1ST LINE DEFENCE

"I wanted to say thank you to you and the team for carrying out a 1st class job. It was nice to have contractors that led the way in terms of H&S – role models to the others on-site."

Site Manager, Watkin Jones Group

Welcome to 1st Line Defence

1st Line Defence are one of the sector's leading Unexploded Ordnance (UXO) risk mitigation companies, offering services across the UK and Internationally – for both Land and Marine projects.

We provide bespoke solutions to the risk posed from explosive ordnance and munitions buried in the ground and underwater – serving Commercial, Governmental and Humanitarian organisations.

Why is UXO an issue?

Many areas of the UK (and Internationally) have been left with a legacy of UXO contamination – either as a result of bombing sustained during the two World Wars or as a result of current / historic military activity.

Thousands of tons of explosive ordnance was dropped on major areas of industry, population, and other primary targets in the UK such as transport infrastructure, airfields and gas works during the World Wars alone.

Bombing accuracy was generally poor, and sometimes bombs were dropped indiscriminately in so-called 'tip and run' incidents. A proportion of these bombs failed to function as designed (estimated at between 10-20%) and fell as unexploded bombs (UXBs). Numerous UXBs were logged and removed during the World Wars, but hundreds remain buried and untouched.

Away from urban areas, the primary concern is often land currently or formerly used by the military, such as military airfields, army camps, WWII defensive positions, training areas and ranges. These areas can leave a legacy of UXO contamination due to items being misfired, lost, burnt, buried or discarded / disposed.

UXO contamination can pose a serious health and safety risk to construction and development projects with many UXO discoveries regularly reported by the media – and there have been numerous examples of 'near misses' involving large high explosive bombs in recent years, and unfortunately some fatalities reported too.

If left undisturbed, high explosive bombs and other items of UXO generally present no immediate risk, however – construction projects and developments that require intrusive ground works (and deep foundations) are at a higher risk of encountering and initiating such devices.

The recent increase in unexploded bomb finds is thought to be at least in part a result of deeper foundations and remediation, and redevelopment of previous 'brownfield' sites in inner city areas.

How can we help?

Our expertise lies in the management of UXO contamination and a risk assessment is the key starting point of any UXO risk management plan.

Our Preliminary UXO Risk Assessment will provide an essential screening check, which is quick, cost-effective and reliable – that highlights whether further investigation is required.

We consider the works methodology proposed for the project and the likelihood of encountering UXO, and the scale of UXO risk and contamination is assessed in detail.

If a viable UXO risk is identified, 1st Line Defence can recommend and provide a range of mitigation measures to minimise the risk – and if no potential UXO risk or cause for concern is identified on your project – you will have peace of mind that no unnecessary UXO risk mitigation measures will be recommended.

Brett Kinsman
Managing Director

Who are we?

1st Line Defence was founded in 2011 by MD Brett Kinsman, a skilled ex-Army UXO professional with decades of experience in both military and commercial UXO roles.

His ethical stance and rigorous impartiality has seen the company grow rapidly to become one of the sector's leading providers of UXO risk mitigation services.

Our purpose is to make sure that the legacy of UXO contamination in the UK (and Internationally) is managed safely and efficiently and to minimise UXO risk for future generations.

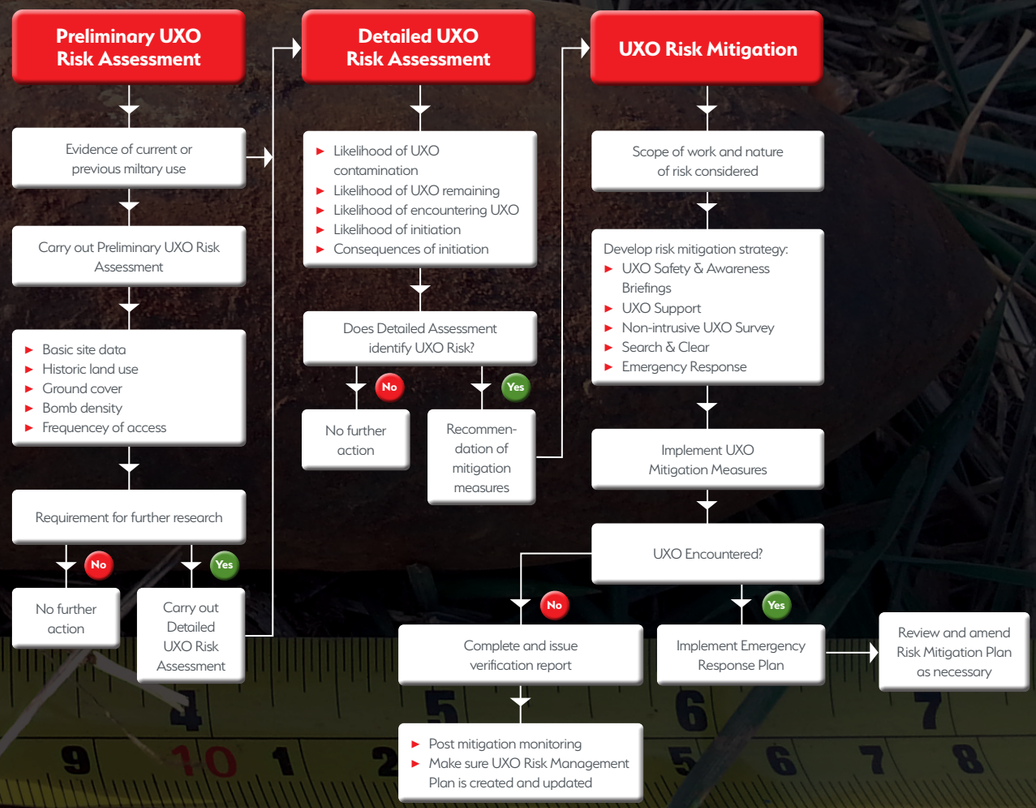
We are dedicated to advancing and improving our capabilities by investing in new UXO detection equipment, technologies and systems to provide our clients with the most cost-effective solutions to their UXO threat.

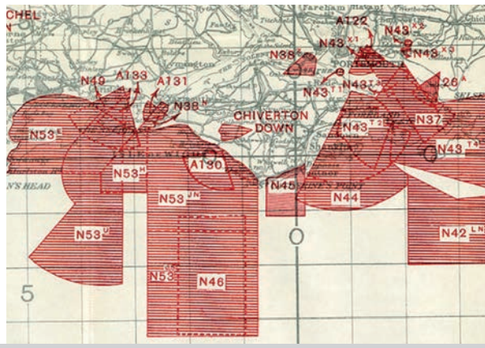
1st Line Defence assess and manage UXO risk on projects of all different shapes, sizes and scopes, and you can have peace of mind that our professionally-trained staff will support you throughout the entire project life cycle.

We are the UXO risk mitigation consultants chosen by many companies due to being UK Home Office Authorised and Police Licensed, and hold numerous professional Accreditations & Memberships with industry leading Health & Safety organisations – safety is our top priority and you are in good hands.

Whatever your knowledge of UXO risk, 1st Line Defence will deliver expert help and guidance, working closely with our clients to make sure that any potential risk is correctly and thoroughly assessed –and provide the expertise and support you need to make sure that the UXO risk is mitigated to as low as reasonably practicable (ALARP).

The process of risk assessment and mitigation can be found in the flowchart below:





UXO Risk Assessments

"Very impressed with the timely turnaround from original enquiry to completion of the UXO report. Will use again and recommend to others."

Project Manager, Stepnell Ltd

Preliminary UXO Risk Assessments

Providing a fast and accurate overview of UXO risk

Our Preliminary UXO Risk Assessment is the First stage in our risk mitigation strategy. It provides an essential screening check which is quick, cost-effective and reliable – and highlights whether further investigation is required.

Usually undertaken at the very start of a project and prior to intrusive ground works commencing, our bespoke and non-automated assessments will highlight any basic UXO risk factors on your project.

The assessments utilise extensive historical digital archives, library resources, maps and internet sources as well as unique UXO geo-databases – which include datasets that are not available in the public domain.

A Preliminary UXO Risk Assessment report costs only £150 and is produced by our dedicated in-house Research Team, and are usually completed within 1-2 working days of your order.

Useful info: *50% of the projects we investigate return a result of 'no further action needed', removing the need for further UXO risk mitigation support.*

Bespoke and Non-automated

Our Preliminary UXO Risk Assessments are non-automated and bespoke, and each report adds genuine value to your project.

Each risk assessment utilises data that is available to us offline or online and we consider factors such as historic land use, site location history, recorded bomb damage, frequency of access and the proposed scope of works.

All risk assessments conform to CIRIA C681 guidelines and consider the following factors:

- Previous military use, location history and land use
- Reports and records of air-delivered bombs (WWI & WWII)
- Frequency of access, damage, ground cover
- Consideration of any mitigating factors
- Extent and nature of proposed intrusive works
- Potential requirement for additional research

Detailed UXO Risk Assessments

Comprehensive, bespoke and non-automated historical research

Providing a detailed overview of UXO risk

Stage 2 of our risk mitigation strategy: a Detailed UXO Risk Assessment examines the likelihood of encountering UXO during intrusive ground works – on Land or Marine projects.

Our detailed reports utilise extensive historical digital archives, maps, library and internet resources, plus our unique UXO geo-database – which includes data that is not available in the public domain.

The risk assessment will confirm a UXO risk level for your project, and if necessary, we will provide recommendations for the most appropriate risk mitigation measures to support ground works so that they proceed safely.

Our detailed reports consider:

- The risk that the site was contaminated with UXO
- The risk that UXO still remains
- The risk of encountering UXO
- The risk of initiating UXO
- The consequences of encounter or initiation

Thorough, Concise & Accurate Reports

All data collected is presented within the report, and our Quality Assurance (QA) and Senior Management Teams review the risk levels and conclusions.

Each report goes through a rigorous QA procedure, being both management and peer-reviewed to make sure that the research is comprehensive, consistent and the evaluations are well-defined and justified.

All reports are meticulously produced to help you fully understand any potential risk involved, and if necessary – any risk mitigation measures required.

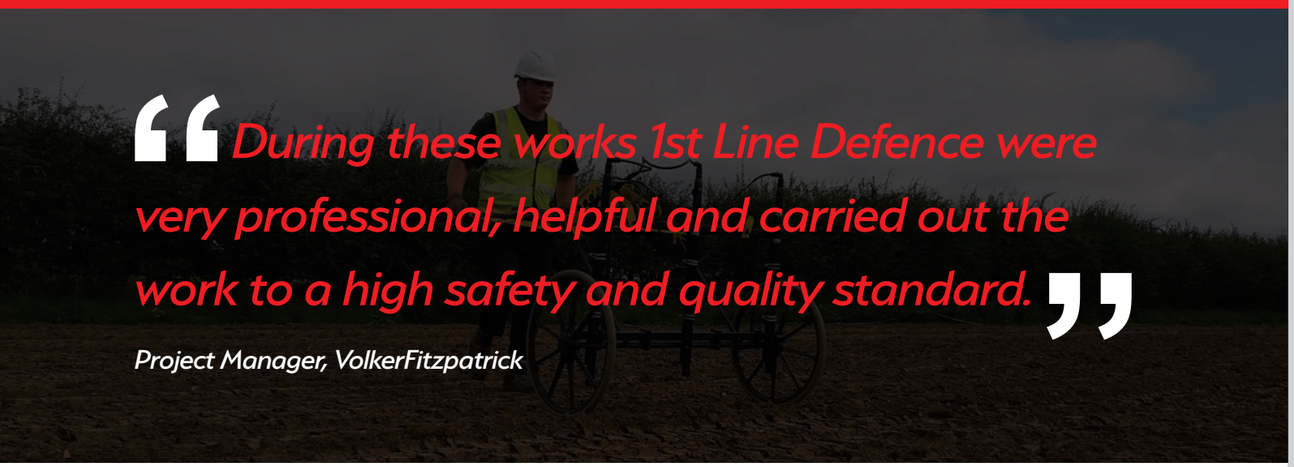
Our Detailed UXO Risk Assessments utilise sources including:

- Local and national archives
- Historical and bomb census mapping
- High-resolution WWII-era aerial photography
- Written ARP bomb incident reports
- Luftwaffe target information

"1st Line Defence are extremely accommodating during all aspects of our work, regularly meeting tight deadlines and providing quality work at short notice."

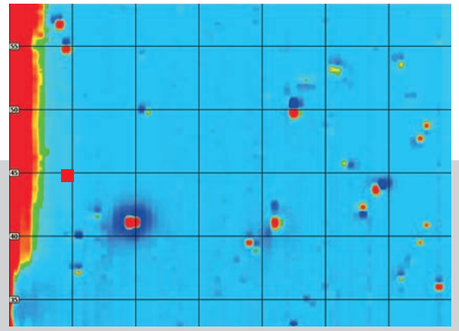
Geotechnical Engineer, GEA Ltd

UXO Surveys



"During these works 1st Line Defence were very professional, helpful and carried out the work to a high safety and quality standard."

Project Manager, VolkerFitzpatrick



Non-intrusive UXO Survey

Mitigate risk of shallow buried UXO on Greenfield land with a Non-intrusive Survey

A Non-intrusive UXO Survey is ideal for Greenfield site projects, which is classified as undeveloped land with little extraneous ferrous contamination.

The survey system is designed to detect sub-surface ferrous anomalies which have the potential to be UXO-related, and the methodology used is similar to a Geophysical survey.

Our equipment can map your entire project site location by walking or towing a mobile detection system over the ground surface – or by using a Drone / Unmanned Aerial Vehicle (UAV) which has been installed with the latest magnetometer sensors.

In optimum ground conditions, a Non-Intrusive UXO Survey can detect a buried 50kg German bomb up to 4m below ground level. It is also very effective at detecting smaller and more shallow-buried items such as grenades, mortars and projectiles – both on land and over water.

Data from the magnetometer survey is recorded and sent back to our in-house geophysical team for processing and interpretation, and our bespoke software produces a 'false colour' map of the site location highlighting any ferrous anomalies discovered.

On some projects, it's not practicable to investigate every ferrous anomaly detected as there will sometimes be too many targets to make this possible. In these circumstances a percentage clearance will be recommended.

Target Investigation

Once a Non-intrusive UXO Survey has been completed, the data is processed and a list is created to carry out Target Investigation – which is a process of identifying and clearing any items of UXO found from the project site location.

The investigation of targets is the second phase of the survey and is undertaken by a team of UXO Specialists – who are Explosive Ordnance Disposal (EOD) certified. Each target is located using GPS equipment and excavated by hand and / or machine.

Any UXO-related anomalies are identified, classified and arrangements made for safe removal / disposal. If a significant volume of UXO is found on your project it may result in a re-assessment of the number of targets which require investigation.

If the items are non-UXO related, they would be recorded and removed if necessary, and at the end of the survey, a report is issued detailing the clearance operation – and if there is any residual risk still present and / or any further recommendations.

Survey Parameters / Limitations

Areas with significant amounts of Made Ground such as 'brownfield' sites, which have either been previously developed or in-filled – are often too contaminated with scrap and materials such as brick, clinker, rebar and reinforced concrete for discreet ferrous anomalies which could be UXO-related to be discovered.

Intrusive UXO Survey

Mitigate UXO risk ahead of piling and boreholes with a magnetometer survey

Mitigate risk of deep buried UXO with an Intrusive Survey

For projects where the risk of encountering deep buried unexploded bombs (UXBs) has been assessed, an Intrusive UXO Survey is the best survey solution before starting borehole operations – even on previously developed 'brownfield' land.

This method provides surveys at depths beyond the detection capabilities of non-intrusive survey methods.

Data from the intrusive survey is recorded and sent back to our in-house geophysical team for quality checking and modelling of any anomalies using specialist software.

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

The ground conditions present will determine the average amount of surveys that can be conducted per day.

Survey Layout

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 diagram of survey positions.

Each survey position provides a column of clearance (diameter dependant on ground conditions) with more than one pile location covered by each survey (dependant on pile spacing) – reducing the overall number of surveys required.

Prior to works commencing, the client may be required to permit to dig, service clearance and on occasions – an operated excavator.

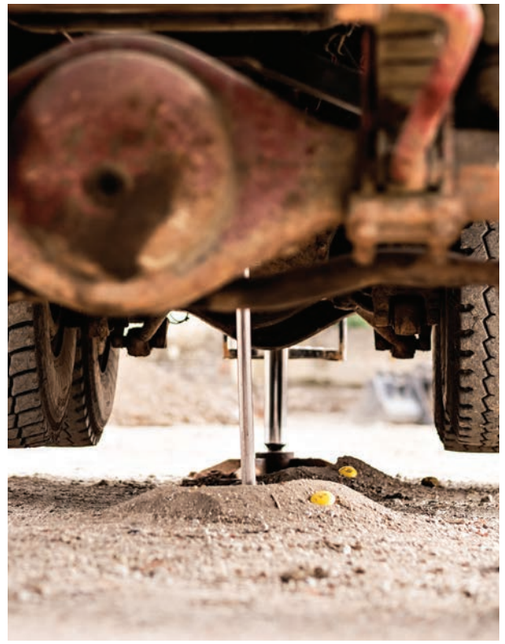
A magnetometer probe is pushed into the ground using hydraulic pressure, and we survey a column of soil to detect for deep buried unexploded bombs (UXBs).

The survey can be deployed on different platform configurations to suit specific sites – for example using a 20 tonne modified CPT rig, hand portable rams, mini rig, overwater survey etc.

As the magnetometer 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.

Useful info: *Where there is significant or particularly dense Made Ground, there may be a requirement for 'pre-drilling' of the survey positions. This is to facilitate the survey through dense Made Ground where brick / concrete fragments would not allow the probe to penetrate into the ground.*



UXO Support

Watching Brief

If open excavations are planned, our certified EOD engineers work closely with the machine operator or ground worker to make sure that excavations are carried out in a controlled manner, and to provide an immediate response to any suspect or suspicious items that are encountered.

If any items are discovered, they can be immediately assessed, identified and removed by one of our UXO Specialists.

We can also provide safety briefings for new groundsmen and personnel joining the project.

The benefits of having Watching Brief support include:

- Immediate specialist response to any suspect or suspicious items
- Immediate evaluation of any UXO-related items found
- On-site incident control and advice in the event of a UXO discovery
- Dedicated UXO Safety & Awareness Training to protect personnel and assets
- Prevent unnecessarily delays due to mis-identification (e.g. old gas cylinders and pipes)

Borehole Clearance

We offer support during the boreholes and window sample stages of ground works and can provide a hand-held 'down-hole' magnetometer survey to detect for ferrous anomalies which have the potential to be UXO-related.

The 1st Line Defence operative would work closely with the drillers to survey each borehole in 1m stages using a specialised probe.

If an anomaly is detected, the UXO Specialist can recommend that the borehole is terminated and moved, or we can arrange for further investigation if that's not a viable option.

The survey continues until an assessed 'maximum bomb penetration depth' is reached and then the borehole can progress without our support.

By working closely with drillers and the project management team, our methodology and approach means there will be no significant time delay in undertaking the survey – and we can provide the assurances you need that machine operators and ground personnel can continue with the development safely.

Safety & Awareness Briefings

One of our primary goals is to spread best practice and awareness about the risk of UXO, and to make sure that ground operatives who may come into unexpected contact with items of ordnance – are given the tools and knowledge they need to understand the risks involved and act safely.

1st Line Defence offers bespoke group training packages for management, site supervisors and groundsmen.

We make sure that your staff and ground personnel are aware of the UXO risk specific to your project, what to look out for and what to do in the event that a suspect item is encountered.

The briefings are provided in the form of a 'toolbox talk', and one of our experienced UXO Specialists will provide an overview about UXO risk – which is tailored specifically to the risk on your project.

"The operatives where very professional and proactive, with a good attitude to completing the works to the highest safety and quality standards. It was a pleasure having them on-site."

Site Manager, Wood PLC

UXO Disposal Operations

Maximum safety & minimal disruption

Disposing of UXO in a safe and controlled manner is a complex process that requires specialist management and years of experience.

Once a UXO hazard has been discovered, our EOD engineers are on hand to provide identification and assessment of the item.

After the UXO target has been investigated, if found to be 'Live', it can be disposed of using the most suitable and appropriate method – which is dependent on many factors – including the type of explosive ordnance found, location and burial depth.

Due to constraints posed by licensing and environmental considerations, there may be a requirement to relocate the UXO target prior to its disposal – which is included in our services.

1st Line Defence's expertise means it's able to provide UXO disposal services in any Land or Marine environment in the world – for both conventional ordnance containing high explosives and for ordnance containing chemical warfare agents.

Our EOD engineers will dispose of the UXO hazard in the safest possible way – working closely with our clients to make sure the requirements of any local governing bodies are fully met.

We are highly experienced in the technical nature of bomb disposal and manage the process from start-to-finish, maintaining control of the site location – and making sure there is clear communication with all stakeholders involved.

International UXO Services

1st Line Defence has access to all mine action resources; including trained people, detector equipment, mechanical clearance systems and detection dogs.

We can conduct all mine action operations in accordance to your bespoke situation and the specific needs of your project.

Our specialist teams comprise a pool of experienced EOD experts, national de-miners and detection dog teams to deliver Battle Area Clearance (BAC) services and clearance from Explosive Remnants of War (ERW).

We offer a range of services ranging from deploying armoured and remote-controlled machines to remove vegetation and undergrowth in preparation for the manual demining teams, to providing comprehensive reports detailing all suspected presence of landmines and UXO within a designated area.

All projects are managed by our experienced overseas team based within the UK complying with a robust Quality Management System (QMS), in accordance of International Mine Action Standards.

Surveys

Commission our Desktop, Non-technical and Technical UXO Surveys.

Available as a standalone service, surveys provide a comprehensive report detailing all data gathered on the suspected presence of landmines and UXO within a designated area.

This will clarify the ERW threat posed to your project.

Route Assessments

Having issues accessing areas that you need to operate in? Let us clear routes to your target destination.

EOD Risk Training

Make sure that your employees and management teams are professionally briefed to understand and manage UXO risks.

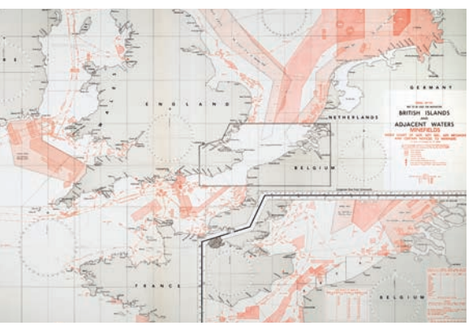
EOD Training

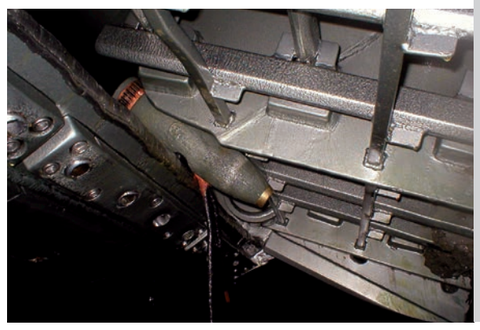
Let us train your staff as individuals or in groups to make them experts in their field.

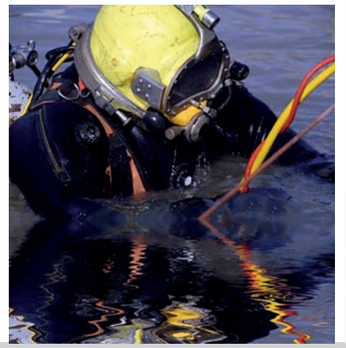
Marine UXO Services

"It's been a first class experience working with you and I would like to thank all of you for the excellent service. You have always been there to offer advice and support, and you have bent over backwards to accommodate our ever changing circumstances."

Project Manager, Clark Contracts







Marine Consultancy & Management Services

1st Line Defence provides a wide-range of UXO risk mitigation services to protect marine projects from the risk of explosive ordnance and chemical contamination – from Minefields, Naval Conflicts, Aerial bombing, Military shipwrecks, Military training and dumping of munitions / explosives.

Our UXO Specialists offer vast experience working in a wide-range of marine environments, and we can support your projects independently or in collaboration with Developers, Contractors, Local Authorities, International Mine Action Agencies or Joint Military Operations.

We combine leading industry technologies and methods with highly-experienced personnel to locate, recover and dispose of UXO and Explosive Remnants of War (ERW) from rivers, lakes, docks, beaches, intertidal zones and offshore – safely and efficiently – whilst also understanding our clients deadlines to deliver a project on time and in budget.

We offer a range of support services for a wide variety of projects – from sub-sea cables to wind farm installations, offshore structures and dredging operations.

We offer services for the following industry sectors – Oil & Gas Industry, Offshore Renewables, Cables, Dredging & Infrastructure / Port Development and support a wide variety of projects.

Our Marine UXO Services include:

Consultancy & Management Services

- Marine UXO Risk Assessments
- Risk Mitigation Strategies
- Project Management & Delivery
- Seconded Consultancy & Peer-to-peer Review
- Provision of Client Representatives
- Reporting & Documentation Provision
- ALARP Certification
- Quality Assurance & Quality Control

Specialist Marine UXO Services

- Geophysical Non-intrusive Survey
- Geophysical Intrusive Survey
- Interpretation & Data processing
- Investigation & Clearance
- Recovery & Disposal
- Environmental Mitigation

Marine UXO Risk Assessments

Our Marine UXO Risk Assessments take into consideration not only the historic risk of contamination in an area, but also factors such as the scope of the proposed works, seabed geology, burial depth, water depth and risk / consequences of detonation – working in accordance to CIRIA C754 Guidelines.

1st Line Defence

Unit 3, Maple Park,
Essex Road, Hoddesdon,
Hertfordshire EN11 0EX

Call +44 (0) 1992 245020
Email info@1stlinedefence.co.uk
Web www.1stlinedefence.co.uk

1ST LINE DEFENCE