



Case Study

Loch Rannoch, Scotland



Challenge

In August 2014, 1st Line Defence were commissioned by Green Power International to undertake a Detailed UXO Risk Assessment for a project at Loch Rannoch in the highlands of Scotland – to determine whether any UXO contamination may be present.

Our client planned to build a new hydroelectric scheme, which was situated in a Loch, and the hill banks had to be clear of any UXO risk to allow ground works to proceed safely for all of the personnel working on-site.

Process

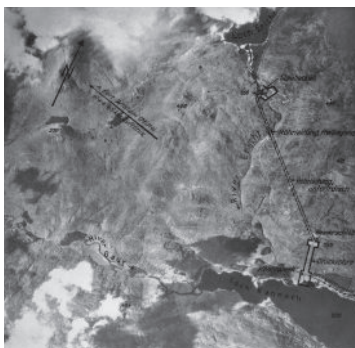
Stage 1 – Detailed UXO Risk Assessment

Initial research indicated that the area was used historically by the military, and WWII-era aerial imagery showed the presence of a temporary military garrison – which was used by a Norwegian Army unit.

Due to the above findings, a Detailed Risk UXO Assessment was recommended and further research identified that the surrounding area was used as an ad-hoc training area. Aerial photography showed that the ground cover and topography in this area would have been ideal for training exercises – especially for mortar practice. Historic records showed that area was subject to ‘visual’ clearance operations in the 1950’s, over a seven-month period.

Searches using magnetometer technology from the period may have taken place, however – this would not have been comprehensive enough to completely mitigate the presence of UXO within the area which needed to be investigated. Additionally, a live 2-inch mortar round was also reportedly discovered in the area in 2011, and as a result of this discovery – a potential risk of encountering items of Land Service Ammunition (LSA) was identified.

Because of previous use and history of the main works area, the site was assessed to be at a ‘High-Risk’ of UXO contamination being present – and additional UXO risk mitigation was recommended.



Luftwaffe target imagery of Loch Rannoch, Scotland.



RAF Aerial Imagery of Loch Rannoch, Scotland.

Case Study Overview

Client

Green Power International

Location

Loch Rannoch, Scotland

Industry

Renewables

Project Duration

August – September 2014

Services

Detailed UXO Assessment

Non-intrusive UXO Survey

UXO Support

Search & Clear

Target Investigation

Process (cont.)

Stage 2 – Risk Mitigation Strategy

Due to the history of the site and the type of terrain, the risk mitigation services recommended for the project involved phases of Non-intrusive UXO Survey, Target Investigation and Search & Clear operations – within the areas of the site where traditional survey methods were not feasible or suitable to use.

This methodology would cover all areas of the site that were being developed or accessed, and if any UXO-related items were discovered, they could be checked, identified and removed safely – and the risk from UXO would be reduced to as low as reasonably practicable (ALARP) before ground works commenced.

Stage 3 – Non-intrusive UXO Survey

A walkover Non-intrusive UXO Survey was the most sensible solution for the ground conditions, and once completed – the survey results were investigated by our in-house Geophysical Team.

A number of targets were identified and modelled, and a selection of anomalies were recommended for further investigation.

Stage 4 – UXO Support

The Target Investigation team worked in very challenging conditions to investigate the anomalies, many trees were planted in the area since WWII and working on the steep hill banks of a densely vegetated Loch had its own challenges. A Search & Clear operation was required in certain areas of the site due to the difficult terrain and groundcover.

During the operation, a number of live and expended WWII-era Mortar rounds and other UXO-related items were found, including some items of UXO being found around and under trees and other vegetation.

Outcome

Following approximately two months of risk assessments and ground investigations, the risk from UXO was reduced to ALARP status – no further items were discovered and the hydroelectric scheme was fully operational by October 2015.



Several 2-inch mortar rounds (Inert) found during a Search & Clear operation in Loch Rannoch, Scotland.



Image of a 3-inch mortar round found during Target Investigation in Loch Rannoch, Scotland.



Parts from various types of (Inert) ordnance found during a Search & Clear operation in Loch Rannoch, Scotland.