

PRE-INSTALLATION CABLE ROUTE UXO SURVEY

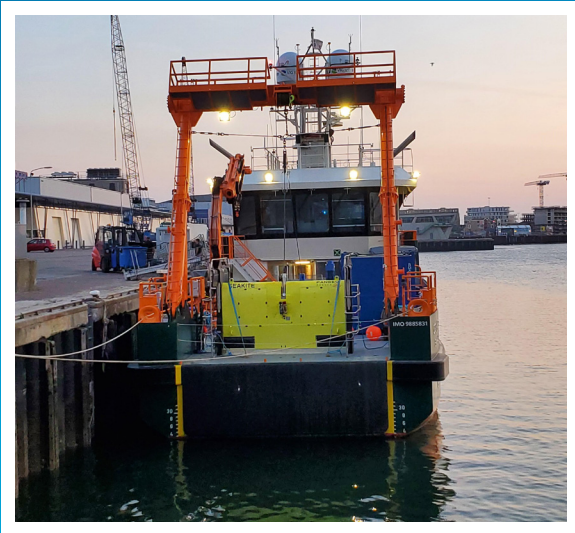


FIGURE 1: SeaKite ready to be deployed from the Geo Ranger survey vessel.

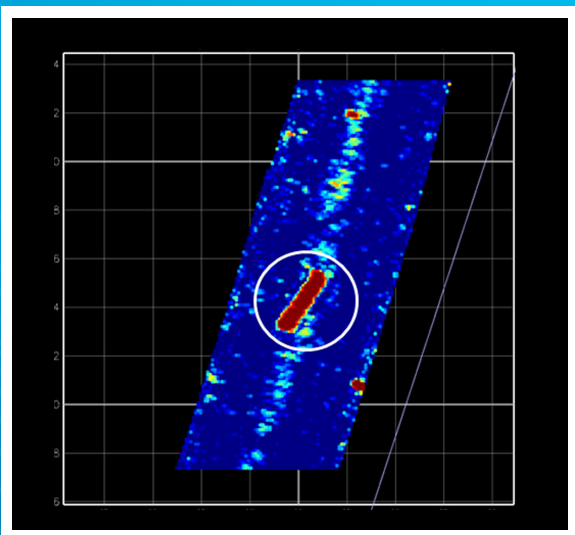


FIGURE 2: Plan view image of a UXO found by SeaKite.

PanGeo's innovative SeaKite, a Remotely Operated Towed Vehicle (ROTV), fitted with the Sub-Bottom Imager™ (SBI), recently completed its largest project to date carrying out a large-scale pre-installation UXO survey off the Dutch coast.

The SeaKite surveyed an offshore wind farm development, collecting data along 30m wide Inter Array Cable (IAC) route corridors and 300m diameter Wind Turbine Generator (WTG) locations.

SeaKite produced a 3D acoustic sub-seabed data volume along all IAC corridors and WTG locations to assess the sub-seabed conditions comprehensively before installing infrastructure. In total, the SeaKite acquired over 1,100km of 3D acoustic data. Survey speeds averaged 4kts over 130km of 3D acoustic SBI data was collected per day. The SeaKite was mobilized from the Geo Ranger survey vessel with the 3D acoustic SBI data acquired alongside hull-mounted multibeam echosounder and was positioned using the vessels USBL system.

The SeaKite acquired 3D acoustic images of all buried targets and sediment boundaries within the full survey area. Pre-installation surveys allow developers and installation contractors to assess the sub-seabed conditions and finalize cable routes onshore, thereby reducing the risk of costly offshore challenges that require rerouting during installation. Additionally, the data collected and interpreted by PanGeo delivers accurate (cm) dimensions and depths of buried pUXO magnetic targets enabling Explosive Ordnance Disposal (EOD) experts to reduce the master target lists by over 75%.

The acoustic SBI survey imaged magnetic pUXO targets during the campaign; each target assessed for size, shape, and depth. Details were shared with the offshore EOD experts to support the reduction of target listings. As the SeaKite's SBI technology images ferrous and non-ferrous anomalies, PanGeo analyzed the data for non-ferrous pUXOs, with all targets meeting expected UXO dimensions given to the client for visual investigation.

The project was the first large-scale UXO survey to utilize SeaKite. The results further demonstrated the SeaKite's capability of a stable platform capable of acquiring more than 130km of PanGeo SBI acoustic data per day and at speeds 7 times faster than an ROV-based survey. Following completion of all processing, the client was awarded the As Low As Reasonably Practicable (ALARP) certification covering the mitigation of both ferrous and non-ferrous UXO, allowing the windfarm development to progress to installation without delay in the schedule.