1ST LINE DEFENCE

UXO Assessed, Mitigated, Managed

Unexploded Ordnance (UXO) – Intrusive Survey

Reduce risk and survey ahead of piling or boreholes

On sites where a risk of encountering deep buried unexploded bombs (UXBs) has been assessed, and where piled foundations are planned, 1st Line Defence can provide an Intrusive Magnetometer Survey to provide clearance ahead of individual pile locations or clusters and boreholes.

This method permits survey at depths not achievable by non-intrusive methods and in conditions beyond of the detection capabilities of a non-intrusive survey, such as in areas of made ground and gross ferro-contamination.

Anomalies identified during the survey, which are modelled as having similar characteristics to a UXB, can be avoided and/or investigated depending on the site conditions and the client's requirements.

How do we approach the intrusive survey?

Based on a drawing of the proposed pile layout, 1st Line Defence will calculate the minimum number of surveys that would be required to cover each pile location and create a coordinate list and drawing of survey positions.

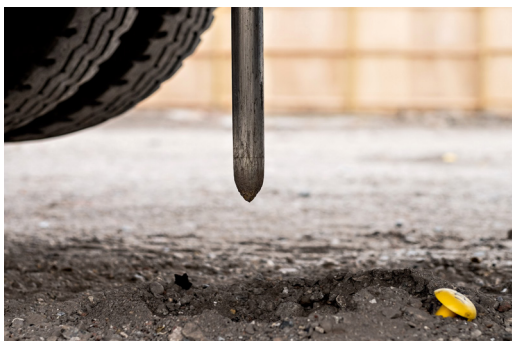
Each survey can provide a column of clearance (diameter dependant on ground conditions) with often more than one pile being covered by each survey (dependant on pile spacing) reducing the overall number of surveys required. Prior to works commencing, the client would be required to provide a permit to dig, service clearance and sometimes an operated excavator.

How does an intrusive survey work?

The magnetometer probe is pushed into the ground by a survey rig using hydraulic pressure. The survey can be deployed on different platform configurations to suit specific sites (20 tonne modified CPT rig, mini rig, overwater survey etc.). If the site is 'brownfield' and significant Made Ground is present, we would often ask that an excavator be provided to dig out shallow obstructions.

Where there is significant or particularly dense Made Ground, there may be a requirement for 'pre-drilling' of the survey positions. This is purely to facilitate the survey through dense Made Ground where brick/concrete fragments would not allow the probe to be pushed into the ground. As the probe is pushed into the ground, a 'real-time' display of the magnetometer reading is fed back to the survey engineer present.

This allows for a check of both ferrous anomalies directly beneath the probe (the probes have look-ahead capability) and for any horizontal deviation of the probe (detected by inclinometers in the probe body) so that if necessary the survey can be terminated or corrected.



How deep in the ground does the probe reach?

The survey engineer will push the probe down to a previously assessed 'Maximum Bomb Penetration Depth' for a 500kg bomb (an assessment based on factors such as the ground conditions/geological strata present on the site including the density and type of geology present obtained from borehole logs).

Alternatively, the engineer will terminate the survey when the maximum tonnage push of the rig is reached (when a density is reached through which it is assessed a UXB would not have penetrated).

Results and quality assurance

The ground conditions present will determine the average amount of surveys that can be conducted per day. Each day, the data collected is sent back for QA by in-house geophysicists to look for and model any anomalies on our own proprietary software.

If a magnetic signature is detected with characteristics similar to a buried iron bomb, the position of the anomaly can be triangulated using additional surveys and the anomaly can be either investigated or avoided.

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