

## **Shallow water bathymetry of a reservoir using the Kongsberg GeoAcoustics' GeoSwath system fitted to the Compact Survey Vessel (CSV)**

For many years the GeoSwath system from Kongsberg GeoAcoustics has been providing an efficient simultaneous swath bathymetry and side scan seabed mapping solution with accuracies that exceed the IHO Standards for hydrographic surveys.

GeoSwath systems have been fitted to a number of small craft and have been utilised to conduct bathymetric surveys of lakes, ponds, dams and rivers. This article describes two of the vessels which have been employed to undertake this area of work.

There are occasions where remote control of a USV is not practicable or desirable given the potential distances which are required to be surveyed. In order to address these situations, Kongsberg GeoAcoustics have recently launched their Compact Survey Vessel (CSV). The CSV has been specifically designed to survey shallow coastal and inland waterways quickly, using a powerful and manoeuvrable two-person catamaran equipped with the latest GeoSwath system.

The CSV is a lightweight two person catamaran and is easily transportable so that launch and recovery can be made in the remotest of locations. The craft is light enough to be launched by one person, and all the instrument controls, communication systems and survey operating tools are ergonomically designed so that everything can be accessed from the helmsman's position.

The vessel is constructed from plastic with all stainless steel fittings. It measures 3m in length, has a width of 1.62m and weights 182kg which includes the supplied 30HP outboard engine. Standard fuel capacity is 24L which gives the Compact Survey Vessel the ability to operate for many hours before the need to refuel. With a top speed of 27 knots it can quickly get from launch site to survey area.

The vessel has a draft of just 0.35m so can operate in extreme shallow environments. One of the key advantages of the Geoswath system is its ability to image a swath up to 12 times the water depth which in just 35 centimetres of water gives a swath of over 4m wide at survey speed. The GeoSwath transducer is mounted on a retractable pole with pre-installed motion sensor, GPS heading and position system and sound velocity sensor. The operator uses a console mounted ruggedised laptop to plan and control the survey. The GeoSwath system is pre-calibrated so that the survey operation can commence immediately on arrival, and no time is wasted running additional survey lines.



Figure 3 : The Compact Survey Vessel (CSV) shown here fitted with a Seatex SeaPath 134 GPS compass and MRU

Its shallow draft, high top speed and manoeuvrability combined with the stability of a catamaran hull make it ideal for use in both marine surveys and on canals, river and lakes. The ability to steer tight survey grids makes it a fast and accurate addition to the surveyor's portfolio.

Draycote Water reservoir was completed in 1972 and supplies drinking water to the town of Rugby and the surrounding area. It has a surface area of approximately 2.4 km<sup>2</sup> and holds 22.7M m<sup>3</sup> of water with a maximum depth of 19m. The site was originally chosen as the land was low lying and was surrounded by 5 small hills and a ridge which were linked together by 6 dams to form the reservoir. The CSV was used to survey an area (700m x 300m) adjacent to the dam wall on the west side of the reservoir in less than an hour. The maximum depth measured in this area was 17.5m

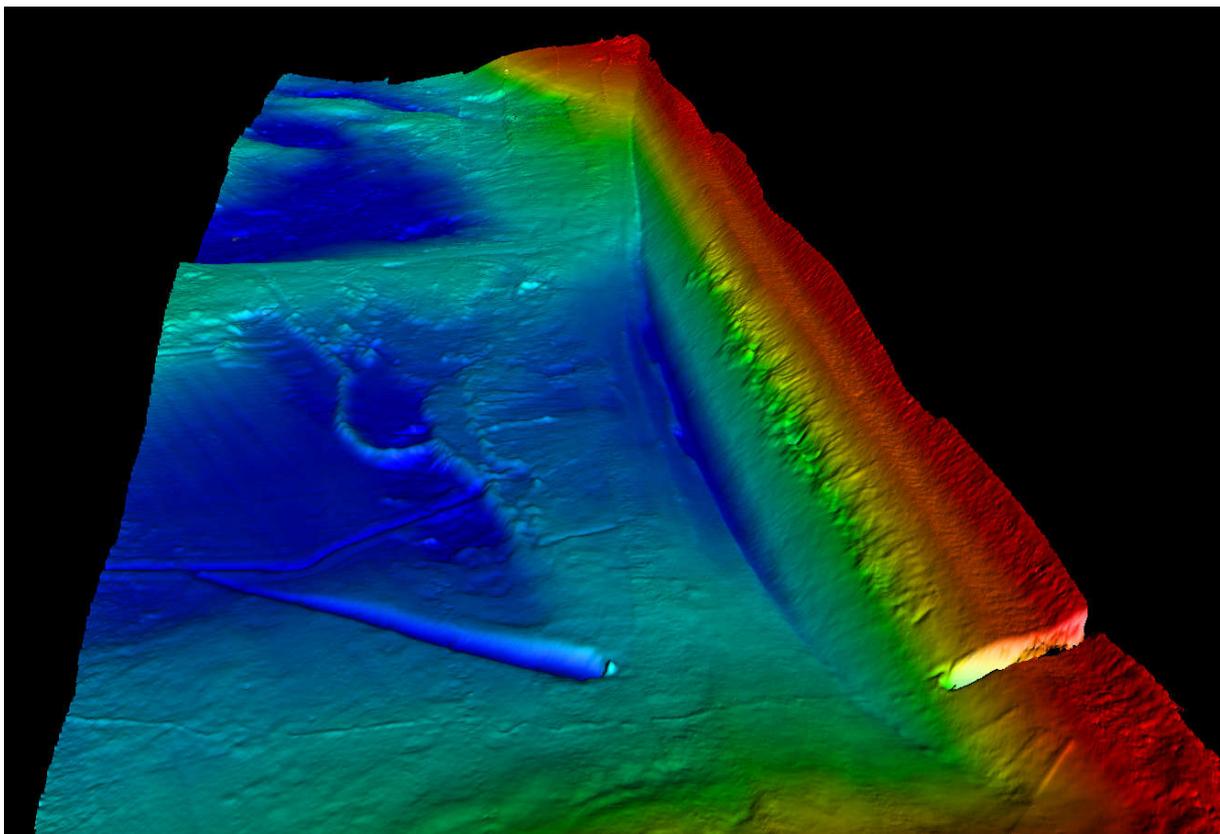


Figure 4 : 3D plot of the bathymetry of part of the west dam wall at Draycote Water. Colour scaling is from the surface down to 17.5m

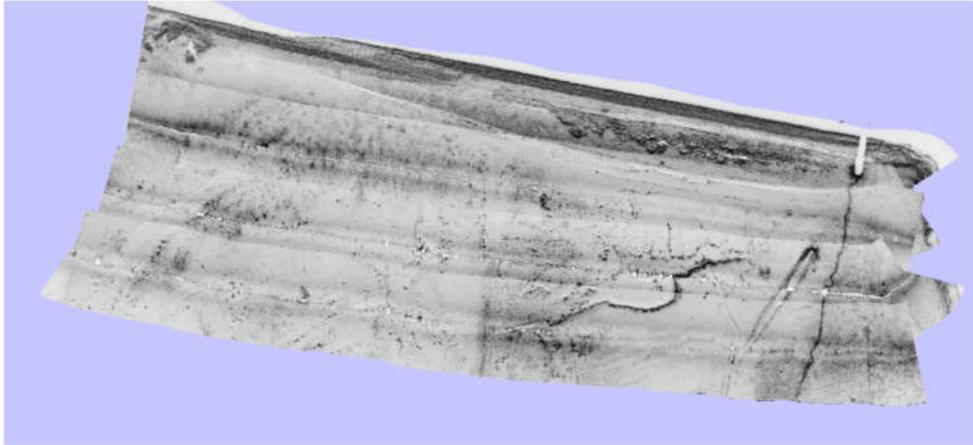


Figure 5 : Co-registered geo-referenced side scan data for the area adjacent to the dam wall

By capturing side scan images at the same time it is possible to extract additional information through subsequent processing such as material classification and texture analysis.

The GeoSwath system has for many years proven itself to be a highly accurate and reliable bathymetric measurement system capable of providing data coverage of up to 12 times the water depth, giving unsurpassed survey efficiency in shallow water environments. By using this system as part of the Kongsberg USV & CSV offerings, this same accuracy and efficiency can now be safely and easily applied to surveying a host of lakes, ponds, dams and rivers which were previously inaccessible.