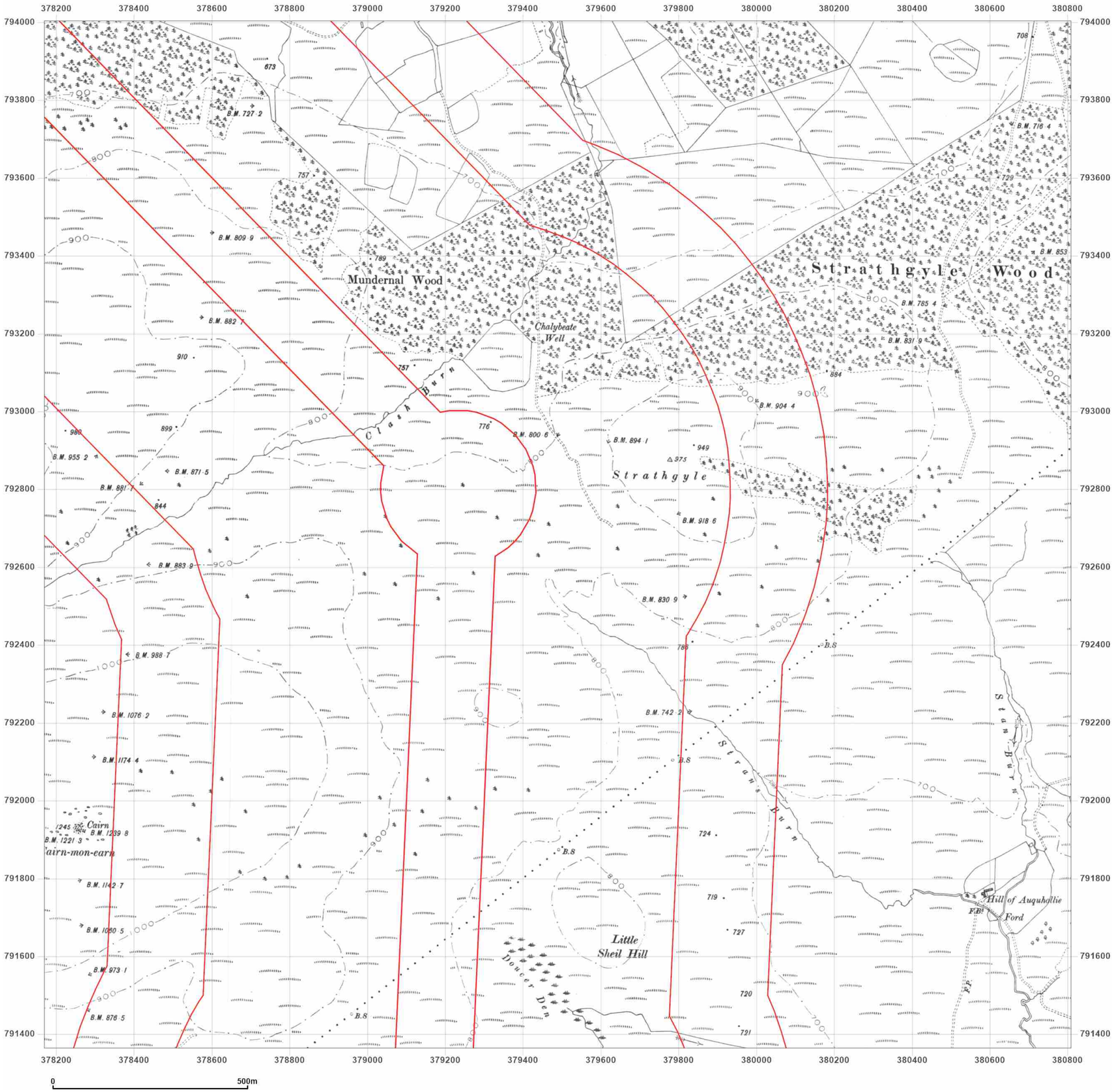

Site Details:

Section E

Client Ref: P110439UK001
Report Ref: WSP-2F1-937-86C-C7L_SS_2_4
Grid Ref: 379488, 792683

Map Name: County Series

Map date: **1904**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed 1864
Revised 1904
Edition N/A
Copyright N/A
Levelled N/A

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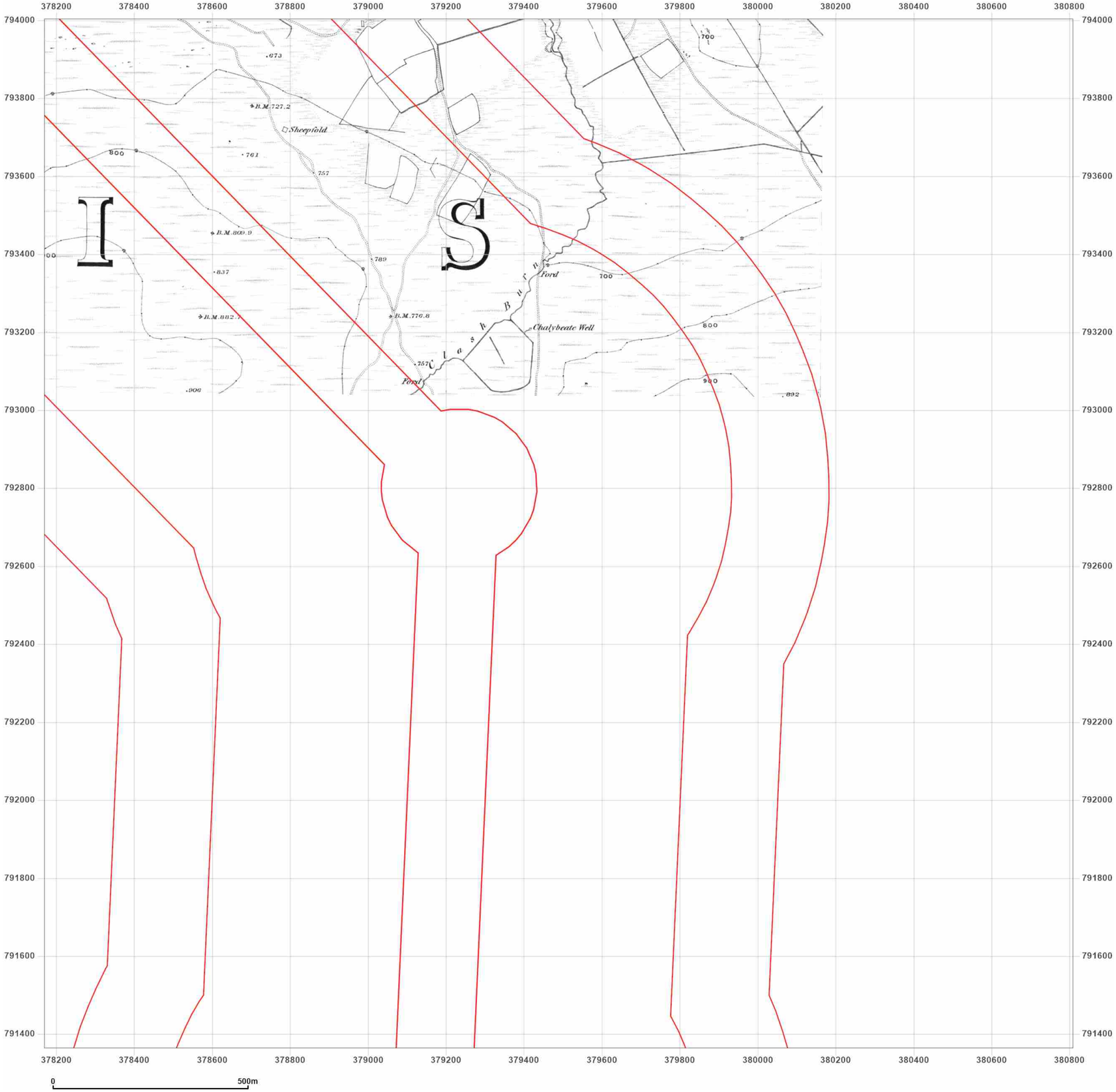

Site Details:

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Report Ref: WSP-2F1-937-86C-C7L_SS_2_4
Grid Ref: 379488, 792683

Map Name: County Series

Map date: **1923**

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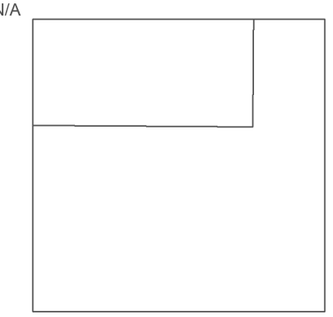
Surveyed 1865
Revised 1923
Edition N/A
Copyright N/A
Levelled N/A



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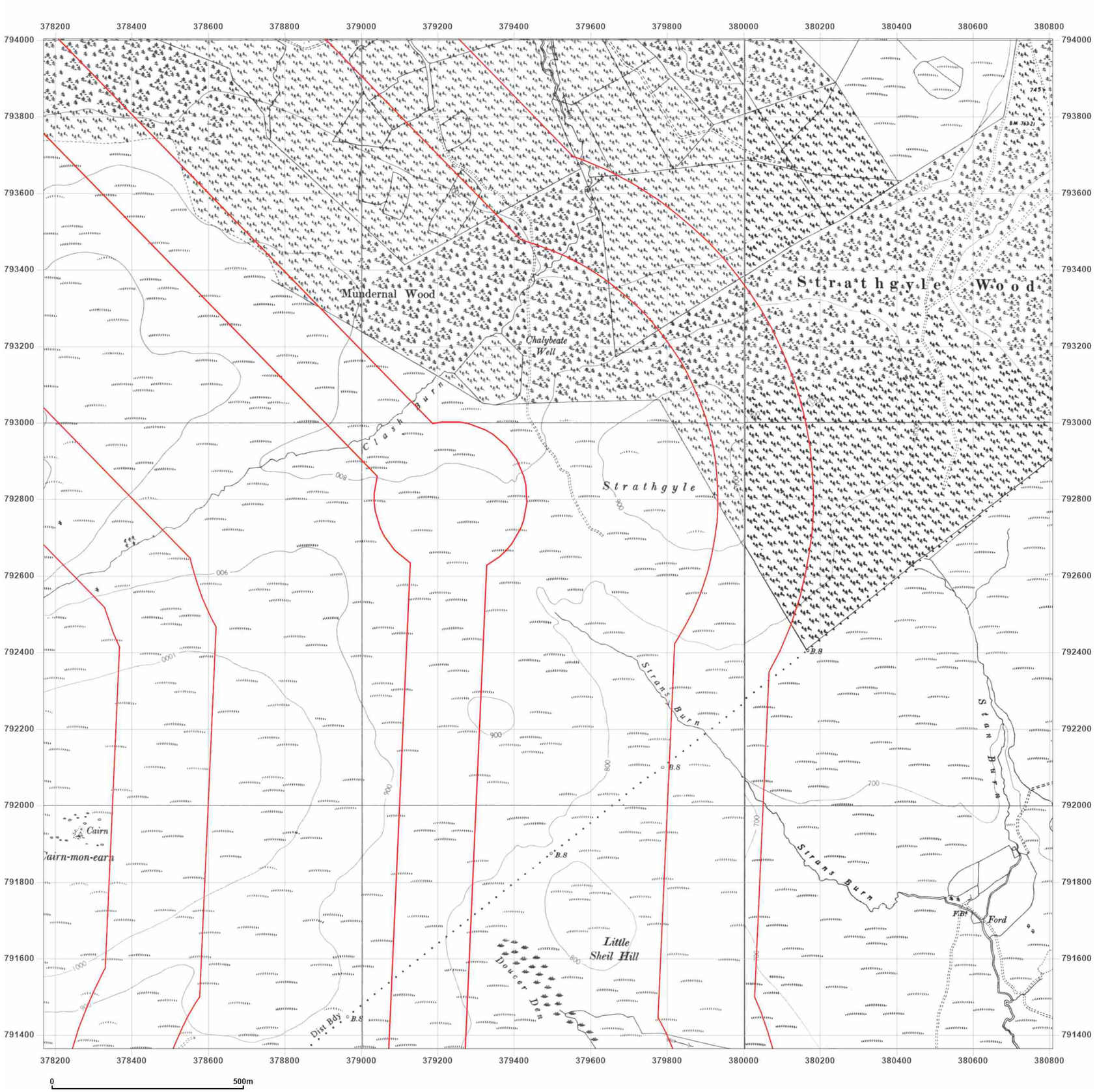

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Report Ref: WSP-2F1-937-86C-C7L_SS_2_4
Grid Ref: 379488, 792683

Map Name: Provisional

Map date: **1956**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed 1956
Revised 1956
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Surveyed 1956
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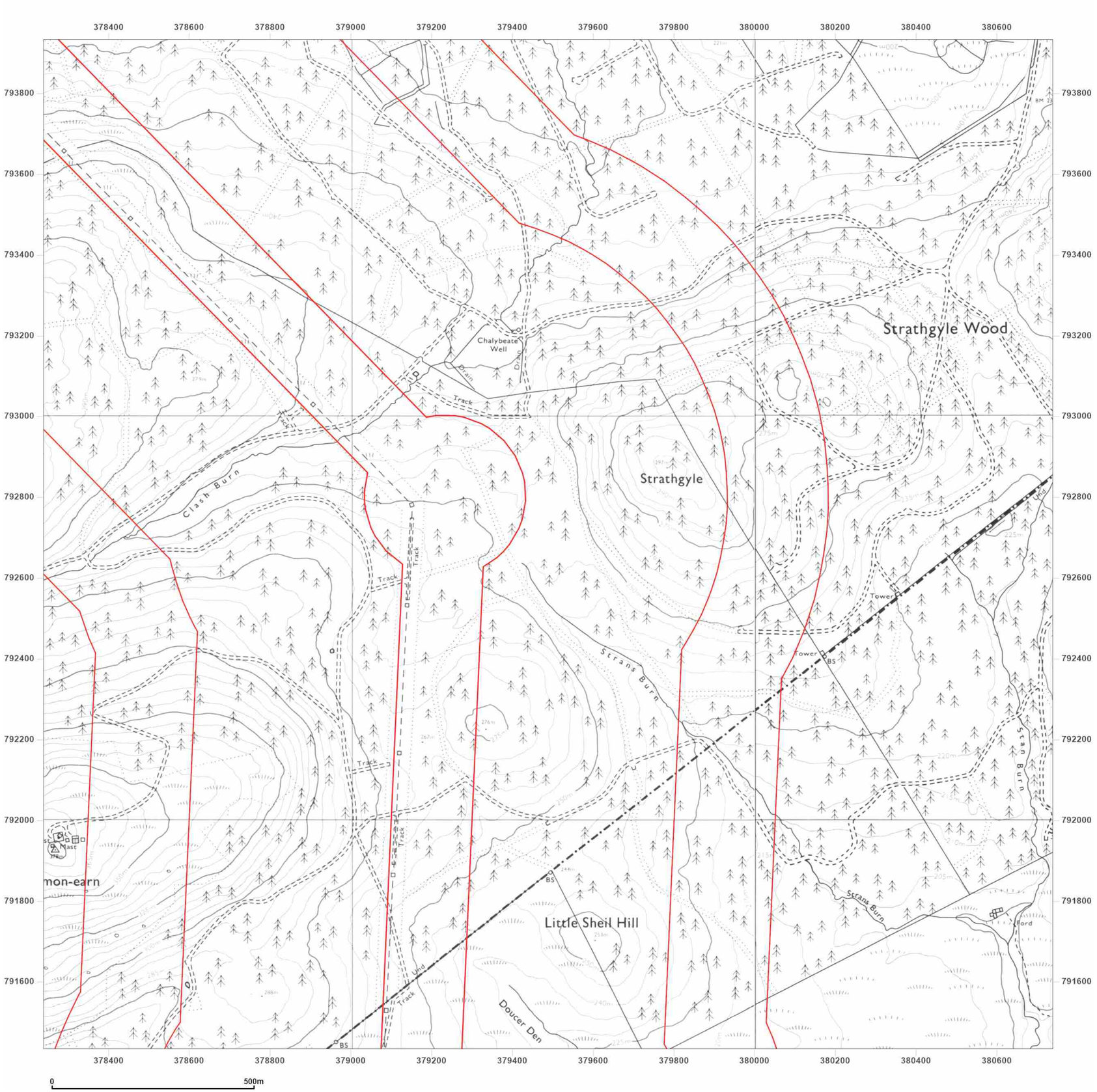

Site Details:

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Report Ref: WSP-2F1-937-86C-C7L_SS_2_4
Grid Ref: 379488, 792683

Map Name: National Grid

Map date: **1973-1974**

Scale: 1:10,000

Printed at: 1:10,000

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Surveyed 1973
Revised 1974
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1973
Revised 1973
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Site Details:

Section E

Client Ref: P110439UK001
Report Ref: WSP-2F1-937-86C-C7L_SS_2_4
Grid Ref: 379488, 792683

Map Name: National Grid

Map date: **2001**

Scale: 1:10,000

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Site Details:

Section E

Client Ref: P110439UK001
Report Ref: WSP-2F1-937-86C-C7L_SS_2_4
Grid Ref: 379488, 792683

Map Name: National Grid

Map date: **2010**

Scale: 1:10,000

Printed at: 1:10,000

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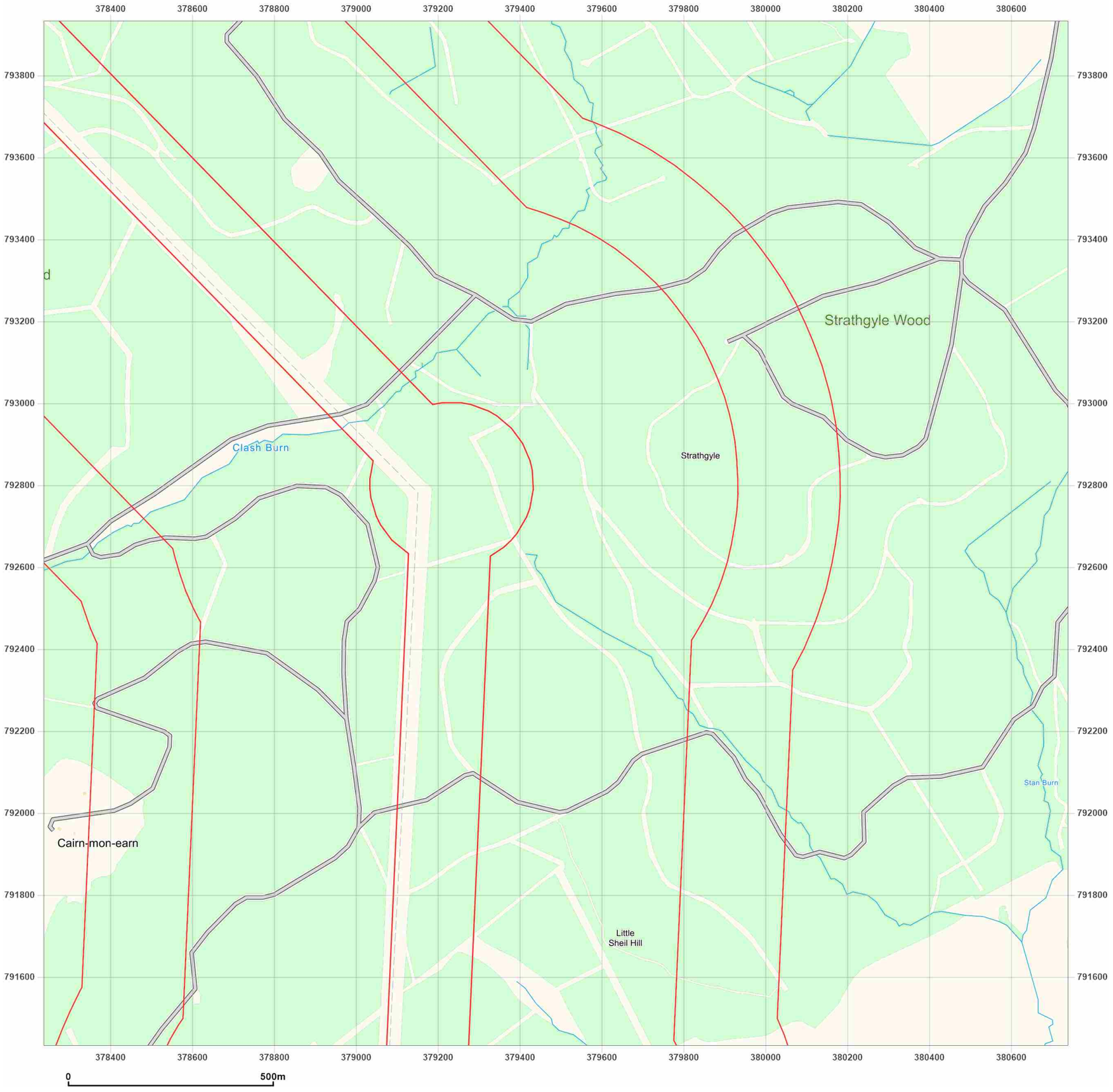

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Report Ref: WSP-2F1-937-86C-C7L_SS_2_4
Grid Ref: 379488, 792683

Map Name: National Grid

Map date: **2025**

Scale: 1:10,000

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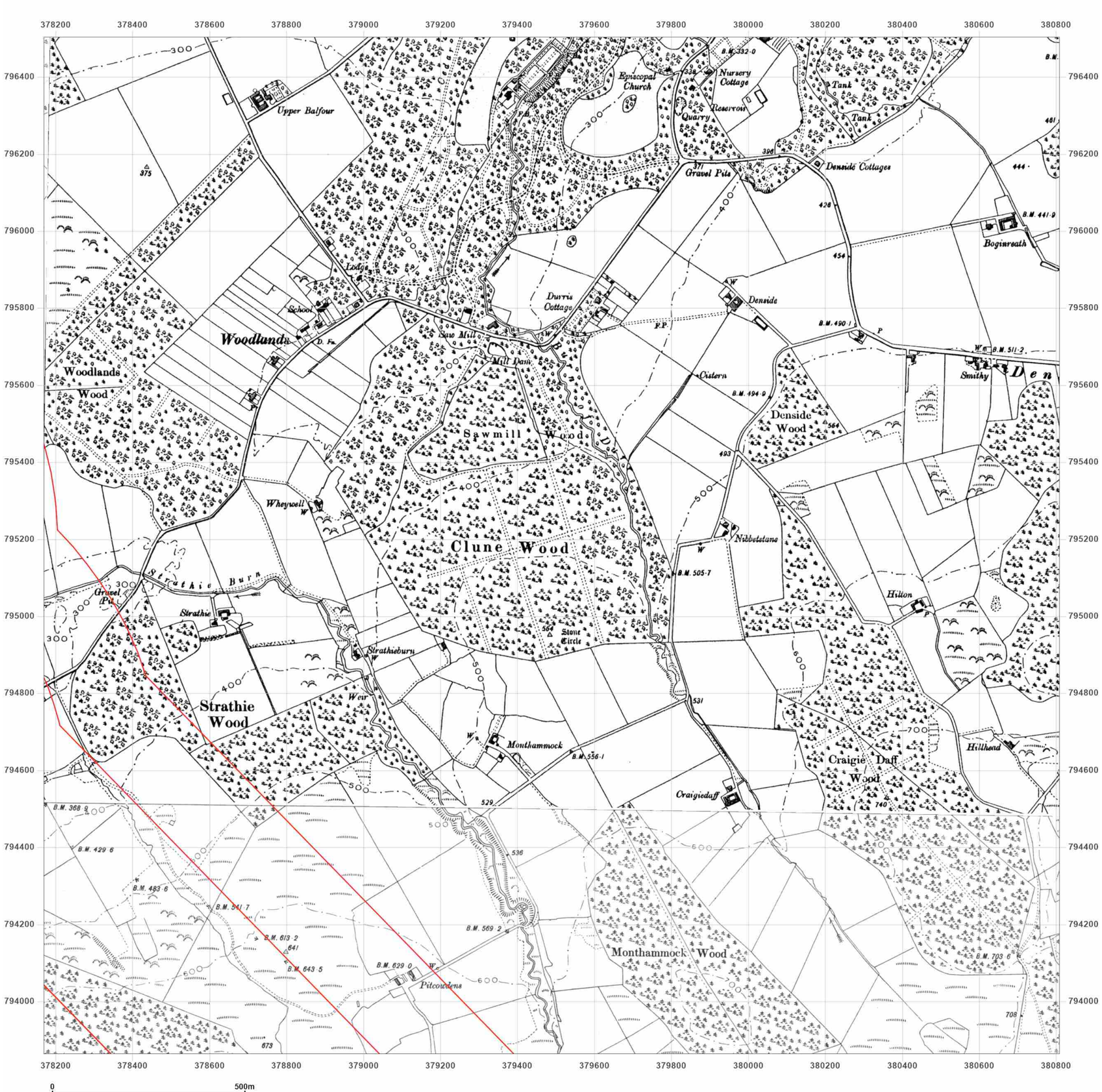

Site Details:

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Client Ref: P110439UK001
Report Ref: WSP-2F1-937-86C-C7L_SS_2_5
Grid Ref: 379488, 795183

Map Name: County Series

Map date: **1899-1904**

Scale: 1:10,560

Printed at: 1:10,560

N
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Surveyed 1865
Revised 1899
Edition N/A
Copyright N/A
Levelled N/A

Surveyed N/A
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Surveyed 1864
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Edition N/A
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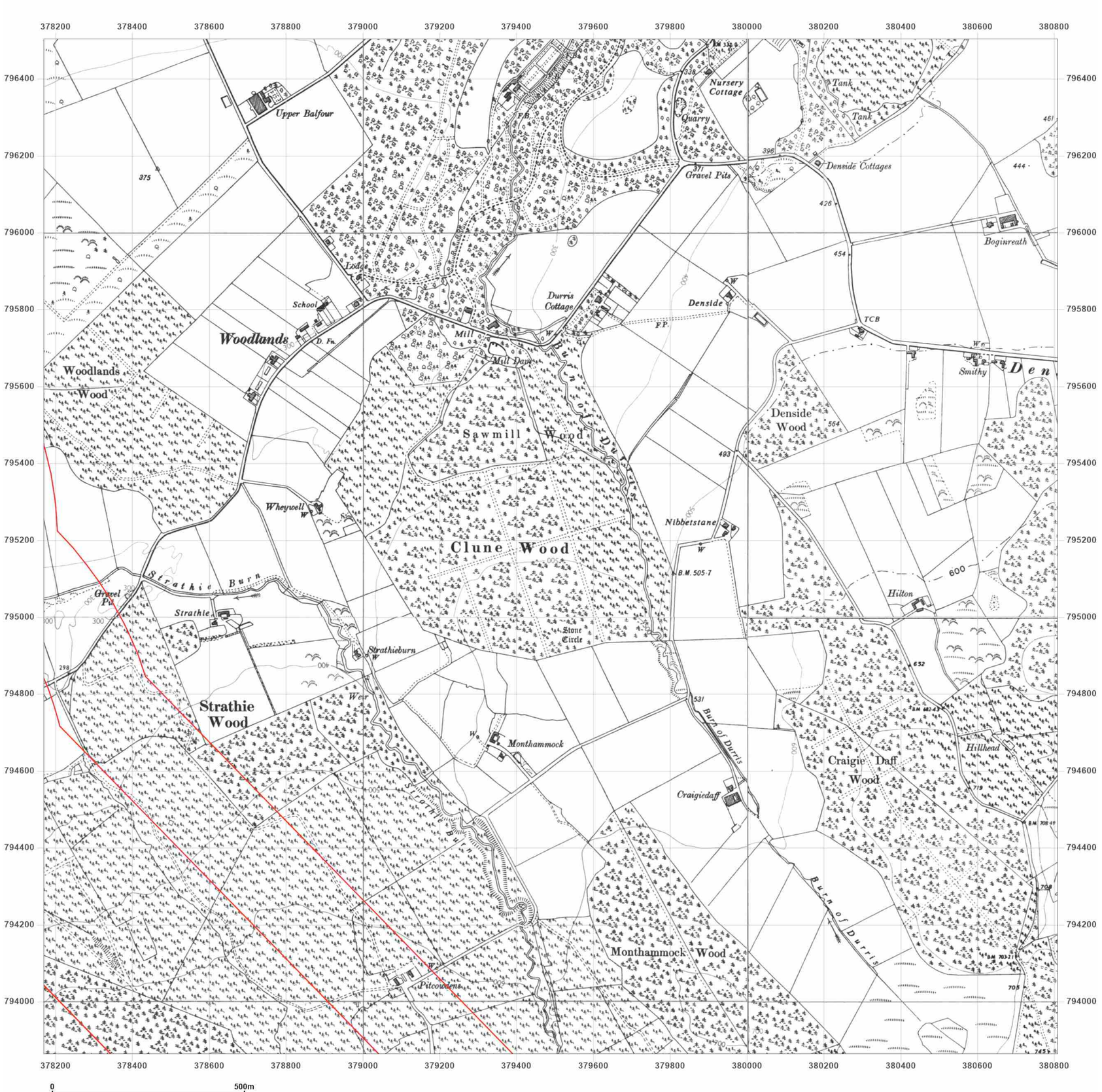

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Report Ref: WSP-2F1-937-86C-C7L_SS_2_5
Grid Ref: 379488, 795183

Map Name: Provisional

Map date: **1956**

Scale: 1:10,560

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Surveyed 1956
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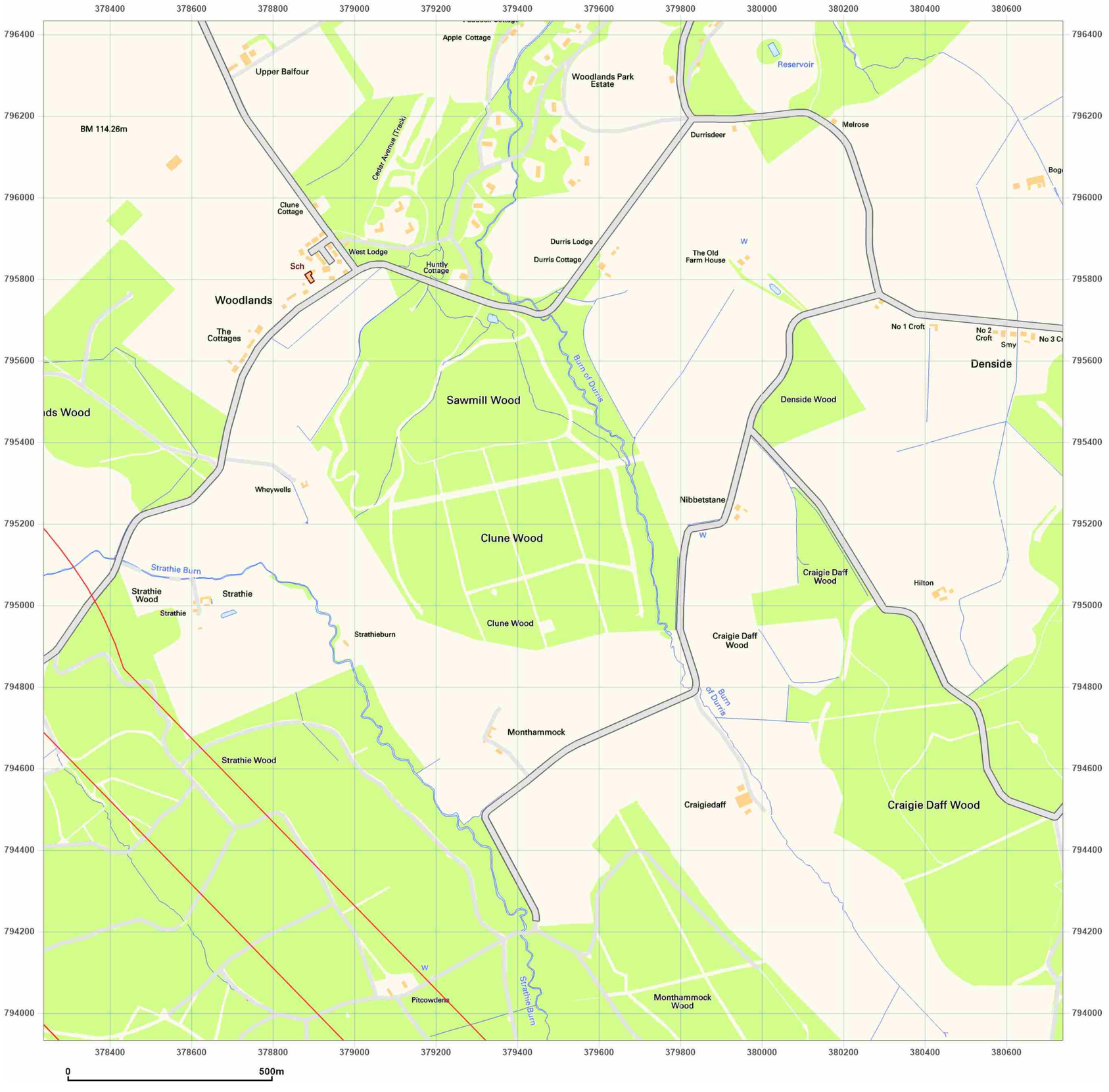

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Map Name: National Grid

Map date: **2001**

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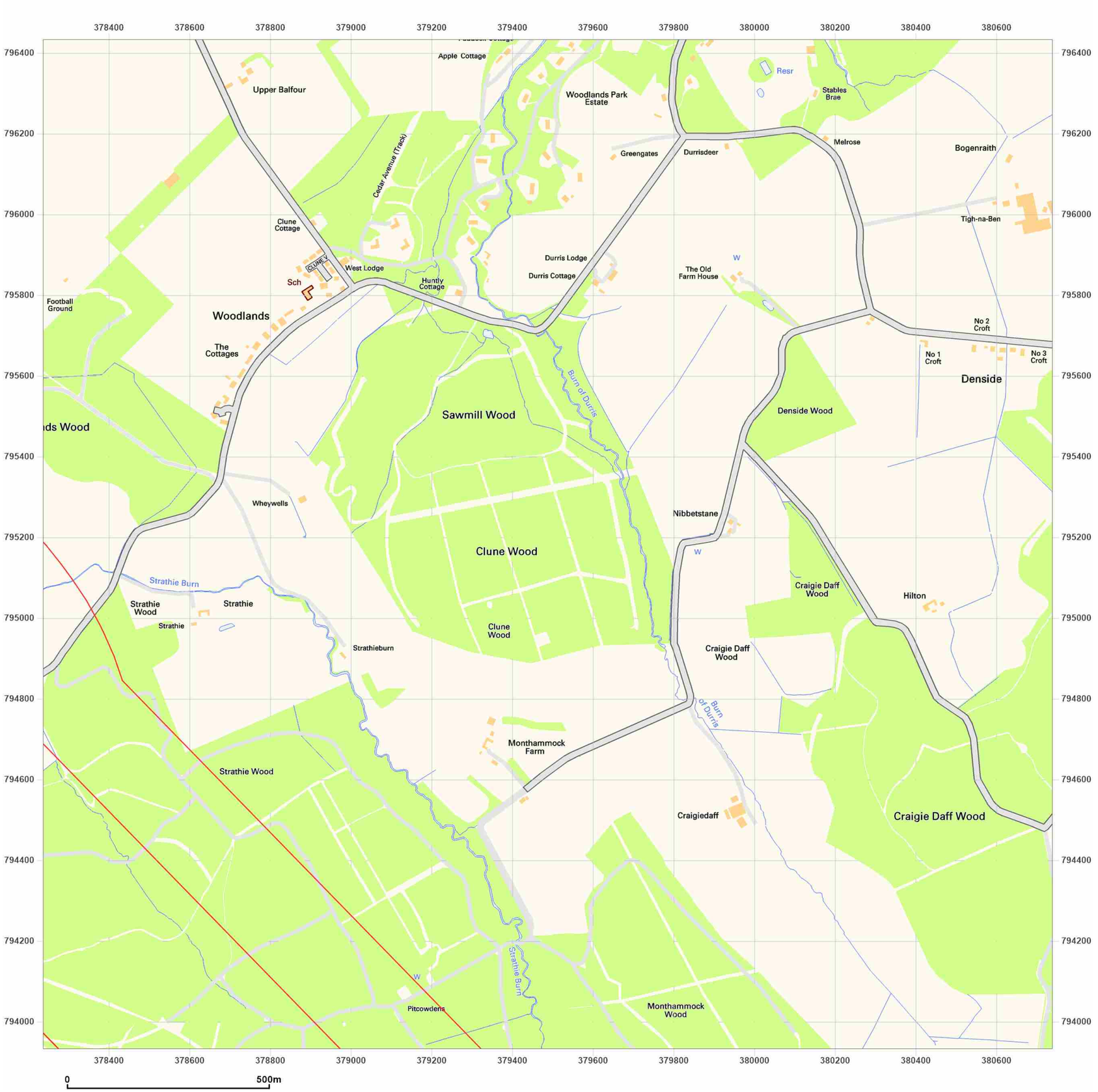

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Site Details:

Section E

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Grid Ref: 379488, 795183

Map Name: National Grid

Map date: **2010**

Scale: 1:10,000

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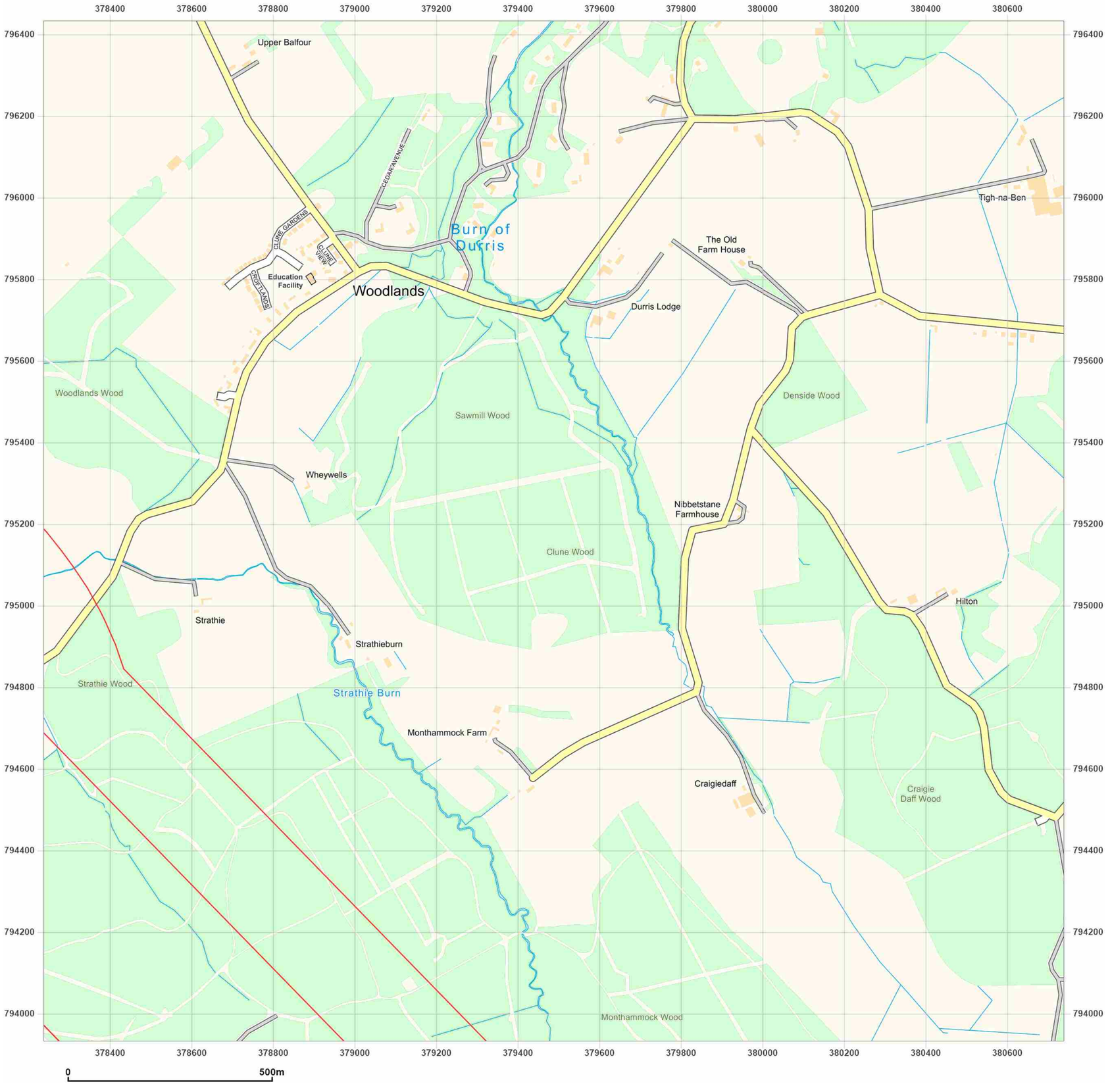

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Map Name: National Grid

Map date: **2025**

Scale: 1:10,000

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Appendix C

LEGISLATIVE BACKGROUND

THE REGULATORY FRAMEWORK FOR OUR ASSESSMENT

Our assessment is made within the framework of the Contaminated Land Regime defined by Part 2A of the Environmental Protection Act and the Contaminated Land Statutory Guidance 2012. We have considered the contaminated land guidance documents issued by the Department for Environment, Food and Rural Affairs (DEFRA) including the 'Land Contamination Risk Management (LCRM) (Environment Agency, 2020).

Our method is to create a clear conceptual model of the potential Pollutant Linkages present on site, consider the Sources (potential contaminants on site) which may cause harm, via Pathways, to Receptors such as human health (e.g., that of site users), the water environment (groundwater, surface water) and the built environment (buildings, services). Contaminated Land has a precise definition, and does not include all land which contains contaminants, but only land where there is a Pollutant Linkage causing (or giving rise to a significant risk of) a degree of harm.

Our approach to the assessment of risks to Human Health is consistent with that established in LCRM. This establishes a tiered approach including:

- Preliminary Risk Assessment (e.g., the establishment of potential pollutant linkages) – normally through desk based work;
- Generic Quantitative Risk Assessment (GQRA) (e.g., the comparison of contaminant concentrations against Soil Guideline Values (SGV) or other Generic Assessment Criteria (GAC)); and,
- Detailed Quantitative Risk Assessment (DQRA) (e.g., the comparison of contaminant concentrations against site specific assessment criteria).

Our approach to Generic Quantitative Risk Assessment (GQRA) is described in outline in the following section.

In addition to the Contaminated Land Regime, where appropriate, we have considered :

- The Environmental Damage Regulations (2009). These implement the European Environmental Liability Directive and provide that; for certain activities, where there is an imminent risk of environmental damage, steps must be taken to prevent such damage, and if environmental damage has already occurred, the operator of the activity must prevent further damage.
- Common Law Liability. This remains an important aspect of contaminated land law, particularly for third parties harmed by, or suffering loss as a result of, contaminated land. Through Nuisance a person may be liable if he owns or occupies land and behaves in a way so as to cause foreseeable injury, loss or damage by creating a nuisance, for example by allowing contamination to migrate off-site either over a period of time or as a one-off event. By Negligence, where the owner of contaminated land owes a duty of care (to a claimant) which was breached. In Trespass where the contamination on a defendant's land has directly interfered with the property of a claimant.

OUR APPROACH TO GQRA

Once we have an initial understanding of the site and the potential pollutant linkages in place we plan our investigation, soil sampling regime and analytical suites. Our plan is informed by documentation such as:

- The available desk study/preliminary risk assessment reports available for the site;
- CLR 8 'Priority Contaminants for the Assessment of Land' (Environment Agency 2002a); and,
- The Department of the Environment's Industry Profiles (DoE 1995-95).

In order to undertake a GQRA, contaminant concentrations need to be compared to appropriate generic assessment criteria. Current UK industry practice is to use, as first preference, UK Soil Guideline Values (SGV)s which are generic assessment criteria published by the Environment Agency and derived using the Contaminated Land Exposure Assessment model (CLEA).

The CLEA model provides an approach for the assessment of chronic risks to human health from concentrations of a substance within soil; where appropriate. However, the SGVs published to date are limited to only a small number of contaminants. Consequently, where published SGV do not exist, other GAC can be used including:

- GAC prepared in accordance with the CLEA V1.071 model by authoritative bodies (e.g. Chartered Institute of Environmental Health (CIEH), Environment Industries Commission (EIC)); or in their absence,
- WSP in-house GAC prepared in accordance with the CLEA V1.071 model and associated documents.

The approach adopted by WSP has been to generate GAC for chronic risks to human health using CLEA V1.071. In generating GAC, input parameters consistent with Environment Agency publications have been adopted by WSP. In generating GAC, the default CLEA assumptions have been applied to a range of likely human health exposure models and associated critical age receptor groups including:

- Residential with Plant Uptake;
- Residential without Plant Uptake;
- Allotments;
- Parks;
- Open Spaces; and,
- Commercial/Industrial.

CYANIDES

The primary risk to human receptors from free cyanide in soils is an acute risk (i.e. a single dose could have a lethal affect as opposed to adverse effects from cumulative intake (chronic affect)). There is no current UK guidance available for calculating acute risks from free cyanide; therefore, an in-house methodology has been used to derive an acute GAC of 60 mg/kg for all exposure scenarios.

Volatile Hydrocarbons from Groundwater and Impacts to Human Health.

The CLEA model does not explicitly consider the potential for chronic impact to Human Health from indoor inhalation of concentrations of volatile vapours from dissolved phase contamination. The potential exists for this to be an important exposure route for a limited number of highly volatile contaminants. GAC have been calculated for volatile contaminants for volatilisation from groundwater using an in-house implementation of the Johnson and Ettinger model (WSP In-house Groundwater Model V1.1) which has been adapted to account for a dissolved phase source through consideration of (a) partitioning from groundwater to soil vapour, and, (b) transport through the capillary zone.

GENERIC QUANTITATIVE RISK ASSESSMENT - CONTROLLED WATERS / WATER ENVIRONMENT

Our approach to the assessment of plausible pollutant linkages with respect to the pollution of Controlled Waters / Water Environment is consistent with UK guidance. The guidance identifies that for the pollution of the water environment to occur; poisonous, noxious, polluting or solid waste matter must be entering such waters or must be considered more likely than not to enter the water environment in the future. The assessment of whether the pollution of the water environment is likely to occur in the future requires consideration of those contaminants at source, which are present in a mobile form, at such a concentration that they will reach a receptor at concentrations considered to be poisonous, noxious, polluting or solid waste matter.

Our adopted approach for GQRA assessment therefore typically comprises the following:

- Consideration of soil concentrations of organic substances in the context of soil saturation to assess the potential for migration under gravity;
- Comparison of soil leachate/pore water concentrations against appropriate GAC; and
- Comparison of groundwater concentrations against appropriate GAC.

This approach is equivalent to Tier 1 / Level 1 Assessment as undertaken using ConSim (2009) / Environment Agency Remedial Targets Methodology V3.1 (2006).

Effectively, for the majority of sites, contaminant concentrations are compared to both drinking water standards and environmental quality standards to identify the need for further consideration/DQRA.

FURTHER WORK

Where a GAC is exceeded further work and/or remediation is normally required. For moderate exceedances further work may include progression to a Detailed Quantitative Risk Assessment (DQRA) which is likely to require further data collection. The outcome of the DQRA may be that the risk is not significant or, if the risk is identified as being significant, the generation of site-specific remedial targets.

Where significant exceedances of GAC are identified or there is evidence of potential acute risks remedial measures may be immediately required.

GROUND GAS

Gas results are assessed with regard to Assessing Risks Posed by Hazardous Gases to Buildings, CIRIA Report C665, 2007 (CIRIA C665).

The method in CIRIA C665 uses both gas concentrations and borehole flow rates to define a characteristic situation for a site based on the gas screening value for methane and carbon dioxide. Gas screening value = borehole flow rate (litres of gas per hour) x gas concentration (%). The calculation is carried out for both methane and carbon dioxide and the worse-case value adopted.

If necessary, more detailed information on our approach to risk assessment can be provided if required.

Appendix D

CIRIA RISK DEFINITIONS

CIRIA RISK DEFINITIONS

Table A1– Classifications of Probability

Classification	Definition
High likelihood	There is a pollution linkage / identified geotechnical hazard and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term

Table A2 – Classifications of Consequence

Classification	Definition
Severe	Short-term (acute) risk to human health likely to result in "significant harm" as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resource. Catastrophic damage to buildings/property. A short-term risk to a particular ecosystem, or organism forming part of such ecosystem.
Medium	Chronic damage to Human Health ("significant harm" as defined in DETR, 2000). Pollution of sensitive water resources. A significant change in a particular ecosystem, or organism forming part of such ecosystem.
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services (significant harm as defined in the Draft Circular on Contaminated Land, DETR, 2000). Damage to sensitive buildings/structures/services or the environment.
Minor	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve, Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc.). Easily repairable effects of damage to buildings, structures and services.

The risk categories presented in this reporting, taking into account both probability and severity, are based on the matrix presented in Table A3 below, following CIRIA C552.

Table A3- Adopted Risk Categories / Comparison of Consequence against Probability

Probability	Consequence			
	Severe	Medium	Mild	Minor
High Likelihood	Very High Risk	High Risk	Moderate Risk	Low to Moderate Risk
Likely	High Risk	Moderate Risk	Low to Moderate Risk	Low Risk
Low Likelihood	Moderate Risk	Low to Moderate Risk	Low Risk	Very Low Risk
Unlikely	Low to Moderate Risk	Low Risk	Very Low Risk	Very Low Risk

CONTAMINANT LINKAGES UNDER CONSIDERATION

CPL	Source	Pathway	Receptor1	Comments
Human Health (on site)				
H1	Contaminants in near surface materials	Dermal contact, ingestion, inhalation of dust	Current and future site users; construction personnel	
H2	Contaminants in deeper materials	Dermal contact, ingestion, inhalation of dust during groundwork's	Construction personnel	Usually managed by use of personal protective equipment (PPE) except in incidents of extreme contamination where further measures are needed
H3	Contaminants in near surface materials	Root uptake in site-grown produce followed by ingestion	Consumers of produce	Requires residential, allotment or agricultural use

[1] 'Receptors' are defined in BS10175 as "persons, living organisms, ecological systems, controlled waters, atmosphere, structures and utilities that could be adversely affected by the contaminant(s)". Controlled waters equate to water environment receptors in Scotland. The Contaminated Land (Scotland) Regulations 2005 which extend to Scotland only, amends Part IIA of the Environmental Protection Act 1990 (c.43) ("the 1990 Act") and the Contaminated Land (Scotland) Regulations 2000 (S.S.I. 2000/178) ("the 2000 Regulations") in light of the Water Environment and Water Services (Scotland) Act 2003 (asp 3) ("the 2003 Act").

CPL	Source	Pathway	Receptor1	Comments
H4	Volatile contaminants in ground or groundwater	Migration to indoor air	Current and future site users	Requires occupied, enclosed structures
H5	Ground Gas generation from Made Ground, organic material degradation, or coal measures	Migration to indoor air	Current and future site users	Requires occupied, enclosed structures
H6	Contaminants in groundwater	Abstraction and ingestion	Current and future site users	Not a viable linkage in the absence of groundwater abstractions
H7	Contaminants in surface water	Dermal contact, ingestion, or abstraction and ingestion	Current and future site users, construction personnel	Usually not a viable linkage in the absence of surface water abstractions, however contact with surface waters may occur
H8	Radon Gas	Migration of radon gas from bedrock to indoor air and inhalation	Current and future site users	The implementation of radon protection measures may be required for new structures on the site or where existing structures are significantly modified.
H9	Radon, Ground gas, and volatile materials	Outdoor air inhalation	Current and future site users; construction personnel	Generally, not a viable risk due to dilution with outdoor air, unless significant contamination / source is present. May need consideration for trenching works or confined space entry.
Water Environment (on site and surrounding)				
W1	Contaminants in ground	Leaching to groundwater	Groundwater	
W2	Near-surface contaminants	Surface run-off	Surface Water	Viability of linkage is dependent on the distance to surface water receptors

CPL	Source	Pathway	Receptor1	Comments
W3	Contaminants in groundwater	Lateral migration	Surface Water	Viability of linkage is dependent on the distance to surface water receptors
W4	Contaminants in groundwater	Lateral and downward migration	Drift aquifer with Future Resource Potential	Following SEPA guidance, if drift material includes greater than 1-2m of non-cohesive materials
W5	Contaminants in groundwater	Downward migration	Bedrock aquifer with Future Resource Potential	Following SEPA guidance, most bedrock aquifers in Scotland have future resource potential.
Built Environment (on site)				
B1	Phytotoxic contaminants in shallow ground	Root uptake	Plant life	
B2	pH and sulphate in shallow ground and/or groundwater in contact with concrete structures	Attack on concrete by direct contact	Buried concrete	
B3	Contaminants in shallow ground	Permeation of water pipes	Pipe material and water ingestion	
Off-Site Human Health / Built Environment Receptors				
O1	Ground Gas / volatile contaminants vapour generation on site	Migration to indoor air on off-site properties	Adjacent site users	Requires occupied, enclosed structures within influencing distance of site
O2	Groundwater with volatile contamination	Migration off-site and subsequent volatilisation to indoor air	Adjacent site users	Requires occupied, enclosed structures within influencing distance of site
O3	Contaminated groundwater	Migration off-site and contact with services	Services and structures in adjacent site	Requires built environment structures within influencing distance of site

Appendix E

GENERAL LIMITATIONS

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G1 3BX

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