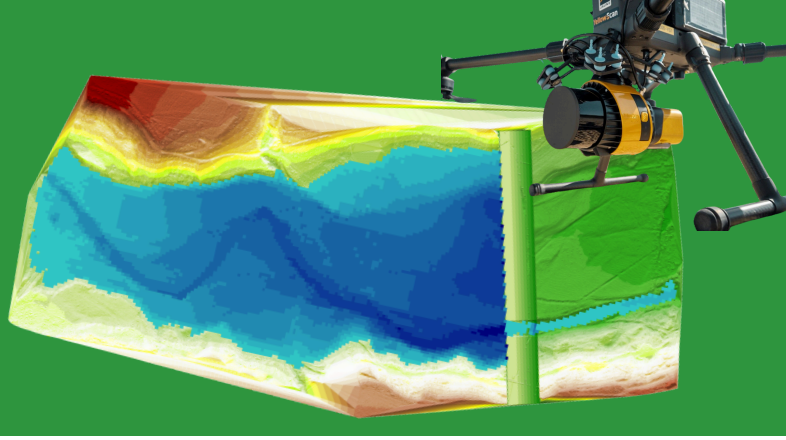
Assessing Hydro Power Feasibility with LiDAR and Flood Simulation.



At A Glance

OR3D GEO was engaged to support a feasibility study for a proposed small-scale hydroelectric power facility in the UK. The project required rapid, high-resolution terrain data and detailed flood simulation to identify the most suitable location for a new dam. By combining drone-based LiDAR surveying, advanced terrain modelling, and simulation tools, OR3D delivered a fast, accurate, and visually compelling assessment to support informed decision-making and stakeholder engagement.

PROJECT OVERVIEW

CLIENT

HYDROPOWER DEVELOPER

SERVICES PROVIDED

DRONE-BASED LIDAR SURVEY
DIGITAL TERRAIN MODEL (DTM)
FLOOD SIMULATION CONSULTING

EQUIPMENT USED

YELLOWSCAN ULTRA 3, FLOOD MODELLER AND GEOMAGIC DESIGN x

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Challenge

A renewable energy developer needed to assess the feasibility of constructing a small-scale hydroelectric power facility in a rural, undeveloped area. The site in question was remote, uneven, and densely vegetated — presenting significant logistical and technical challenges for conventional surveying methods.

The primary goal was to identify a suitable location for a new dam that could provide sufficient water storage capacity. To do so, it was essential to gain a precise understanding of the site's topography and how water would behave across various seasonal and rainfall scenarios. Speed was also critical, as the findings would inform early-stage planning and support timely funding and stakeholder discussions.

To move the project forward, the client required:

- **High-resolution terrain** data that could be captured quickly and accurately despite difficult access and heavy vegetation cover.
- **Flood simulation analysis** to model water flow, predict potential flood risks, and identify optimal dam placement.
- A **3D visualisation model** to clearly present the proposed infrastructure — including the dam and spillway — to stakeholders, planning authorities, and investors.

The challenge was not only technical but also logistical: to collect and process large volumes of geospatial data efficiently, simulate realistic flood scenarios, and produce compelling visuals — all within a tight timeframe and with minimal disruption to the natural environment.

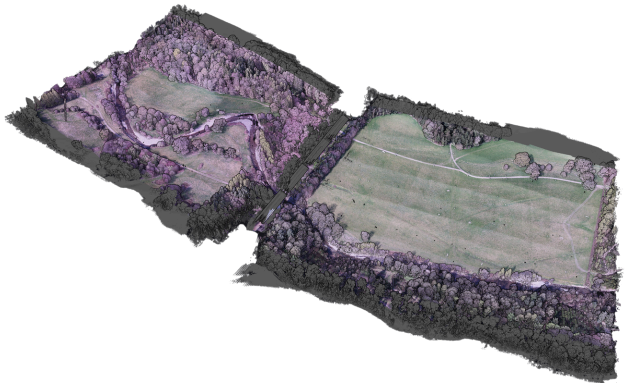
LiDAR Overview

YellowScan Ultra 3 LiDAR unit.

640,000 lines per second.

Advanced Airbourne LiDAR for deep penetration.

The Process

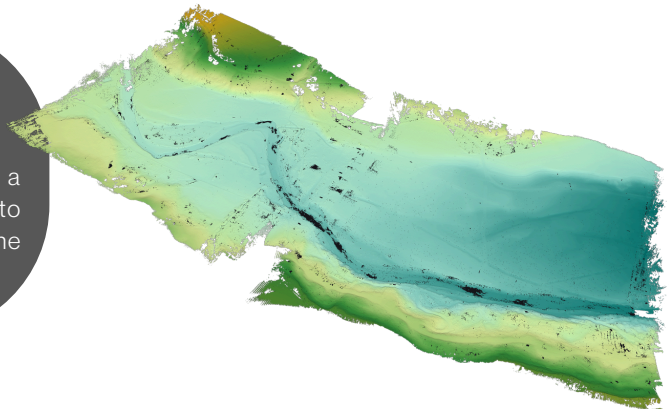


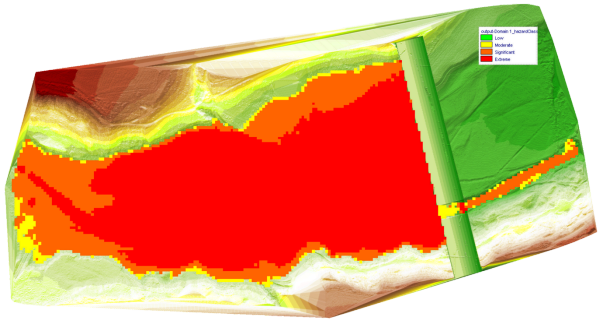
Rapid LiDAR Capture

A YellowScan Ultra 3 LiDAR scanner mounted on a drone was used to capture the full site in just 90 minutes of flight time. This approach significantly reduced time on site while producing rich, high-density spatial data suitable for detailed analysis.

Terrain Data Processing

Once collected, the LIDAR data was registered and colourised into a single, unified point cloud. Vegetation was carefully filtered out to produce a clean and accurate Digital Terrain Model (DTM), forming the foundation for the next stages of analysis.



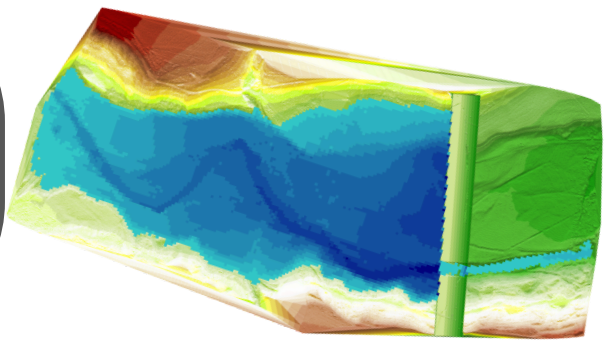


Flood Simulation

The DTM was imported into Flood Modeller, where a series of simulations were run to assess how water would behave under different flow conditions. This helped determine the most suitable location for the dam, ensuring it would offer sufficient storage capacity while aligning with the site's natural topography.

3D Modelling and Design

Following the simulation, the selected dam location was further developed in Geomagic Design X. Here, a more detailed model of the dam was created, including the addition of key infrastructure such as a spillway. The enhanced model was then re-integrated into Flood Modeller for final visualisation.



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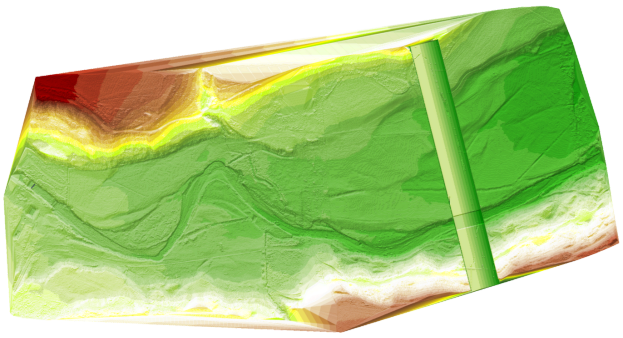

Visualisation

To support wider engagement, a visual animation was produced to demonstrate how the reservoir would fill and how the spillway would function under real-world conditions. This provided the client with a compelling tool to communicate the proposed development to stakeholders, planners, and investors.

Results

OR3D GEO's integrated use of drone-based LiDAR, digital modelling, and flood simulation provided the client with fast, accurate, and actionable insights. The project demonstrated the value of combining advanced geospatial technology with an efficient end-to-end workflow.

Key outcomes included:

- **Rapid Data Capture**: Full site survey completed in under two hours using drone-mounted LiDAR
- **High Accuracy**: Detailed terrain data enabled precise analysis of topography and water flow dynamics
- **Informed Planning**: Flood simulations helped identify the most technically and environmentally suitable dam location.
- **Stakeholder Confidence**: 3D visualisations and animations clearly communicated the proposed infrastructure to non-technical audiences.
- **Seamless Workflow**: End-to-end integration of survey, modelling, simulation, and visualisation maximised efficiency and reduced turnaround time.

Conclusion

Through a fully integrated approach combining drone-based LiDAR capture, advanced terrain modelling, and flood simulation, OR3D GEO delivered a fast, accurate, and insightful feasibility assessment for a proposed small-scale hydro power facility. The seamless workflow enabled confident decision-making, supported effective stakeholder engagement, and provided a clear path forward for infrastructure planning - all completed with minimal time on site and maximum technical precision.

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