

VOLUMETRIC SURVEYS TO ENABLE FUTURE PLANNING AT LOCHS



PROJECT OVERVIEW

UTEC, the lead brand for Acteon's Geo-services segment, was contracted to provide a bathymetric and topographic survey at Loch A'Chuilinn and Loch Achanalt.

THE CHALLENGE

A bathymetric survey of both lochs and a topographical survey of the surrounding shorelines were required, including three cross-sections on the River Bran joining the two lochs. The satellite signals were weak in areas and this meant we had to take a flexible approach to survey methodologies.

A depth storage curve was to be derived from the gathered data to demonstrate storage in million cubic meters stored below a specified water level, in meters above Ordnance datum.

CUSTOMER GOAL

The customer needed to understand the reservoir capacity and flow constrictions to enable future planning on water storage, flow-through and downstream hydro-electric generation at the sites.

OUR SOLUTION AND ITS COMMERCIAL BENEFITS TO THE PROJECT

Market-leading services and integrated solutions

- The bathymetric survey was undertaken using an echo sounder linked with a GPS receiver to obtain the bed levels. The boat covered the area with a series of long and cross profiles from which a dense regular grid of levels was generated, and a bed surface model created.
- The bed surface model up to the water line was combined with the topographic survey data to support the calculation of the volumetric data required.
- Three separate volume calculations were carried out on Loch Achanalt based on the 110.50m, 110.60m and 110.70m contours and 10 calculations on Loch A'Chuilinn at 0.1m intervals from 110.60m to 111.50m. This was requested to provide various volumetric calculations, so the customer was able to determine floor risk models within the loch.

Operational bases across the world

- All personnel and equipment were mobilised from UTEC's base in Livingston, Scotland.

Work at scale with a proven track record for delivery

- UTEC has provided data capture solutions using all available technologies on previous works for SSE Renewables. Both land and air capture methods were deemed appropriate on this project for both safety and cost advantages.
- UTEC has extensive experience on surveys of this nature gained over several years.

Optimise the project to increase commercial value

- By introducing the use of UAV LIDAR, UTEC were able to minimise the time on-site and reduce the number of field crews. On previous surveys, the topographic data would have been captured by "boots on the ground" at a significantly higher cost and longer time scale.

Minimise the environmental impact

- By utilising the UAV LIDAR there was no requirement for people walking across the site; this was important from an ecological perspective as no ground-nesting birds were disturbed.

Digital technology and data to enhance our expertise

- The grid was approximately 10m with 2m observations along the grid lines. Control and surface structures were surveyed in outline using GPS, supplemented with total station observations where the GPS signal was poor.
- Due to the relative remoteness of this area in the Scottish Highlands, there were several areas where a GPS signal was impossible to achieve with the required accuracy, so we supplemented this with traditional topographic survey techniques.
- The resultant data sets were delivered in AutoCAD DWG format, which is a readily accepted industry standard.

PRODUCTS USED

- Echo sounder linked with a GPS
- Total Station



A challenging project undertaken in two distinct tranches starting with Loch A'Chuilinn followed by Loch Achanalt.