Advanced LiDAR Techniques for Landslide Identification

At A Glance

OR3D GEO utilised advanced aerial LiDAR technology to assess landslide risks in a densely vegetated woodland. **LiDAR** provided precise elevation data, Digital Elevation Models (DEMs), and comprehensive terrain analysis. This enabled accurate identification of potential landslide hazards and informed proactive mitigation strategies.

FLIGHT OVERVIEW

SURVEY SIZE
60 Hectares

NUMBER OF FLIGHTS
One 30 minute at 50 metres above ground level.

POINTS PER SQUARE METRE
300 points

PENETRATION
Multiple returns

Challenge

OR3D GEO was approached by a **National Forestry organisation** to assess landslide risks in a large woodland in North Wales area prone to terrain instability and erosion. Traditional survey methods were inadequate due to the dense vegetation and challenging terrain, making it difficult to obtain accurate elevation data and monitor ground movement.

One of the primary issues was obtaining accurate elevation data to create precise elevation models, which are crucial for identifying potential future large-scale landslides. Accurate elevation models are essential to understand the terrain's morphology, predict areas at risk, and plan mitigation strategies effectively. Without this data, it becomes challenging to monitor land movement, detect subtle shifts indicating potential landslide activity, and estimate the volume of potential landslide debris.

Ensuring high data accuracy was vital for this project to capture critical measurements and provide a reliable assessment of the landslide risks. Addressing this challenge required **LiDAR technology** to penetrate dense vegetation and accurately map the terrain to enable effective monitoring and risk management.

LiDAR Overview

YellowScan Ultra 3 LiDAR unit.

640,000 lines per second.

Advanced Airbourne LiDAR for deep penetration.

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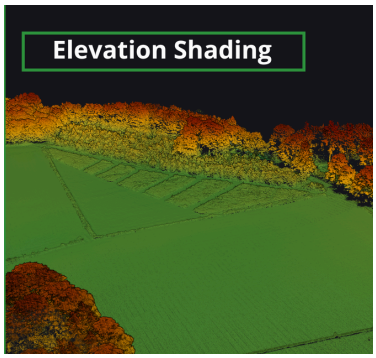

Solution

OR3D GEO employs leading technology for data acquisition, utilising the **Yellowscan Ultra 3 LiDAR** unit. This LiDAR unit boasts impressive capabilities, emitting 640,000 lines per second and capturing 3 Echoes per shot. These specifications ensure exceptional accuracy (+/- 25mm) and precision (+/- 30mm) in distance measurements, crucial for detailed mapping in challenging environments.

Deploying these advanced airborne LiDAR sensors, OR3D GEO meticulously captured detailed elevation data across the entire woodland area. The high-speed laser pulses emitted by the Yellowscan Ultra 3 LiDAR unit penetrate dense tree canopies and debris, allowing for precise measurements of the forest floor and underlying terrain features.

Results

Analysis and Landslide Identification

By capturing and meticulously analysing the reflected signals, OR3D GEO obtained a comprehensive dataset including detailed point cloud data and **Digital Elevation Models (DEMs**). This approach allowed for a thorough examination of the terrain morphology, revealing intricate details such as slope gradients, drainage patterns, and areas susceptible to erosion and landslide identification. The high-resolution DEMs provided by LiDAR technology enabled OR3D GEO to precisely map and understand the complex topography of the woodland area.

Visualisation and Reporting

Using the LiDAR-derived topographic maps, OR3D GEO's geospatial analysts conducted a detailed assessment to identify landslide hazards. They systematically pinpointed areas with steep slopes, which are critical indicators of instability, as well as locations showing signs of previous erosion and potential drainage issues. These findings were essential in delineating zones at high risk of landslides and erosion within the woodland.

By integrating advanced **LiDAR technology** with meticulous terrain analysis, OR3D GEO effectively identified and mapped landslide risks within the woodland area. This holistic approach yielded valuable insights crucial for implementing proactive mitigation strategies aimed at protecting against geological hazards and promoting the long-term environmental stability.