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SPITTAL, THURSO
PRELIMINARY RISK ASSESSMENT

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Client Name: Field
Client Address: Fora Montacute Yards
186 Shoreditch High Street
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E1 6HU

Site Address: Spittal,
Halkirk
KW12 6XA

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EXECUTIVE SUMMARY

Curtins were instructed by Field to under a Phase 1 Preliminary Risk Assessment of a site located in Spittal, Thurso. The proposed redevelopment for the Site is a battery storage facility for renewable energy storage.

A review of relevant geological maps, historical maps and publicly available resources show the Site has undergone minimal development since 1872. The Site has previously been used for agricultural purposes and at the time of writing was in use as an agricultural field.

The construction of overhead pylons associated with an electrical transmission substation to the north of the Site and a historical infilled quarry to the north-east of the Site may indicate made ground in these areas that could be a potential source of contamination and ground gas respectively.

As the Site is proposed for extensive redevelopment for a battery storage facility there is a low risk to future site users but a moderate to low risk to adjacent surface water bodies posed by any potential contaminants in the near surface superficial deposits. As such further work, including an intrusive site investigation is required to characterise site soils, assess extents of contamination, assess gas risk to future site users and allow for a geotechnical assessment of the Site.

CONTENTS

1 INTRODUCTION

1.1 Project Background

In January 2024 Curtins were instructed by Field to undertake a Phase 1 Preliminary Risk Assessment of a site located in Spittal near Thurso.

1.2 Scope of Services

The Preliminary Risk Assessment (PRA) is intended to provide an overview of the geo-environmental and geotechnical setting of the site. It is understood the site is to be developed into a battery storage facility with associated access and drainage infrastructure.

Through this overview, the PRA aims to develop both a working conceptual and ground model for the site, as well as present an initial assessment of any risks that could be presented to the development including its intended end users and the wider environment.

Specifically, the PRA provides an initial assessment of the site regarding:

a) Potential contamination of the site strata by historical and or current use;

b) The potential impact on the wider environment by historical and or current use of the site of interest;

c) The potential impact from surrounding land uses and other environmental factors;

d) Potential problems associated with geological features such as faulting, mineral extraction, mining and land instability;

e) The location of any sub-surface structures that may affect the proposed redevelopment;

f) The location of above-surface features that may affect the proposed redevelopment; and,

g) Recommendations for intrusive investigations.

A Site walkover was undertaken in addition to desk-based searches. Consideration of detailed flood risk, ecology and archaeological issues are outside the scope of this report.

2 SITE DETAILS

2.1 Site Location and Current Details

Site use, location and description are shown below in Table 2.1 and Figure 2.1 obtained from desk-based sources. It is noted that the site boundary considered as part of this PRA is confined to areas proposed to accommodate primary on-site infrastructure, which would further inform intrusive site investigations.

Site Address	Spittal, Halkirk, KW12 6XA
NGR	315725,955062
Area of Site Assessed	11 ha
Current Site use and Description	The site is currently used for grazing..

Table 2.1 – Site Details

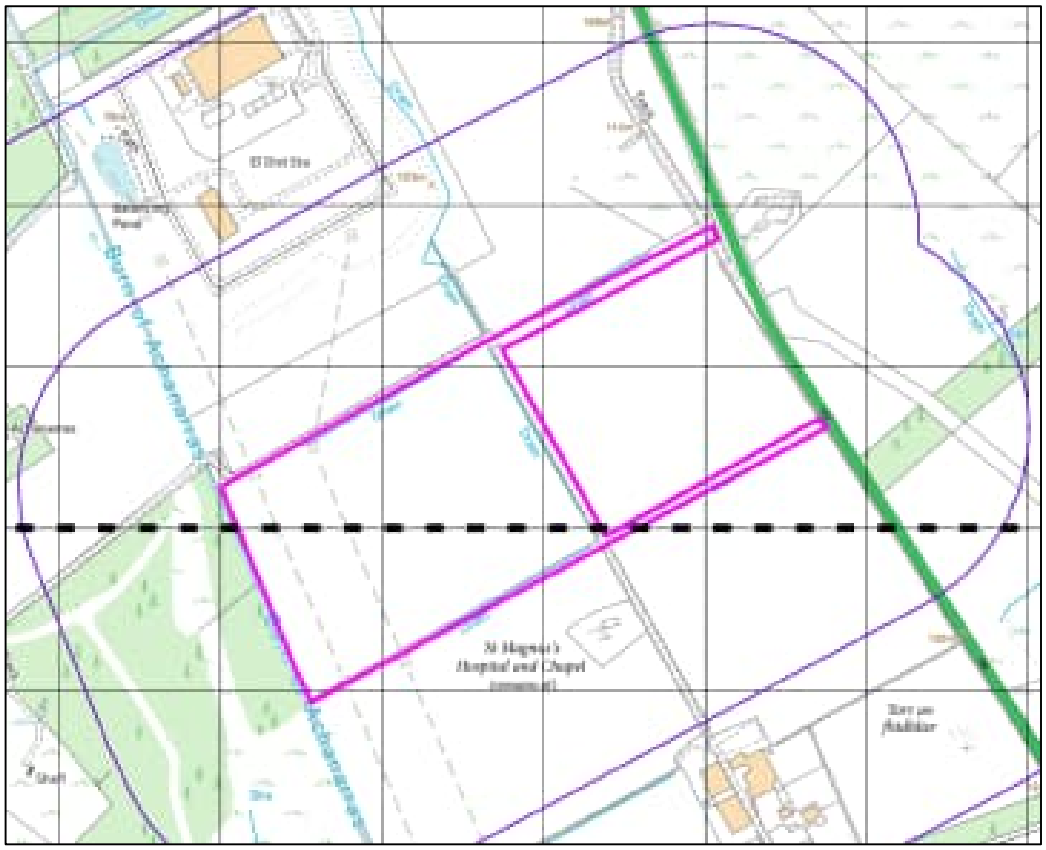

Figure 2.1 Site Location Plan (Site boundary shown in pink and 250m buffer in blue).

2.2 Surrounding Area Details

The following information was also established through undertaking an environmental database search (Envirocheck report (Ref.1) included in Appendix B).

Surrounding Area	N	Electrical Substation
	E	Agricultural land
	S	Agricultural land
	W	Agricultural land and woodland

Table 2.2 Surrounding Land uses

2.3 Site Walkover

A Site walkover was undertaken by a Curtins Engineer on the 22nd January 2024. The walkover was undertaken to ascertain current Site conditions. The weather was generally characterised by strong winds followed by clear skies after a period of heavy rain.

The Site is a large agricultural field downslope from a large pastural farm. Overhead pylons cross the Site on a north to south bearing in the west section of the Site. The Site slopes from east to north-west. Drainage burns bound the Site on the south, east and north boundaries. The north boundary drainage burn shows potential shallow rock at the base of the burn. The Site is immediately surrounded by agricultural land to the east, south and west and a recently constructed electrical substation to the north. The area of the Site proposed for access roads, the east of the Site, is bound by a road and further agricultural land.

There were no visual or olfactory indications of contaminated land issues on the Site.

3 SITE HISTORY

3.1 Historical Maps Review

A review of the available historical mapping and other information for the site, as presented within the Envirocheck Report (Ref.1), has been undertaken and is presented in *Table 3.0* below.

Date	Description	Potential Sources of Contamination
1872	Site is shown as an agricultural field. The wider surrounding land use is shown as various (presumed) agricultural land, quarries and farm buildings. The remains of a Chapel and graveyard are shown approximately 90m to the south of the Site. An Old Quarry is shown midway along the north boundary.	Potential for ground gas generation associated with the graveyard, however, considering the earliest available maps show the chapel was already disused, gas generated is likely to have dissipated.
1907	The Site remains generally unaltered. An old quarry is shown approximately 50m to the north-east corner of the Site, approximately 400m from where the main Site buildings are likely to be located.	Potential for the uncontrolled deposition of made ground from historical quarry associated with potential backfilled materials adjacent to the Site, in particular, potential for ground gas generation.
1960	No changes shown on the Site. The old quarries out with the Site boundary were no longer shown.	No significant sources identified
1968	The old quarry within the Site boundary is no longer shown.	No significant sources identified
1970	No changes noted on-site. The old quarries were no longer shown.	No significant sources identified
2001 – 2006	No changes noted on-site.	No significant sources identified
2023	Overhead pylons shown crossing the site, north to south. Electrical distribution station shown 250m to the north of the Site.	Potential for the uncontrolled deposition of made ground associated with construction of pylons on Site and sub-station to north.

Table - 3.0 Previous Site and Surrounding Land Use and Potential Sources of Contamination

Potential sources of on-site contamination are further discussed in Section 5.0.

4 GEOLOGY, HYDROGEOLOGY AND HYDROLOGY

4.1 Geology and Hydrogeology

A study of the Envirocheck records, British Geological Survey (BGS) 1:50,000 mapping records (Bedrock and Superficial Editions) for Stonehaven (Sheet 067) (Ref.2) indicates the following geological and hydrogeological succession underlying the site.

Geology	Associated Hydrogeological Classification
Tilll, Devensian - Diamicton	SEPA mapping does not provide information on superficial aquifers.
Spital Flagstone Formation – Siltstone, Mudstone and Sandstone	Middle Old Red Sandstone – Moderately productive aquifer. Sandstones, in places flaggy, with siltstones, mudstones and conglomerates and interbedded lavas, locally yields small amount of groundwater.

Table 4.1 – Geological/Hydrogeological Succession

The nearest BGS recorded borehole (Ref.3) is located approximately 380m to the south-west, details of which are presented within Table 4.2 below.

Record Number	Location (NGR)	Details - depth to top of strata / lithology / (depth to base)
ND15SE1	190m north-east (387824, 785552)	Ground level – peaty soil underlain by brownish weathered silty clay (2.50m bgl) 2.50m bgl, Interbedded siltstone, mudstone and sandstone (138.15m bgl)

Table 4.2 – BGS Borehole Records

Groundwater within the superficial deposits is likely to be limited due to the cohesive nature of the clay and where present is likely to be perched within sandy bands.

No groundwater abstractions are located within 1km of the Site and no historical wells were noted during the Site walkover or during the historical map review.

4.1.1 Mining

The site is not within a coal mining reporting area according to the Coal Authority Interactive Mapping (Ref.4).

4.1.2 Ground Stability

The Envirocheck Report confirms that there is a ‘no hazard’ to ‘low risk’ from the following ground stability hazards onsite; collapsible ground, compressible ground, ground dissolution, landslide ground, running sands and shrinking or swelling clay.

4.1.3 Landfill

The Envirocheck Report confirms there are no recorded operational or historic landfills recorded within 1km of the Site. It is noted that the Site is within the Highland Council local authority landfill coverage and the Envirocheck Report did not receive information pertaining to landfill activities on the Site. A search of the Highland Council’s landfill and contaminated land registers was undertaken in addition to a search of SEPA’s landfill register. No landfill records were noted during both searches.

4.1.4 Ground Gas

The BGS Radon Mapping (Ref.5) confirms the site is situated in a radon area where >3-5% of homes are at or above the radon action level. On this basis, basic radon protection measures are considered necessary in the construction of any enclosed spaces.

Where the new development incorporates a basement the advice of a specialist Radon assessor must be obtained.

As per the historical map review, infilled quarries adjacent and on the Site could contain materials with the potential to generate ground gas.

4.2 Hydrology

The nearest surface water feature is the Achanarras Burn located adjacent to the west of the Site. The burn is classified as Moderate, is a small tributary in the River Thurso catchment and is designated as a heavily modified water body. The burns adjacent to the site that flow along the north, east and south field boundaries of the main Site area, flow into the Achanarras Burn.

No surface water abstractions are noted within 500m of the site.

No pollution incidents have been registered within 300m of the site.

4.3 Unexploded Ordnance

Military activities including those conducted as part of both the First and Second World Wars have resulted in a legacy of unexploded ordnance (UXO) being present within the shallow soils of the UK.

UXO result from various sources including both allied (military training) and German (bombing raids) with a guide figure of approximately 10% of all munitions failing to function as designed.

The likelihood of UXO being encountered on a development site is influenced by several factors including; the proximity to strategic targets, the nature of the development works being undertaken and evidence of local damage in the post-war periods amongst others. To determine the likelihood of UXO being present on a site, a step-wise risk assessment process is followed. This process is outlined within CIRIA C681 Unexploded Ordnance: A Guide for the Construction Industry (Ref.6) with the following commentary considered to represent a Preliminary Risk Assessment intended to guide if and where there is a requirement for a Detailed Risk Assessment.

4.4 Preliminary UXO Assessment

Risk mapping (Ref.7) for UXO's has placed the site in a Low risk area. Low risk areas are those with a bombing density of up to 10 bombs per 1000 acres. These areas are considered to have a low UXO risk.

The Envirocheck Report historical mapping (Ref.1) does not indicate any ruins, or buildings that disappeared during WWII, on or surrounding the site.

Based on the forgoing commentary, the likelihood of encountering UXO on site as part of the ground investigation or development works is Low.

If unexploded ordnance is discovered, stop immediately, prevent access to the area, and inform the police. If the site boundary or location changes then the UXO risk should be reassessed

5 CONCEPTUAL SITE MODEL & QUALITATIVE RISK ASSESSMENT

5.1 Conceptual Site Model

The conceptual site model (CSM) and Qualitative Risk Assessment (QRA) are presented in the table within this section.

The CSM details the source-pathway-receptor linkages or potential pollutant linkages (PPL) that have been identified for the site. The QRA details the associated level of risk relating to these potential pollutant linkages.

The CSM and QRA concern risk to human health and water environment with additional, more specific risk assessment protocols contained within the main body of this reporting, as detailed in Section 6.2 below.

The QRA follows the framework outlined within CIRIA C552 which is summarised within Appendix C.

The 'risk rating' within the QRA refers to the risk that the source, pathway, receptor linkage or PPL is complete. Unless specifically stated it does not necessarily refer to an immediate risk and is intended to be used as a tool to assess the necessity for further assessment/investigation

5.2 Additional Risk Assessments

The following risk assessments, listed below, are not included within the main CSM and QRA but nonetheless can be of critical importance to the onward development of the site.

- The risk presented by Mining is discussed and assessed in Section 4.1.1.
- The risk presented by Radon is discussed and assessed in Section 4.1.3.
- The risk presented by Unexploded Ordnance is discussed and assessed in Section 4.3.

Under current health and safety legislation, employers are required to carry out their own appropriate risk assessments and mitigation to protect themselves and their employees, other human receptors and the environment from potential contamination. Such risks must be adequately mitigated by law, specifically the Construction Design Management (CDM) Regulations 2015 (Ref.8) which require that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate/manage that risk. It has been assumed that any future construction works on site will be undertaken in compliance with these requirements.

Qualitative Risk Assessment → Generic Quantitative Risk Assessment → Detailed Quantitative Risk Assessment or; Remedial Action

- The table below represents the first stage in the land quality risk assessment process: The Qualitative Risk Assessment.
- For a development site to be deemed 'suitable for use', the level of risk needs to be brought down to acceptable levels, i.e. low to very low risk. The purpose of each stage of risk assessment is ultimately to establish, if there is a requirement for additional levels of assessment to be made to have sufficient confidence to support a risk characterisation or management decision, e.g. remedial action.
- In the absence of specific site data, a Generic Quantitative Risk Assessment is invariably recommended.

Conceptual Site Model			*Qualitative Risk Assessment*			*Recommended Actions*
Source	*Pathway(s)*	*Receptor(s)*	*Consequence*	*Likelihood of Occurrence*	*Risk Rating*	
Made Ground and contamination associated with: • *Uncontrolled deposition during construction of pylons and adjacent sub-station.* **Fuel Spills from farming equipment during farming activities on the Site.**	**Direct contact, ingestion,** *inhalation (dust and vapours).*	**Site end-user**	**Mild** *Acute health risk*	**Low** *Due to the nature of the Site having undergone minimal development over time the presence of made ground is considered Low.*	***Low***	**Generic Quantitative Risk Assessment** recommended as part of the ground investigation to confirm risk assessment and findings of previous ground investigations.
	Vertical migration through the superficial deposits (soils) *May occur due physical processes including; capillary action and downwards into the natural deposits through infiltration, however presence of cohesive glacial till may limit vertical migration on Site*	**Water Environment (groundwater)** *Unclassified Aquifer.* *No potable abstraction points located within the vicinity of the site.*	**Mild** *Pollution of non-sensitive water resources*	**Low** *There is limited potential for the leaching of contamination from made ground arising. There is also a lack of potable abstractions within the area.*	***Low***	
	Horizontal migration *over and through the superficial deposits (soils).*	**Water Environment (surface water)** *Achanarras Burn*	**Medium** *Pollution of sensitive water resources*	**Unlikely** *Unlikely considering the distance to the receptor and presence of anticipated cohesive soils.*	***Moderate/ Low***	
Production of ground generating gases from: • *Made ground from infilled quarry to the north and north east of the Site.*	**Vertical and horizontal migration** *through the underlying superficial deposits, however, cohesive deposits may limit vertical gas migration*	**Site end-user**	**Medium** *Human health risk*	**Unlikely** *With reference to BS8576:2013 (Ref.10), these sources are considered to have a moderate gassing potential, however the feature was considered to be located sufficient distance from likely receptors to pose a significant risk.*	***Low***	**Ground Gas Monitoring** Risk is considered low due to cohesive nature of on-site superficial soils. However, any residual risk can be mitigated though ground gas monitoring. Recommended as part of the ground investigation.

6 CONCLUSION AND RECOMMENDATIONS

The qualitative risk assessment (QRA) determined a varied level of risk associated with the proposed development.

The QRA concluded by recommending that generic quantitative risk assessments (GQRA) were conducted to confirm the assessment of risk ascribed to each of the respective potential pollutant linkages (PPLs). It is recommended that the GQRA is conducted as part of a ground investigation in support of the engineering design of the proposed development.

In summary, the following recommendations are made:

- Undertake an intrusive ground investigation;
- Undertake a GQRA as part of the ground investigation; and
- Undertake ground gas monitoring.

It is further recommended that this work is completed in advance of any development works taking place. A Drawing showing a proposed ground investigation is located in Appendix B.

6.1 Contaminants of Concern

Potential contaminants of concern associated with the sources identified within the Conceptual Site Model in Section 5.0 of this report include but are not limited to: broad range aliphatic and aromatic hydrocarbons present within any fuel oils used from farming activities (localised spills); polycyclic aromatic hydrocarbons (PAHs); inorganic compounds including heavy metals) and asbestos.

Potential contaminants associated with the airborne dust/particulates include but are not limited to: polycyclic aromatic hydrocarbons and inorganic compounds including toxic metals that are also accounted for by potential on-site contaminants of concern.

6.2 Geotechnical Considerations

A review of the geological mapping and Envirocheck report in Section 4.0 has determined that, whilst there are no geological features that pose significant risk to the Site development a ground investigation should be undertaken to characterise ground conditions on-site.

Therefore, an allowance should be made for in situ testing of soils and retrieval of soil samples for laboratory testing to develop recommendations for suitable foundation solutions and consideration of other geotechnical aspects, for example:

- The presence of soft/ unsuitable soils, including organic-rich materials and/ or peat,
- The presence of shallow bedrock,
- The presence of shallow groundwater which may impact on the cutting of foundations and other excavations during development,
- The stability of excavation side walls during development works, including services/ utilities and foundations,
- The potential re-use of site-won materials within earthworks (where appropriate), and
- The potential requirement for slope stability assessments (where appropriate).

6.3 Additional Considerations

The requirement for additional surveys, e.g. archaeological, flood risk, arboriculture and ecological surveys, should be confirmed through advice from a suitably qualified and experienced professional.

7 REFERENCES

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8 APPENDICES

8.1 Appendix A - Drawings

Key

Cable Percussive Boreholes	CP
Machine Excavated Trial Pits	TP
Soakaway Tests	SA

REV	ISSUED	00/00/00	XXX	XXX
Rev:	Description:	Date:	By:	Chkd:

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Project: SPITTAL		Status: FINAL	
Drg Title: PROPOSED GROUND INVESTIGATION LOCATIONS		Drawn By MTL	Checked By CD
		Designed By MTL	Date 22/03/24
		Scales @ A3 NTS	

Project No - Originator - Function - Spatial - Form - Discipline - Number	Revision
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