m
- **Number of flights:** 2
- **FOV:** 60-degree (30 degrees off Nadir)
- **Survey area:** 50ha (island)
- **Survey time:** 1hr 40mins on site (40mins LiDAR / 1hr RGB)
- **Planning:** 0.5 day planning (risk assessments/flight planning etc.)

Results.

To carry out a LiDAR survey of Holy Island (known as Inis Cealtra in Gaelic), Ireland. The minimum requirements were 8ppm and a 50cm DTM and DSM. GeoAerospace delivered 10cm DTM & DSM, point cloud with up to 250ppm and 2cm GSD orthophoto.



Digital Replica of Holy Island mission

Surveyor Ultra Benefits.

- 360° Field of View, ideal for vertical mapping
- Productivity solution optimized for VTOL fixed-wing
- Suitable for mobile mapping with Fly&Drive
- High point-density
- Turn-key: simple to operate and self-powered
- Can be mounted quickly on most UAV's

The Yellowscan Surveyor Ultra was purchased by Maynooth University as part of NATDaP, a Science Foundation Ireland funded Research Infrastructure programme (18/RI/5810).

YellowScan | Designed to innovate.

SUCCESS STORY

Overcoming geotechnical engineering challenges with LiDAR for road monitoring

ROAD & RAILWAY | CONSTRUCTION & ENGINEERING

Business need.

Diospatial's client is responsible for managing geotechnical risks along a 170km long rural road which travels through remote and rugged terrain and is prone to landslides and rock fall. The client conducts routine inspections and geotechnical risk assessments as part of their geotechnical management plan.

However, the rugged nature of the area - dense vegetation and large sandstone escarpments - limits the ability to use conventional inspection methods. Only the slope areas immediately adjacent to the roadway were assessed, leaving the majority of the slope largely unassessed and the risk profile uncertain.

Solution.

The YellowScan Surveyor was utilised to survey the slopes on both sides of the valley from creek to crest. In four days, an area of 400ha of mountainous terrain was covered, exceeding 250m of vertical relief in some places.

INTEGRATION
DJI M600

SOLUTION
Surveyor

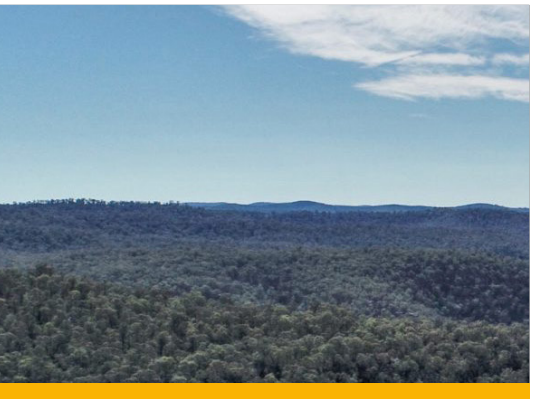
Discontinued first generation.
New generation now available!

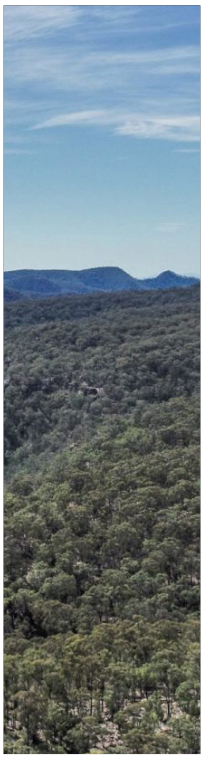
> *Flying low and slow with the surveyor and processing with high scan angles achieved more than 400 points/m² – providing incredible detail of surface topography including cliff faces, inside caves and beneath overhangs.*

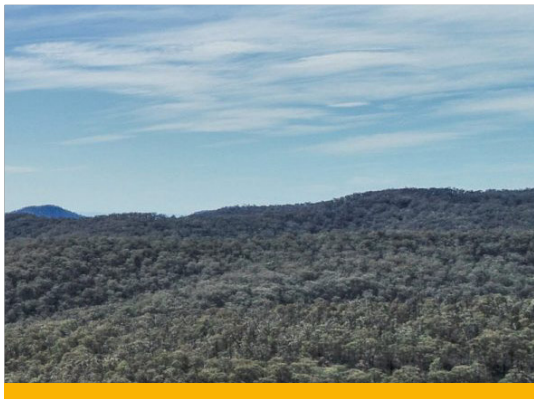
Zack Wasson
CEO and Founder
Diospatial

DIOSPATIAL

Company: Diospatial
Website: www.diospatial.com
Country: Australia







SUCCESS STORY

Solution

Want to learn more about the new generation Surveyor Ultra LiDAR solution?

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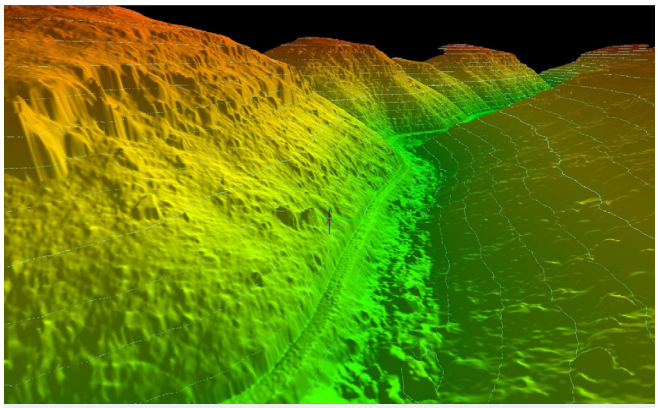
Acquisition.

4 days operating along 5km of road length and capturing an 800m corridor width with up to 250m of vertical relief. Pre-programmed flights were optimised to increase point density and data capture along cliff faces and within caves.



Digital Terrain Model of the area (DTM)

Mission parameters.

- **Number of flights:** 27
- **Survey size:** 400ha
- **Flight speed:** 4m/s
- **Flight altitude:** 50m AGL

Results.

The high-resolution LiDAR point cloud was then classified for ground points with extensive manual refinement to ensure that boulders, erosion gullies and other geological features were retained in the ground classification and evident in the resulting digital terrain model (DTM).

The resulting deliverables provided geotechnical engineers with a high-fidelity DTM for use in rockfall modelling as well as identifying the location and extent of boulders, landslide debris, erosion gullies and overhanging rock formations - essentially providing a heatmap of potential rockfall sources throughout the assessment area.

The data reduced uncertainty and improved the geotechnical engineer's confidence in the risk profile enabling and optimised decision making.

Benefits.

- High density data
- Detailed DTM beneath dense vegetation
- 50mm RMSE
- Variable scan angle to optimise point density in caves and steep terrain

YellowScan | Designed to innovate.

SUCCESS STORY

LiDAR remaps Diamond Vista Wind Farm in Tornado Alley : Saves $1M

CONSTRUCTION & ENGINEERING | ENERGY & UTILITIES

Business need.

Juniper's client was an Engineering Procurement Construction (EPC) contractor with a subcontract to create the Diamond Vista Wind Farm at an estimated cost of U.S. $400 million. The EPC expected to set up 92 wind turbine pad sites across 345 km of access roads over a 62 km area.

However, initial land surveys proved inaccurate, construction could not continue using existing DTM data. Traditional surveys would have incurred extremely expensive delays with heavy machinery sitting idle and possible late delivery penalties.

Solution.

The Surveyor was able to remap over 8,800 hectares in just three days of collection, as opposed to traditional surveying methods that would have cost delays of up to six weeks. Because of the quality of the resulting digital terrain surface captured by the YellowScan Surveyor, the client saved an estimated one million dollars in additional earth-moving costs.

INTEGRATION
DJI M600

SOLUTION
Surveyor

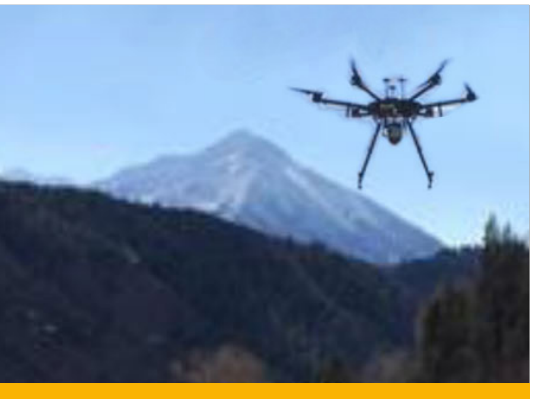
Discontinued first generation.
New generation now available!

> *With a traditional survey you might get a data point every 50 feet. With our YellowScan Surveyor we were able to deliver between 40 to 45 points per square meter–incredibly accurate data for our client.*

Brian Soliday
Chief Revenue Officer
Juniper

juniper unmanned

Company: Juniper Unmanned
Website: juniperunmanned.com
Country: Texas, USA



SUCCESS STORY

Results

Want to learn more about the new generation Surveyor Ultra LiDAR solution?

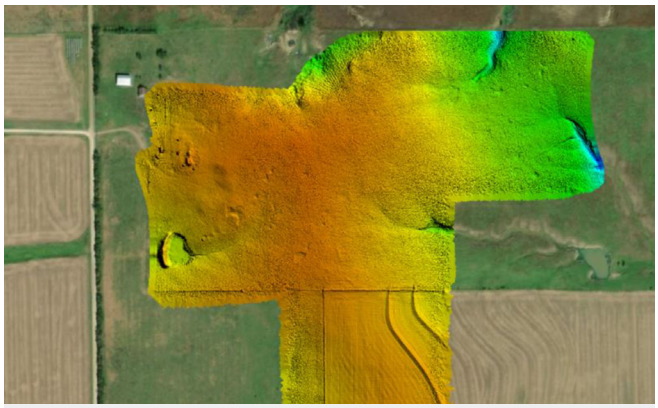
Scan this QR CODE

3 days of data processing delivered all survey data and value-added products:

Digital Terrain Models (DTMs) in .XML format,1 foot Contours, Cut-and-Fill Reports for each pad/road and GPS Machine Control Files.

Acquisition.

3 days operating on-site across a 62 sq km geographic area with pre-programmed drone missions capturing a 76 meter swath of LiDAR. Accurate data acquired in winds under 32 kph, overcoming challenging site access logistics.



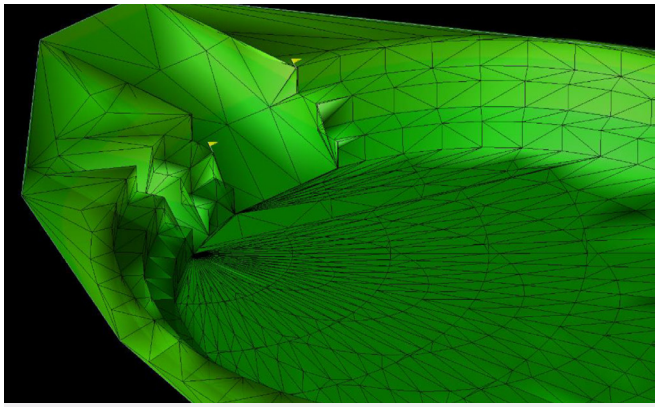
Bare earth Digital Terrain Model (DTM)

Benefits.

- High density data
- Fast data turnaround
- Access to difficult areas
- 40-45 points per m²
- Rapid deployment
- Maximum efficiency

Mission parameters.

- **Number of flights:** Confidential
- **Survey size**: 8800 hectares
- **Swath:** 76 m
- **Flight altitude:** 50 m



Machine Control Model

YellowScan | Designed to innovate.

SUCCESS STORY

How Enedis detects offending vegetation around powerlines

ENERGY & UTILITIES

Business need.

Mapping the vegetation around powerlines is a major issue for most energy companies around the world. The goal is to detect offending vegetation around powerlines in order to efficiently organize targeted pruning. Another expressed need is the mapping of the powerline itself to detect any problems (loose or ripped cable, object falls...).

The mapping is currently done on foot or with a LiDAR on a helicopter. The issues encountered whilst walking are hard to access areas as well as a visual evaluation that can lack precision. For the helicopter there are high costs and a low reactivity due to fully booked service providers.

Being able to map small areas of interest to complete the helicopter's annual work would greatly improve the pruning process, therefore reducing mobilization costs for both mapping and pruning.

YellowScan lightweight UAV LiDARs enable the quick and easy collection of detailed data about the powerlines and its environment, which is not possible through the use of remote sensing imagery or Radar and takes longer and costs more with classical airborne LiDARs or on foot methods.

INTEGRATION
DJI S1000

SOLUTION
Surveyor

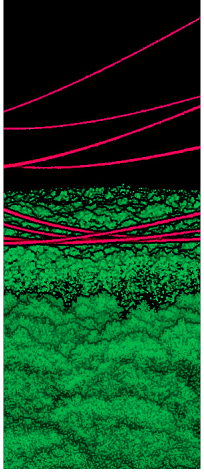
Discontinued first generation.
New generation now available!

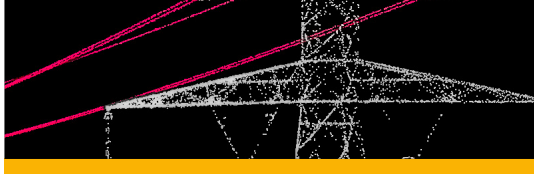
> *YellowScan UAV LiDARs enable the quick and easy collection of detailed data about the powerline and its environment.*

Daniel Dumas
Enedis

ENEDIS
L'ELECTRICITE EN RESEAU

Company: Enedis
Website: enedis.fr
Country: France





SUCCESS STORY

Solution

Want to learn more about the new generation Surveyor Ultra LiDAR solution?

Scan this QR CODE

The generated point cloud leads to 3D maps of the powerline and surrounding vegetation, and further key metrics can be calculated, such as detection of offending vegetation.

Data post-processing.

The LiDAR is provided in the open-source LAS point cloud format, which is the industry standard. Here are the steps followed by Dielmo3D to extract the essential information and provide it to Enedis :

1. Vectorization of each voltage line, with auto snapping.

3. Using Dielmo Open LiDAR, an automated classification is run using a subsample of the LAS files that are contained in a buffer around the powerlines' poles and conductors. It is then verified and edited manually as the powerline structure is considered vegetation. Once the classification ends, profiles are extracted.

3. Vegetation encroachment detection in the network: the goal is to detect, analyze and assess the risk of potential forest fires at different levels from it. The buffers are based on the voltage, conductor type, span length and position of the vegetation along the span. For each voltage, a vector layer of polygons showing the classified OV and the minimum 3D distance inside the polygon are generated. Vegetation that is encroaching over the conductors is also identified as an overhang.

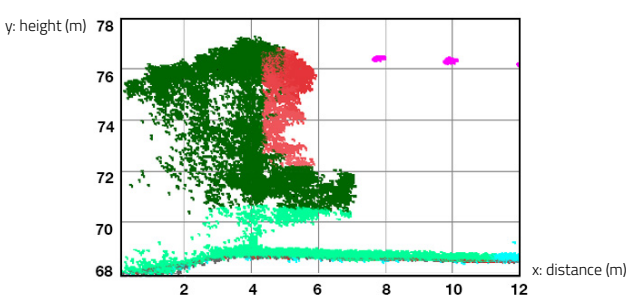
4. Tree fall risk: an algorithm checks each pixel of the Digital Surface Model (DSM) and assesses if the height of the vegetation stands above an imaginary line at 45° from the nearest power line : the vegetation over this line might hit it. As a result, a vector layer of polygons with the delimitation of the regions with tree fall potential helps them prioritize the risk.

5. Ground clearance: This measurement is done directly on the LiDAR point cloud. Dielmo's own algorithms are used for this step to measure the minimum distance to the ground for each point of the wire. The result is an Excel spreadsheet to find violations of the regulations to prioritize the next actions.

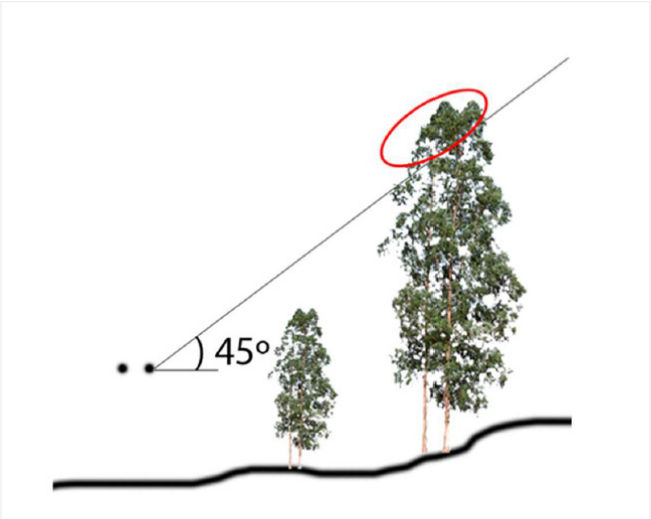
Results.

The Surveyor solution provided approximately 20 pts/m^2

(1.86 pts/ft^2) thanks to its 2 echoes per shot, allowing information on the powerline and surrounding vegetation to be extracted. The raw point cloud was classified to identify offending vegetation and produce the expected output (excel file indicating key areas and maps).



Cross section of mapped hazards



Tree fall logic

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SUCCESS STORY

Highway Infrastructure LiDAR mapping survey

ROAD & RAILWAY | CONSTRUCTION & ENGINEERING

INTEGRATION
DJI M600

SOLUTION
Surveyor

Discontinued first generation.
New generation now available!

Business need.

We needed to capture raw data for complete geographical surveys of linear infrastructure in a safe and efficient way. The goal is to capture the present geographical state of a 47 km long highway segment with its supporting infrastructure (one of the busiest roads in Central Europe) to start designing the extension of the road from 2+2 lanes to 3+3 lanes.

The road should not be closed during the survey. The survey had to be done in the shortest time and document the present state in the highest detail, in case something has to be measured in the future. The engineering design of the road will be based on the data.

Finish the survey with the least interruption to traffic, in a shortest amount of time and document the present state in the highest detail, in case something has to be measured in the future.

Acquisition.

Our lightweight UAV Lidar, YellowScan Surveyor, enabled quickand easy collection of detailed data about topography of the surveyed area.

> *Customer support of Yellowscan was incredibly good, they provided extremely valuable support to set up such a complex and large project.*

Balint Vanek
Chief Technology Officer
Ventus-Tech

VENTUS TECH

Company: Ventus-Tech Ltd.
Website: www.ventustech.hu
Country: Hungary

SUCCESS STORY

Solution

Want to learn more about the new generation Surveyor Ultra LiDAR solution?

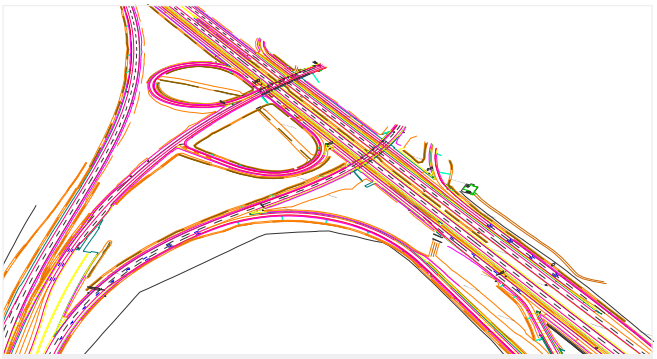
Scan this QR CODE

« We aimed for 100 points/m² (10 pts/ft2), ideally >10 point/m² from the ground, ditches on the sides of the road are very important for drainage, where significant vegetation is present. We had to proove < 5cm (2") absolute accuracy due to volume of Earthworks. Vectorization of present state is done using the combination of LIDAR and photogrammetric survey. The technology is developed by MindiGIS, partner in the project. »

YellowScan Surveyor, LiveStation and RGB camera on a M600 from DJI

Benefits.

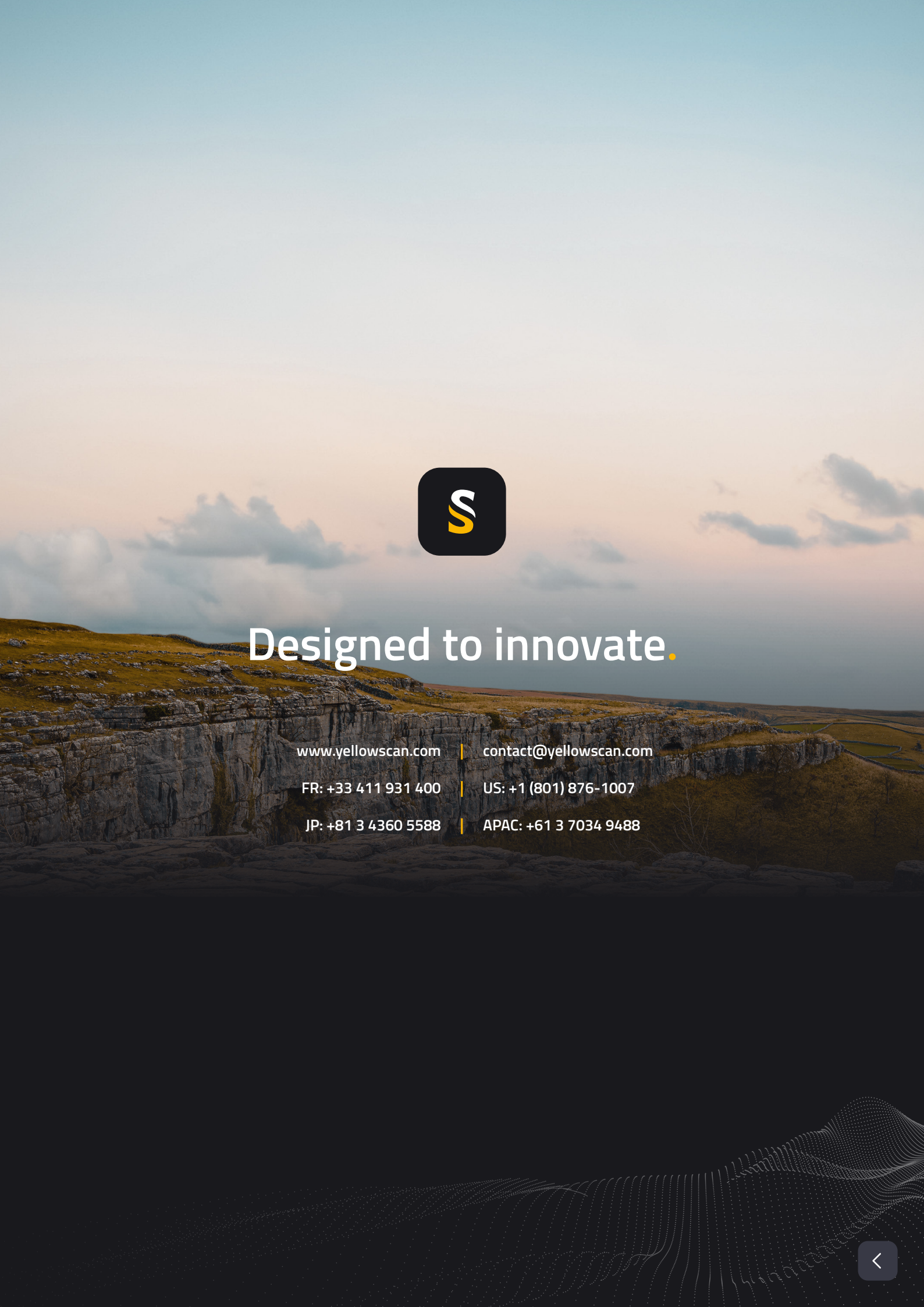
The Yellowscan Surveyor is truly a turnkey solution for such an advanced application. In case manual survey has to be done, the surveyors have to work during partial road closure, which is dangerous and costly. Due to the great amount of detail we can add items to the survey list in the office without going back to the field.



Road with surrounding infrastructure and terrain: geodesy for road reconstruction and extension

Mission parameters.

- **Number of flights:** 88
- **Survey Size:** 47 km lenght (155 000 ft)
- **Flight speed:** 5 m/s
- **Flight altitude:** 40 m
- **Sofware:** UGCS, Pix4D, Yellowscan QGis module, TopoDOT
- **Duration:** 1 month
- **Add-on:** Leica GNSS base station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