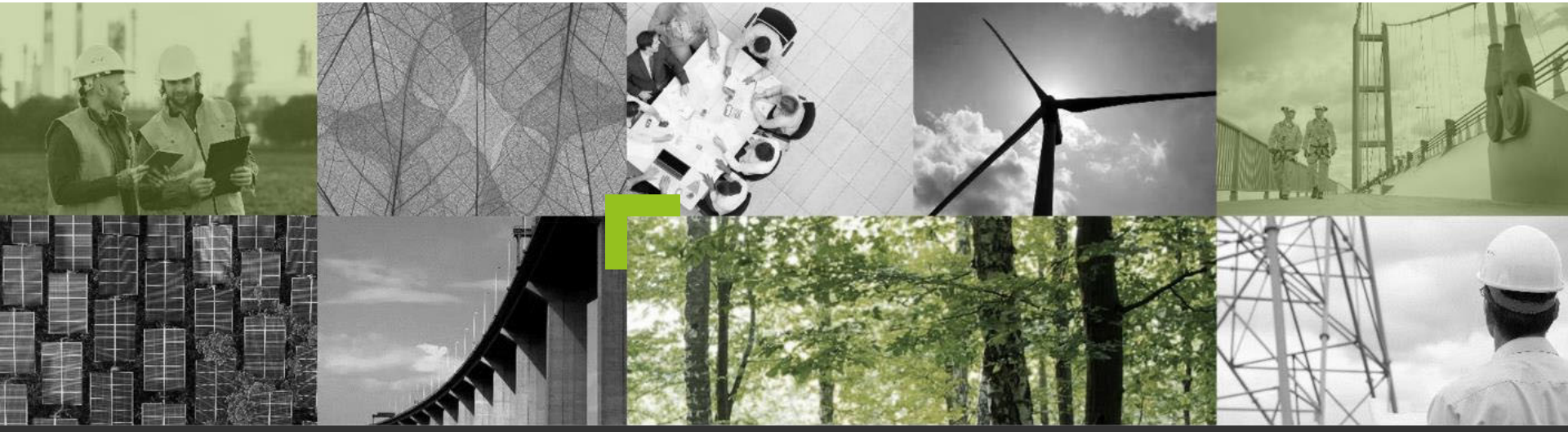
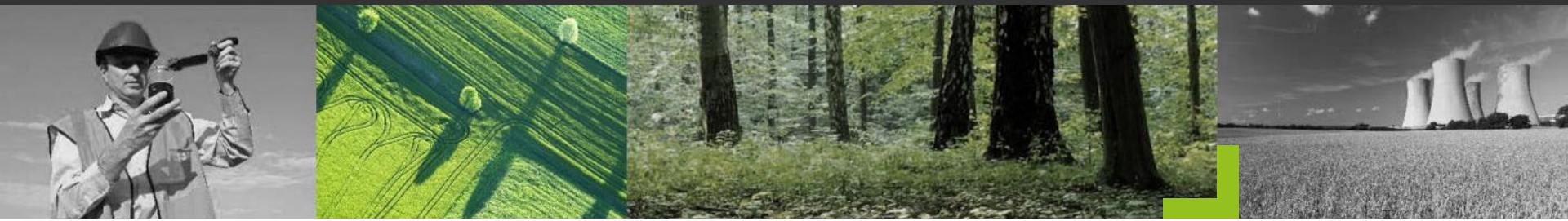


Burning Ground Remediation

Soil excavation and UXO search and clear operations

2023

REMEDX



INTRODUCTION

Site Location

Former training area
and burning ground

Site Background

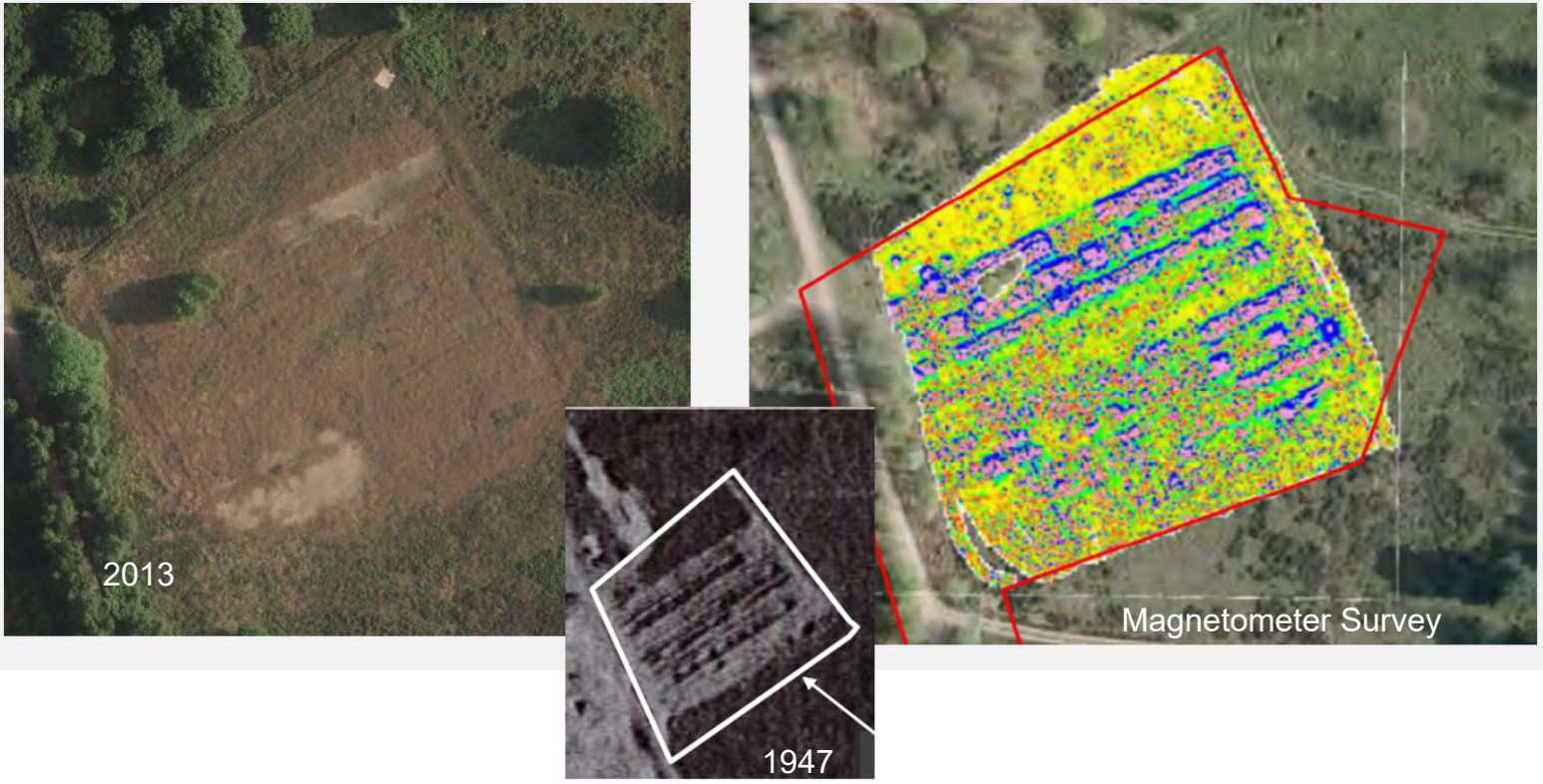
Site History:

- Part of the former training area
- The Burning Ground covers an area of 1 hectare where weapons and ammunition were taken for demolition by burning and then burying

Background:

- The site was extensively investigated, including:
  - Vegetation clearance & ecology surveys
  - Radiological surveys
  - Geophysical surveys – conductivity and magnetic
  - Soil investigation for environmental contaminants (metals, TPH, SVOCs, VOCs, explosives)

Site Background



Conceptual Site Model (for environmental impact)

Geology and Hydrogeology:

- Groundwater at the site is present within the main aquifer at depths of 18 to 21m below ground level – not impacted and incomplete pathway
- Soil comprises made ground varying in thickness 1-2m overlying natural sands

Contaminants and receptors:

- Lead (up to 13000mg/kg) and Zinc (up to 440000mg/kg) impact within the made ground requiring remediation
- Receptors: site users, cattle and ecology

SCOPE OF WORKS

Scope of Works

Objectives and drivers:

- Main objective was to remove impacted soil to allow the return of the lease and integrate the land to the wider park

Main activities by RemedX (Principal Contractor):

- Pre-commencement condition and utility surveys
- Site set up including welfare, security and fencing
- Installation of semi-permanent reptile fencing consisting of 1mm HDPE fencing
- Vegetation clearance
- Excavation of all dark ashy soils and impacted soils with concentrations above the threshold for parks / open spaces for lead (1,300mg/kg) and zinc (170,000mg/kg)
- Excavation works (average 0.42m bgl) completed with UXO watching brief
- On site validation using XRF

Scope of Works

Main activities (cont.):

- Off site disposal of impacted material
- Environmental monitoring including on site continuous dust monitoring
- Occupational health monitoring for site operatives
- Post excavation verification including non-intrusive UXO assessment and soil sampling
- Final UXO verification report including risk assessment to demonstrate UXO have been removed to as low as reasonably possible (ALARP) levels

Additional activities required during the course of the works:

- Additional excavation – increased depth up to >2m bgl
- UXO search and clear
- Set up of on site storage and disposal of live UXO
- Water management and disposal

MAIN ACTIVITIES

Site setup and initial excavation

Compound Area

UXO demolition area & scrap storage

- Vegetation scrape completed across the site.
- Excavation of impacted soil at the site compound area
- UXO storage area and set up of the UXO demolition area.

UXO storage area

Setup of UXO demolition area

UXO demolition area

Excavation works & contaminant distribution

Waste streams and requirements for disposal

Main waste streams:

- Green waste
- Vegetation scrape
- Excavated soils
- Scrap metal
- UXO

Requirement for disposal:

- Free of explosive certificate => For this the works need to meet the definition for ALARP (as low as reasonably practicable). It is required that the material has been subject to the necessary steps to remove explosives to ALARP levels

UXO Search and Clear - pads

Search and clear pads: applied throughout the works at different set up to achieved the highest productivity possible

UXO Search and Clear

Pads monitoring equipment:

Schonstedt GA-72Cd - Magnetometer

Vallon VMH3CS – metal detector

UXO Search and Clear – single picking station

- Aiming to expedite the production of cleared material to be removed from the site and maintain the highest level of search and clear
- The approach comprised the material undergoing two-step search and clear process:
  1) Ferrous UXO item detection completed at the search and clear pad with Vallon VMH3CS.
  2) Non-ferrous UXO item detection completed by hand picking from the conveyor belt within the picking station.

UXO Search and Clear – second picking station

- A second picking station was later mobilised to site on in order to increase productivity of the search and clear process given the challenges posed to the process by the high scrap density and variable nature of the material
- The approach comprised the material undergoing two-step search and clear process:
  1) Ferrous UXO item detection completed at the search and clear pad with Vallon VMH3CS.
  2) Non-ferrous UXO item detection completed by hand picking from the conveyor belt within the picking stations.

UXO Search and Clear – Armoured sifting operations

- HESCO bastion installed in a retaining wall formation around the working area.
- Sifting bucket (40mm mesh) was fitted to the armoured excavator to process the vegetation scrape material, which was successfully completed.

Aerial Site Survey

UXO Findings

Findings include: smoke grenades, bullets, grenades, projectiles, launchers, detonators, rounds, 60mm casings, mortars, fuzes

UXO storage and demolition

Storage:

Secured compound in compliance with Firearms Regulations

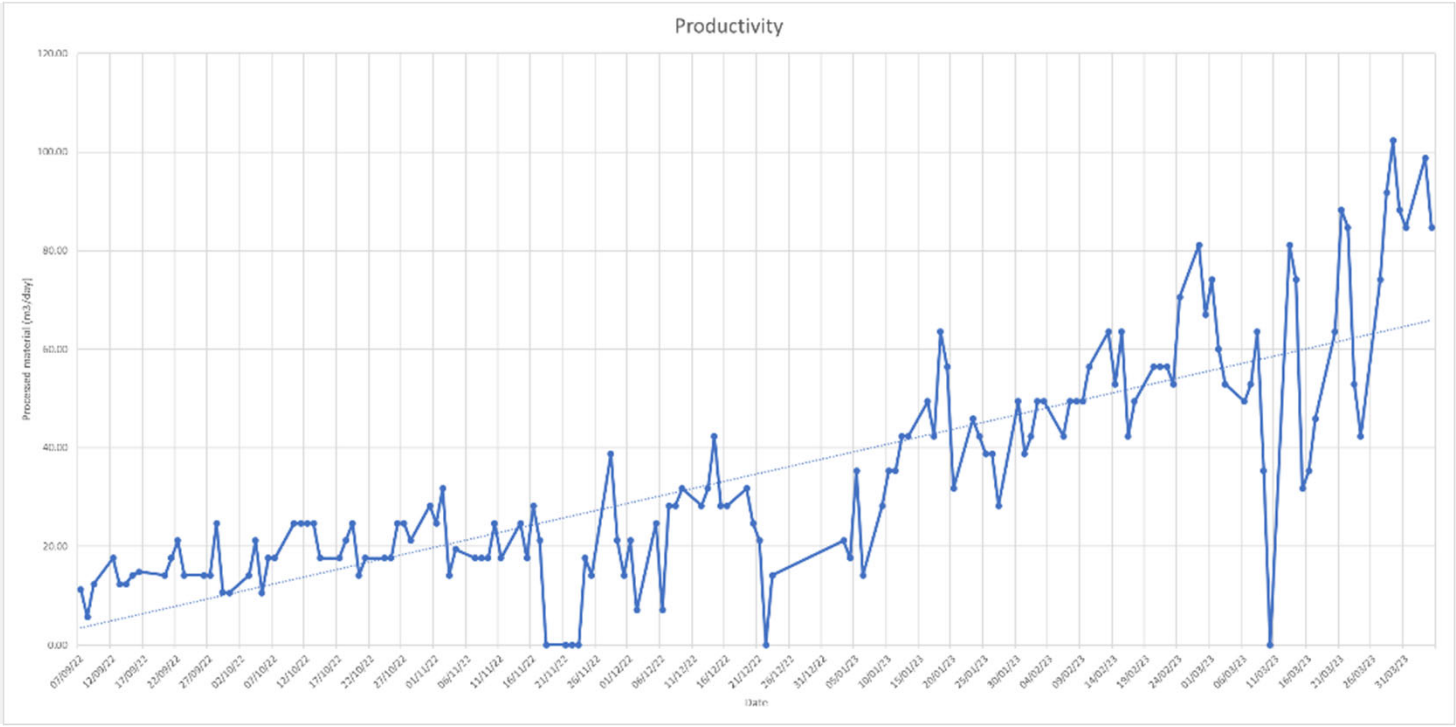
Thermite flare:
Burns with a jetting flame
> 2000°C

Note: photo for illustration only not from site

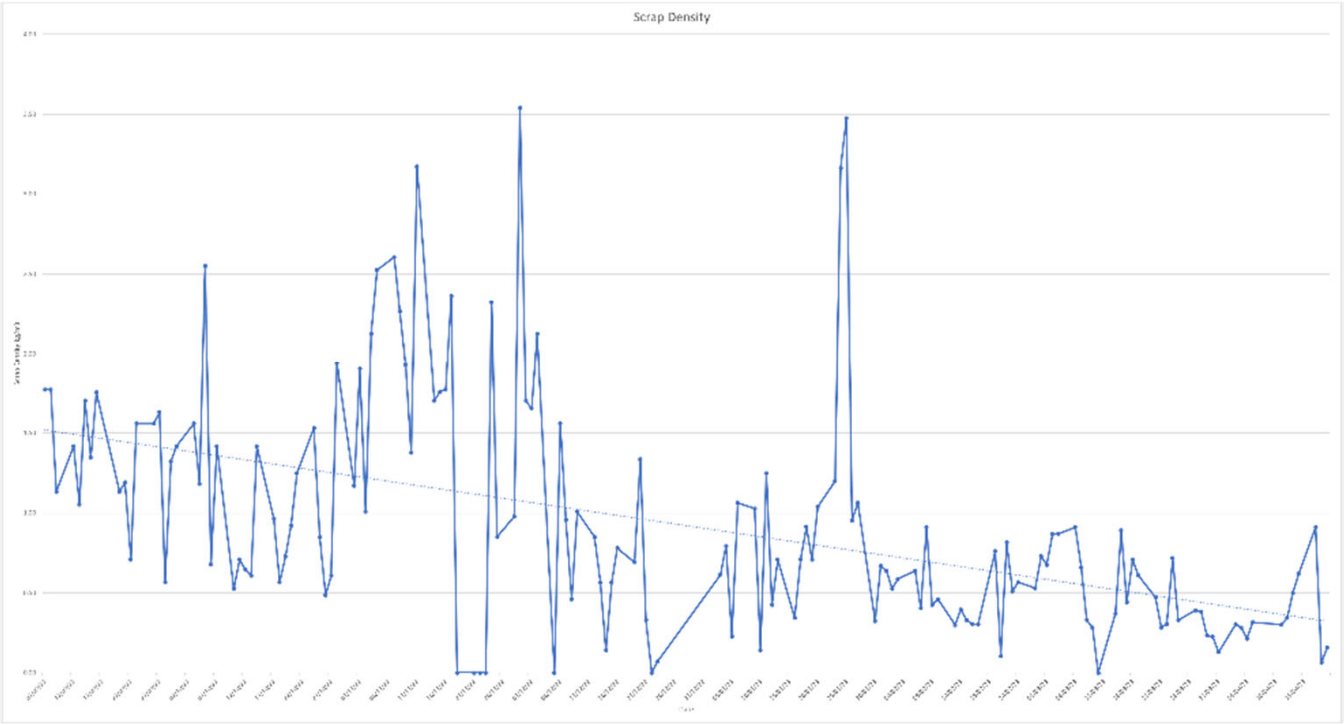
Standard Demolition

METRICS

Productivity



Scrap Density



RESULTS

Results

- Total of 6200 m3 of contaminated soils excavated, including material from the vegetation scrape screened
- Total of 6200 m3 search and cleared and disposed of off site (hazardous waste)
- 1233 ordnance items found of which 535 live items requiring demolition on site
- 6300 kg of scrap found