



SULMARA



Experience

Sulmara delivers unique robotic solution for UXO investigations

Towed USV solution delivers data in challenging location.

▽ Location: Scotland, UK

Challenge

Can you simultaneously collect detailed bathymetry data while detecting UXO targets?

Sulmara recently completed a successful unexploded ordnance (UXO) and multibeam survey (MBES) of Ardersier Port, Scotland for Haventus Limited. To help service future Scotwind requirements' the port is currently undertaking a significant regeneration project, with construction and dredging underway. The survey simultaneously aimed to identify potential UXOs targets whilst collecting detailed bathymetry of this dynamic environment in water varying from 1-10m deep.

The survey was executed using an advanced uncrewed surface vessel (USV), WAMV-16, equipped with state-of-the-art technology. The USV was outfitted with a high-resolution NORBIT Subsea MBES system to acquire detailed bathymetric data, ensuring safe towing operations, and generating accurate seafloor mapping and charting. The Norbit MBES system had a wide coverage angle, enabling efficient data acquisition in the shallow water environment.



Delivery

The WAMV-16 towed two of SafeLane Global's G882's Magnetometers and these instruments detected magnetic anomalies associated with submerged UXOs, aiding in target identification and classification.

The USV surveyed the challenging waters of Ardersier Port, with 4m line spacing for optimum coverage (approximately 450,000sqm), employing precise waypoint navigation to ensure complete coverage of the survey area. Throughout the survey, the UXO detection systems continuously measured and recorded magnetic field variations. These measurements were co-recorded with the multibeam, facilitating the correlation of potential UXO signatures with corresponding seafloor features, with data monitored remotely in near real-time at our US office.

By utilizing an uncrewed asset, the field operational team were able to navigate a towed body through a challenging environment. The WAMV-16 USV allowed the field ops team a better vantage to assess hazards with a more manoeuvrable vehicle than if a traditional vessel was used. Further to the navigational safety gains, the electronically and acoustically quiet nature, and the stable platform that the USV provides yields a much higher quality of data product than a crewed vessel. The WAMV-16 USV is considered a low carbon solution generating zero CO2 emissions.

Resilience

UXO survey in shallow waters is notoriously difficult and Ardersier was an extremely difficult environment to operate in from a vessel perspective due to the shallow bathymetry. The Sulmara USV field operations team established a mobile Remote Operating Centre (ROC) and continually monitored the USV's onboard control system to ensure safe navigation through constrained areas, including jetties and docks. Dredging equipment and other infrastructure added to submerged hazards, such as buoys and ropes increased the complexity of the survey. As equipment was being towed it meant the likelihood of getting snagged was extremely high.

It was the WAMV's size and operability that allowed the team to pre-empt and respond quickly to obstacles. The flexibility of the ROC allowed the team close access to the site to be on hand if there were any issues, even if the local conditions made life very difficult for the team, requiring a 4 x 4 to get around the site.



Impact

Upon completion of the survey, the data underwent post-processing and analysis. The multibeam bathymetric data was processed, generating digital terrain models and seafloor contours. This information facilitated the identification of shallow areas, potential navigational hazards, and areas requiring further investigation. Advanced algorithms and pattern recognition techniques were applied to differentiate between natural seabed features and potential UXO targets, ensuring accurate identification.

Furthermore, the magnetic field data collected by the UXO detection systems was processed and analysed, enabling the identification of magnetic anomalies associated with potential UXOs. The data analysis integrated all available information, including bathymetric data and magnetic signatures, to generate a comprehensive report highlighting the location and classification of potential UXOs within Ardersier Port.

The survey outcomes, include accurate bathymetric charts, high-resolution seafloor imagery, identification of multiple ferrous objects and potential UXOs, that will contribute to the port's safety and aid in future decision-making regarding UXO clearance, risk strategy and management.

“Through the powerful synergy of SafeLane Global and Sulmara joining forces, we unlock an unparalleled level of UXO expertise and technology that can be deployed worldwide. Our combined capabilities create an exceptional added value, enabling us to deliver unrivalled efficiency and safety in detecting and neutralizing underwater explosive hazards.”



Kevin McBarron

