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Taymouth Castle Estate  
– Zone 4 Residential  
Development Area

**Stage 1**  
**Geoenvironmental**  
**Risk Assessment**

Ref: 17877/MM/875

APRIL 2023



**Taymouth Castle Estate – Zone 4 Residential Development Area**

**STAGE 1 GEOENVIRONMENTAL RISK ASSESSMENT**

**APRIL 2023**

**REPORT REF: 17877/MM/875**

CLIENT: The River Tay Castle LLP

ENGINEER: Millard Consulting  
Seabraes  
18 Greenmarket  
Dundee  
DD1 4QB

Tel.: 01382 227380

Fax: 01382 229291

Report Prepared By:



.....  
Michael Mudie MSc GMICE

Report Checked by



.....  
James Short BSc. MSc. CEnv, CSci

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**REGISTRATION OF AMENDMENTS**

Revision and Date	Amendment Details	Revision Prepared By	Revision Approved By

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## 1 INTRODUCTION

### 1.1. General

Millard Consulting were appointed by The River Tay Castle LLP to prepare a Stage 1 geoenvironmental risk assessment to inform development planning in Zone 4 of the Taymouth Castle estate by Aberfeldy. The study area includes forested land to the northeast of the estate where residential dwellings with garden grounds and access roads are planned. Location plans are included in Appendix A and Appendix B.

### 1.2. Objectives

The primary objective of this (Stage 1) report is to collate information on the site history and its environmental setting to create a Conceptual Site Model to inform a preliminary risk assessment of geoenvironmental constraints.

Land contamination risks are evaluated relative to the residential land-use, provision of utilities, site users and the water environment. Ground conditions are evaluated in regard to proposed structural development.

Where potentially elevated risks are identified a secondary objective is to outline, where necessary, a (Stage 2) investigation strategy, to qualify and quantify hazards that could present risk. This may include trial excavations, boring, coring, soil sampling and testing, construction of monitoring installations and ground gas or groundwater monitoring. Where necessary a separate Stage 3 Remediation Implementation Plan may be required, followed by Stage 4 Verification (1.4).

### 1.3. Limitations and Exceptions

This report has been prepared by Millard Consulting for the benefit of The River Tay Castle LLP and their advisors only, no third-party liability or duty of care is extended. Third parties using any information contained in this report do so at their own risk. The report has been prepared using information available at the time of writing and as dated. No liability is taken for information which has become available since this time. The assessment has been undertaken on the identified development area using information referenced. Any changes to the development area after these dates may need to be assessed separately and are not included as part of this assessment.

### 1.4. Land Quality Assessment Methodology

The assessment of risk relating to land and groundwater contamination is undertaken in a structured and consistent procedure. Reference is made to regulatory guidance for the evaluation and assessment of land quality for current and proposed use as well as authoritative guidance on best practise methods for compiling risk assessments and completing this process in support of planned land-use. A complete description of the Risk Assessment Framework including the methods and references is given in Appendix C.

## 2 LAND USE AND ENVIRONMENTAL SETTING

Information on the historic land-use and environmental setting is obtained from a variety of sources as detailed within each section. A site specific environmental database report (Appendix B) has been consulted, which provides information on Historical Industrial Sites, Landfill and Other Waste Sites, Current Land Use, Geology and Hydrogeology, Designated Environmentally Sensitive Sites, Flooding, Mining, Natural Hazards, Radon reporting (which supersedes the UK Radon online mapping<sup>1</sup>), Borehole Records, Railways and Tunnels. This has been supplemented where necessary by reference to the British Geological Survey GEOINDEX<sup>4</sup> online database, Scotland’s Environment Map<sup>2</sup> and the Coal Authority mapping<sup>3</sup> and reporting services.

### 2.1 Site Location

The study area comprises a dense woodland on the northwest side of the Taymouth castle estate inside the boundary wall which runs parallel to the River Tay and A827 Aberfeldy to Kenmore Road. A location plan is provided in the Environmental Database report (Appendix B). Photographs were taken during the site walkover to provide illustrative context of the written descriptions.

### 2.2 Site Description and Walkover

Area	6.17ha approx.	NGR	E277885 N745876
Date	13/03/23	Weather	Cloudy, Wet
Carried out by	Michael Mudie		

#### 2.2.1 General appearance

The study area comprises of a densely wooded (coniferous and deciduous trees), undulating forest, with multiple forestry tracks snaking throughout the area. There is a steep slope on the north and eastern boundaries, as shown in the images below.



Central study area showing undulating forest



Northeast Corner of study area

#### 2.2.2 Topography

The study area sits approximately 20m above the River Tay along the northwest to northeast boundary, where it begins to level off with the River Tay towards the southwest boundary.

<sup>1</sup> <http://www.ukradon.org/information/ukmaps>  
<sup>2</sup> <https://map.environment.gov.scot/sewebmap/>  
<sup>3</sup> <http://mapapps2.bgs.ac.uk/coalauthority/home.html>

2.2.3 Boundary conditions

Adjacent land-use			
North	Woodland/Track/River Tay	East	Track/Woodland/Golf course
South	Track/Woodland/ Golf Course	West	Track/Woodland/ Golf Course

2.2.4 Surface Cover, Uneven or Made Ground

A forestry track snakes around the west and north boundaries, and another along the south and east boundary where they both meet in the northeast corner of the study area. A further forestry track leads northwards to a building (named the Dairy in the historical maps, see Section 2.3) with garage and kennel outbuildings beyond.



Outbuildings to rear of Dairy

2.2.5 Vegetation

Evidence of stress	x
Invasive plant species (e.g. giant hogweed/ Japanese Knotweed)	x

Dense trees along with grass, and some Rhododendron are typical found across the area.

2.2.6 Surface Water

Streams, ponds, seepages, sinks etc.	<input checked="" type="checkbox"/>
Unsuitable ground (marshy, waterlogged, standing water)	x

The River Tay flows east along the northern boundary. To the western boundary a small burn/ditch flow from south to north.



Burn across Northern Boundary



2.2.7 Evidence of Contamination / Materials Storage (waste, spoil, fuel etc.)

There was evidence of material storage and possible contamination within the study area in the form of a gas storage tank to the north of the Dairy Building, current use undetermined. Nearby there is also an inspection chamber with an underground storage tank, as show in the images below.



Gas and Underground Storage Tanks to rear of Dairy

2.2.8 Infrastructure and Structural Information

Structures on site	<input checked="" type="checkbox"/>
Evidence of previous structures	<input checked="" type="checkbox"/>
Utilities evidence	<input type="checkbox"/>
Access constraints (e.g. for investigation plant)	<input checked="" type="checkbox"/>



The only significant structure in the study area is a large A listed Dairy building structure with associated derelict garage and kennels. To the southwest of the study area there is a Scottish Water Monitoring Station with signs of foul and surface water drainage. The Dairy building and other structures are built atop the steep slopes to the north and east boundaries. The Scottish Water monitoring station is situated in the southwest of the study area where foul and surface water utilities were found to be present, as shown in the images below.



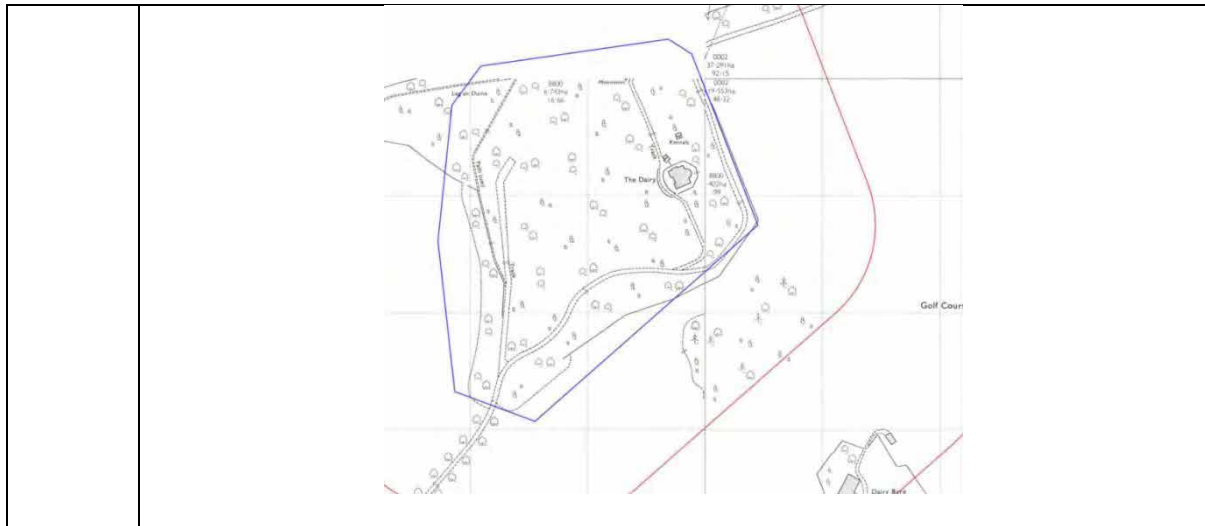
FW and SW Sewers

### 2.3 History

The site history has been assessed by reviewing historical Ordnance Survey maps provided in the Environmental Database report (Appendix B).

Dates	History
1862 – 1901	<p>The County Series first edition plans show undulating densely wooded ground in the study area, with tree lined forestry tracks snaking around the perimeter of the study area. The study area sits on top of a steep slope which wraps around the West, North and East boundaries. The River Tay flows eastwards along the northern boundary of the study area. A small monument is shown in the northeast of the study area.</p> <p>An unnamed structure is shown in the middle of the study area</p> 
1977-1981	<p>The entire study area is marked by densely wooded coniferous and deciduous plantation. To the Northeast the construction of 2 new buildings are shown beside the existing Dairy Building which is now named. One is labelled Kennels.</p> <p>Part of the forestry track on the south boundary has been re-aligned to give access to the dairy building from south to north rather than from west to east (see map extract below).</p> 
1981 - 2022	<p>To the northeast of the study area the buildings and structure remain and are still marked as Dairy, Kennels and monument. To the south, out with the study area the land use has changed, and a golf course is now present (see extract of map below).</p>





## 2.4 Relevant Environmental Database Records

Information from the database, which is of relevance or close proximity is summarised below to inform the environmental setting of the site-specific conceptual site model (CSM).

Environmental Database Information	Site Specific Comment
Historical industrial land uses.	A Dairy is identified on site, but it is a listed structure for habitation or leisure use rather than of industrial consequence.
Designated Ancient Woodland	Ancient Woodland is designated in the wider local area, but not within the study area and therefore is of no significant concern.

## 2.5 Geology, Hydrogeology and Hydrology

A review of geological conditions is made from records presented in the Environmental database (Appendix B), the British Geological Survey (BGS) onshore Geoindex<sup>4</sup> and site walkover observations.

### 2.5.1 Made Ground

No artificial deposits are recorded in published data for the area, though the Dairy building and associated structures in the middle of the area may have been backfilled, along with any previous structures and road constructions and thus comprise of made ground of an undetermined nature.

### 2.5.2 Superficial Deposits

Superficial deposits underlying the low-lying areas of the site are mapped as undifferentiated river terrace deposits, which include river alluvium, typically of sand and gravel, locally with lenses of silt and peat. River and water worked deposits may be loose to dense fine to coarse-grained sand or sand and gravel, with some cobbles. Sandy clay and silt, sometimes laminated, may occur locally and be associated with peat. At the foot of the hill where water deposited (alluvial) material is present they may range from sand and gravel to very soft to very stiff silt or clay. Deposits may become soft to very soft at depth.

<sup>4</sup> <http://www.bgs.ac.uk/geoindex/>

### 2.5.3 Solid Geology

The bedrock underlying the site is the Pitlochry Schist formation comprising psammite and semipelite. The BGS describe these as very weak to strong generally widely jointed foliated, often with pronounced mineral layering, medium to coarse-grained schist. These rocks usually show marked strength anisotropy which is stronger to normal foliation. They weather to gravelly sand or sandy clay.

### 2.5.4 Hydrogeology and Hydrology

The nearest classified surface watercourse is the river Tay (ID:6501) which is in the River Tay catchment of the Scotland river basin District. The stem from Loch Tay to River Lyon confluence is 4.4km in length and classified as good overall status. The superficial deposits underlying are identified as the Tummel and Tay Sand and Gravel, which is a groundwater (ID: 150735), in the Scotland river basin district, which is 76.0 square kilometres in area and of overall good status. The BGS record these deposits to have high to very high permeability with flow through matrix. They are a quaternary sand and gravel aquifer of local importance.

Bedrock is recorded by the BGS as Precambrian crystalline basement rock, known as the Southern Highland group, which offers little potential for groundwater storage and transport other than in cracks and joints. It is a low productivity aquifer of medium to very low permeability in which flow is through discontinuities in the near surface and weathered zone.

Flooding	
River flooding	1 in 30 year, 0.3-1.0m (within 50m)
Coastal flooding	Negligible within 50m
Surface water flooding	1 in 30 year, 0.3-1.0m (within 50m)
Groundwater flooding	Low within 50m

## 2.6 Geohazards

### 2.6.1 Radon

The study area is not a radon affected area.

### 2.6.2 Mining

The site is not in a coal mining reporting area.

2.6.3 Geo-Hazard Summary Table

Rank	Geo-Hazard	Hazard Rating	Advice	Technical Considerations
Very low	Shrink Swell	Ground conditions predominantly low plasticity.	No actions required to avoid problems due to shrink–swell clays	No special ground investigation required or increased construction costs or increased financial risk due to potential problems with shrink–swell clays.
Moderate	Landslides	Significant potential for slope instability with relatively small changes in ground conditions.	Avoid large amounts of water entering the ground through pipe leakage or soakaways. Do not undercut or place large amounts of material on slopes without technical advice.	New build – Assess slope stability of site and consequences of excavation, loading and water content changes during and after construction. Existing property – Probable increase in insurance risk due to natural slope instability after changes to ground conditions such as a very long, excessively wet winter.
Negligible	Soluble Rocks	Soluble rocks are either not thought to be present or are not prone to dissolution. Dissolution features are unlikely to be present.	No actions required to avoid problems due to soluble rocks.	No special ground investigation required or increased construction costs or increased financial risk due to potential problems with soluble rocks.
Moderate	Compressible Ground	Significant potential for compressibility problems.	Avoid large differential loadings of ground. Do not drain or dewater ground near the property without technical advice.	New build – Assess the variability and bearing capacity of the ground. May need special foundations to avoid excessive settlement during and after construction. Consider effects of groundwater changes. Extra construction costs are likely. Existing property – Possible increase in insurance risk from compressibility if groundwater levels drop due to drought or dewatering.
Very low	Collapsible Rocks	Deposits with potential to collapse when loaded and saturated are unlikely to be present.	No actions required to avoid problems due to collapsible ground.	No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible ground.
Low	Running Sand	Possibility of running sand problems after major changes in ground conditions.	Normal maintenance to avoid leakage of water-bearing services or water bodies (ponds, swimming pools) should avoid any problems due to running sands.	New build – Consider possibility of running sands into trenches or excavations if water table is high. Avoid concentrated water inputs to site. Unlikely to be increase in construction costs due to potential for running sand problems. Existing property – No significant increase in insurance risk due to running sand problems.

### 3 GEOENVIRONMENTAL RISK ASSESSMENT

To formulate a qualitative risk assessment this section establishes what relevant hazards may exist. How those hazards may reach sensitive receptors (pathways) and what those receptors may be in view of the proposed site use and environmental setting.

#### 3.1 Hazards

The land has been developed with castle estate grounds, comprising grass and woodland since first edition mapping. The only significant feature was noted to be a Dairy Building on the 1900 OS plan. Evidence of man-made ground includes the presence of forestry tracks, Dairy building, garage, kennels, and an underground storage tank. On tracks, made ground is expected to comprise replaced natural soils, or introduced gravel, which is most likely generally inert. The nature of material in the surrounding area of the Dairy is unknown.

The following possible hazards may exist in the study area:

Made ground – Dairy.

#### 3.2 Pathways

Hazards released to the ground, could allow pollution to enter groundwater, which in granular alluvial soils would most likely permeate readily into the water table. Gravels and sands immediately underlying are likely to be high permeability and it should be assumed are water bearing in continuity with the protected water environment of the River Tay.

The proposed residential use, comprising new hardcover of buildings and driveways reduces infiltration of precipitation. Private gardens will allow residents to come into contact with soil. In low lying alluvium the presence of peat could be associated with hazardous ground gases, which if found may be a constraint that requires to be managed during planned redevelopment.

Building and utility materials will be in direct contact with soil, such as standard water supply pipe.

If mobile or leachable contamination has been released to the ground there are likely to be pathways into the superficial groundwater and even laterally to the surface water environment. Bedrock aquifer is of limited resource potential and pathways for contamination to enter rock are limited.

Consideration is given to the buildings and utilities being in direct contact with site soil and future users being exposed to soil in gardens. Consideration is also given to the potential for site sourced contamination to affect the water environment.

The following pathways are considered relevant for the conceptual site model and risk assessment:

- Consumption of contaminated produce
- Dermal contact with soil and soil derived dust
- Direct / indirect exposure to hazards
- Direct contact with groundwater
- Direct contact with soils
- Gas migration
- Infiltration and migration
- Ingestion of soil
- Inhalation of soil derived dust
- Migration through groundwater & ecological uptake

Surface water run-off and soakaways

3.3 Receptors

The following relevant receptors are identified for the risk assessment.

Receptor	Description
Residents and ground workers	During development and upon completion within new residential premises.
Property – buildings, utilities	Foundations and utilities.
Water Environment	Surface water, superficial groundwater and deep groundwater in the bedrock.
Special Area of Conservation	River Tay

3.4 Conceptual Site Model

The potential hazard-pathway-receptor linkages identified above can now be combined to formulate a qualitative risk assessment. The risk assessment is based on best practise guidance using a combination of the receptor sensitivity, hazard severity, magnitude of consequences and likelihood of a pollutant linkage occurring. A semi-quantitative scoring system is applied to ensure consistent and proportionate evaluation of risk. The risk assessment methodology detailing the classes of significance is given in Appendix C.

The hazards, pathways and receptors are now combined in a semi-quantitative assessment of risk in the table below.



Receptor Group	Min. risk	Max. risk	Action	Risk Management Action
Residents	Low	Low	Advisory	Hard covered use is planned in the Dairy area. While residents are high sensitivity and hazard severity is medium a significant exposure scenario is not proposed in the new use, which results in low risk. It is likely that the building will be retained due to it's A listing status, therefore there is minimal chance of elevated risk.
Users	Low / Moderate	Low / Moderate	Advisory	Risk scenarios are as for Residents above. Sensitive uses in the Dairy area could include the use of the building as a golf club establishment with outdoor seating and putting area, in which exposure to site soil could cause greater probability of exposure and elevated risk.
Groundworkers	Low / Moderate	Low / Moderate	Advisory	As there is proposed hard landscaping in the Dairy area only, there is expected to be a low likelihood of exposure for groundworkers. Low risk can be further ameliorated by adherence to use of standard HSW PPE protocols including overalls and gloves for coming in contact with ground in this area.
Buildings	Low	Low	No	This hazard category is of little significance for building materials.
Groundwater	Low / Moderate	Low / Moderate	Advisory	The groundwater is at low likelihood of being locally impacted by former Dairy activities. Given the close proximity to the River Tay and surrounding soil type risk is concluded to be low.
Surface Water	Low	Low	Advisory	The closest pathway can be found within 150m of the Dairy site. It is advisable that new drainage installed as part of the planned use of the Dairy area is suitable to protect against any potential contamination and protect any drainage outfall or soakaway discharge that could potentially mobilise contamination residues.
Habitats	Low	Low	No	The habitat in the site area and the habitats of the Tay are sufficiently remote to be unlikely to be affected by this hazard category.
Utilities	Low / Moderate	Low / Moderate	Advisory	As the area is a greenfield site and the A listed structure will be retained, organic contamination will be non-aggressive to the water supply pipe. Therefore standard pipe should be laid for the purpose of the development.
Aquifer	Very Low	Very Low	No	Bedrock aquifer has very limited resource potential and is unlikely to be impacted by any surface source hazards.

### 3.5 Qualitative Risk Assessment

The risk assessment has been compiled for the hazards, pathways and receptors identified in the risk assessment table presented above. The pollution linkages are summarised below in order of receptor category along with the minimum and maximum risk ranges. Actions regarding risk management are qualified where required.

Site Name		Taymouth Castle Estate – Zone 4		Stage of Assessment		Preliminary CSM Stage1	
Site no.		17877		Date		28/03/23	
Receptors	Sensitivity	Hazards	Hazard Severity	Pathways	Consequence	Likelihood	Risk
Residents	High	Made Ground releases around Dairy	Medium	Consumption of contaminated produce	Substantial	Very Unlikely	Low
Residents	High	Made Ground releases around Dairy	Medium	Dermal contact with soil and soil derived dust	Substantial	Very Unlikely	Low
Residents	High	Made Ground releases around Dairy	Medium	Direct contact with soils	Substantial	Very Unlikely	Low
Residents	High	Made Ground releases around Dairy	Medium	Gas migration	Substantial	Very Unlikely	Low
Residents	High	Made Ground releases around Dairy	Medium	Ingestion of soil	Substantial	Very Unlikely	Low
Residents	High	Made Ground releases around Dairy	Medium	Inhalation of soil derived dust	Substantial	Very Unlikely	Low
Groundworkers	Medium	Made Ground releases around Dairy	High	Dermal contact with soil and soil derived dust	Substantial	Unlikely	Low / Moderate
Groundworkers	Medium	Made Ground releases around Dairy	High	Direct contact with soils	Substantial	Unlikely	Low / Moderate
Groundworkers	Medium	Made Ground releases around Dairy	High	Ingestion of soil	Substantial	Unlikely	Low / Moderate
Groundworkers	Medium	Made Ground releases around Dairy	High	Inhalation of soil derived dust	Substantial	Unlikely	Low / Moderate
Groundworkers	Medium	Made Ground releases around Dairy	High	Gas migration	Substantial	Unlikely	Low / Moderate
Users	High	Made Ground releases around Dairy	Medium	Consumption of contaminated produce	Substantial	Unlikely	Low / Moderate
Users	High	Made Ground releases around Dairy	Medium	Dermal contact with soil and soil derived dust	Substantial	Unlikely	Low / Moderate
Users	High	Made Ground releases around Dairy	Medium	Direct contact with soils	Substantial	Unlikely	Low / Moderate
Users	High	Made Ground releases around Dairy	Medium	Gas migration	Substantial	Unlikely	Low / Moderate
Users	High	Made Ground releases around Dairy	Medium	Ingestion of soil	Substantial	Unlikely	Low / Moderate
Users	High	Made Ground releases around Dairy	Medium	Inhalation of soil derived dust	Substantial	Unlikely	Low / Moderate
Buildings	High	Made Ground releases around Dairy	Low	Direct contact with soils	Mild	Low Likelihood	Low
Buildings	High	Made Ground releases around Dairy	Low	Direct contact with groundwater	Mild	Low Likelihood	Low
Buildings	High	Made Ground releases around Dairy	Low	Gas migration	Mild	Low Likelihood	Low
Utilities	High	Made Ground releases around Dairy	High	Direct contact with soils	Severe	Unlikely	Low / Moderate
Utilities	High	Made Ground releases around Dairy	High	Direct contact with groundwater	Severe	Unlikely	Low / Moderate
Groundwater	High	Made Ground releases around Dairy	High	Infiltration and migration	Severe	Unlikely	Low / Moderate
Aquifer	Low	Made Ground releases around Dairy	Low	Infiltration and migration	Minor	Unlikely	Very Low
Aquifer	Low	Made Ground releases around Dairy	Medium	Surface water run-off and soakaways	Minor	Unlikely	Very Low
Surface_Waters	Medium	Made Ground releases around Dairy	Medium	Infiltration and migration	Mild	Low Likelihood	Low
Surface_Waters	Medium	Made Ground releases around Dairy	Medium	Surface water run-off and soakaways	Mild	Low Likelihood	Low
Habitats	Medium	Made Ground releases around Dairy	Medium	Migration through groundwater & ecological uptake	Mild	Low Likelihood	Low
Habitats	Medium	Made Ground releases around Dairy	Medium	Surface water run-off and soakaways	Mild	Low Likelihood	Low

### 3.6 Risk Management Actions

The majority of the study area is expected to be free of potential hazards and thus at very low to low risk from land contamination.

## 4 ENGINEERING DISCUSSION

### 4.1 Superficial Soil Formations

In the middle of the area where the Dairy is located a band of alluvium has been deposited with river terrace deposits found on either side.

Alluvium and river terrace deposits present variable foundation conditions, which are dependent on shear strength and consolidation characteristics. In particular the Groundsure report highlights that the river terrace deposits present a moderate hazard in relation to compressibility (“compressibility and uneven settlement hazards are probably present. Land use should consider specifically the compressibility and variability of the site”) whilst the alluvium is considered to present a negligible risk.

Foundation design may need to include the potential risk of severe differential settlements in soft, highly compressible zones, especially where foundations bridge from fine to coarse deposits. Near surface silty and fine sandy lithologies may also be frost susceptible and should be considered if designing shallow foundations. Blown sand may be unsuitable for pad or strip foundations and may require raft or piling in its place.

Alluvium and river terrace deposits are usually easy digging and excavations may be stable in the short-term, though may require immediate support unless groundwater ingress is controlled or absent. Running conditions may occur in silts and sands below the water table. The presence of water-bearing sand/silt layers will require groundwater control measures.

Site Investigation is important to determine lithological variation and deposit geometry, particularly the presence and dimensions of buried channels and characteristics of infilling deposits, the presence, depth and extent of any soft compressible zones (and depth to sound strata). Fine deposits may need to be assessed for shrink-swell potential and sulphate/sulphide contents.

### 4.2 Bedrock Formations

Bedrock is highly unlikely to be encountered across the study area.

If encountered bedrock is generally expected to present good foundation conditions, which will be dependent on inherent variability of the schist rock and depth and nature of the weathered zone.

For excavation, ripping or blasting may be required, depending on strength along foliations and spacing and orientation of discontinuities.

Variable strength and durability affect use of bedrock as engineered fill, though it is usually suitable as general granular fill if care is taken in selection and abstraction.

### 4.3 Groundwater

Groundwater control measures will be required where excavations are taken below the water table, especially in alluvium across the low-lying portion of the study area.

Where significant underbuilding is proposed in shallow groundwater areas then groundwater level monitoring and permeability testing of superficial deposits is advisable to obtain parameters to inform groundwater control options, tanking and buoyancy considerations.

Running sand conditions may confound deep excavation works where adequate groundwater controls are not designed appropriate for the conditions.

## 2 CONCLUSIONS AND RECOMMENDATIONS

### 5.1 Conclusions

One discreet portion of land on the middle east corner of the study area has been used as a Dairy historically and some disturbed ground in this area can be expected, the nature of which should be evaluated to determine if it is environmentally acceptable in regard to contamination. The risk to development in this part of the area is currently assessed as low / moderate.

The presence of an underground storage tank alongside the Dairy building presents a low / moderate risk of contamination as well as the potential for locally unstable ground conditions due to presence of soft, compressible materials.

Risk associated with made ground and new water mains design is expected to be low. An advisory note is given that soil tests may be required if water mains are to be routed through made ground.

The land in the study area is evaluated to present low risk to the water environment.

### 5.2 Recommendations

Further investigation is required to establish the extent and usage of the underground storage tank beside the Dairy and of potentially soft, compressible, or made ground across development plots. Geotechnical testing is recommended to confirm depth, strength, and settlement characteristics of superficial sub-soil formations across the proposed structural development plot areas.

In water bearing soils the measurement of groundwater levels is recommended.

Selected samples of soil and water should be taken as required for analysis at an accredited environmental laboratory to evaluate land contamination risk from made ground.

A range of in-situ and laboratory testing would be appropriate to classify sub-soil formations to inform foundation designs for proposed infrastructure and structural development. Such testing is typically a requirement of house building insurers.



APPENDIX A      SITE PLANS

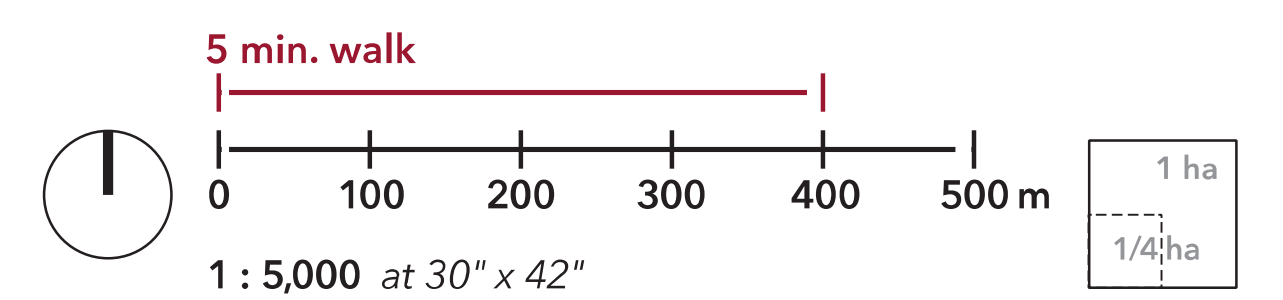




# Taymouth Castle | Master Plan

Taymouth Castle Kenmore, Scotland January 24, 2023

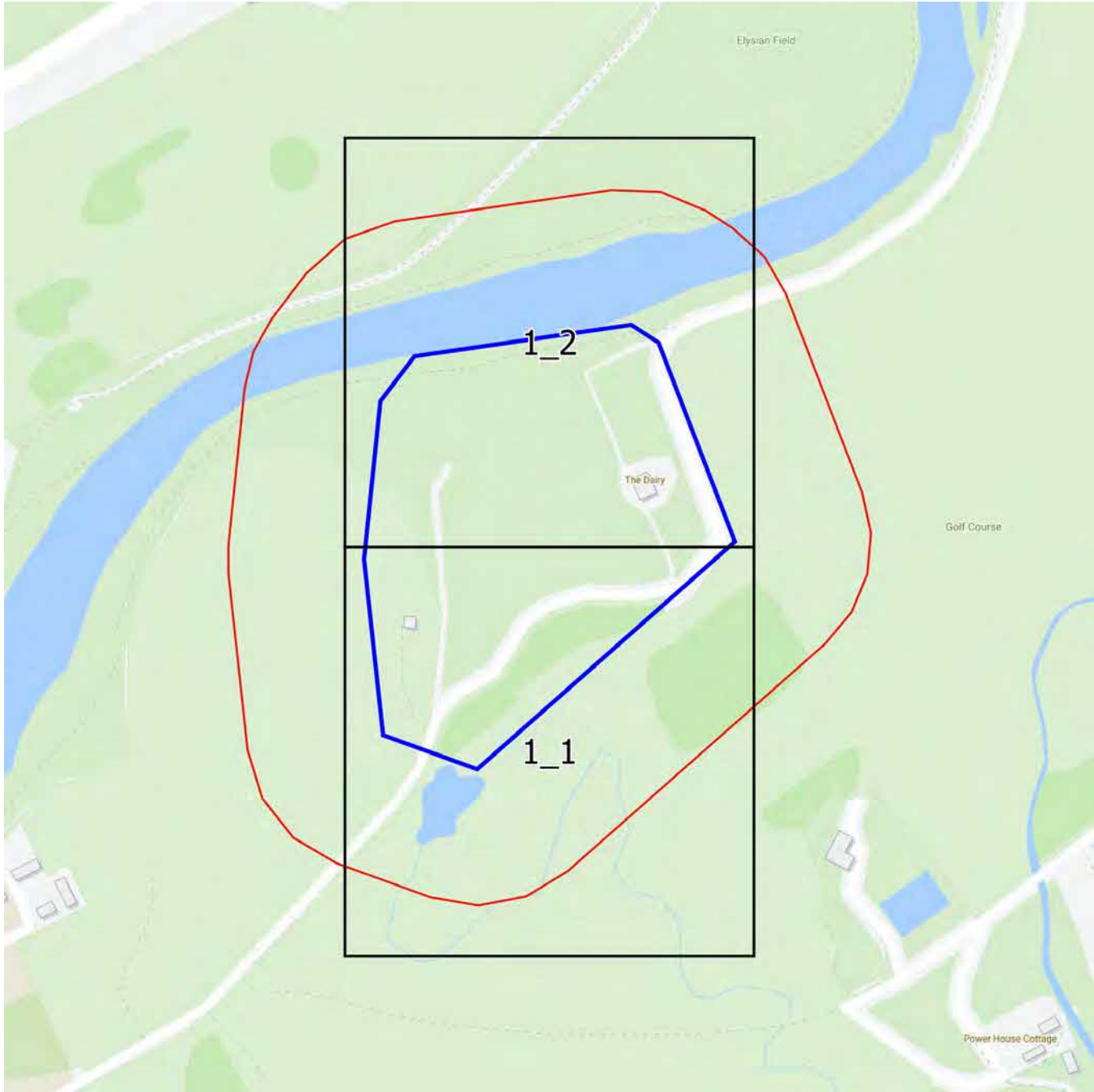
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HART HOWERTON

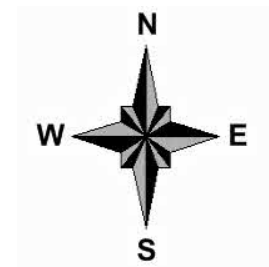


APPENDIX B ENVIRONMENTAL DATABASE REPORT



**Groundsure**  
INSIGHTS

Landline Scale Grid Index





Site Details

Taymouth Zone 4

Client Ref: 17877\_z4  
 Report Ref: GS-9247843  
 Grid Ref: 277909, 745871

Map Name: County Series

Map date: 1862

Scale: 1:10,560

Printed at: 1:10,560



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 Revised 1862  
 Edition N/A  
 Copyright N/A  
 Levelled N/A

Surveyed 1862  
 Revised 1862  
 Edition N/A  
 Copyright N/A  
 Levelled N/A

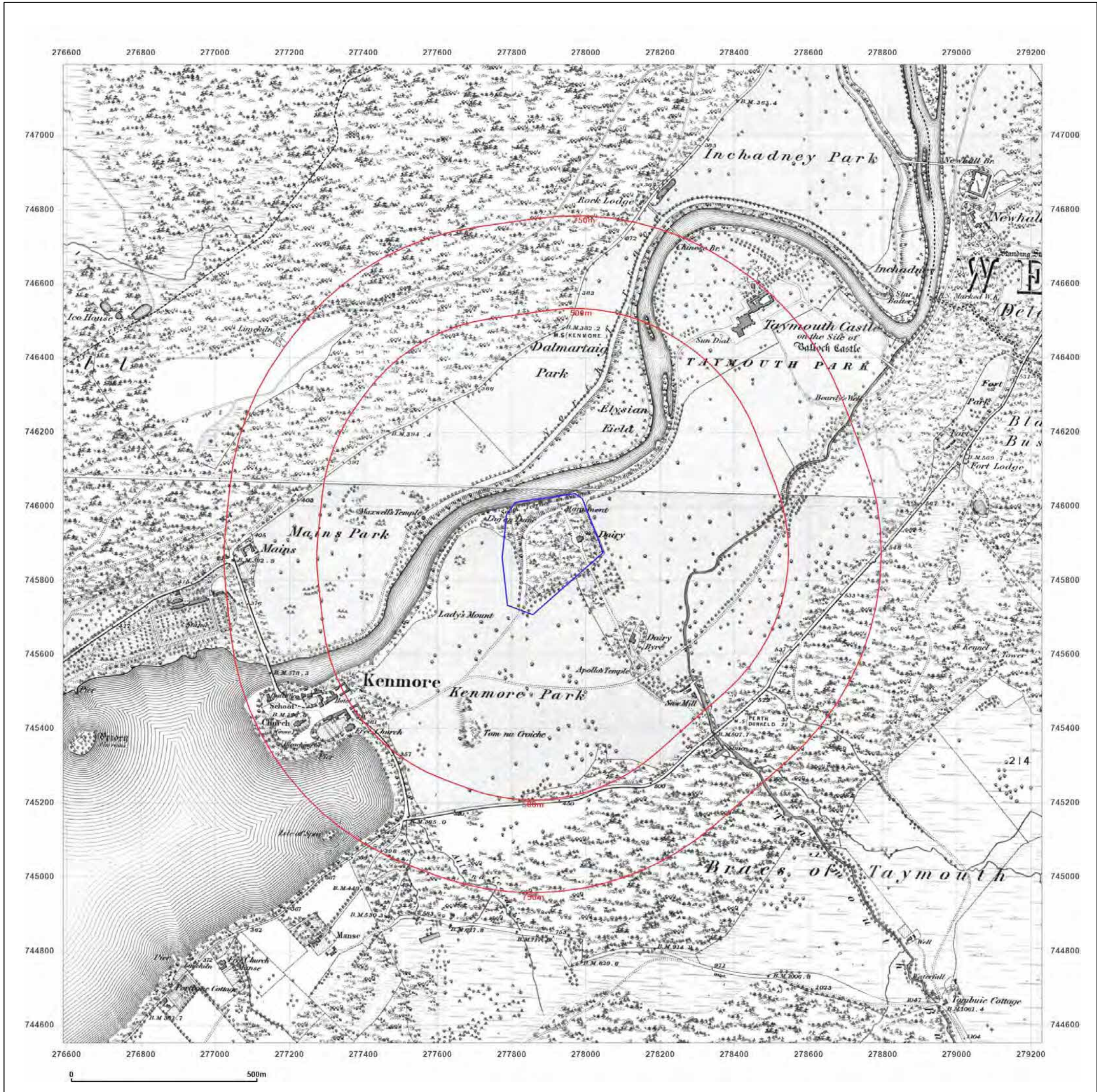


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Site Details

Taymouth Zone 4

Client Ref: 17877\_z4  
 Report Ref: GS-9247843  
 Grid Ref: 277909, 745871

Map Name: County Series

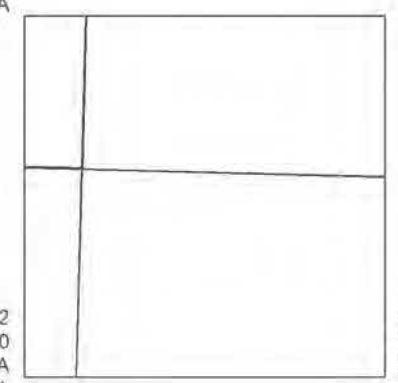
Map date: 1900-1901

Scale: 1:10,560

Printed at: 1:10,560



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 Revised 1901  
 Edition N/A  
 Copyright N/A  
 Levelled N/A



Surveyed 1862  
 Revised 1900  
 Edition N/A  
 Copyright N/A  
 Levelled N/A

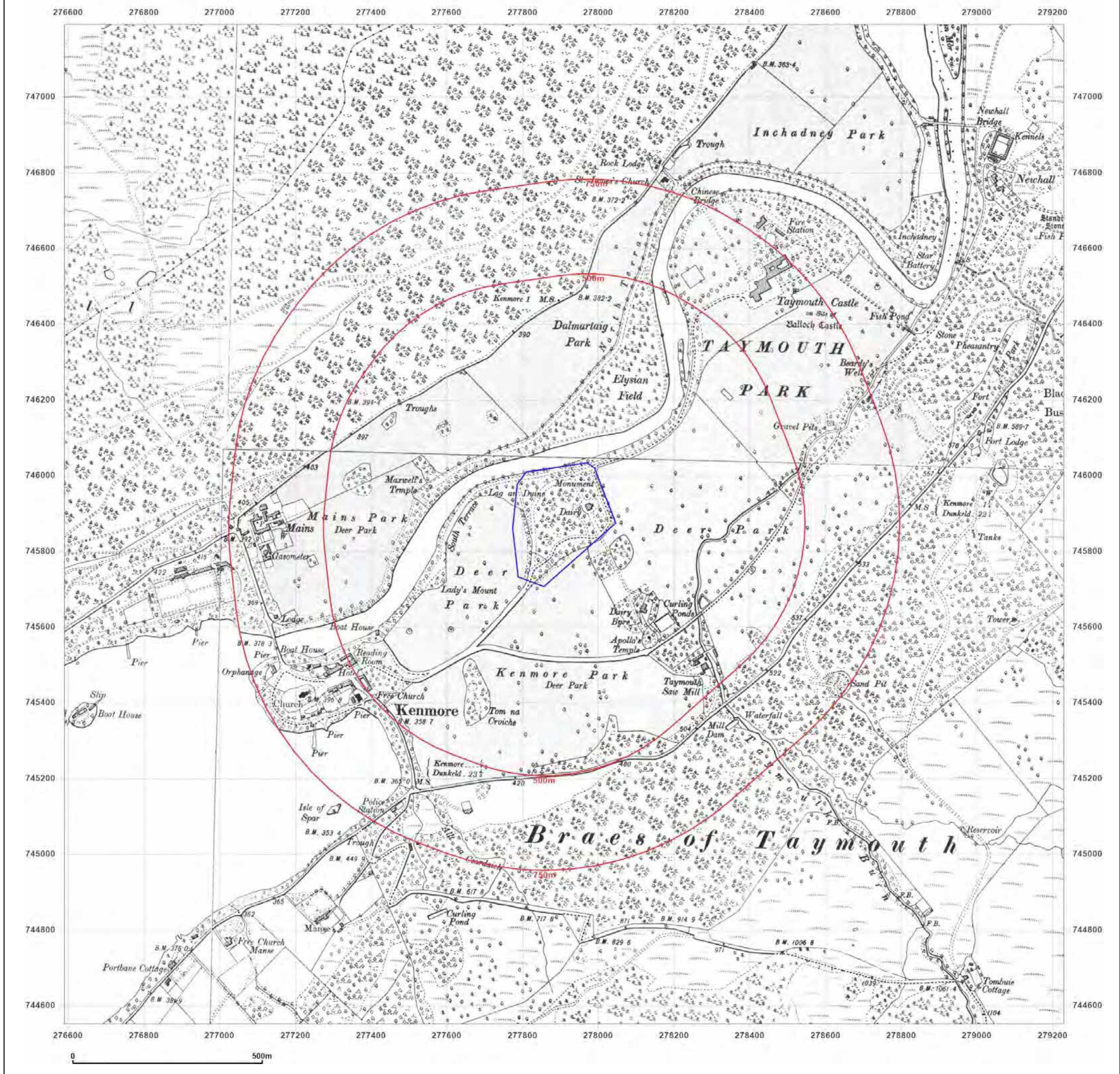


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Site Details

Taymouth Zone 4

Client Ref: 17877\_z4  
 Report Ref: GS-9247843  
 Grid Ref: 277909, 745871

Map Name: National Grid

Map date: 1977-1980

Scale: 1:10,000

Printed at: 1:10,000



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 Revised 1980  
 Edition N/A  
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Surveyed 1977  
 Revised N/A  
 Edition N/A  
 Copyright 1979  
 Levelled N/A

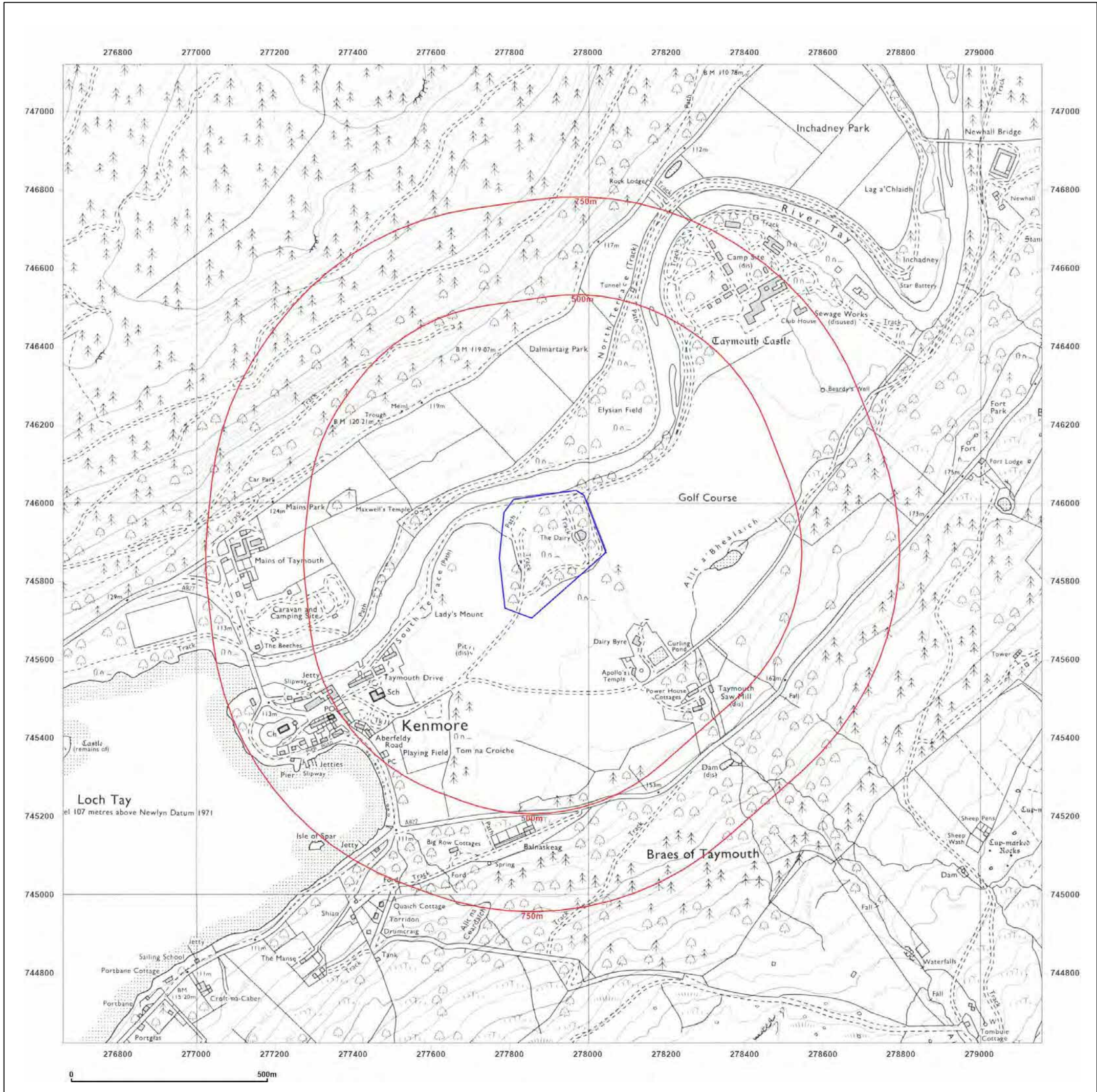


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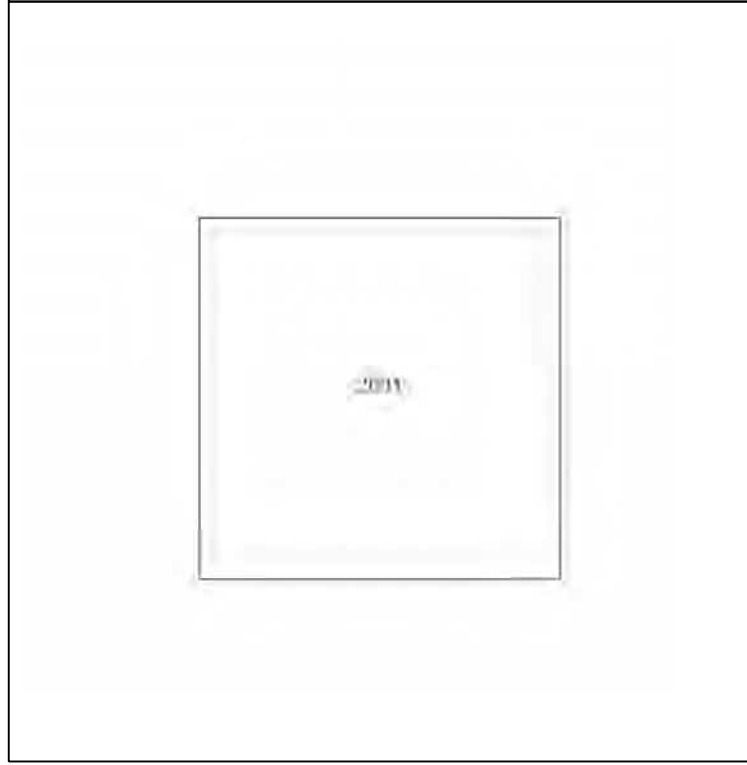
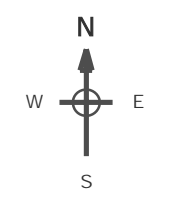


Site Details

Taymouth Zone 4

Client Ref: 17877\_z4  
 Report Ref: GS-9247843  
 Grid Ref: 277909, 745871

Map Name: National Grid  
 Map date: 2001  
 Scale: 1:10,000  
 Printed at: 1:10,000

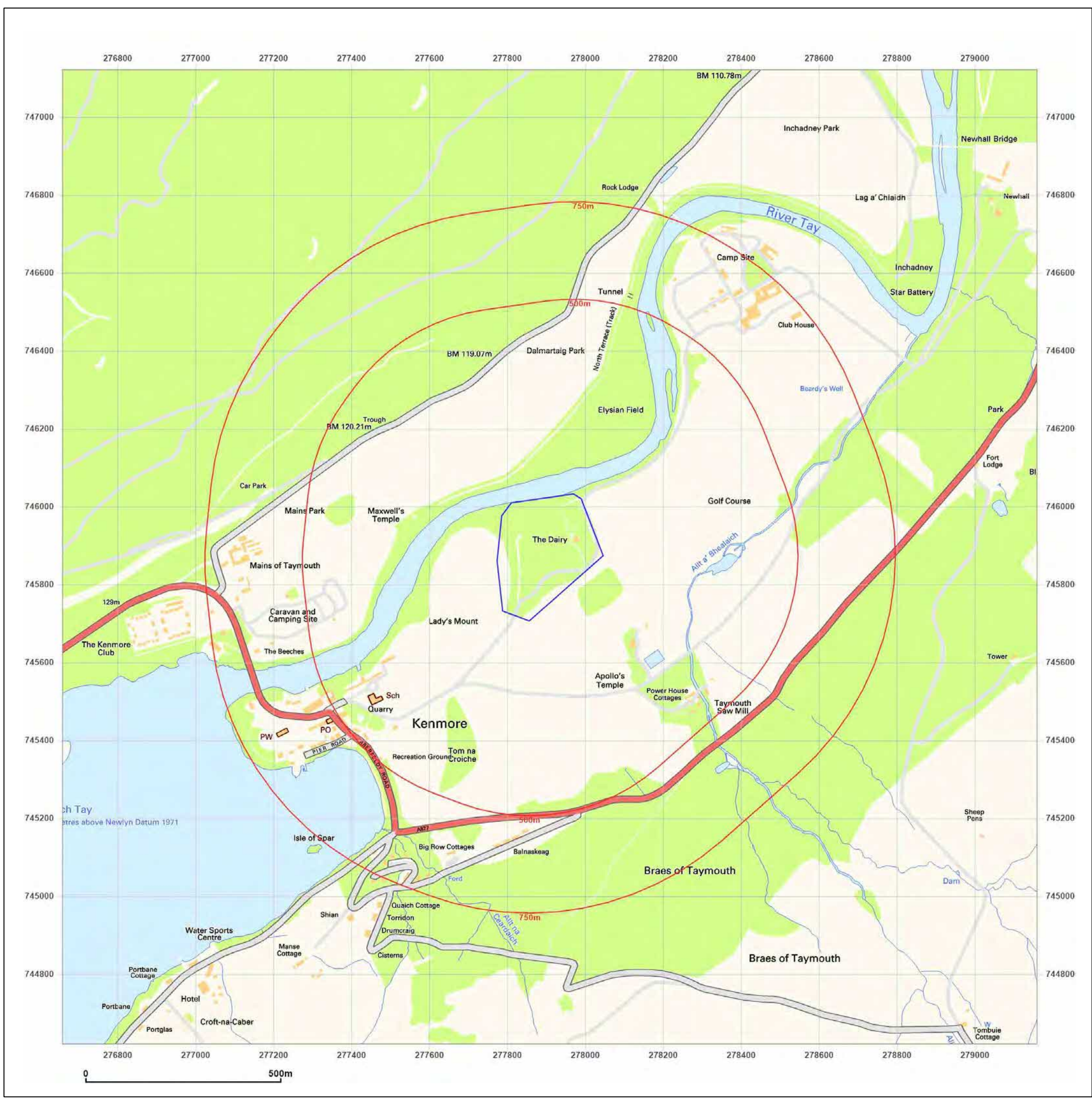


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Site Details

Taymouth Zone 4

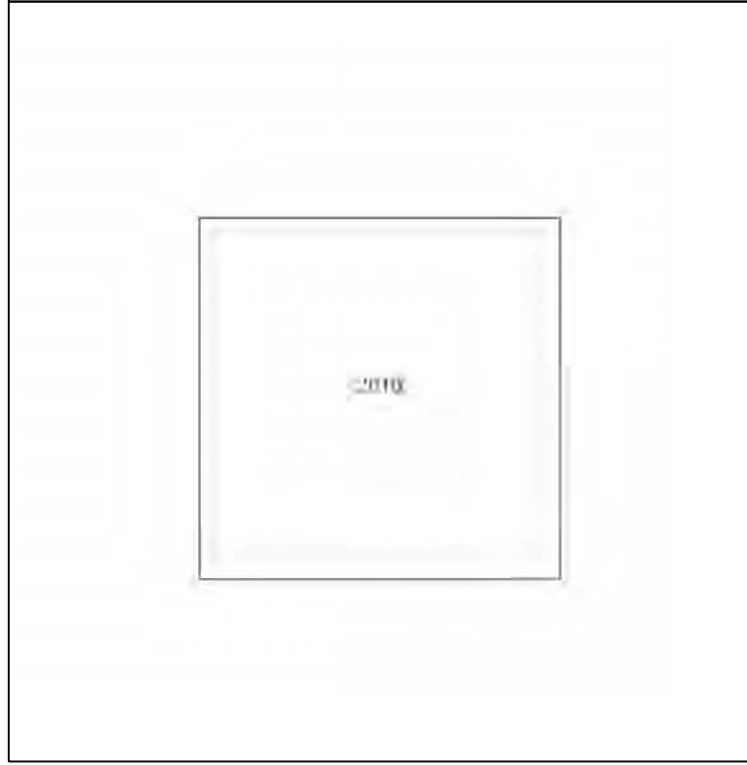
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 Grid Ref: 277909, 745871

Map Name: National Grid

Map date: 2010

Scale: 1:10,000

Printed at: 1:10,000

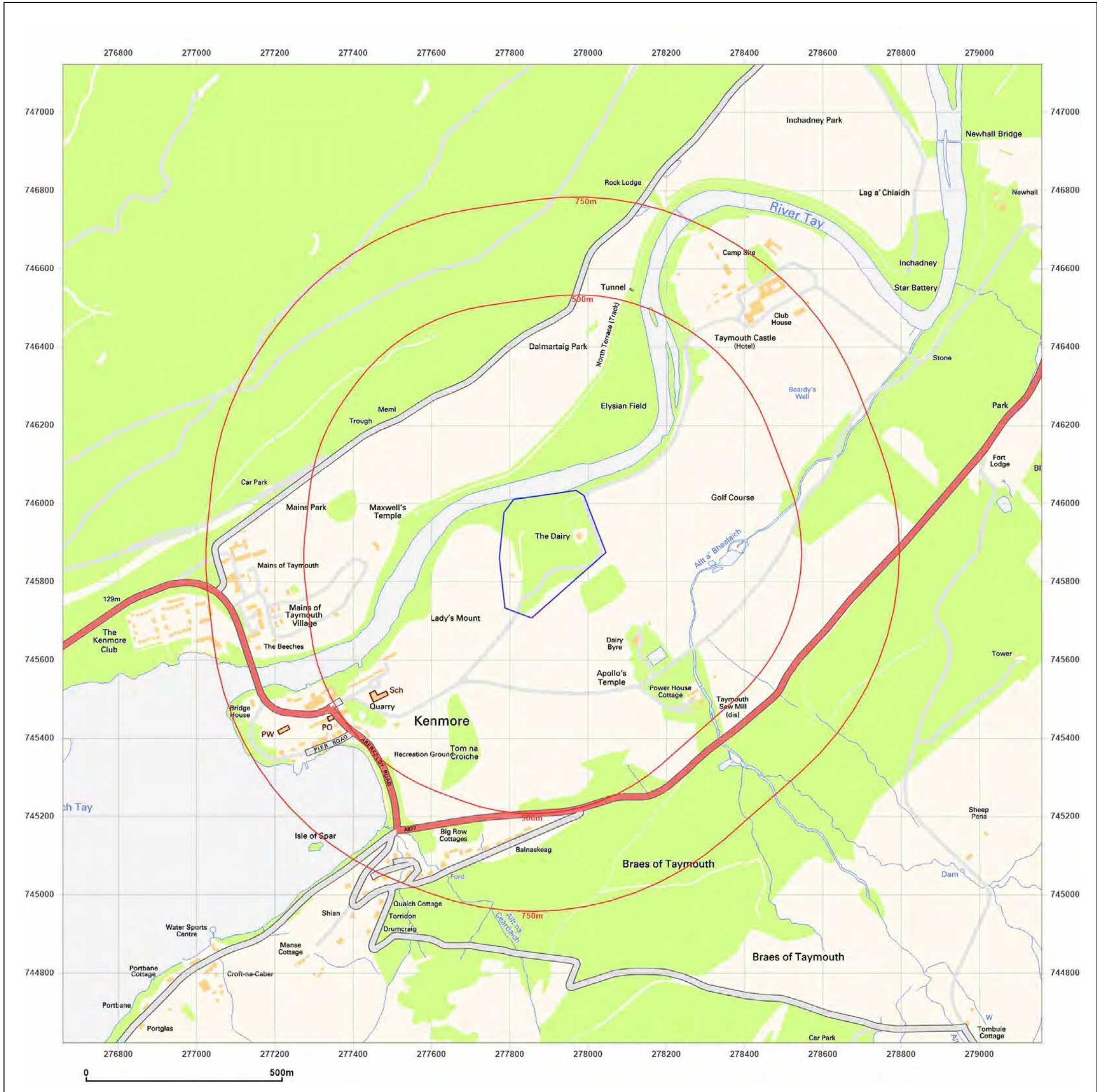


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Site Details

Taymouth Zone 4

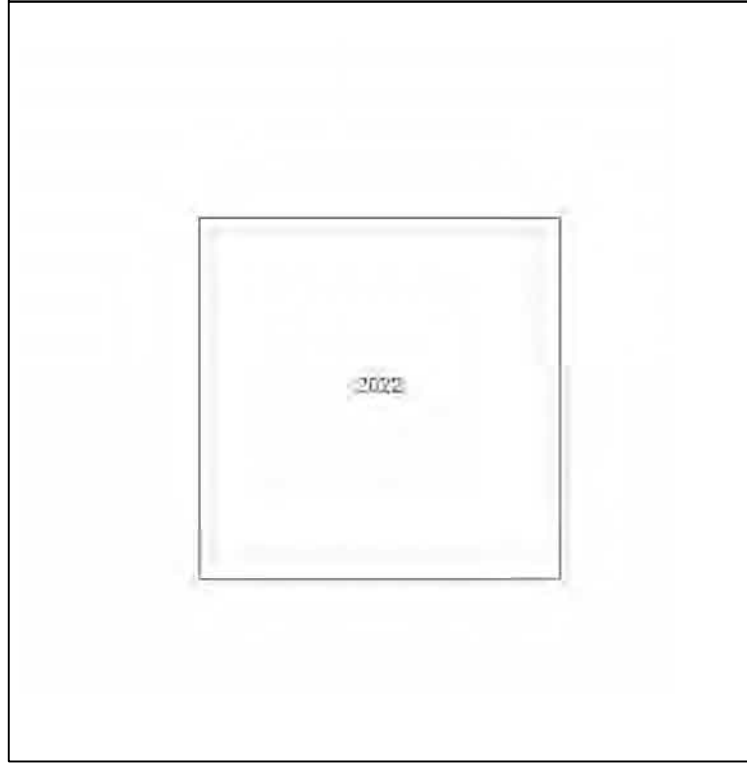
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 Grid Ref: 277909, 745871

Map Name: National Grid

Map date: 2022

Scale: 1:10,000

Printed at: 1:10,000

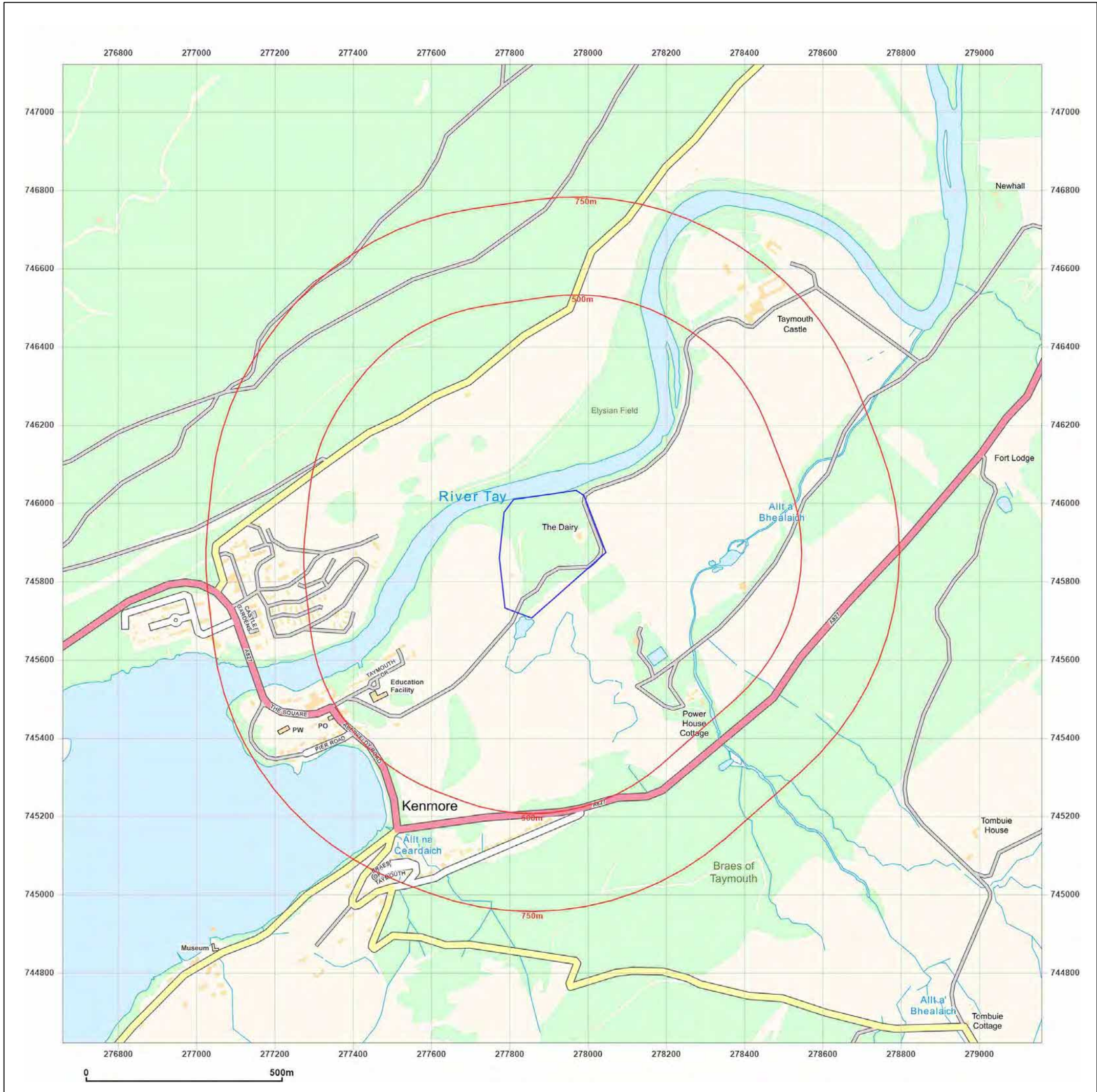


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Site Details

Taymouth Zone 4

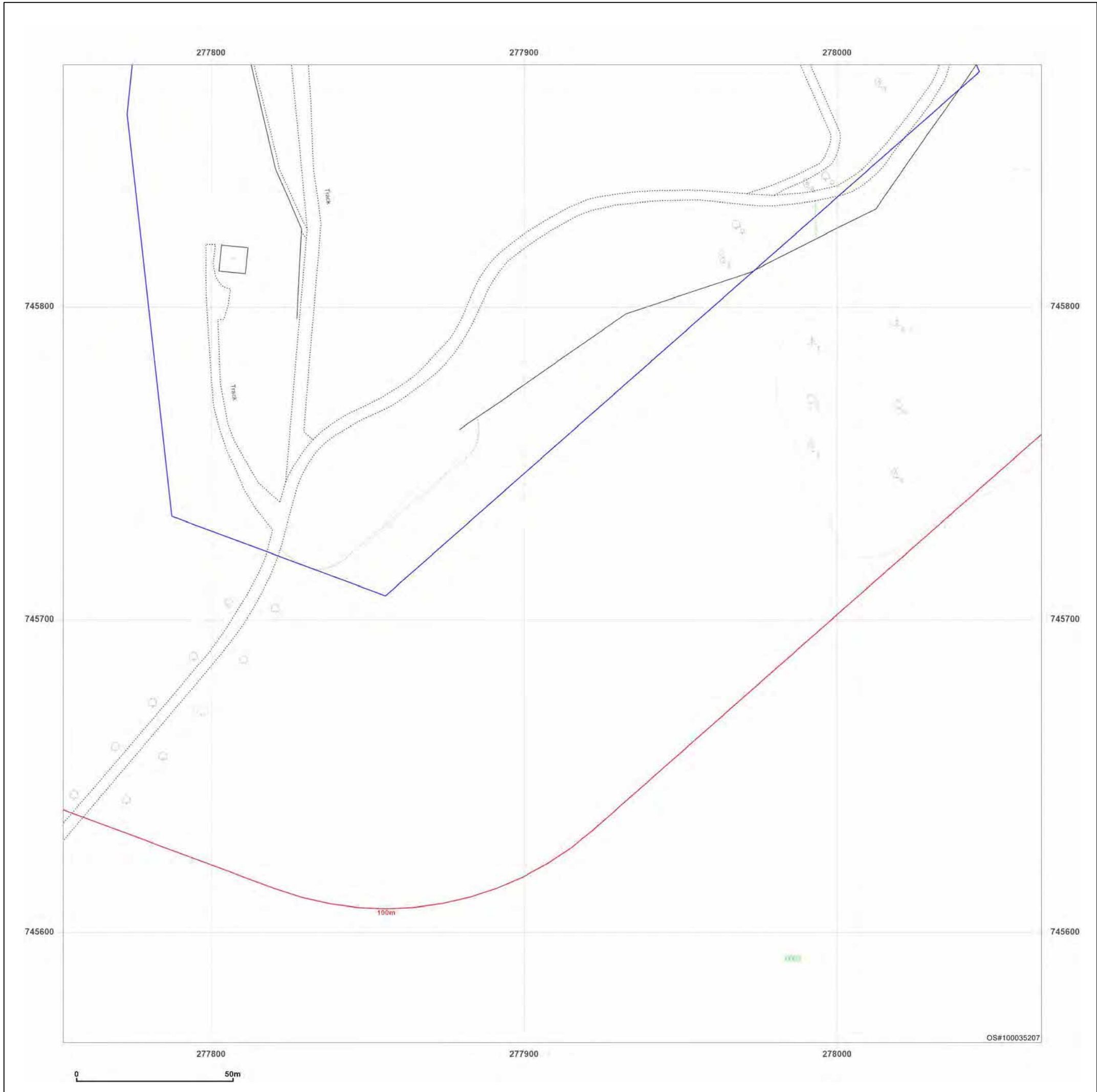
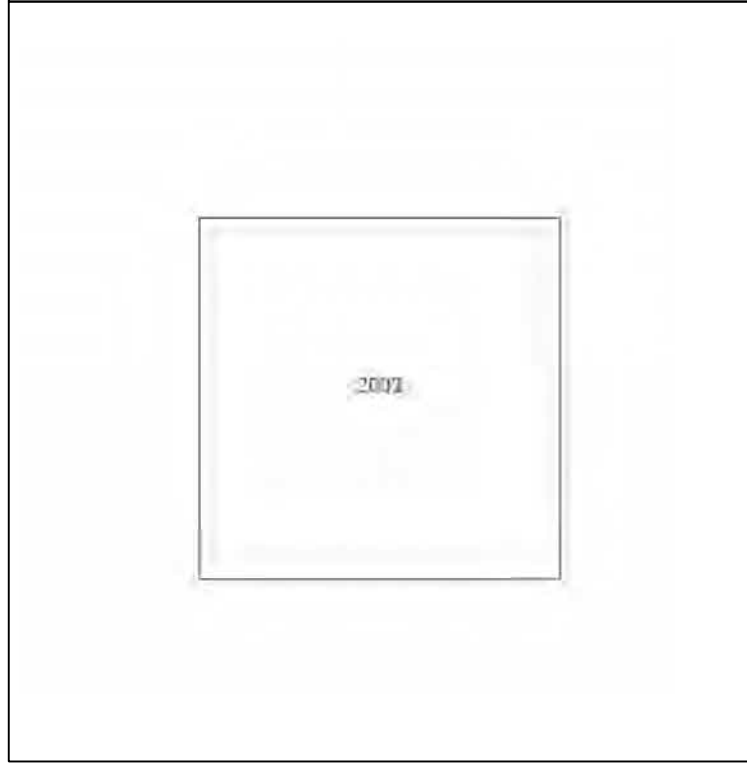
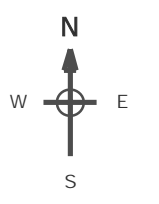
Client Ref: 17877\_z4  
 Report Ref: GS-9247843\_Landline\_1\_1  
 Grid Ref: 277909, 745721

Map Name: LandLine

Map date: 2003

Scale: 1:1,250

Printed at: 1:1,250



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Site Details

Taymouth Zone 4

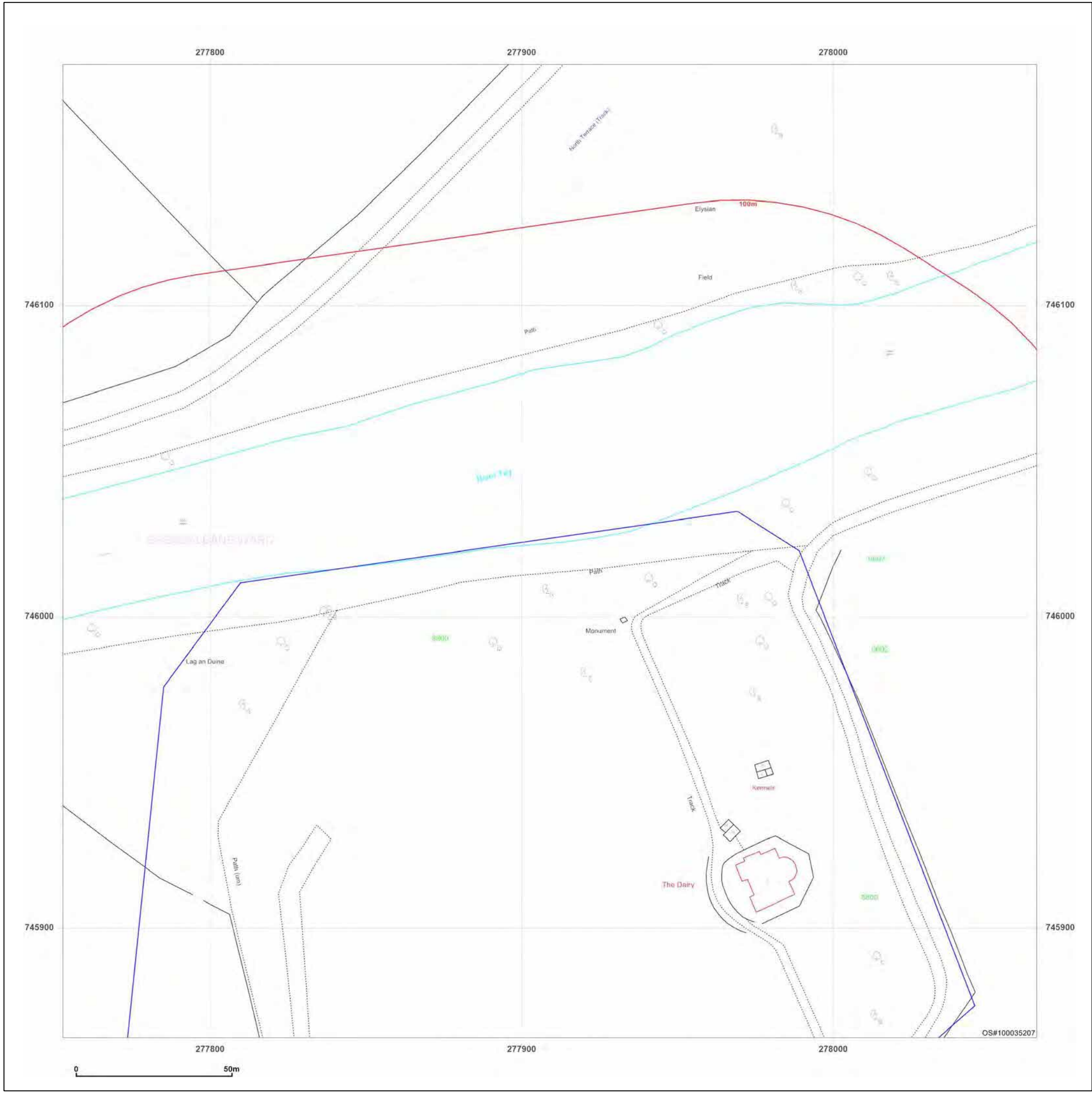
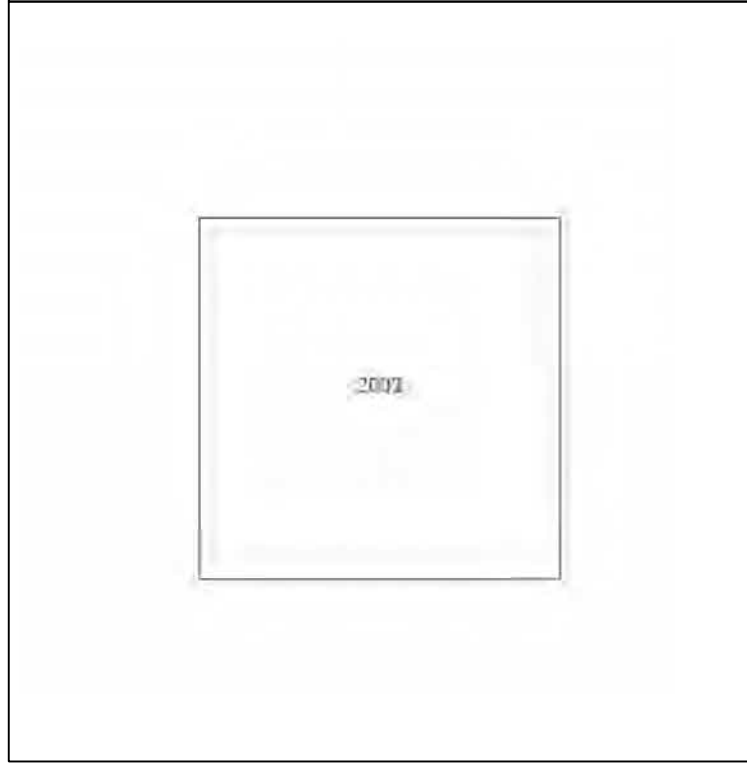
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 Grid Ref: 277909, 746021

Map Name: LandLine

Map date: 2003

Scale: 1:1,250

Printed at: 1:1,250



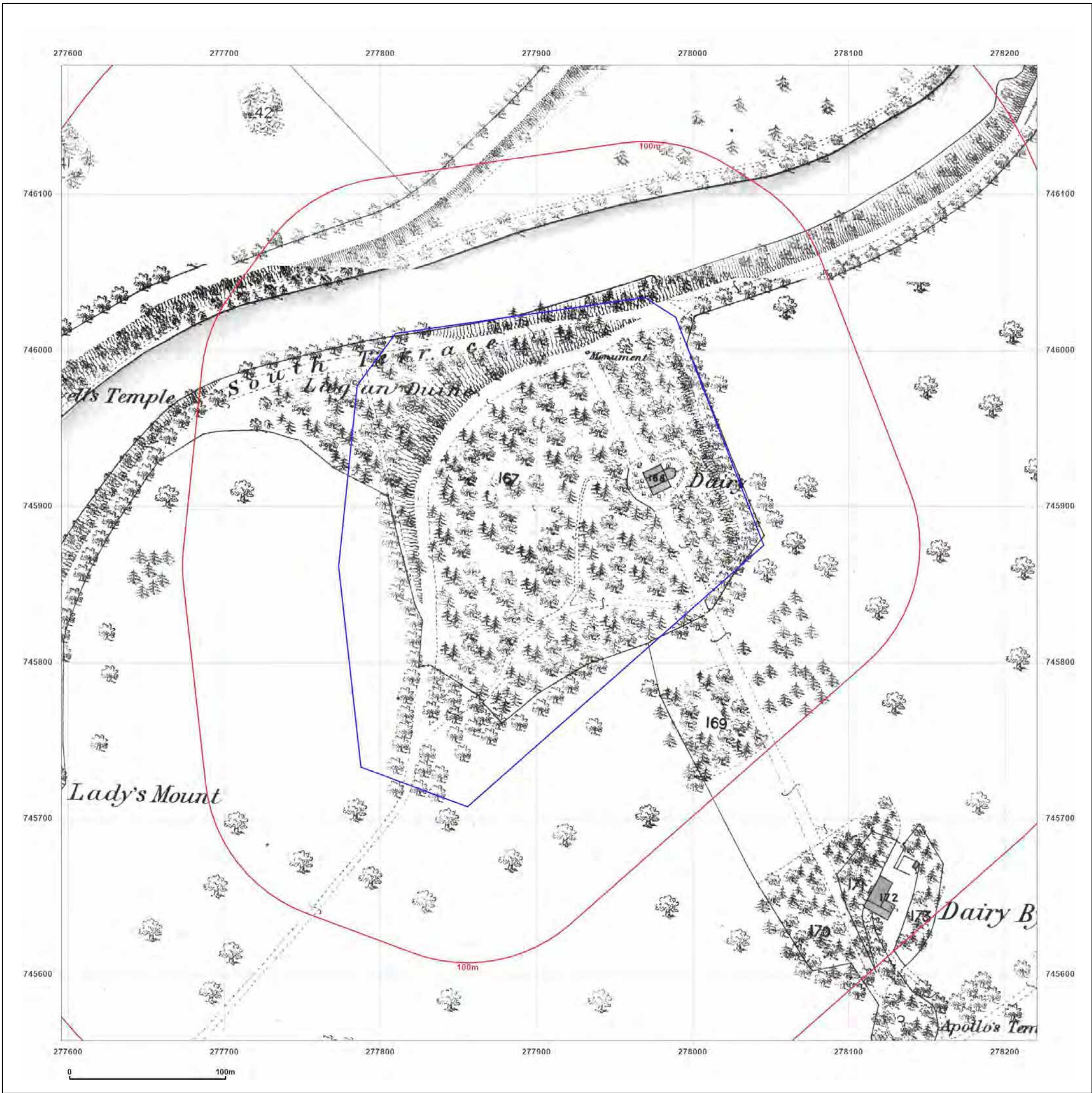
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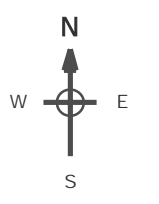




Site Details  
 Taymouth Zone 4


Client Ref: 17877\_z4  
 Report Ref: GS-9247843\_2500  
 Grid Ref: 277908, 745870

Map Name: County Series  
 Map date: 1867  
 Scale: 1:2,500  
 Printed at: 1:2,500



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 Revised 1867  
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Site Details

Taymouth Zone 4

Client Ref: 17877\_z4  
 Report Ref: GS-9247843\_2500  
 Grid Ref: 277908, 745870

Map Name: County Series

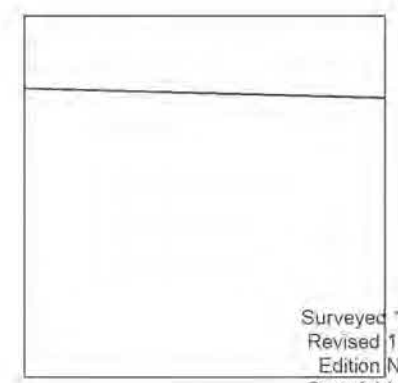
Map date: 1900

Scale: 1:2,500

Printed at: 1:2,500



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 Edition N/A  
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 Revised 1900  
 Edition N/A  
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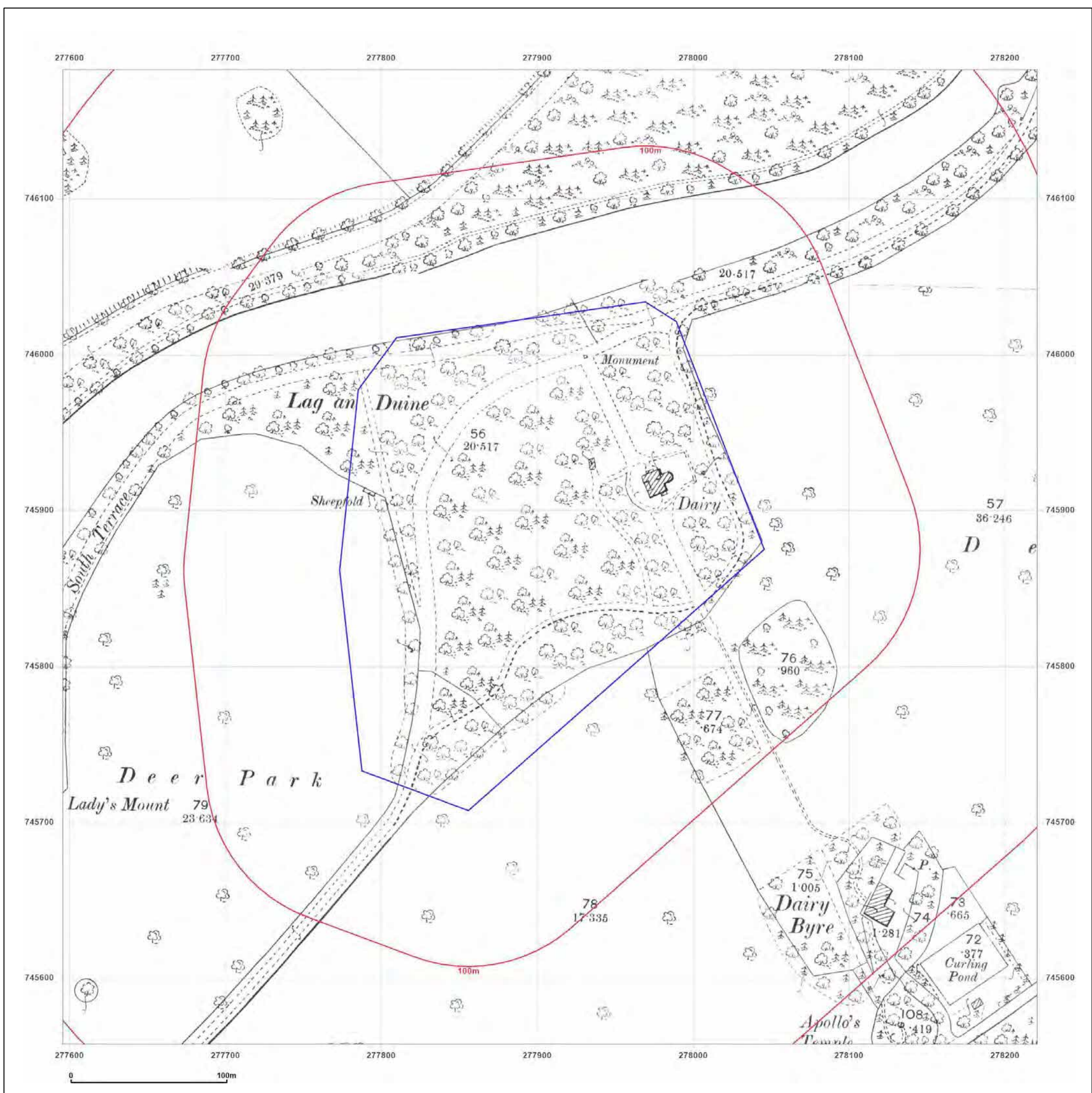


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Site Details

Taymouth Zone 4

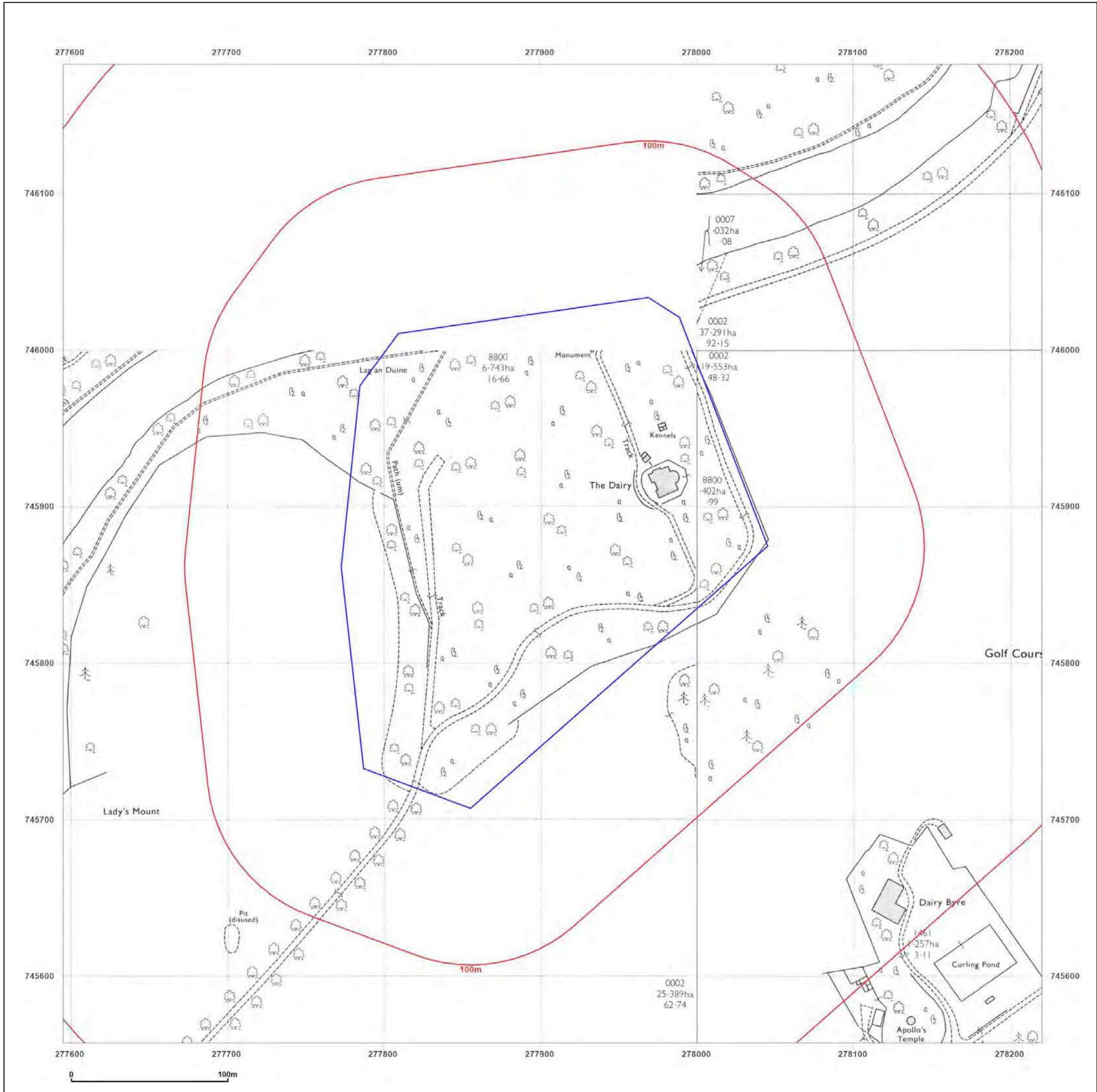
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 Grid Ref: 277908, 745870

Map Name: National Grid

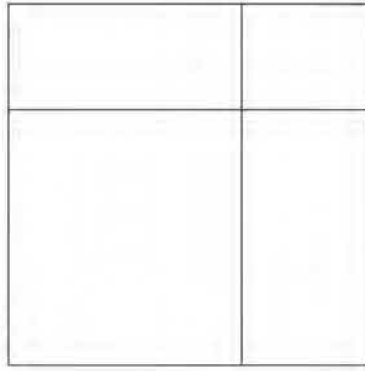
Map date: 1981

Scale: 1:2,500

Printed at: 1:2,500



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Site Details

Taymouth Zone 4

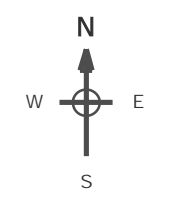
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Map Name: National Grid

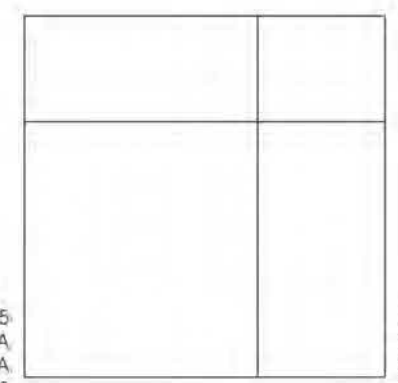
Map date: 1995

Scale: 1:2,500

Printed at: 1:2,500



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 Edition N/A  
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 Revised N/A  
 Edition N/A  
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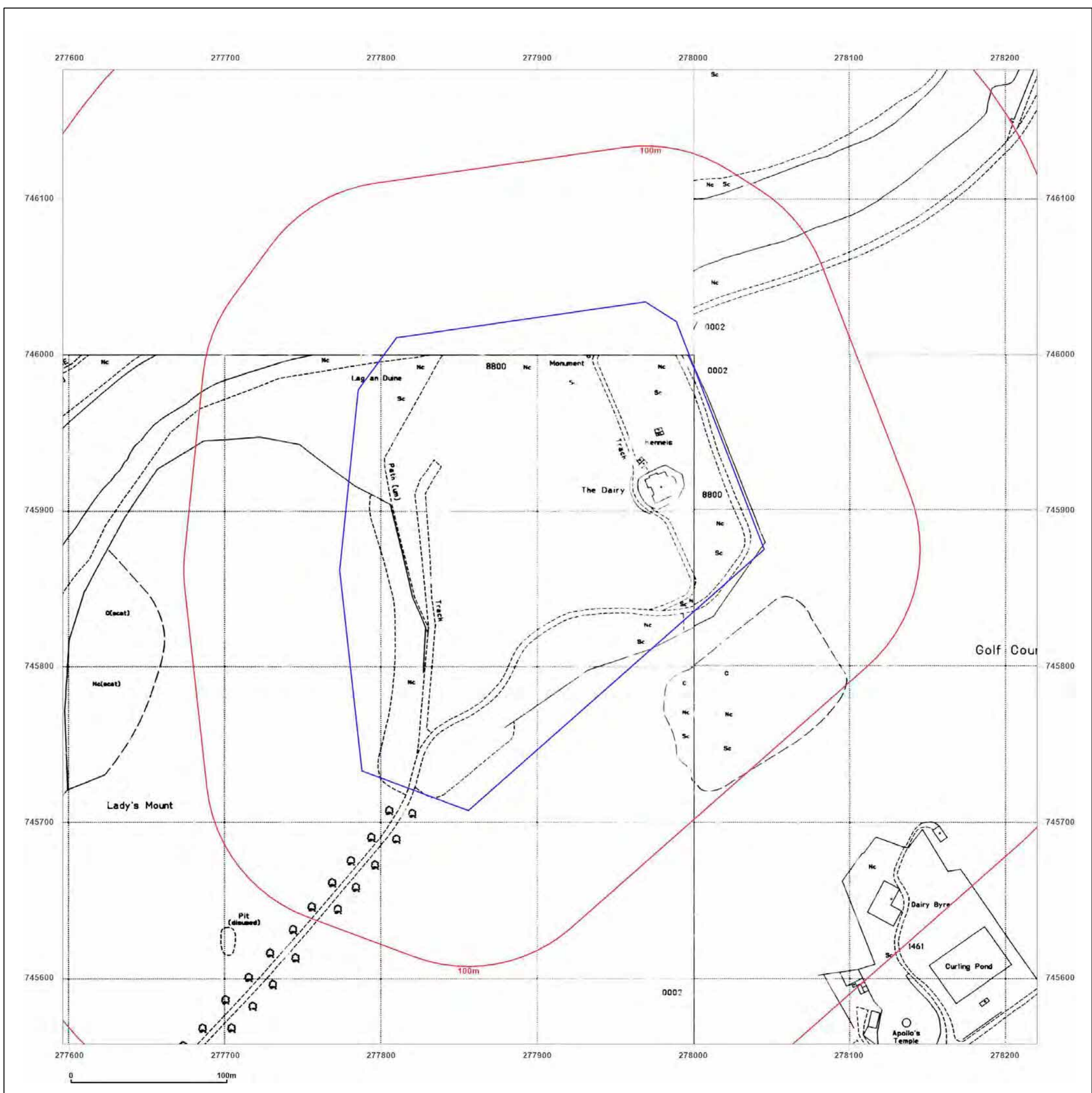


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Taymouth Zone 4,

## Order Details

Date: 07/12/2022  
Your ref: 17877\_z4  
Our Ref: GS-9247844

## Site Details

Location: 277885 745876  
Area: 6.17 ha  
Authority: [Perth and Kinross Council](#)



Summary of findings

p. 2

Aerial image

p. 7

OS MasterMap site plan

p.11

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## Summary of findings

Page	Section	Past land use	On site	0-50m	50-250m	250-500m	500-2000m
<b>12</b>	<b>1.1</b>	<b><u>Historical industrial land uses</u></b>	2	0	2	5	-
13	1.2	Historical tanks	0	0	0	0	-
<b>13</b>	<b>1.3</b>	<b><u>Historical energy features</u></b>	0	0	0	1	-
14	1.4	Historical petrol stations	0	0	0	0	-
14	1.5	Historical garages	0	0	0	0	-
14	1.6	Historical military land	0	0	0	0	-
Page	Section	Past land use - un-grouped	On site	0-50m	50-250m	250-500m	500-2000m
<b>15</b>	<b>2.1</b>	<b><u>Historical industrial land uses</u></b>	3	0	3	6	-
16	2.2	Historical tanks	0	0	0	0	-
<b>16</b>	<b>2.3</b>	<b><u>Historical energy features</u></b>	0	0	0	1	-
17	2.4	Historical petrol stations	0	0	0	0	-
17	2.5	Historical garages	0	0	0	0	-
Page	Section	Waste and landfill	On site	0-50m	50-250m	250-500m	500-2000m
<b>18</b>	<b>3.1</b>	<b><u>Active or recent landfill</u></b>	0	0	1	1	-
19	3.2	Historical landfill (BGS records)	0	0	0	0	-
19	3.3	Historical landfill (LA/mapping records)	0	0	0	0	-
19	3.4	Licensed waste sites	0	0	0	0	-
19	3.5	Historical waste sites	0	0	0	0	-
Page	Section	Current industrial land use	On site	0-50m	50-250m	250-500m	500-2000m
20	4.1	Recent industrial land uses	0	0	0	-	-
20	4.2	Current or recent petrol stations	0	0	0	0	-
20	4.3	Electricity cables	0	0	0	0	-
20	4.4	Gas pipelines	0	0	0	0	-
20	4.5	Sites determined as Contaminated Land	0	0	0	0	-
21	4.6	Control of Major Accident Hazards (COMAH)	0	0	0	0	-
21	4.7	Regulated explosive sites	0	0	0	0	-



21	4.8	Hazardous substance storage/usage	0	0	0	0	-
21	4.9	Part A(1), IPPC and Historic IPC Authorisations	0	0	0	0	-
21	4.10	Part B Authorisations	0	0	0	0	-
22	4.11	Pollution inventory substances	0	0	0	0	-
22	4.12	Pollution inventory waste transfers	0	0	0	0	-
22	4.13	Pollution inventory radioactive waste	0	0	0	0	-
Page	Section	Hydrogeology	On site	0-50m	50-250m	250-500m	500-2000m
<b>23</b>	<b>5.1</b>	<b><u>Superficial aquifer</u></b>	Identified (within 500m)				
<b>24</b>	<b>5.2</b>	<b><u>Bedrock aquifer</u></b>	Identified (within 500m)				
Page	Section	Hydrology	On site	0-50m	50-250m	250-500m	500-2000m
<b>25</b>	<b>6.1</b>	<b><u>Water Network (OS MasterMap)</u></b>	0	3	7	-	-
<b>26</b>	<b>6.2</b>	<b><u>Surface water features</u></b>	1	2	4	-	-
Page	Section	River flooding					
<b>27</b>	<b>7.1</b>	<b><u>River flooding</u></b>	1 in 30 year, 0.3m - 1.0m (within 50m)				
Page	Section	Coastal flooding					
29	8.1	Coastal flooding	Negligible (within 50m)				
Page	Section	Surface water flooding					
<b>30</b>	<b>9.1</b>	<b><u>Surface water flooding</u></b>	1 in 30 year, 0.3m - 1.0m (within 50m)				
Page	Section	Groundwater flooding					
<b>32</b>	<b>10.1</b>	<b><u>Groundwater flooding</u></b>	Low (within 50m)				
Page	Section	Environmental designations	On site	0-50m	50-250m	250-500m	500-2000m
33	11.1	Sites of Special Scientific Interest (SSSI)	0	0	0	0	0
34	11.2	Conserved wetland sites (Ramsar sites)	0	0	0	0	0
<b>34</b>	<b>11.3</b>	<b><u>Special Areas of Conservation (SAC)</u></b>	1	0	0	0	0
34	11.4	Special Protection Areas (SPA)	0	0	0	0	0
35	11.5	National Nature Reserves (NNR)	0	0	0	0	0
35	11.6	Local Nature Reserves (LNR)	0	0	0	0	0
<b>35</b>	<b>11.7</b>	<b><u>Designated Ancient Woodland</u></b>	0	0	1	3	22
36	11.8	Biosphere Reserves	0	0	0	0	0



<b>37</b>	<b>11.9</b>	<b><u>Forest Parks</u></b>	0	0	0	2	0
37	11.10	Marine Conservation Zones	0	0	0	0	0
Page	Section	Visual and cultural designations	On site	0-50m	50-250m	250-500m	500-2000m
38	12.1	World Heritage Sites	0	0	0	-	-
39	12.2	Area of Outstanding Natural Beauty	0	0	0	-	-
39	12.3	National Parks	0	0	0	-	-
<b>39</b>	<b>12.4</b>	<b><u>Listed Buildings</u></b>	2	0	2	-	-
40	12.5	Conservation Areas	0	0	0	-	-
40	12.6	Scheduled Ancient Monuments	0	0	0	-	-
<b>40</b>	<b>12.7</b>	<b><u>Registered Parks and Gardens</u></b>	1	0	0	-	-
Page	Section	Agricultural designations	On site	0-50m	50-250m	250-500m	500-2000m
<b>41</b>	<b>13.1</b>	<b><u>Agricultural Land Classification</u></b>	Grade 4.1 (within 250m)				
Page	Section	Geology 1:10,000 scale	On site	0-50m	50-250m	250-500m	500-2000m
<b>42</b>	<b>14.1</b>	<b><u>10k Availability</u></b>	Identified (within 500m)				
43	14.2	Artificial and made ground (10k)	0	0	0	0	-
44	14.3	Superficial geology (10k)	0	0	0	0	-
44	14.4	Landslip (10k)	0	0	0	0	-
45	14.5	Bedrock geology (10k)	0	0	0	0	-
45	14.6	Bedrock faults and other linear features (10k)	0	0	0	0	-
Page	Section	Geology 1:50,000 scale	On site	0-50m	50-250m	250-500m	500-2000m
<b>46</b>	<b>15.1</b>	<b><u>50k Availability</u></b>	Identified (within 500m)				
47	15.2	Artificial and made ground (50k)	0	0	0	0	-
47	15.3	Artificial ground permeability (50k)	0	0	-	-	-
<b>48</b>	<b>15.4</b>	<b><u>Superficial geology (50k)</u></b>	2	0	2	1	-
<b>49</b>	<b>15.5</b>	<b><u>Superficial permeability (50k)</u></b>	Identified (within 50m)				
49	15.6	Landslip (50k)	0	0	0	0	-
49	15.7	Landslip permeability (50k)	None (within 50m)				
<b>50</b>	<b>15.8</b>	<b><u>Bedrock geology (50k)</u></b>	1	0	0	2	-
<b>51</b>	<b>15.9</b>	<b><u>Bedrock permeability (50k)</u></b>	Identified (within 50m)				



51	15.10	Bedrock faults and other linear features (50k)	0	0	0	0	-
Page	Section	Boreholes	On site	0-50m	50-250m	250-500m	500-2000m
<b>52</b>	<b>16.1</b>	<b><u>BGS Boreholes</u></b>	0	0	1	-	-
Page	Section	Natural ground subsidence					
<b>53</b>	<b>17.1</b>	<b><u>Shrink swell clays</u></b>	Very low (within 50m)				
<b>54</b>	<b>17.2</b>	<b><u>Running sands</u></b>	Low (within 50m)				
<b>56</b>	<b>17.3</b>	<b><u>Compressible deposits</u></b>	Moderate (within 50m)				
<b>58</b>	<b>17.4</b>	<b><u>Collapsible deposits</u></b>	Very low (within 50m)				
<b>59</b>	<b>17.5</b>	<b><u>Landslides</u></b>	Moderate (within 50m)				
<b>61</b>	<b>17.6</b>	<b><u>Ground dissolution of soluble rocks</u></b>	Negligible (within 50m)				
Page	Section	Mining, ground workings and natural cavities	On site	0-50m	50-250m	250-500m	500-2000m
62	18.1	Natural cavities	0	0	0	0	-
<b>63</b>	<b>18.2</b>	<b><u>BritPits</u></b>	0	0	1	1	-
<b>63</b>	<b>18.3</b>	<b><u>Surface ground workings</u></b>	0	0	1	-	-
64	18.4	Underground workings	0	0	0	0	0
64	18.5	Historical Mineral Planning Areas	0	0	0	0	-
<b>64</b>	<b>18.6</b>	<b><u>Non-coal mining</u></b>	0	0	0	0	6
65	18.7	Mining cavities	0	0	0	0	0
65	18.8	JPB mining areas	None (within 0m)				
65	18.9	Coal mining	None (within 0m)				
65	18.10	Brine areas	None (within 0m)				
66	18.11	Gypsum areas	None (within 0m)				
66	18.12	Tin mining	None (within 0m)				
66	18.13	Clay mining	None (within 0m)				
Page	Section	Radon					
<b>67</b>	<b>19.1</b>	<b><u>Radon</u></b>	Less than 1% (within 0m)				
Page	Section	Soil chemistry	On site	0-50m	50-250m	250-500m	500-2000m
<b>69</b>	<b>20.1</b>	<b><u>BGS Estimated Background Soil Chemistry</u></b>	9	7	-	-	-
70	20.2	BGS Estimated Urban Soil Chemistry	0	0	-	-	-



70	20.3	BGS Measured Urban Soil Chemistry	0	0	-	-	-
Page	Section	Railway infrastructure and projects	On site	0-50m	50-250m	250-500m	500-2000m
71	21.1	Underground railways (London)	0	0	0	-	-
71	21.2	Underground railways (Non-London)	0	0	0	-	-
71	21.3	Railway tunnels	0	0	0	-	-
71	21.4	Historical railway and tunnel features	0	0	0	-	-
71	21.5	Royal Mail tunnels	0	0	0	-	-
72	21.6	Historical railways	0	0	0	-	-
72	21.7	Railways	0	0	0	-	-
72	21.8	Crossrail 1	0	0	0	0	-
72	21.9	Crossrail 2	0	0	0	0	-
72	21.10	HS2	0	0	0	0	-

## Recent aerial photograph



Capture Date: 25/08/2019

Site Area: 6.17ha





## Recent site history - 2015 aerial photograph



Capture Date: 01/10/2015

Site Area: 6.17ha



## Recent site history - 2011 aerial photograph



Capture Date: 12/05/2011

Site Area: 6.17ha





## Recent site history - 2010 aerial photograph

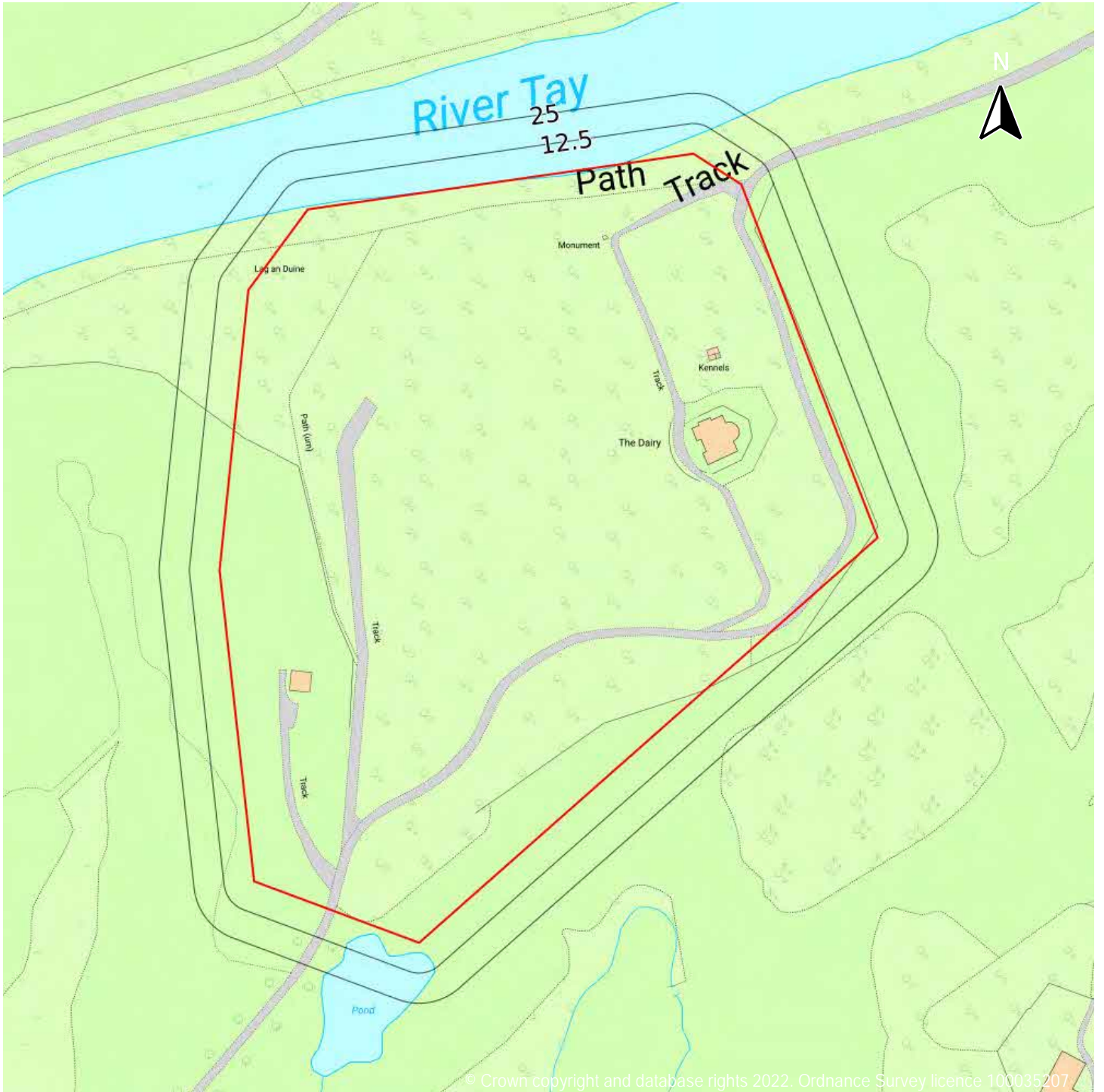


Capture Date: 26/09/2010

Site Area: 6.17ha



# OS MasterMap site plan



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Site Area: 6.17ha





# 1 Past land use



— Site Outline

Search buffers in metres (m)

- Historical industrial land uses
- Historical energy features

## 1.1 Historical industrial land uses

Records within 500m 9

Potentially contaminative land use features digitised from historical Ordnance Survey mapping at 1:10,000 and 1:10,560 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 12**

ID	Location	Land use	Dates present	Group ID
A	On site	Dairy	1862 - 1900	77417

ID	Location	Land use	Dates present	Group ID
<b>A</b>	<b>On site</b>	<b>Dairy</b>	<b>1980</b>	<b>78697</b>
1	128m SW	Unspecified Disused Pit	1980	75375
2	207m SE	Dairy	1862 - 1900	77268
3	278m SW	Unspecified Ground Workings	1862	72590
4	395m SW	Boat House	1900	75857
5	415m SE	Sawmill	1862 - 1900	78052
6	428m SE	Disused Saw Mill	1980	73646
8	477m N	Tunnel	1980	75547

*This data is sourced from Ordnance Survey / Groundsure.*

## 1.2 Historical tanks

Records within 500m

0

Tank features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

*This data is sourced from Ordnance Survey / Groundsure.*

## 1.3 Historical energy features

Records within 500m

1

Energy features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 12**

ID	Location	Land use	Dates present	Group ID
7	477m SW	Electricity Substation	1980	3878

*This data is sourced from Ordnance Survey / Groundsure.*





## 1.4 Historical petrol stations

Records within 500m

0

Petrol stations digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

*This data is sourced from Ordnance Survey / Groundsure.*

## 1.5 Historical garages

Records within 500m

0

Garages digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

*This data is sourced from Ordnance Survey / Groundsure.*

## 1.6 Historical military land

Records within 500m

0

Areas of military land digitised from multiple sources including the National Archives, local records, MOD records and verified other sources, intelligently grouped into contiguous features.

*This data is sourced from Ordnance Survey / Groundsure / other sources.*



## 2 Past land use - un-grouped



- Site Outline
- Search buffers in metres (m)
- Historical industrial land uses
- Historical energy features

### 2.1 Historical industrial land uses

**Records within 500m** 12

Potentially contaminative land use features digitised from historical Ordnance Survey mapping at 1:10,000 and 10,560 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 15**

ID	Location	Land Use	Date	Group ID
A	On site	Dairy	1900	77417
A	On site	Dairy	1862	77417
A	On site	Dairy	1980	78697

ID	Location	Land Use	Date	Group ID
1	128m SW	Unspecified Disused Pit	1980	75375
B	207m SE	Dairy	1900	77268
B	215m SE	Dairy	1862	77268
2	278m SW	Unspecified Ground Workings	1862	72590
3	395m SW	Boat House	1900	75857
C	415m SE	Sawmill	1900	78052
C	417m SE	Sawmill	1862	78052
C	428m SE	Disused Saw Mill	1980	73646
5	477m N	Tunnel	1980	75547

*This data is sourced from Ordnance Survey / Groundsure.*

## 2.2 Historical tanks

Records within 500m

0

Tank features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

*This data is sourced from Ordnance Survey / Groundsure.*

## 2.3 Historical energy features

Records within 500m

1

Energy features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 15**

ID	Location	Land Use	Date	Group ID
4	477m SW	Electricity Substation	1980	3878

*This data is sourced from Ordnance Survey / Groundsure.*





## 2.4 Historical petrol stations

Records within 500m

0

Petrol stations digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

*This data is sourced from Ordnance Survey / Groundsure.*

## 2.5 Historical garages

Records within 500m

0

Garages digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

*This data is sourced from Ordnance Survey / Groundsure.*



## 3 Waste and landfill



— Site Outline

Search buffers in metres (m)

■ Active or recent landfill point

### 3.1 Active or recent landfill

Records within 500m

2

Active or recently closed landfill sites under Scottish Environment Protection (SEPA) regulation.

Features are displayed on the Waste and landfill map on **page 18**

ID	Location	Address	Details
1	180m SW	Name: Mains Of Taymouth, Kenmore, Ph15 2hn	Licence number: PPC/E/20049 Waste type: Inert Wastes - Ec Code 10 11 03 Waste Glass Based Fibrous Materials, 15 01 07 - Glass Packaging, 17 01 01 Concrete, 17 01 02 Bricks, 17 01 03 Tiles & Ceramics, 17 02 02 Glass, 17 05 04 Soil & Stones Excluding Topsoil & Peat, 20 01 02 Glass, 20 02 02 Facility type: -

ID	Location	Address	Details
2	492m W	Name: Mains Of Taymouth, Kenmore, Ph15 2hn	Licence number: PPC/E/20049 - 11/11/04 Waste type: Inert Wastes - Ec Code 10 11 03 Waste Glass Based Fibrous Materials, 15 01 07 - Glass Packaging, 17 01 01 Concrete, 17 01 02 Bricks, 17 01 03 Tiles & Ceramics, 17 02 02 Glass, 17 05 04 Soil & Stones Excluding Topsoil & Peat, 20 01 02 Glass, 20 02 02 Facility type: Landfill

*This data is sourced from the Scottish Environment Protection Agency.*

### 3.2 Historical landfill (BGS records)

Records within 500m 0

Landfill sites identified on a survey carried out on behalf of the DoE in 1973. These sites may have been closed or operational at this time.

*This data is sourced from the British Geological Survey.*

### 3.3 Historical landfill (LA/mapping records)

Records within 500m 0

Landfill sites identified from Local Authority records and high detail historical mapping.

*This data is sourced from the Ordnance Survey/Groundsure and Local Authority records.*

### 3.4 Licensed waste sites

Records within 500m 0

Active or recently closed waste sites under Scottish Environment Protection Agency (SEPA) regulation.

*This data is sourced from the Scottish Environment Protection Agency.*

### 3.5 Historical waste sites

Records within 500m 0

Waste site records derived from Local Authority planning records and high detail historical mapping.

*This data is sourced from Ordnance Survey/Groundsure and Local Authority records.*





## 4 Current industrial land use

### 4.1 Recent industrial land uses

Records within 250m	0
---------------------	---

Current potentially contaminative industrial sites.

*This data is sourced from Ordnance Survey.*

### 4.2 Current or recent petrol stations

Records within 500m	0
---------------------	---

Open, closed, under development and obsolete petrol stations.

*This data is sourced from Experian.*

### 4.3 Electricity cables

Records within 500m	0
---------------------	---

High voltage underground electricity transmission cables.

*This data is sourced from National Grid.*

### 4.4 Gas pipelines

Records within 500m	0
---------------------	---

High pressure underground gas transmission pipelines.

*This data is sourced from National Grid.*

### 4.5 Sites determined as Contaminated Land

Records within 500m	0
---------------------	---

Contaminated Land Register of sites designated under Part 2a of the Environmental Protection Act 1990.

*This data is sourced from Local Authority records.*



## 4.6 Control of Major Accident Hazards (COMAH)

Records within 500m

0

Control of Major Accident Hazards (COMAH) sites. This data includes upper and lower tier sites, and includes a historical archive of COMAH sites and Notification of Installations Handling Hazardous Substances (NIHHS) records.

*This data is sourced from the Health and Safety Executive.*

## 4.7 Regulated explosive sites

Records within 500m

0

Sites registered and licensed by the Health and Safety Executive under the Manufacture and Storage of Explosives Regulations 2005 (MSER). The last update to this data was in April 2011.

*This data is sourced from the Health and Safety Executive.*

## 4.8 Hazardous substance storage/usage

Records within 500m

0

Consents granted for a site to hold certain quantities of hazardous substances at or above defined limits in accordance with the Planning (Hazardous Substances) Regulations 2015.

*This data is sourced from Local Authority records.*

## 4.9 Part A(1), IPPC and Historic IPC Authorisations

Records within 500m

0

Records of Part A installations regulated for the release of substances to the environment.

*This data is sourced from the Scottish Environment Protection Agency.*

## 4.10 Part B Authorisations

Records within 500m

0

Records of Part B installations regulated for the release of substances to the environment.

*This data is sourced from the Scottish Environment Protection Agency.*





## 4.11 Pollution inventory substances

Records within 500m

0

The pollution inventory (substances) includes reporting on annual emissions of certain regulated substances to air, controlled waters and land. A reporting threshold for each substance is also included. Where emissions fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

*This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.*

## 4.12 Pollution inventory waste transfers

Records within 500m

0

The pollution inventory (waste transfers) includes reporting on annual transfers and recovery/disposal of controlled wastes from a site. A reporting threshold for each waste type is also included. Where releases fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

*This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.*

## 4.13 Pollution inventory radioactive waste

Records within 500m

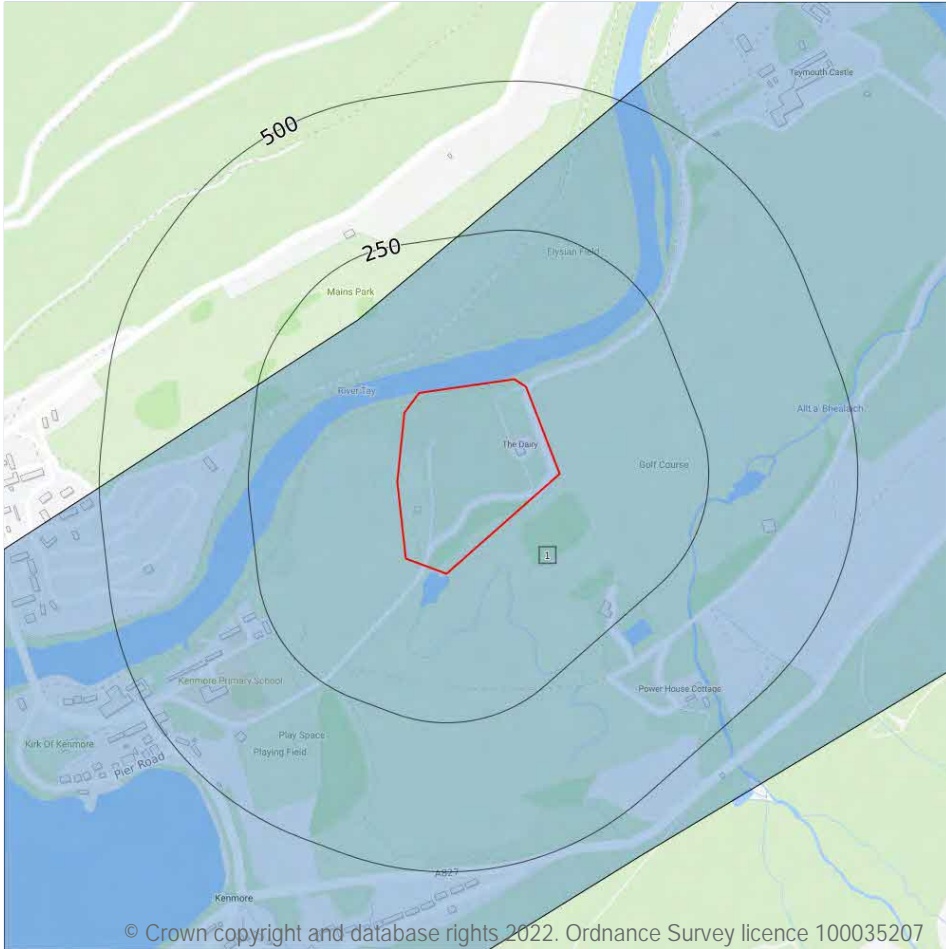
0

The pollution inventory (radioactive wastes) includes reporting on annual releases of radioactive substances from a site, including the means of release. Where releases fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

*This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.*



## 5 Hydrogeology - Superficial aquifer



— Site Outline

Search buffers in metres (m)

- Limited or local potential
- Locally important - intergranular

### 5.1 Superficial aquifer

Records within 500m 1

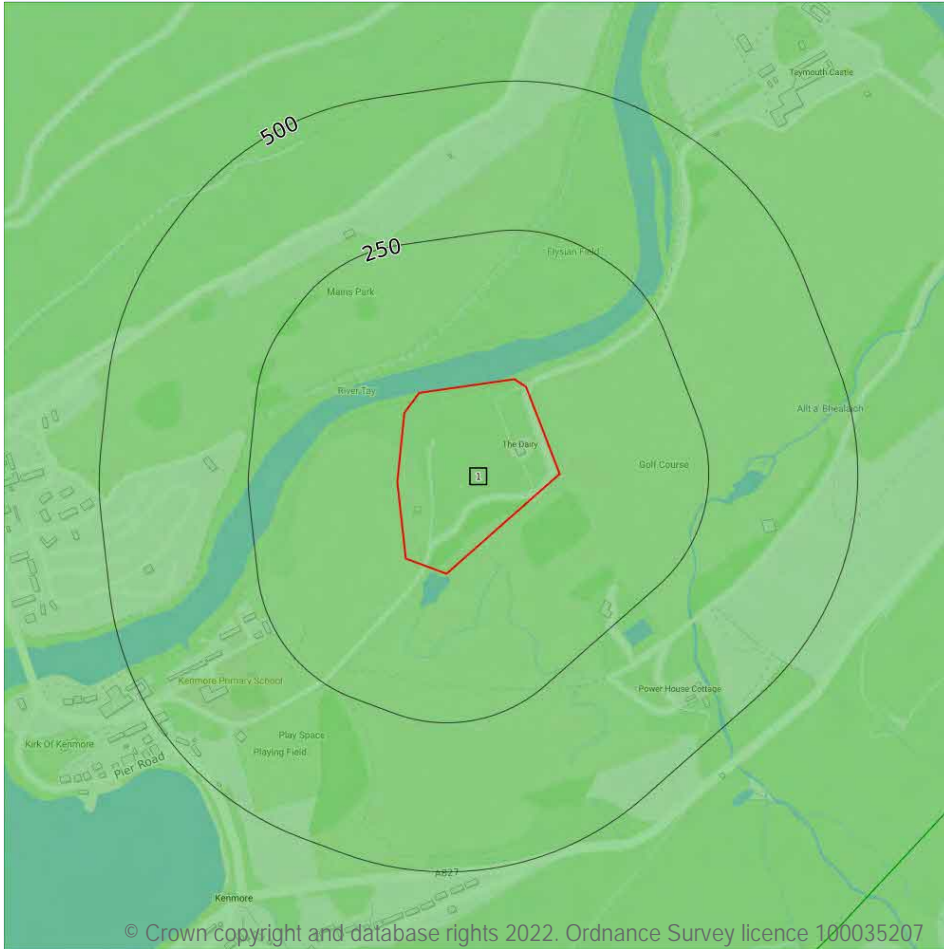
Records of groundwater classification within superficial geology.  
Features are displayed on the Hydrogeology map on [page 23](#)

ID	Location	Description	Type	Rock description
1	On site	Concealed aquifers, aquifers of limited potential, regions without significant groundwater	Concealed aquifers; aquifers with limited or local potential	Quaternary Coastal and Fluvial Alluvium

*This data is sourced from the British Geological Survey.*



## Bedrock aquifer



- Site Outline
- Search buffers in metres (m)
- Highly productive - fissures/discontinuities
- Highly productive - intergranular
- Moderately productive - fissures/discontinuities
- Moderately productive - intergranular
- Low productive - fissures/discontinuities
- Low productive - intergranular
- No significant groundwater

### 5.2 Bedrock aquifer

Records within 500m

1

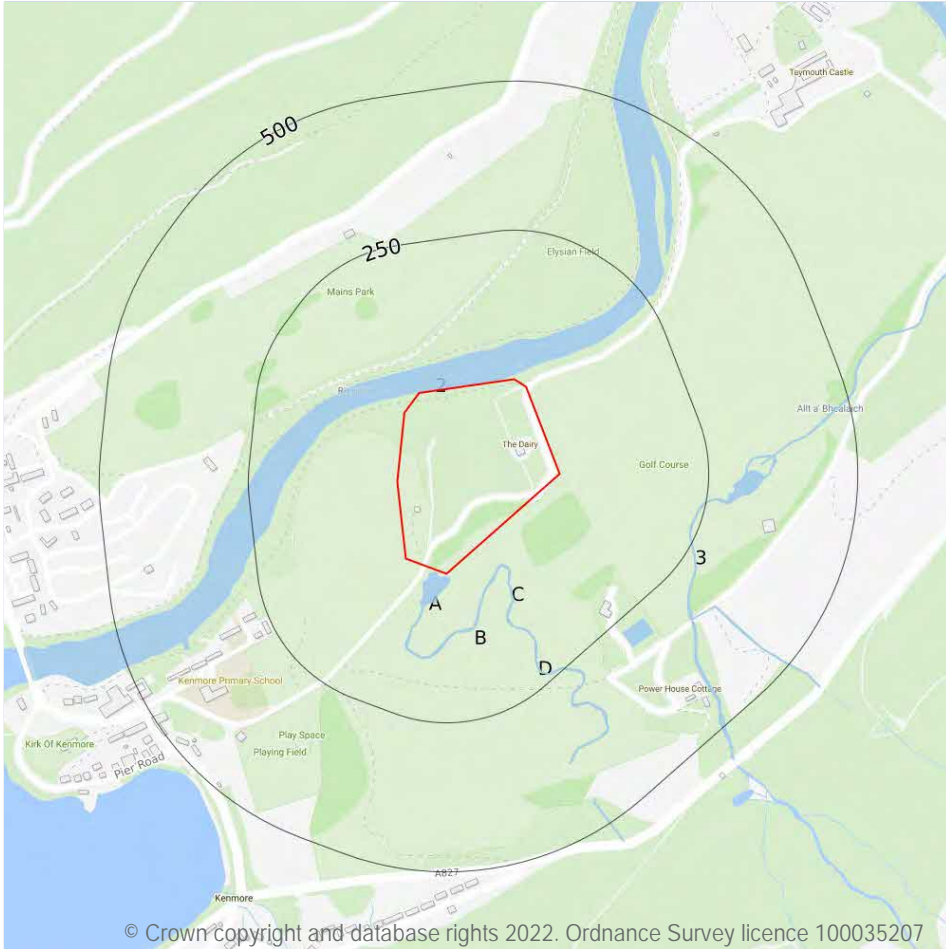
Records of groundwater classification within bedrock geology.

Features are displayed on the Bedrock aquifer map on [page 24](#)

ID	Location	Description	Flow	Summary	Rock description
1	On site	Low productivity aquifer	Flow is virtually all through fractures and other discontinuities	Small amounts of groundwater in near surface weathered zone and secondary fractures.	SOUTHERN HIGHLAND GROUP

*This data is sourced from the British Geological Survey.*

## 6 Hydrology



- Site Outline
- Search buffers in metres (m)
- Water Network (OS MasterMap)
- Surface water features (wider than 5m)
- Surface water features (narrower than 5m)

### 6.1 Water Network (OS MasterMap)

Records within 250m

10

Detailed water network of Great Britain showing the flow and precise central course of every river, stream, lake and canal.

Features are displayed on the Hydrology map on [page 25](#)

ID	Location	Type of water feature	Ground level	Permanence	Name
2	21m NW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	River Tay



ID	Location	Type of water feature	Ground level	Permanence	Name
A	25m S	Lake, loch or reservoir.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
B	49m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
A	65m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
C	82m S	Inland river not influenced by normal tidal action.	Underground	Watercourse contains water year round (in normal circumstances)	-
C	86m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
A	105m S	Inland river not influenced by normal tidal action.	Underground	Watercourse contains water year round (in normal circumstances)	-
C	139m S	Inland river not influenced by normal tidal action.	Underground	Watercourse contains water year round (in normal circumstances)	-
D	143m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
3	237m E	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Allt a' Bhealaich

*This data is sourced from the Ordnance Survey.*

## 6.2 Surface water features

Records within 250m

7

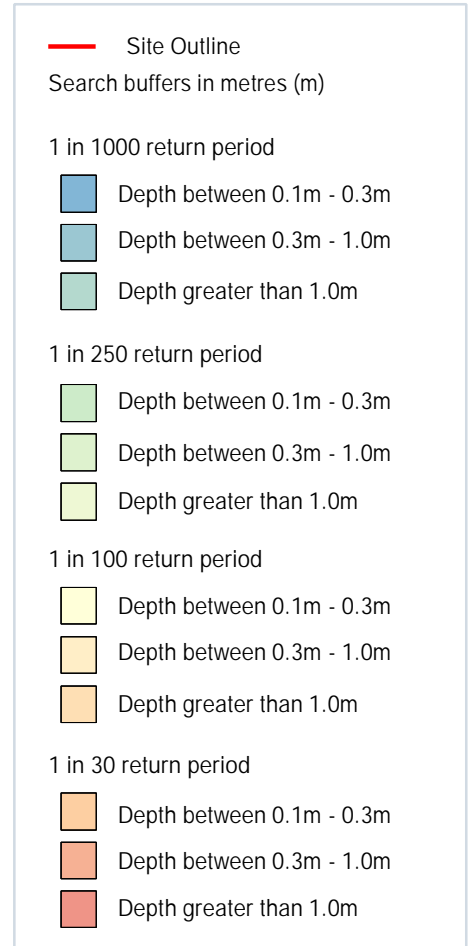
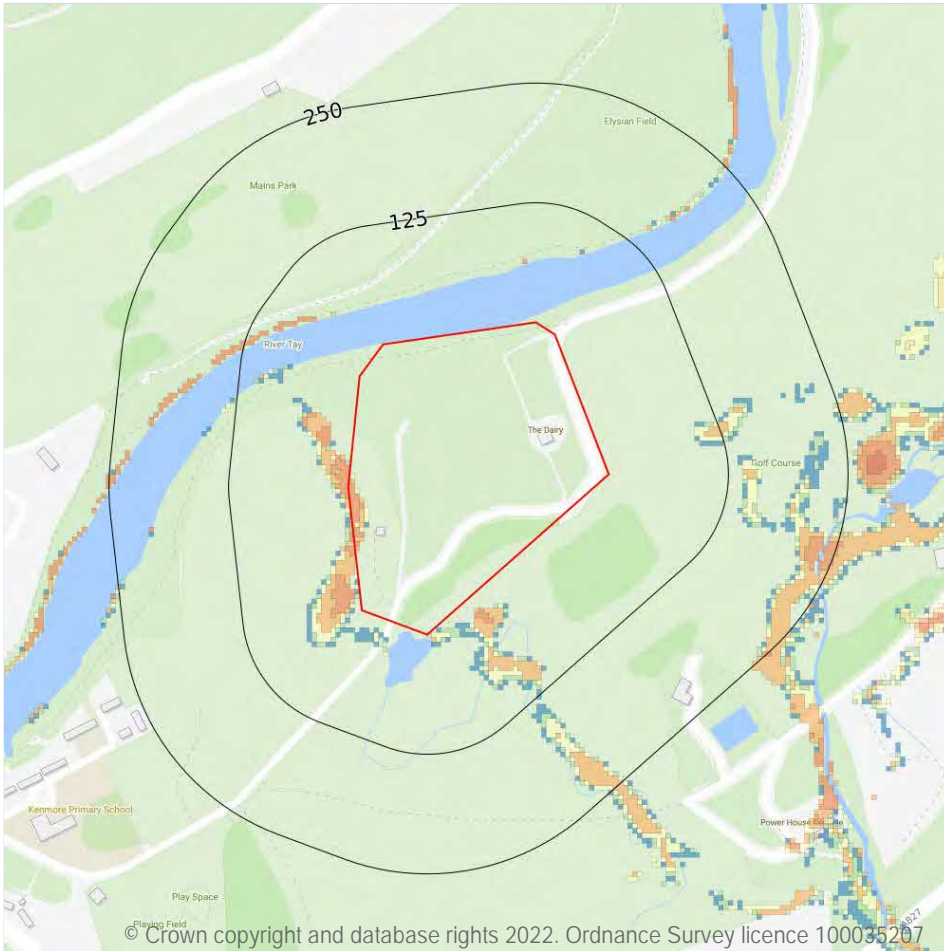
Covering rivers, streams and lakes (some overlap with OS MasterMap Water Network data in previous section) but additionally covers smaller features such as ponds. Rivers and streams narrower than 5m are represented as a single line. Lakes, ponds and rivers or streams wider than 5m are represented as polygons.

Features are displayed on the Hydrology map on **page 25**

*This data is sourced from the Ordnance Survey.*



## 7 River flooding



### 7.1 River flooding

Highest risk on site

1 in 30 year, 0.3m - 1.0m

Highest risk within 50m

1 in 30 year, 0.3m - 1.0m

This is an assessment of flood risk for rivers in Scotland produced using modelled data, provided by Ambiental Risk Analytics. It also takes account of flood defence information provided by the Scottish Environment Protection Agency (SEPA). It shows the chance of flooding from rivers presented in the following categories:

- 1 in 30 year (3.33%)
- 1 in 100 year (1%)
- 1 in 250 year (0.4%)



- and 1 in 1,000 year (0.1%)

The data shown on the map and in the table above shows the highest likelihood of flood events happening at the site. Lower likelihood events may have greater flood depths and hence a greater potential impact on a site. The table below shows the maximum flood depths for a range of return periods for the site.

Features are displayed on the River flooding map on **page 27**

Return period	Maximum modelled depth
1 in 1000 year	Greater than 1.0m
1 in 250 year	Between 0.3m and 1.0m
1 in 100 year	Between 0.3m and 1.0m
1 in 30 year	Between 0.3m and 1.0m

*This data is sourced from Ambiental Risk Analytics.*

## 8 Coastal flooding - Coastal flooding

### 8.1 Coastal flooding

Highest risk on site

Negligible

Highest risk within 50m

Negligible

This is an assessment of coastal flood risk in Scotland produced using modelled data, provided by Ambiental Risk Analytics. It also takes account of flood defence information provided by the Scottish Environment Protection Agency (SEPA). It shows the chance of coastal flooding presented in the following categories:

- 1 in 30 year (3.33%)
- 1 in 100 year (1%)
- 1 in 250 year (0.4%)
- and 1 in 1,000 year (0.1%)

The data shown on the map shows the highest likelihood of flood events happening at the site. Lower likelihood events may have greater flood depths and hence a greater potential impact on a site. The table below shows the maximum flood depths for a range of return periods for the site.

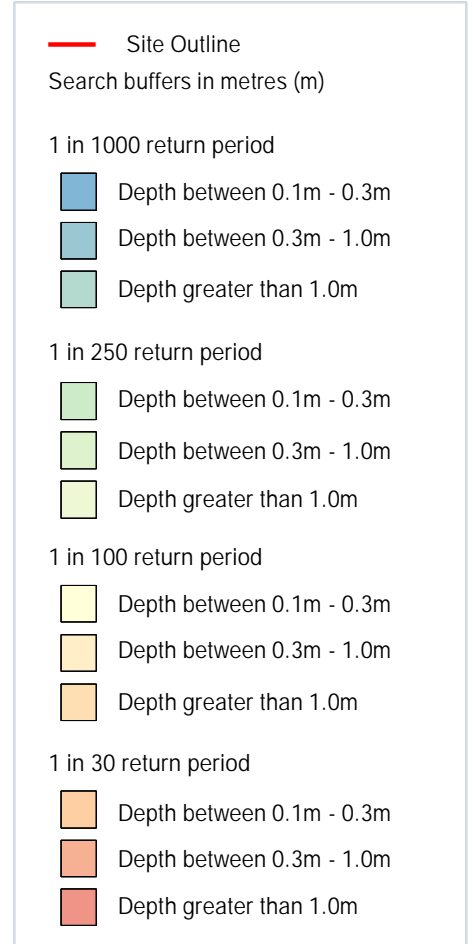
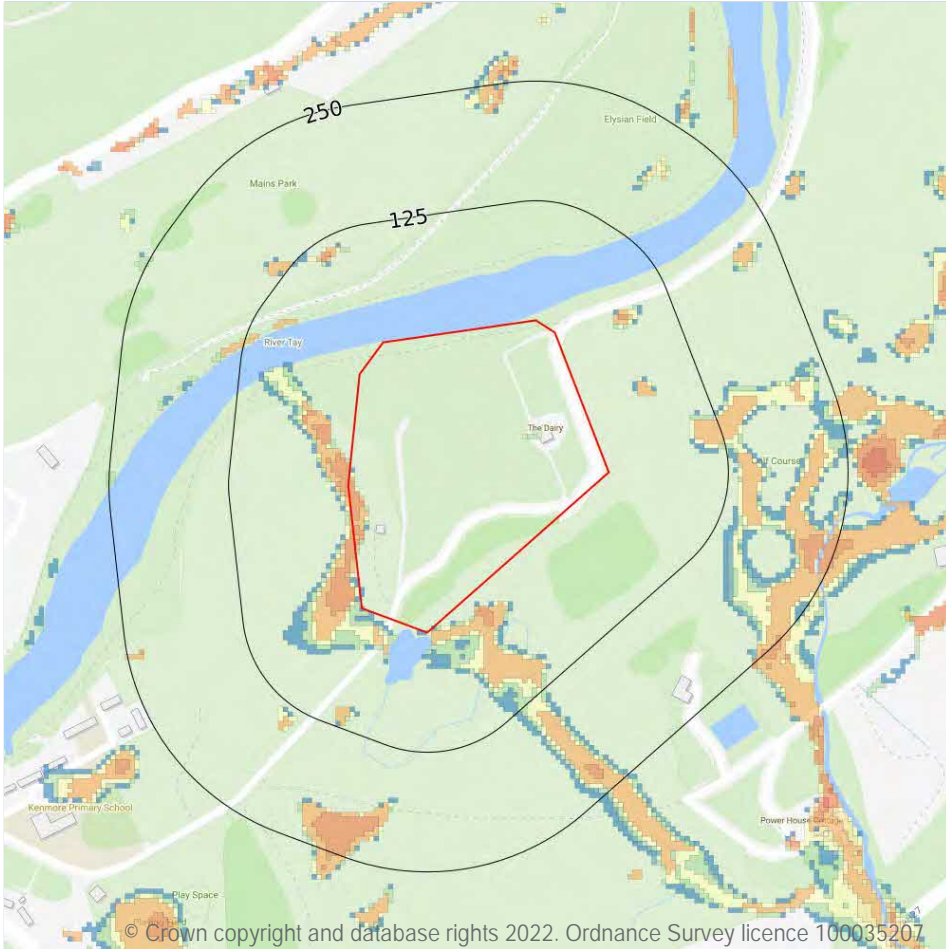
Return period	Maximum modelled depth
1 in 1000 year	Negligible
1 in 250 year	Negligible
1 in 100 year	Negligible
1 in 30 year	Negligible

*This data is sourced from Ambiental Risk Analytics.*





## 9 Surface water flooding



### 9.1 Surface water flooding

Highest risk on site

1 in 30 year, 0.3m - 1.0m

Highest risk within 50m

1 in 30 year, 0.3m - 1.0m

Ambiental Risk Analytics surface water (pluvial) FloodMap identifies areas likely to flood as a result of extreme rainfall events, i.e. land naturally vulnerable to surface water ponding or flooding. This data set was produced by simulating 1 in 30 year, 1 in 100 year, 1 in 250 year and 1 in 1,000 year rainfall events. Modern urban drainage systems are typically built to cope with rainfall events between 1 in 20 and 1 in 30 years, though some older ones may flood in a 1 in 5 year rainfall event.

Features are displayed on the Surface water flooding map on **page 30**

The data shown on the map and in the table above shows the highest likelihood of flood events happening at the site. Lower likelihood events may have greater flood depths and hence a greater potential impact on a site.

The table below shows the maximum flood depths for a range of return periods for the site.

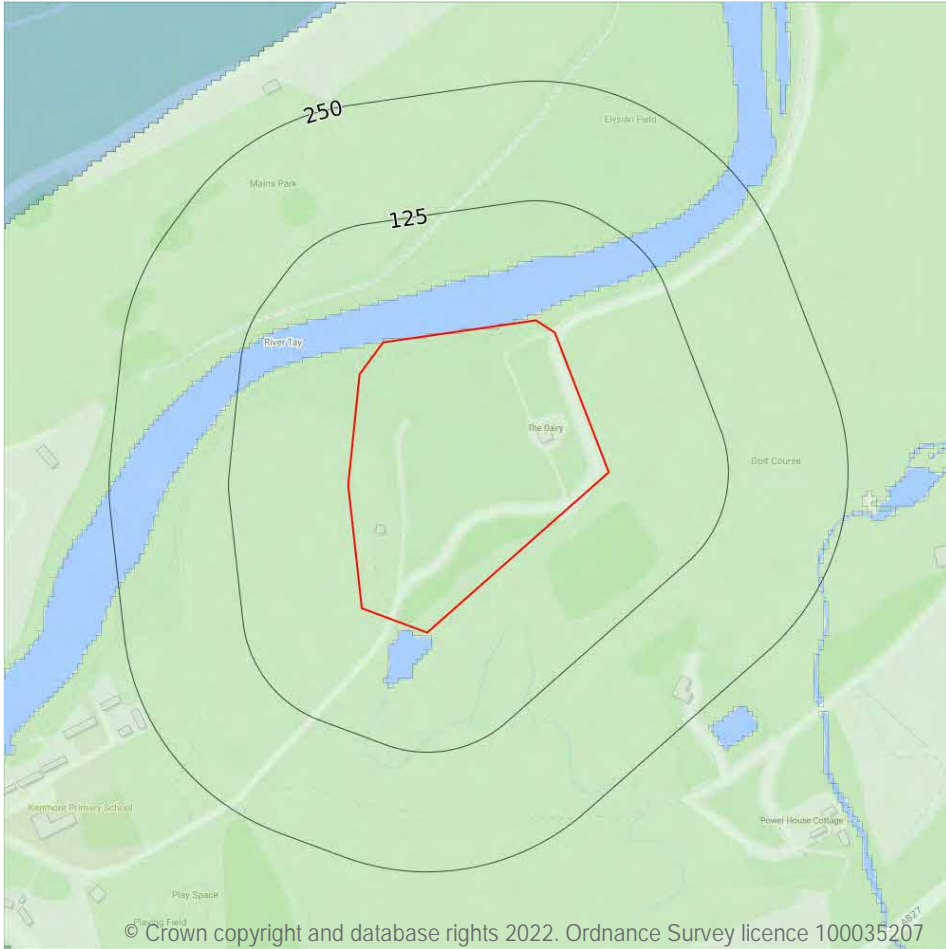
Return period	Maximum modelled depth
1 in 1000 year	Greater than 1.0m
1 in 250 year	Between 0.3m and 1.0m
1 in 100 year	Between 0.3m and 1.0m
1 in 30 year	Between 0.3m and 1.0m

*This data is sourced from Ambiental Risk Analytics.*





## 10 Groundwater flooding



### 10.1 Groundwater flooding

Highest risk on site

Low

Highest risk within 50m

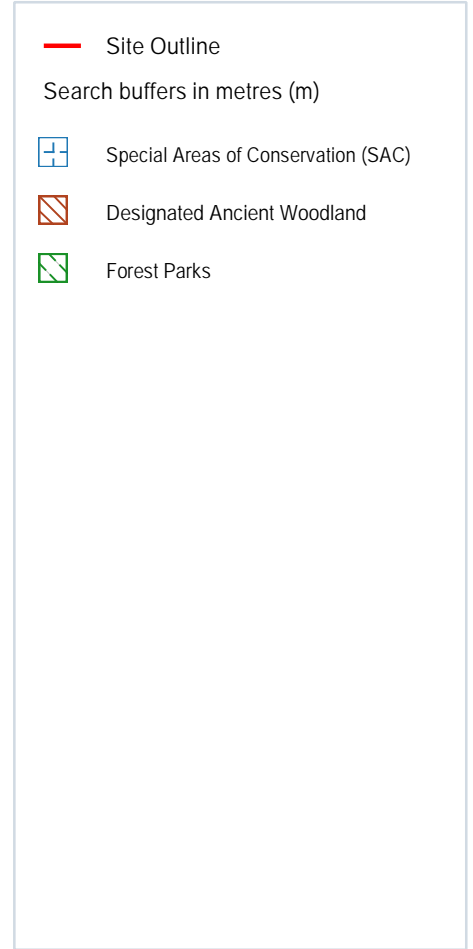
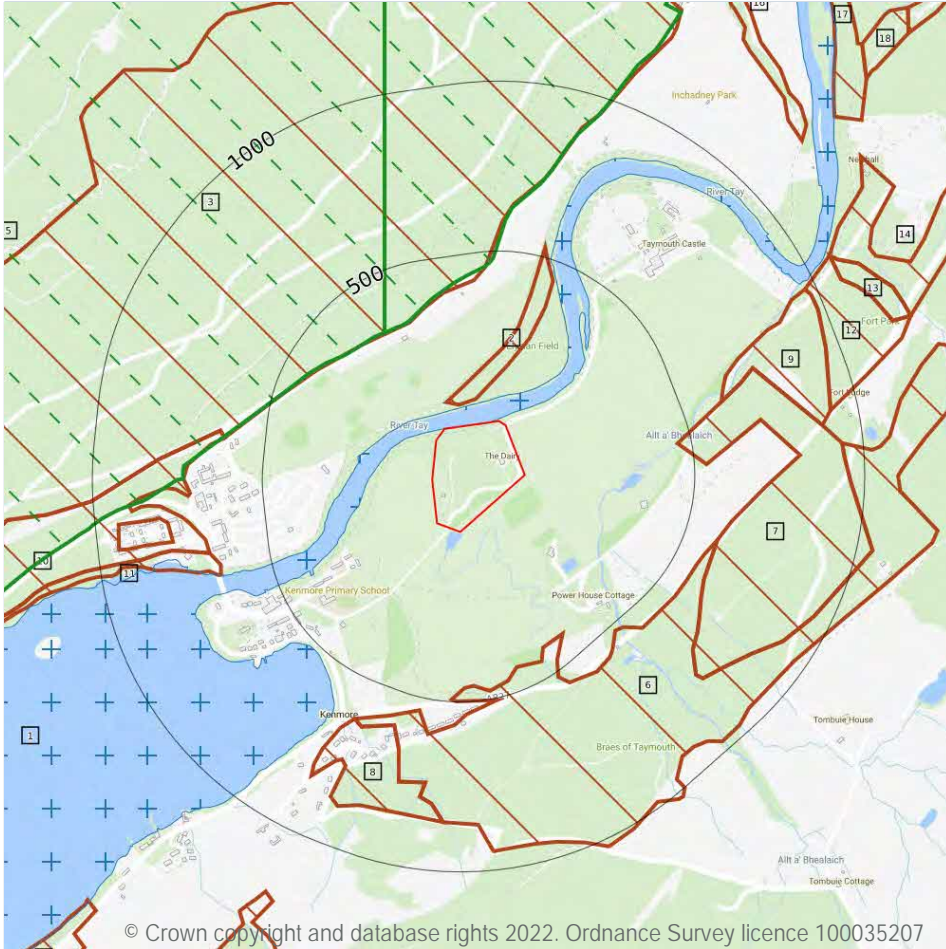
Low

Groundwater flooding is caused by unusually high groundwater levels. It occurs when the water table rises above the ground surface or within underground structures such as basements or cellars. Groundwater flooding tends to exhibit a longer duration than surface water flooding, possibly lasting for weeks or months, and as a result it can cause significant damage to property. This risk assessment is based on a 1 in 100 year return period and a 5m Digital Terrain Model (DTM).

Features are displayed on the Groundwater flooding map on **page 32**

*This data is sourced from Ambient Risk Analytics.*

## 11 Environmental designations



### 11.1 Sites of Special Scientific Interest (SSSI)

Records within 2000m

0

Sites providing statutory protection for the best examples of UK flora, fauna, or geological or physiographical features. Originally notified under the National Parks and Access to the Countryside Act 1949, SSSIs were re-notified under the Wildlife and Countryside Act 1981. Improved provisions for the protection and management of SSSIs were introduced by the Countryside and Rights of Way Act 2000 (in England and Wales) and (in Scotland) by the Nature Conservation (Scotland) Act 2004 and the Wildlife and Natural Environment (Scotland) Act 2010.

*This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.*



## 11.2 Conserved wetland sites (Ramsar sites)

Records within 2000m

0

Ramsar sites are designated under the Convention on Wetlands of International Importance, agreed in Ramsar, Iran, in 1971. They cover all aspects of wetland conservation and wise use, recognizing wetlands as ecosystems that are extremely important for biodiversity conservation in general and for the well-being of human communities. These sites cover a broad definition of wetland; marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, and even some marine areas.

*This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.*

## 11.3 Special Areas of Conservation (SAC)

Records within 2000m

1

Areas which have been identified as best representing the range and variety within the European Union of habitats and (non-bird) species listed on Annexes I and II to the Directive. SACs are designated under the EC Habitats Directive.

Features are displayed on the Environmental designations map on **page 33**

ID	Location	Name	Features of interest	Habitat description	Data source
1	On site	River Tay	Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels; Sea lamprey; Brook lamprey; River lamprey; Atlantic salmon; Otter.	Inland water bodies (Standing water, Running water); Shingle, Sea cliffs, Islets; Bogs, Marshes, Water fringed vegetation, Fens	Scottish Natural Heritage

*This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.*

## 11.4 Special Protection Areas (SPA)

Records within 2000m

0

Sites classified by the UK Government under the EC Birds Directive, SPAs are areas of the most important habitat for rare (listed on Annex I to the Directive) and migratory birds within the European Union.

*This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.*



## 11.5 National Nature Reserves (NNR)

Records within 2000m

0

Sites containing examples of some of the most important natural and semi-natural terrestrial and coastal ecosystems in Great Britain. They are managed to conserve their habitats, provide special opportunities for scientific study or to provide public recreation compatible with natural heritage interests.

*This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.*

## 11.6 Local Nature Reserves (LNR)

Records within 2000m

0

Sites managed for nature conservation, and to provide opportunities for research and education, or simply enjoying and having contact with nature. They are declared by local authorities under the National Parks and Access to the Countryside Act 1949 after consultation with the relevant statutory nature conservation agency.

*This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.*

## 11.7 Designated Ancient Woodland

Records within 2000m

26

Ancient woodlands are classified as areas which have been wooded continuously since at least 1600 AD. This includes semi-natural woodland and plantations on ancient woodland sites. 'Wooded continuously' does not mean there is or has previously been continuous tree cover across the whole site, and not all trees within the woodland have to be old.

Features are displayed on the Environmental designations map on **page 33**

ID	Location	Name	Woodland Type
2	64m N	Unknown	Ancient (of semi-natural origin)
3	327m NW	Unknown	Long-Established (of plantation origin)
6	418m S	Unknown	Long-Established (of plantation origin)
7	459m E	Unknown	Ancient (of semi-natural origin)
8	601m S	Unknown	Long-Established (of plantation origin)
9	617m E	Unknown	Ancient (of semi-natural origin)
10	620m W	Unknown	Long-Established (of plantation origin)
11	648m W	Unknown	Ancient (of semi-natural origin)
12	919m E	Unknown	Ancient (of semi-natural origin)
13	1076m NE	Unknown	Ancient (of semi-natural origin)





ID	Location	Name	Woodland Type
14	1076m NE	Unknown	Long-Established (of plantation origin)
15	1194m SW	Unknown	Ancient (of semi-natural origin)
16	1209m NE	Unknown	Ancient (of semi-natural origin)
17	1327m NE	Unknown	Ancient (of semi-natural origin)
18	1472m NE	Unknown	Other (on Roy map)
19	1511m SW	Unknown	Ancient (of semi-natural origin)
20	1654m NE	Unknown	Ancient (of semi-natural origin)
-	1667m NE	Unknown	Long-Established (of plantation origin)
-	1699m E	Unknown	Long-Established (of plantation origin)
-	1782m NE	Unknown	Long-Established (of plantation origin)
-	1818m NW	Unknown	Other (on Roy map)
-	1830m NE	Unknown	Long-Established (of plantation origin)
-	1831m E	Unknown	Ancient (of semi-natural origin)
-	1861m NW	Unknown	Ancient (of semi-natural origin)
-	1994m E	Tullichuil Wood	Long-Established (of plantation origin)
-	1994m NW	Unknown	Ancient (of semi-natural origin)

*This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.*

## 11.8 Biosphere Reserves

Records within 2000m

0

Biosphere Reserves are internationally recognised by UNESCO as sites of excellence to balance conservation and socioeconomic development between nature and people. They are recognised under the Man and the Biosphere (MAB) Programme with the aim of promoting sustainable development founded on the work of the local community.

*This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.*



## 11.9 Forest Parks

Records within 2000m

2

These are areas managed by the Forestry Commission designated on the basis of recreational, conservation or scenic interest.

Features are displayed on the Environmental designations map on **page 33**

ID	Location	Name
4	329m NW	Tay
5	333m NW	Tay

*This data is sourced from the Forestry Commission.*

## 11.10 Marine Conservation Zones

Records within 2000m

0

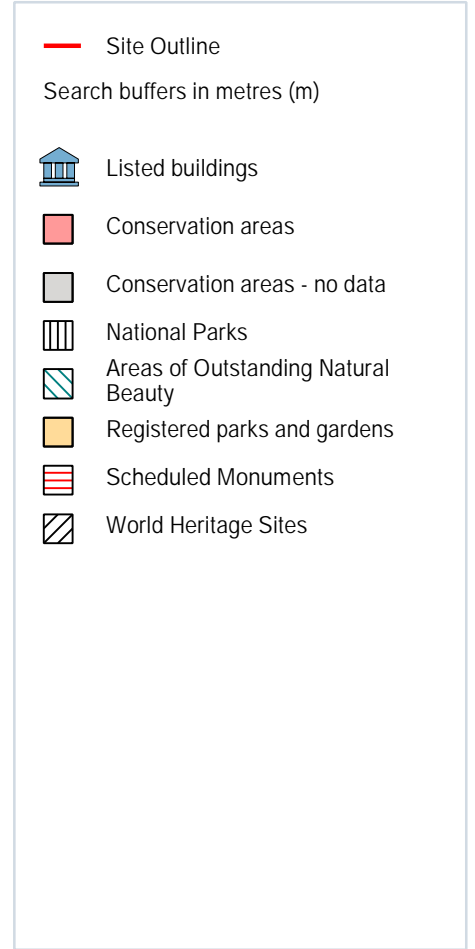
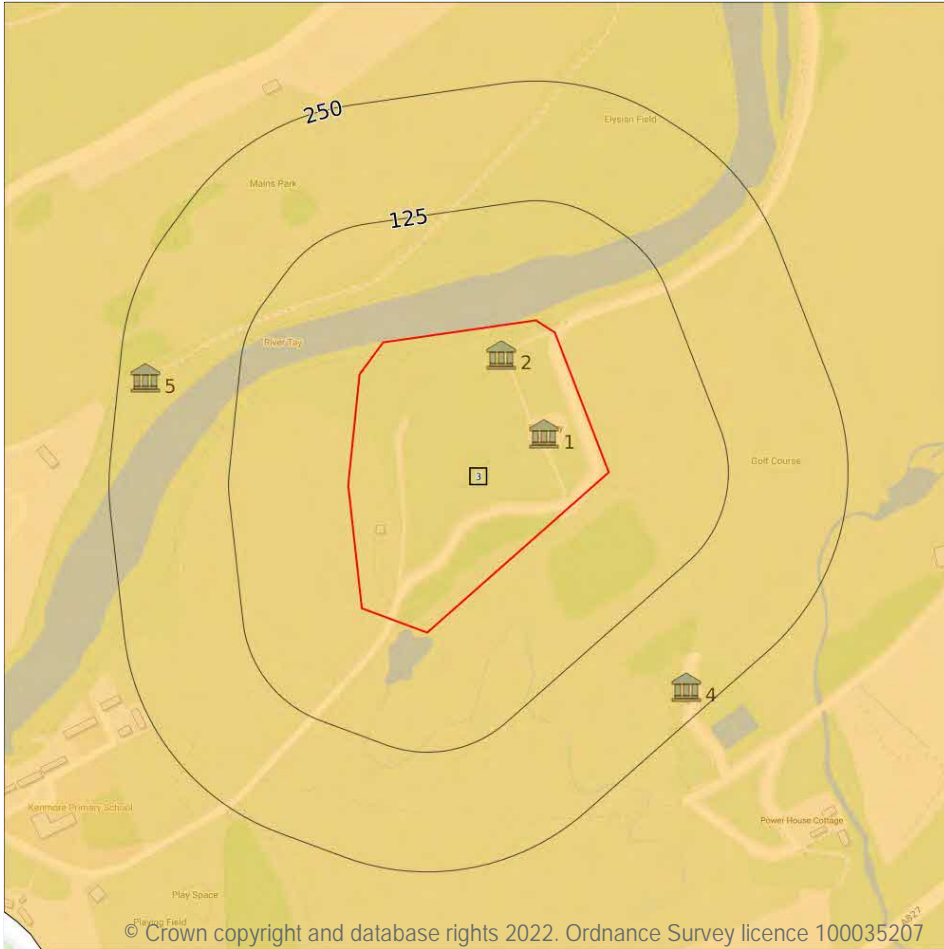
A type of marine nature reserve in UK waters established under the Marine and Coastal Access Act (2009). They are designated with the aim to protect nationally important, rare or threatened habitats and species.

*This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.*





## 12 Visual and cultural designations



### 12.1 World Heritage Sites

Records within 250m

0

Sites designated for their globally important cultural or natural interest requiring appropriate management and protection measures. World Heritage Sites are designated to meet the UK's commitments under the World Heritage Convention.

*This data is sourced from Historic England, Cadw and Historic Environment Scotland.*

## 12.2 Area of Outstanding Natural Beauty

Records within 250m

0

Areas of Outstanding Natural Beauty (AONB) are conservation areas, chosen because they represent 18% of the finest countryside. Each AONB has been designated for special attention because of the quality of their flora, fauna, historical and cultural associations, and/or scenic views. The National Parks and Access to the Countryside Act of 1949 created AONBs and the Countryside and Rights of Way Act, 2000 added further regulation and protection. There are likely to be restrictions to some developments within these areas.

*This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.*

## 12.3 National Parks

Records within 250m

0

In England and Wales, the purpose of National Parks is to conserve and enhance landscapes within the countryside whilst promoting public enjoyment of them and having regard for the social and economic well-being of those living within them. In Scotland National Parks have the additional purpose of promoting the sustainable use of the natural resources of the area and the sustainable social and economic development of its communities. The National Parks and Access to the Countryside Act 1949 established the National Park designation in England and Wales, and The National Parks (Scotland) Act 2000 in Scotland.

*This data is sourced from Natural England, Natural Resources Wales and the Scottish Government.*

## 12.4 Listed Buildings

Records within 250m

4

Buildings listed for their special architectural or historical interest. Building control in the form of 'listed building consent' is required in order to make any changes to that building which might affect its special interest. Listed buildings are graded to indicate their relative importance, however building controls apply to all buildings equally, irrespective of their grade, and apply to the interior and exterior of the building in its entirety, together with any curtilage structures.

Features are displayed on the Visual and cultural designations map on **page 38**

ID	Location	Name	Grade	Reference Number	Listed date
1	On site	Dairy, Taymouth Castle, Perth and Kinross	A	344765	05/10/1971
2	On site	Urn, Dairy Drive, Perth and Kinross	B	347014	05/10/1971
4	221m SE	Dairy Byre, Taymouth Castle, Perth and Kinross	B	391722	23/02/1998
5	223m W	Maxwell's Temple, Taymouth Castle, Perth and Kinross	A	347013	05/10/1971

*This data is sourced from Historic England, Cadw and Historic Environment Scotland.*





## 12.5 Conservation Areas

Records within 250m

0

Local planning authorities are obliged to designate as conservation areas any parts of their own area that are of special architectural or historic interest, the character and appearance of which it is desirable to preserve or enhance. Designation of a conservation area gives broader protection than the listing of individual buildings. All the features within the area, listed or otherwise, are recognised as part of its character. Conservation area designation is the means of recognising the importance of all factors and of ensuring that planning decisions address the quality of the landscape in its broadest sense.

*This data is sourced from Historic England, Cadw and Historic Environment Scotland.*

## 12.6 Scheduled Ancient Monuments

Records within 250m

0

A scheduled monument is an historic building or site that is included in the Schedule of Monuments kept by the Secretary of State for Digital, Culture, Media and Sport. The regime is set out in the Ancient Monuments and Archaeological Areas Act 1979. The Schedule of Monuments has c.20,000 entries and includes sites such as Roman remains, burial mounds, castles, bridges, earthworks, the remains of deserted villages and industrial sites. Monuments are not graded, but all are, by definition, considered to be of national importance.

*This data is sourced from Historic England, Cadw and Historic Environment Scotland.*

## 12.7 Registered Parks and Gardens

Records within 250m

1

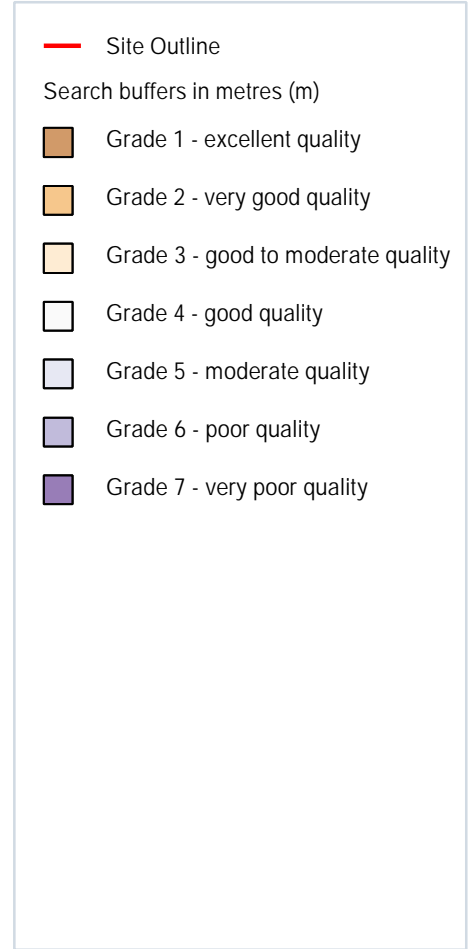
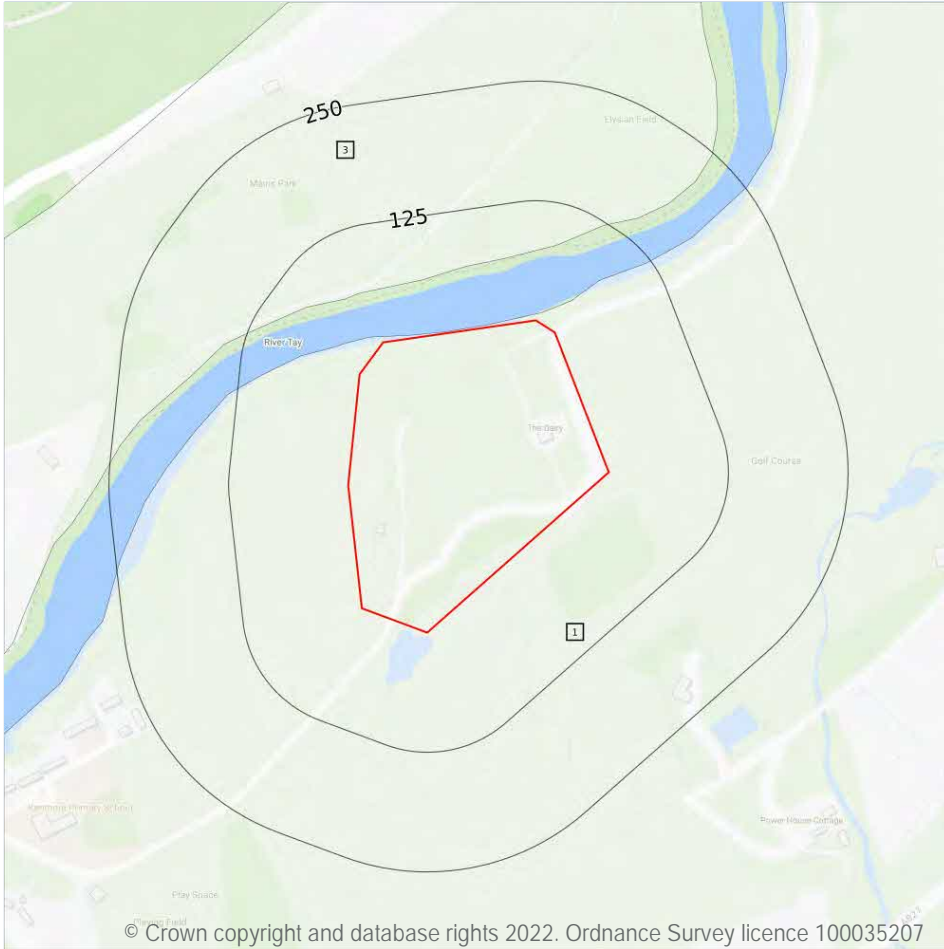
Parks and gardens assessed to be of particular interest and of special historic interest. The emphasis being on 'designed' landscapes, rather than on planting or botanical importance. Registration is a 'material consideration' in the planning process, meaning that planning authorities must consider the impact of any proposed development on the special character of the landscape.

Features are displayed on the Visual and cultural designations map on **page 38**

ID	Location	Name	Grade
3	On site	Taymouth Castle	-

*This data is sourced from Historic England, Cadw and Historic Environment Scotland.*

## 13 Agricultural designations



### 13.1 Agricultural Land Classification

Records within 250m

2

Classification of the quality of agricultural land taking into consideration multiple factors including climate, physical geography and soil properties. It should be noted that the categories for the grading of agricultural land are not consistent across England, Wales and Scotland.

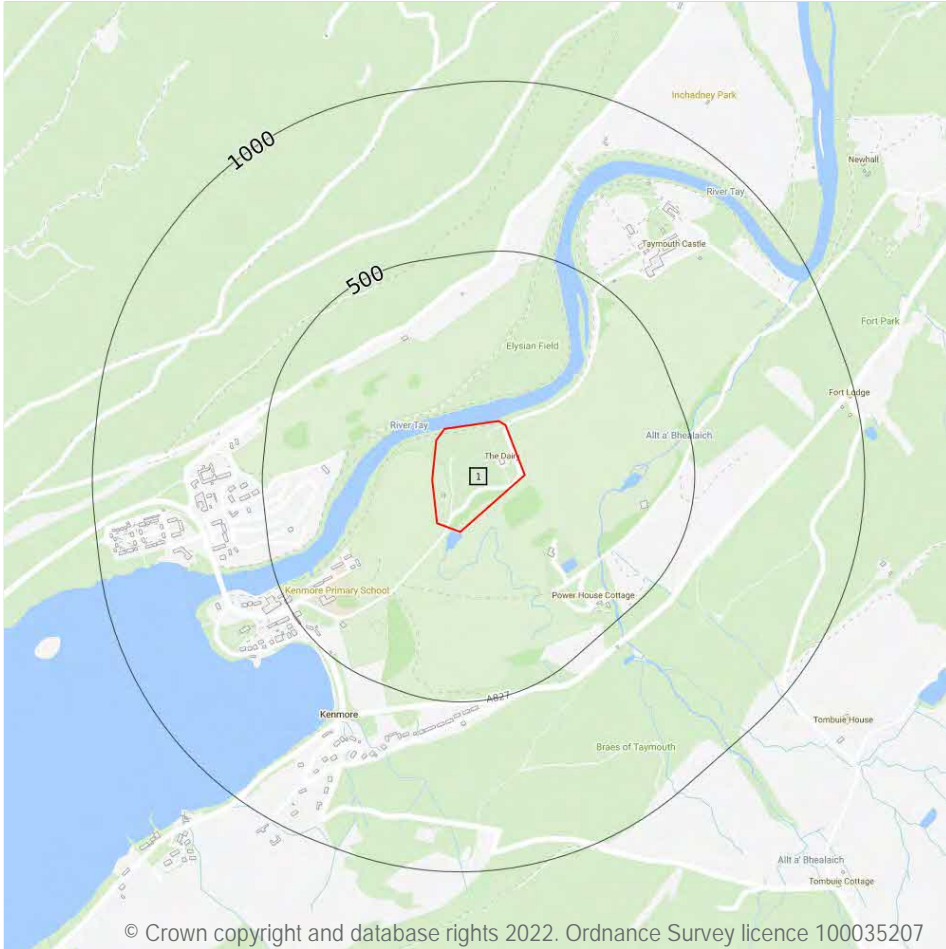
Features are displayed on the Agricultural designations map on **page 41**

ID	Location	Classification	Description
1	On site	Grade 4.1	Land Suited to Arable Cropping
3	55m NW	Grade 4.1	Land Suited to Arable Cropping

*This data is sourced from the James Hutton Institute.*



## 14 Geology 1:10,000 scale - Availability



**— Site Outline**

Search buffers in metres (m)

- Full coverage
- Partial coverage
- No coverage

### 14.1 10k Availability

Records within 500m

1

An indication on the coverage of 1:10,000 scale geology data for the site, the most detailed dataset provided by the British Geological Survey. Either 'Full', 'Partial' or 'No coverage' for each geological theme.

Features are displayed on the Geology 1:10,000 scale - Availability map on [page 42](#)

ID	Location	Artificial	Superficial	Bedrock	Mass movement	Sheet No.
1	On site	No coverage	No coverage	No coverage	No coverage	NoCov

*This data is sourced from the British Geological Survey.*

## Geology 1:10,000 scale - Artificial and made ground

### 14.2 Artificial and made ground (10k)

Records within 500m

0

Details of made, worked, infilled, disturbed and landscaped ground at 1:10,000 scale. Artificial ground can be associated with potentially contaminated material, unpredictable engineering conditions and instability.

*This data is sourced from the British Geological Survey.*





## Geology 1:10,000 scale - Superficial

### 14.3 Superficial geology (10k)

Records within 500m

0

Superficial geological deposits at 1:10,000 scale. Also known as 'drift', these are the youngest geological deposits, formed during the Quaternary. They rest on older deposits or rocks referred to as bedrock.

*This data is sourced from the British Geological Survey.*

### 14.4 Landslip (10k)

Records within 500m

0

Mass movement deposits on BGS geological maps at 1:10,000 scale. Primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground.

*This data is sourced from the British Geological Survey.*



## Geology 1:10,000 scale - Bedrock

### 14.5 Bedrock geology (10k)

Records within 500m

0

Bedrock geology at 1:10,000 scale. The main mass of rocks forming the Earth and present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

*This data is sourced from the British Geological Survey.*

### 14.6 Bedrock faults and other linear features (10k)

Records within 500m

0

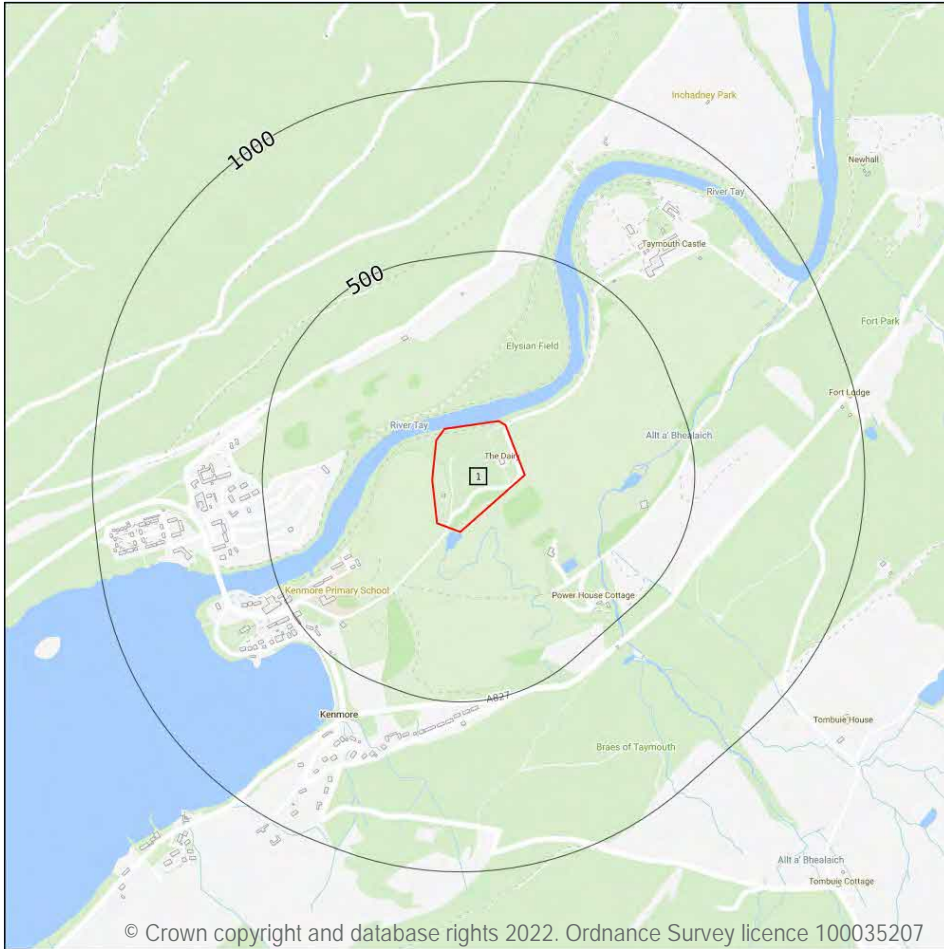
Linear features at the ground or bedrock surface at 1:10,000 scale of six main types; rock, fault, fold axis, mineral vein, alteration area or landform. Features are either observed or inferred, and relate primarily to bedrock.

*This data is sourced from the British Geological Survey.*





## 15 Geology 1:50,000 scale - Availability



— Site Outline  
Search buffers in metres (m)

□ Geological map tile

### 15.1 50k Availability

Records within 500m

1

An indication on the coverage of 1:50,000 scale geology data for the site. Either 'Full' or 'No coverage' for each geological theme.

Features are displayed on the Geology 1:50,000 scale - Availability map on [page 46](#)

ID	Location	Artificial	Superficial	Bedrock	Mass movement	Sheet No.
1	On site	No coverage	Full	Full	No coverage	SC055w_Schiehallion_v4

*This data is sourced from the British Geological Survey.*

## Geology 1:50,000 scale - Artificial and made ground

### 15.2 Artificial and made ground (50k)

Records within 500m

0

Details of made, worked, infilled, disturbed and landscaped ground at 1:50,000 scale. Artificial ground can be associated with potentially contaminated material, unpredictable engineering conditions and instability.

*This data is sourced from the British Geological Survey.*

### 15.3 Artificial ground permeability (50k)

Records within 50m

0

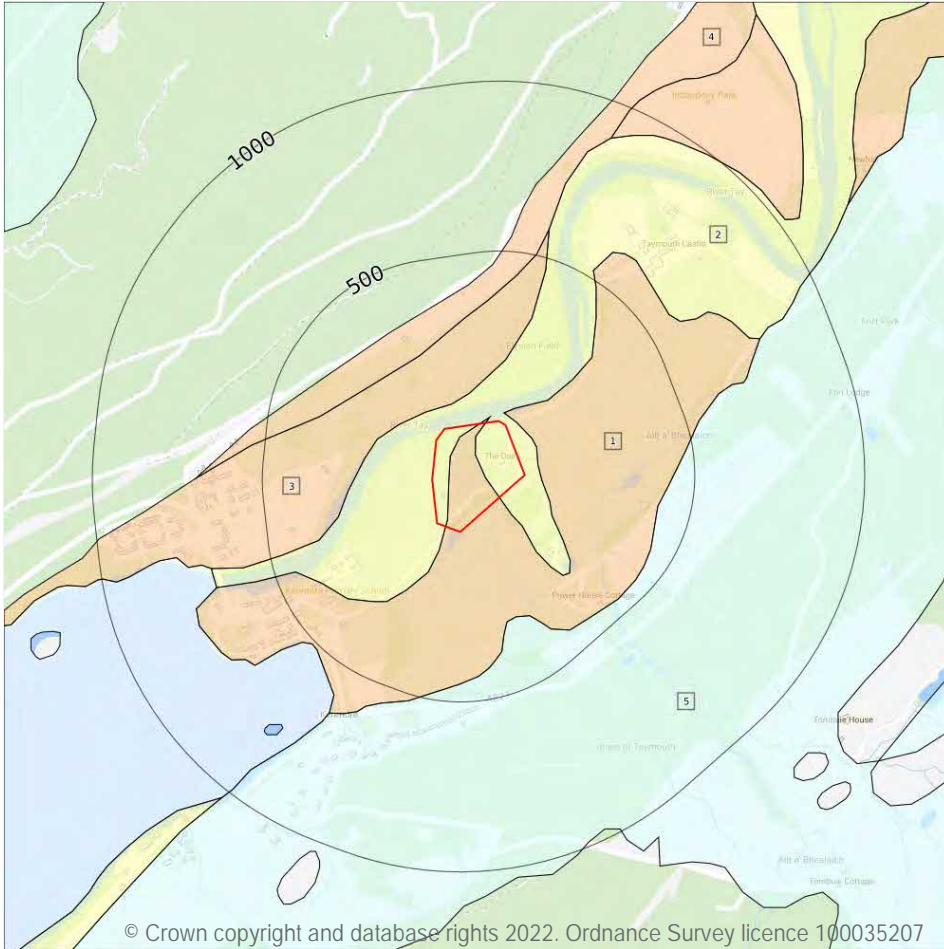
A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any artificial deposits (the zone between the land surface and the water table).

*This data is sourced from the British Geological Survey.*





## Geology 1:50,000 scale - Superficial



- Site Outline
- Search buffers in metres (m)
- Landslip (50k)
- Superficial geology (50k)  
Please see table for more details.

### 15.4 Superficial geology (50k)

Records within 500m

5

Superficial geological deposits at 1:50,000 scale. Also known as 'drift', these are the youngest geological deposits, formed during the Quaternary. They rest on older deposits or rocks referred to as bedrock.

Features are displayed on the Geology 1:50,000 scale - Superficial map on [page 48](#)

ID	Location	LEX Code	Description	Rock description
1	On site	RTDU-XVSZC	RIVER TERRACE DEPOSITS (UNDIFFERENTIATED)	GRAVEL, SAND, SILT AND CLAY
2	On site	ALV-XCZSV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL
3	64m NW	RTDU-XVSZC	RIVER TERRACE DEPOSITS (UNDIFFERENTIATED)	GRAVEL, SAND, SILT AND CLAY

ID	Location	LEX Code	Description	Rock description
4	222m NW	RTDU-XVSZC	RIVER TERRACE DEPOSITS (UNDIFFERENTIATED)	GRAVEL, SAND, SILT AND CLAY
5	298m S	TILLD-DMTN	TILL, DEVENSIAN	DIAMICTON

*This data is sourced from the British Geological Survey.*

## 15.5 Superficial permeability (50k)

Records within 50m 2

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any superficial deposits (the zone between the land surface and the water table).

Location	Flow type	Maximum permeability	Minimum permeability
On site	Intergranular	High	Very Low
On site	Intergranular	Very High	Low

*This data is sourced from the British Geological Survey.*

## 15.6 Landslip (50k)

Records within 500m 0

Mass movement deposits on BGS geological maps at 1:50,000 scale. Primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground.

*This data is sourced from the British Geological Survey.*

## 15.7 Landslip permeability (50k)

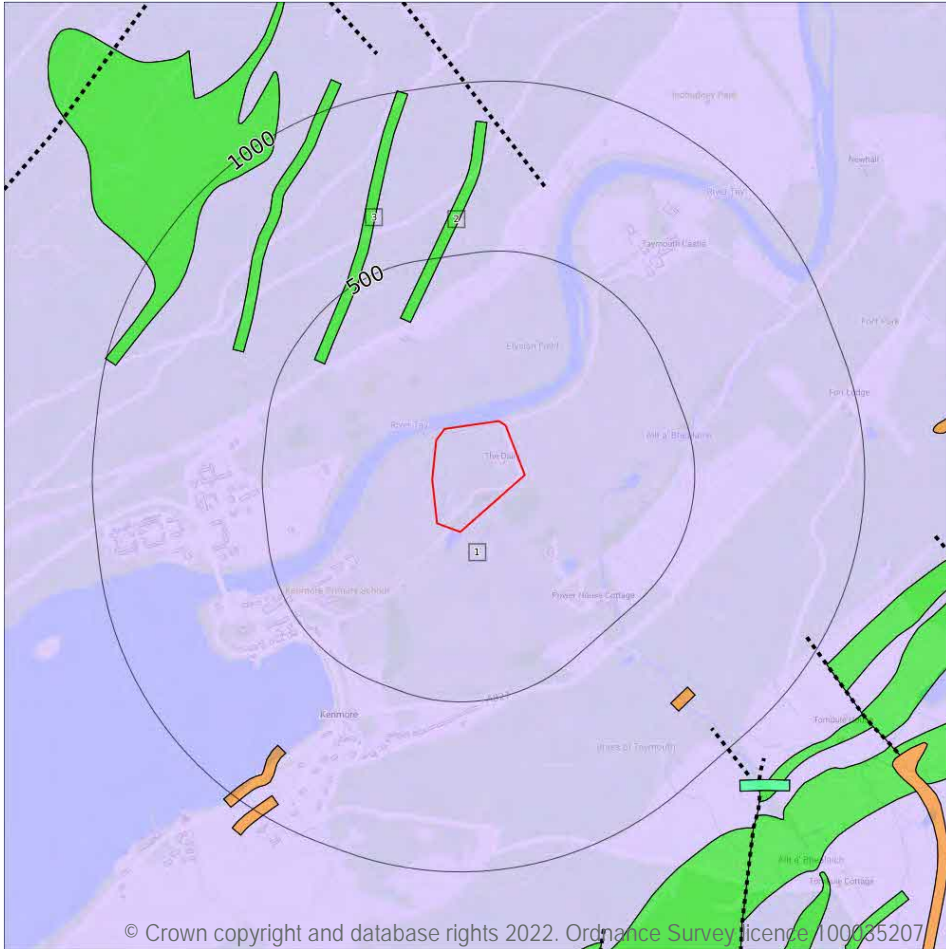
Records within 50m 0

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any landslip deposits (the zone between the land surface and the water table).

*This data is sourced from the British Geological Survey.*



## Geology 1:50,000 scale - Bedrock



**— Site Outline**

Search buffers in metres (m)

**- - - Bedrock faults and other linear features (50k)**

Bedrock geology (50k)  
Please see table for more details.

### 15.8 Bedrock geology (50k)

Records within 500m

3

Bedrock geology at 1:50,000 scale. The main mass of rocks forming the Earth and present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

Features are displayed on the Geology 1:50,000 scale - Bedrock map on **page 50**

ID	Location	LEX Code	Description	Rock age
1	On site	DCPS-PSSP	PITLOCHRY SCHIST FORMATION - PSAMMITE AND SEM IPELITE	-
2	329m NW	UIPC-AMPHB	UNNAMED IGNEOUS INTRUSION, PRE-CALEDONIAN - AMPHIBOLITE	-

ID	Location	LEX Code	Description	Rock age
3	398m NW	UIPC-AMPHB	UNNAMED IGNEOUS INTRUSION, PRE-CALEDONIAN - AMPHIBOLITE	-

*This data is sourced from the British Geological Survey.*

## 15.9 Bedrock permeability (50k)

<b>Records within 50m</b>	<b>1</b>
---------------------------	----------

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of bedrock (the zone between the land surface and the water table).

Location	Flow type	Maximum permeability	Minimum permeability
On site	Fracture	Low	Low

*This data is sourced from the British Geological Survey.*

## 15.10 Bedrock faults and other linear features (50k)

<b>Records within 500m</b>	<b>0</b>
----------------------------	----------

Linear features at the ground or bedrock surface at 1:50,000 scale of six main types; rock, fault, fold axis, mineral vein, alteration area or landform. Features are either observed or inferred, and relate primarily to bedrock.

*This data is sourced from the British Geological Survey.*



## 16 Boreholes



— Site Outline

Search buffers in metres (m)

- Confidential
- 0 - 10m
- 10 - 30m
- 30m+
- Unknown

### 16.1 BGS Boreholes

Records within 250m

1

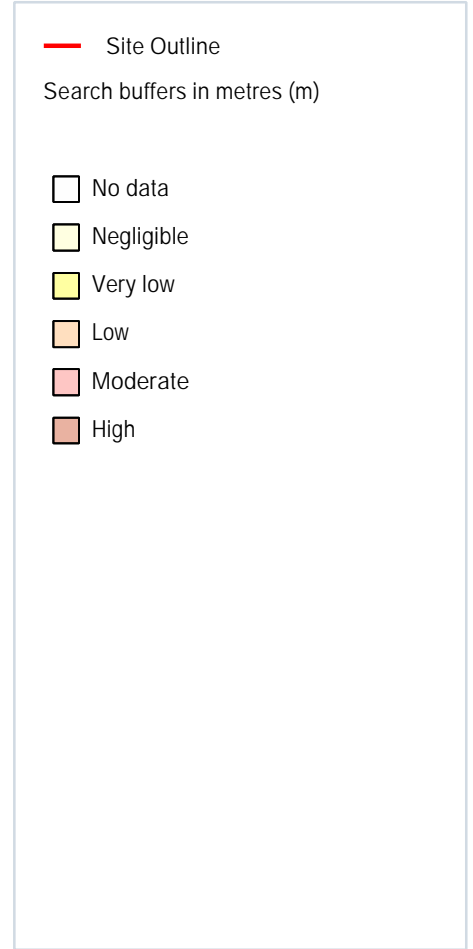
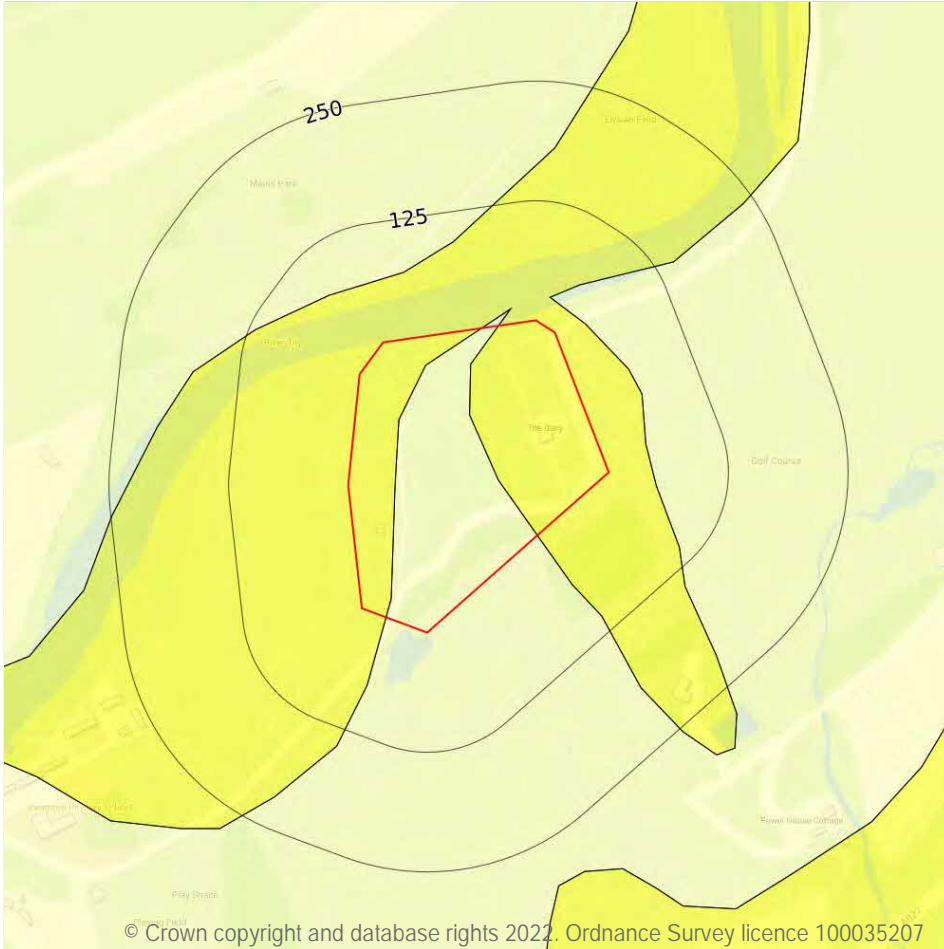
The Single Onshore Boreholes Index (SOBI); an index of over one million records of boreholes, shafts and wells from all forms of drilling and site investigation work held by the British Geological Survey. Covering onshore and nearshore boreholes dating back to at least 1790 and ranging from one to several thousand metres deep.

Features are displayed on the Boreholes map on [page 52](#)

ID	Location	Grid reference	Name	Length	Confidential	Web link
1	121m SW	277700 745650	KENMORE BH	-	Y	N/A

*This data is sourced from the British Geological Survey.*

## 17 Natural ground subsidence - Shrink swell clays



### 17.1 Shrink swell clays

Records within 50m

2

The potential hazard presented by soils that absorb water when wet (making them swell), and lose water as they dry (making them shrink). This shrink-swell behaviour is controlled by the type and amount of clay in the soil, and by seasonal changes in the soil moisture content (related to rainfall and local drainage).

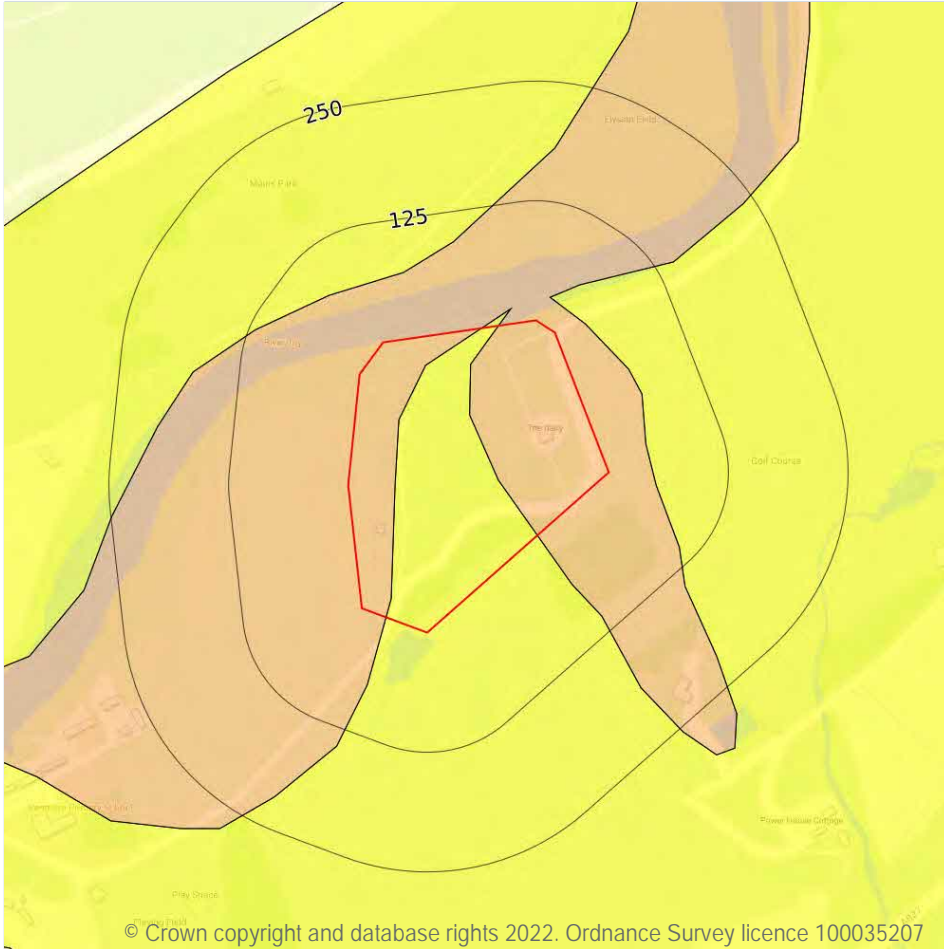
Features are displayed on the Natural ground subsidence - Shrink swell clays map on [page 53](#)

Location	Hazard rating	Details
On site	Negligible	Ground conditions predominantly non-plastic.
On site	Very low	Ground conditions predominantly low plasticity.

*This data is sourced from the British Geological Survey.*



## Natural ground subsidence - Running sands



— Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

### 17.2 Running sands

Records within 50m

2

The potential hazard presented by rocks that can contain loosely-packed sandy layers that can become fluidised by water flowing through them. Such sands can 'run', removing support from overlying buildings and causing potential damage.

Features are displayed on the Natural ground subsidence - Running sands map on [page 54](#)

Location	Hazard rating	Details
On site	Very low	Running sand conditions are unlikely. No identified constraints on land use due to running conditions unless water table rises rapidly.

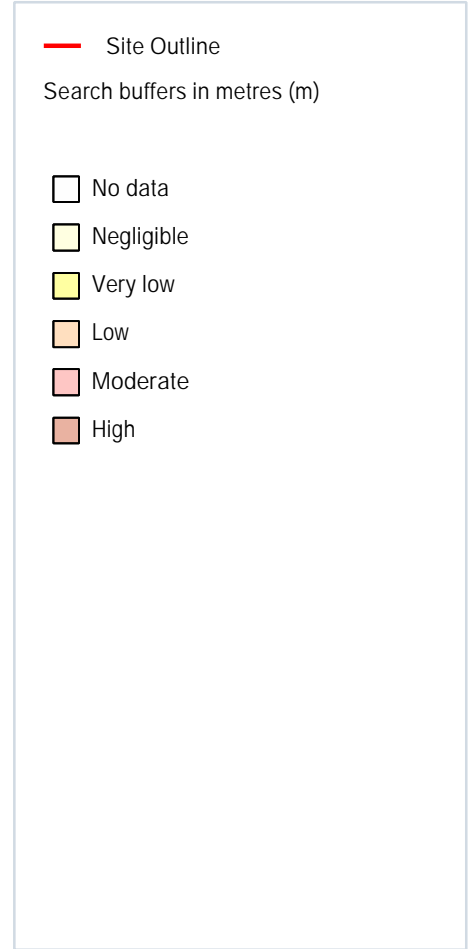
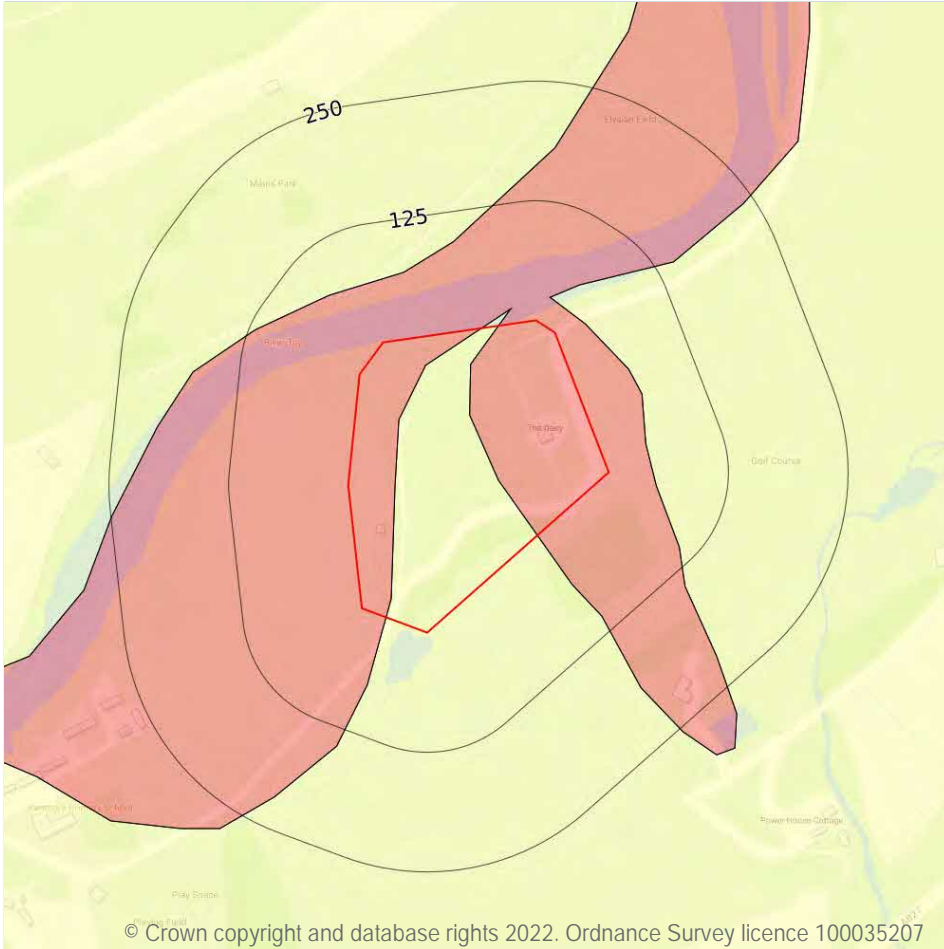
Location	Hazard rating	Details
On site	Low	Running sand conditions may be present. Constraints may apply to land uses involving excavation or the addition or removal of water.

*This data is sourced from the British Geological Survey.*





## Natural ground subsidence - Compressible deposits



### 17.3 Compressible deposits

Records within 50m

2

The potential hazard presented by types of ground that may contain layers of very soft materials like clay or peat and may compress if loaded by overlying structures, or if the groundwater level changes, potentially resulting in depression of the ground and disturbance of foundations.

Features are displayed on the Natural ground subsidence - Compressible deposits map on [page 56](#)

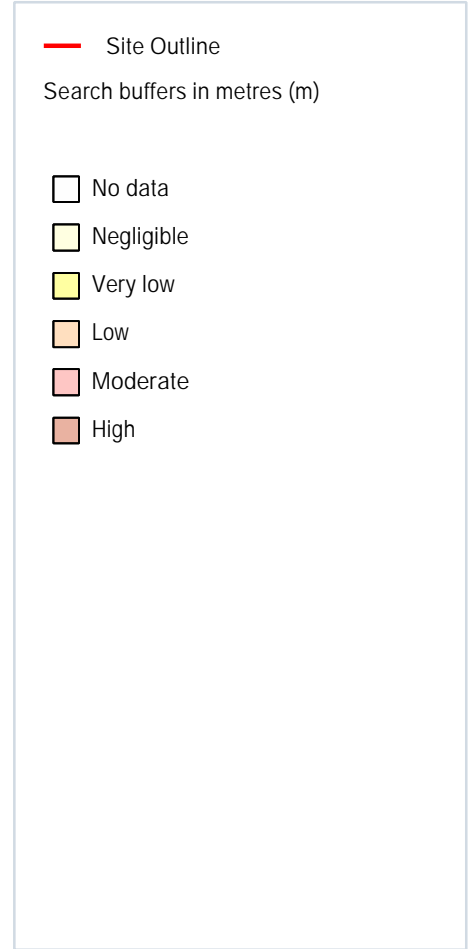
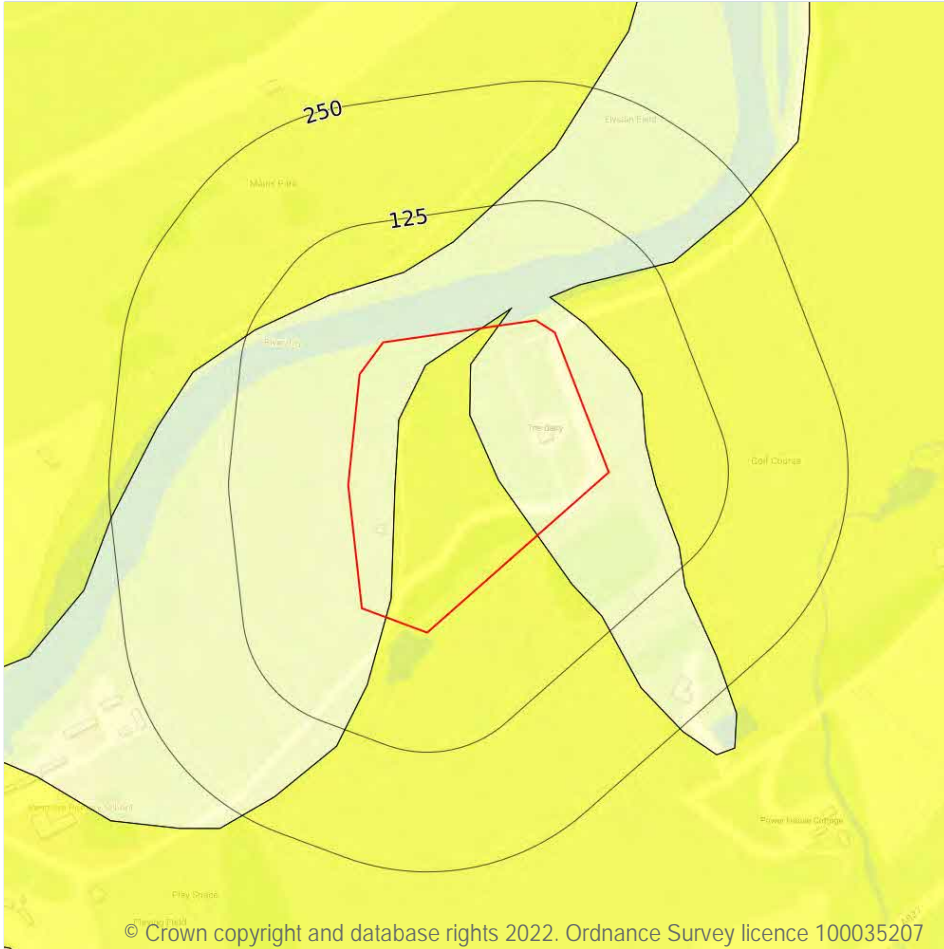
Location	Hazard rating	Details
On site	Negligible	Compressible strata are not thought to occur.
On site	Moderate	Compressibility and uneven settlement hazards are probably present. Land use should consider specifically the compressibility and variability of the site.

*This data is sourced from the British Geological Survey.*





## Natural ground subsidence - Collapsible deposits



### 17.4 Collapsible deposits

Records within 50m

2

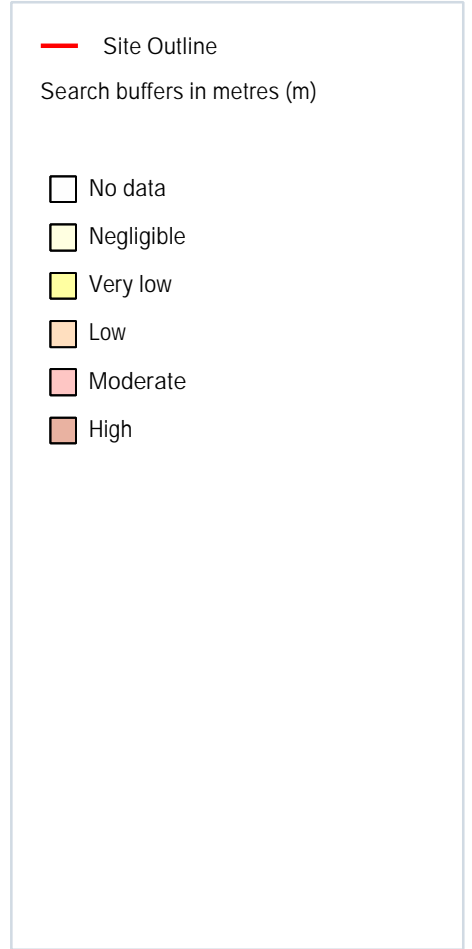
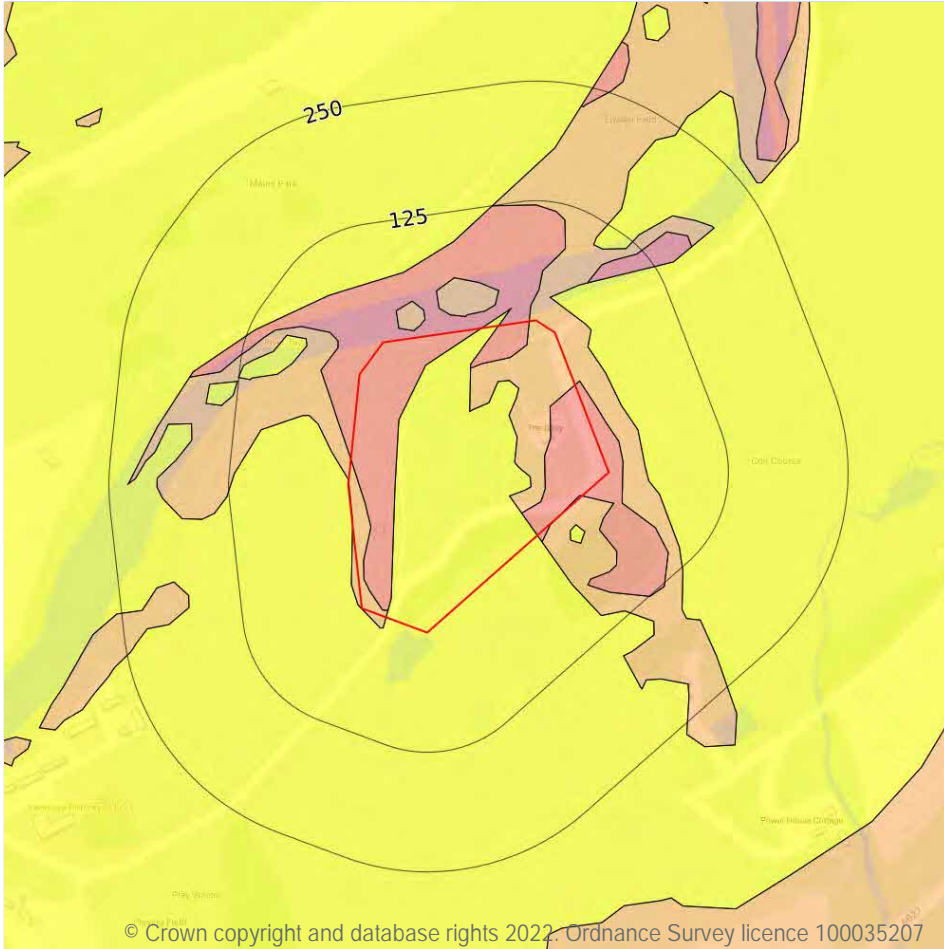
The potential hazard presented by natural deposits that could collapse when a load (such as a building) is placed on them or they become saturated with water.

Features are displayed on the Natural ground subsidence - Collapsible deposits map on [page 58](#)

Location	Hazard rating	Details
On site	Negligible	Deposits with potential to collapse when loaded and saturated are believed not to be present.
On site	Very low	Deposits with potential to collapse when loaded and saturated are unlikely to be present.

*This data is sourced from the British Geological Survey.*

## Natural ground subsidence - Landslides



### 17.5 Landslides

Records within 50m

6

The potential for landsliding (slope instability) to be a hazard assessed using 1:50,000 scale digital maps of superficial and bedrock deposits, combined with information from the BGS National Landslide Database and scientific and engineering reports.

Features are displayed on the Natural ground subsidence - Landslides map on [page 59](#)

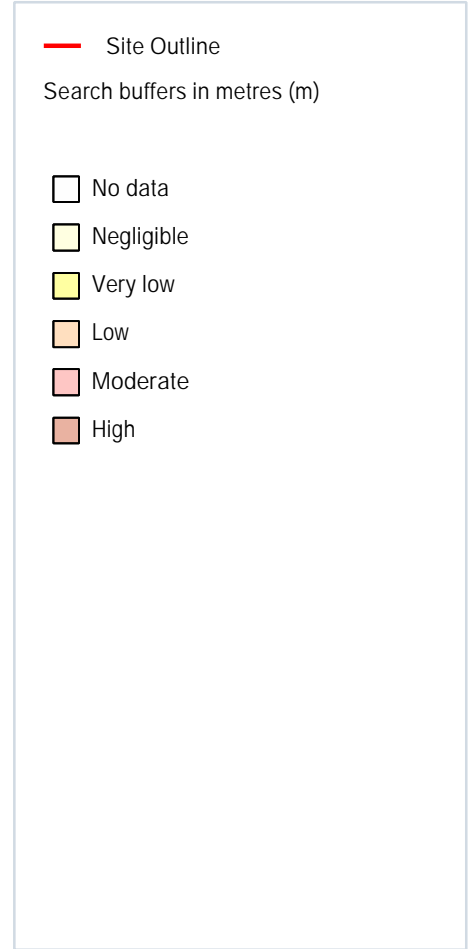
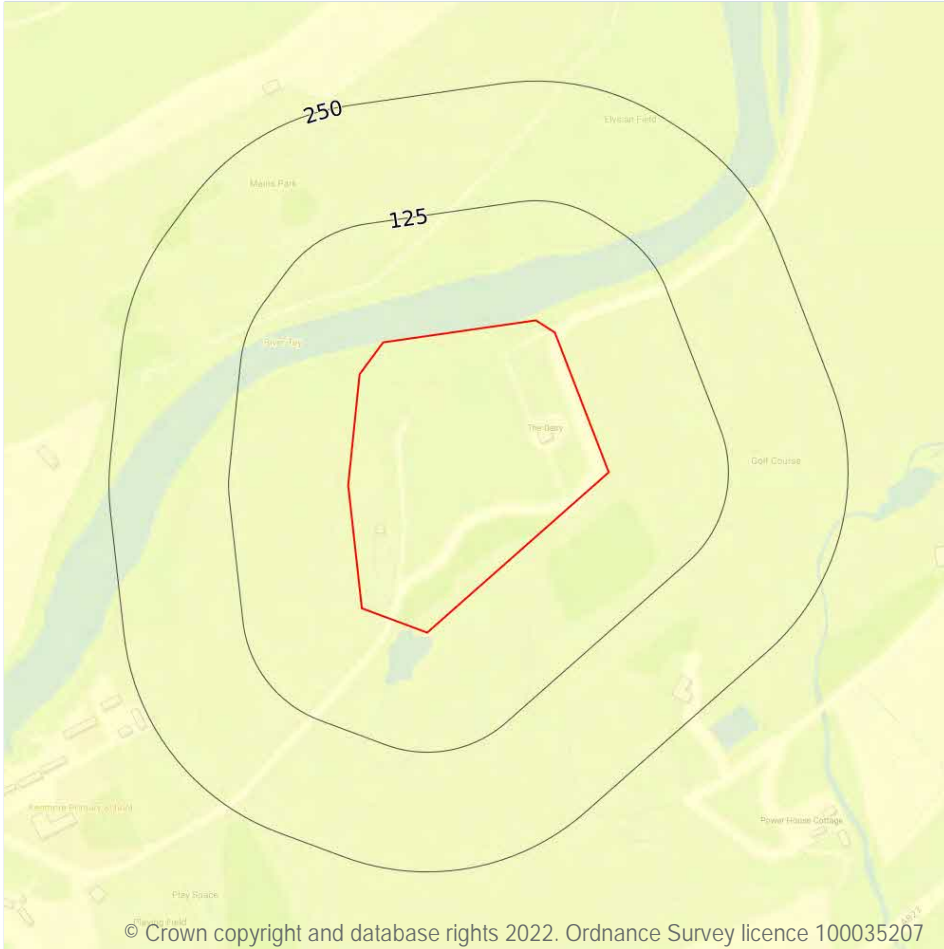
Location	Hazard rating	Details
On site	Very low	Slope instability problems are not likely to occur but consideration to potential problems of adjacent areas impacting on the site should always be considered.

Location	Hazard rating	Details
On site	Low	Slope instability problems may be present or anticipated. Site investigation should consider specifically the slope stability of the site.
On site	Moderate	Slope instability problems are probably present or have occurred in the past. Land use should consider specifically the stability of the site.
7m N	Low	Slope instability problems may be present or anticipated. Site investigation should consider specifically the slope stability of the site.
15m N	Low	Slope instability problems may be present or anticipated. Site investigation should consider specifically the slope stability of the site.
18m SE	Very low	Slope instability problems are not likely to occur but consideration to potential problems of adjacent areas impacting on the site should always be considered.

*This data is sourced from the British Geological Survey.*



## Natural ground subsidence - Ground dissolution of soluble rocks



### 17.6 Ground dissolution of soluble rocks

Records within 50m

1

The potential hazard presented by ground dissolution, which occurs when water passing through soluble rocks produces underground cavities and cave systems. These cavities reduce support to the ground above and can cause localised collapse of the overlying rocks and deposits.

Features are displayed on the Natural ground subsidence - Ground dissolution of soluble rocks map on [page 61](#)

Location	Hazard rating	Details
On site	Negligible	Soluble rocks are either not thought to be present within the ground, or not prone to dissolution. Dissolution features are unlikely to be present.

*This data is sourced from the British Geological Survey.*

## 18 Mining, ground workings and natural cavities



### 18.1 Natural cavities

Records within 500m

0

Industry recognised national database of natural cavities. Sinkholes and caves are formed by the dissolution of soluble rock, such as chalk and limestone, gulls and fissures by cambering. Ground instability can result from movement of loose material contained within these cavities, often triggered by water.

*This data is sourced from Stantec UK Ltd.*

## 18.2 BritPits

Records within 500m

2

BritPits (an abbreviation of British Pits) is a database maintained by the British Geological Survey of currently active and closed surface and underground mineral workings. Details of major mineral handling sites, such as wharfs and rail depots are also held in the database.

Features are displayed on the Mining, ground workings and natural cavities map on **page 62**

ID	Location	Details	Description
A	137m SW	Name: Lady's Mount Sand Pit Address: KENMORE, Perthshire Commodity: Sand & Gravel Status: Ceased	Type: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
4	456m SW	Name: Kenmore Address: KENMORE, Perthshire Commodity: Igneous & Metamorphic Rock Status: Ceased	Type: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority

*This data is sourced from the British Geological Survey.*

## 18.3 Surface ground workings

Records within 250m

1

Historical land uses identified from Ordnance Survey mapping that involved ground excavation at the surface. These features may or may not have been subsequently backfilled.

Features are displayed on the Mining, ground workings and natural cavities map on **page 62**

ID	Location	Land Use	Year of mapping	Mapping scale
A	128m SW	Unspecified Disused Pit	1980	1:10000

*This is data is sourced from Ordnance Survey/Groundsure.*





## 18.4 Underground workings

Records within 1000m

0

Historical land uses identified from Ordnance Survey mapping that indicate the presence of underground workings e.g. mine shafts.

*This is data is sourced from Ordnance Survey/Groundsure.*

## 18.5 Historical Mineral Planning Areas

Records within 500m

0

Boundaries of mineral planning permissions for England and Wales. This data was collated between the 1940s (and retrospectively to the 1930s) and the mid 1980s. The data includes permitted, withdrawn and refused permissions.

*This data is sourced from the British Geological Survey.*

## 18.6 Non-coal mining

Records within 1000m

6

The potential for historical non-coal mining to have affected an area. The assessment is drawn from expert knowledge and literature in addition to the digital geological map of Britain. Mineral commodities may be divided into seven general categories - vein minerals, chalk, oil shale, building stone, bedded ores, evaporites and 'other' commodities (including ball clay, jet, black marble, graphite and chert).

Features are displayed on the Mining, ground workings and natural cavities map on **page 62**

ID	Location	Name	Commodity	Class	Likelihood
6	723m SE	Not available	Vein Mineral	D	Underground mining is known or considered likely to have occurred within or close to the area. Potential for difficult ground conditions are at a level where they should be considered
7	804m SW	Not available	Vein Mineral	B	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
8	823m SE	Not available	Vein Mineral	E	Underground mining is known to have occurred within or very close to the area. Potential for difficult ground conditions should be investigated. Potential for localised subsidence is at a level where it should be considered
-	875m SW	Not available	Vein Mineral	B	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered

ID	Location	Name	Commodity	Class	Likelihood
-	920m SE	Not available	Vein Mineral	D	Underground mining is known or considered likely to have occurred within or close to the area. Potential for difficult ground conditions are at a level where they should be considered
-	937m SW	Not available	Vein Mineral	B	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered

*This data is sourced from the British Geological Survey.*

## 18.7 Mining cavities

Records within 1000m 0

Industry recognised national database of mining cavities. Degraded mines may result in hazardous subsidence (crown holes). Climatic conditions and water escape can also trigger subsidence over mine entrances and workings.

*This data is sourced from Stantec UK Ltd.*

## 18.8 JPB mining areas

Records on site 0

Areas which could be affected by former coal and other mining. This data includes some mine plans unavailable to the Coal Authority.

*This data is sourced from Johnson Poole and Bloomer.*

## 18.9 Coal mining

Records on site 0

Areas which could be affected by past, current or future coal mining.

*This data is sourced from the Coal Authority.*

## 18.10 Brine areas

Records on site 0

The Cheshire Brine Compensation District indicates areas that may be affected by salt and brine extraction in Cheshire and where compensation would be available where damage from this mining has occurred. Damage from salt and brine mining can still occur outside this district, but no compensation will be available.



*This data is sourced from the Cheshire Brine Subsidence Compensation Board.*

## 18.11 Gypsum areas

Records on site	0
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Generalised areas that may be affected by gypsum extraction.

*This data is sourced from British Gypsum.*

## 18.12 Tin mining

Records on site	0
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Generalised areas that may be affected by historical tin mining.

*This data is sourced from Groundsure.*

## 18.13 Clay mining

Records on site	0
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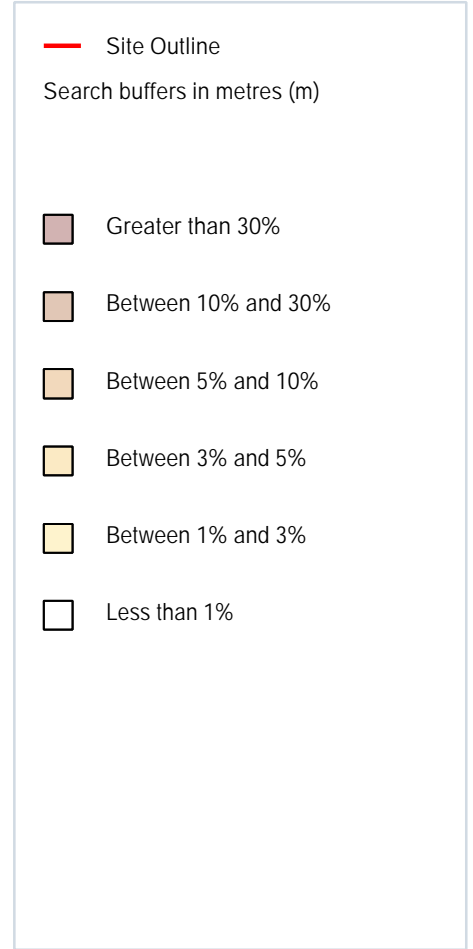
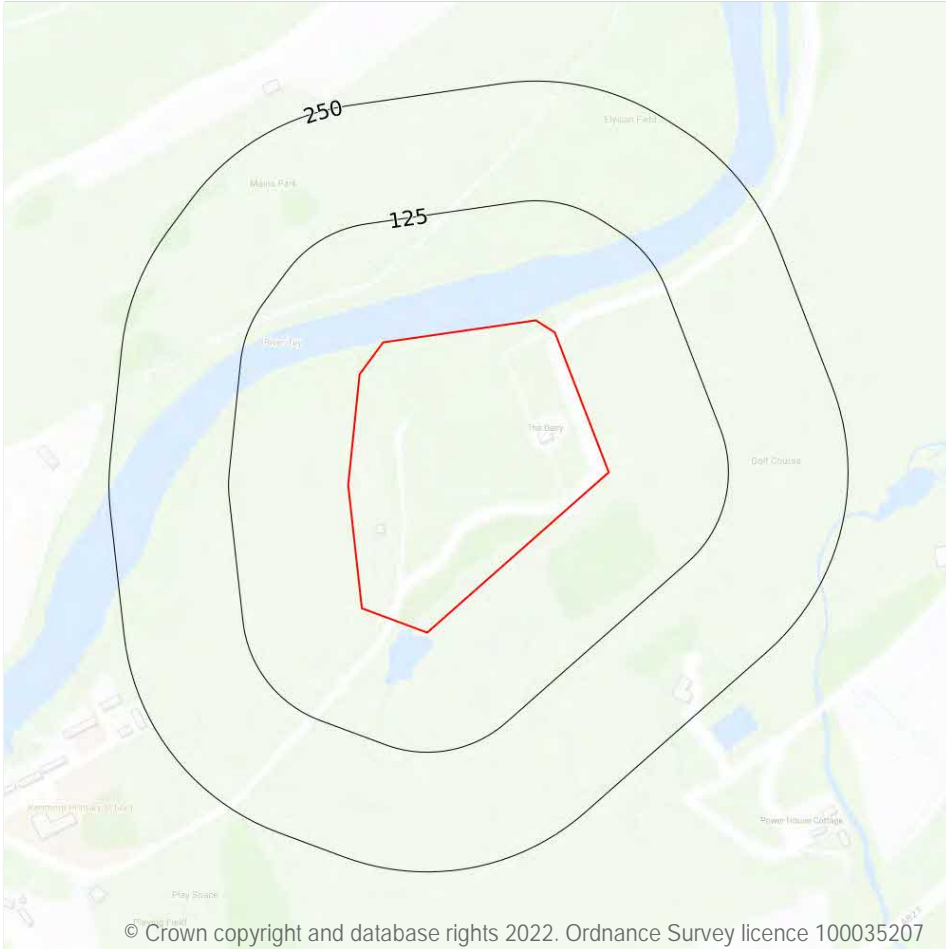
Generalised areas that may be affected by kaolin and ball clay extraction.

*This data is sourced from the Kaolin and Ball Clay Association (UK).*





## 19 Radon



### 19.1 Radon

#### Records on site

1

The Radon Potential data classifies areas based on their likelihood of a property having a radon level at or above the Action Level in Great Britain. The dataset is intended for use at 1:50,000 scale and was derived from both geological assessments and indoor radon measurements (more than 560,000 records). A minimum 50m buffer should be considered when searching the maps, as the smallest detectable feature at this scale is 50m. The findings of this section should supersede any estimations derived from the Indicative Atlas of Radon in Great Britain (1:100,000 scale).

Features are displayed on the Radon map on [page 67](#)

Location	Estimated properties affected	Radon Protection Measures required
On site	Less than 1%	None

*This data is sourced from the British Geological Survey and UK Health Security Agency.*



## 20 Soil chemistry

### 20.1 BGS Estimated Background Soil Chemistry

Records within 50m

16

The estimated values provide the likely background concentration of the potentially harmful elements Arsenic, Cadmium, Chromium, Lead and Nickel in topsoil. The values are estimated primarily from rural topsoil data collected at a sample density of approximately 1 per 2 km<sup>2</sup>. In areas where rural soil samples are not available, estimation is based on stream sediment data collected from small streams at a sampling density of 1 per 2.5 km<sup>2</sup>; this is the case for most of Scotland, Wales and southern England. The stream sediment data are converted to soil-equivalent concentrations prior to the estimation.

Location	Arsenic	Bioaccessible Arsenic	Lead	Bioaccessible Lead	Cadmium	Chromium	Nickel
On site	15 - 25 mg/kg	-	100 mg/kg	60 mg/kg	No data	40 - 60 mg/kg	15 - 30 mg/kg
On site	15 - 25 mg/kg	-	100 mg/kg	60 mg/kg	No data	40 - 60 mg/kg	15 - 30 mg/kg
On site	15 - 25 mg/kg	-	100 mg/kg	60 mg/kg	No data	40 - 60 mg/kg	15 - 30 mg/kg
On site	15 - 25 mg/kg	-	100 mg/kg	60 mg/kg	No data	40 - 60 mg/kg	15 - 30 mg/kg
On site	15 - 25 mg/kg	-	100 mg/kg	60 mg/kg	No data	40 - 60 mg/kg	15 - 30 mg/kg
On site	15 - 25 mg/kg	-	100 mg/kg	60 mg/kg	No data	40 - 60 mg/kg	15 - 30 mg/kg
On site	15 mg/kg	-	100 mg/kg	60 mg/kg	No data	60 - 90 mg/kg	15 - 30 mg/kg
On site	15 mg/kg	-	100 mg/kg	60 mg/kg	No data	60 - 90 mg/kg	15 - 30 mg/kg
On site	15 mg/kg	-	100 mg/kg	60 mg/kg	No data	60 - 90 mg/kg	15 - 30 mg/kg
3m NE	15 - 25 mg/kg	-	100 mg/kg	60 mg/kg	No data	40 - 60 mg/kg	15 - 30 mg/kg
3m NE	15 - 25 mg/kg	-	100 mg/kg	60 mg/kg	No data	40 - 60 mg/kg	15 - 30 mg/kg
26m NE	15 mg/kg	-	100 mg/kg	60 mg/kg	No data	60 - 90 mg/kg	15 - 30 mg/kg
27m NE	15 mg/kg	-	100 mg/kg	60 mg/kg	No data	60 - 90 mg/kg	15 - 30 mg/kg





Location	Arsenic	Bioaccessible Arsenic	Lead	Bioaccessible Lead	Cadmium	Chromium	Nickel
43m NE	15 - 25 mg/kg	-	100 mg/kg	60 mg/kg	No data	40 - 60 mg/kg	15 - 30 mg/kg
45m E	15 mg/kg	-	100 mg/kg	60 mg/kg	No data	60 - 90 mg/kg	15 - 30 mg/kg
49m NE	15 mg/kg	-	100 mg/kg	60 mg/kg	No data	60 - 90 mg/kg	15 - 30 mg/kg

*This data is sourced from the British Geological Survey.*

## 20.2 BGS Estimated Urban Soil Chemistry

Records within 50m

0

Estimated topsoil chemistry of Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Tin and Zinc and bioaccessible Arsenic and Lead in 23 urban centres across Great Britain. These estimates are derived from interpolation of the measured urban topsoil data referred to above and provide information across each city between the measured sample locations (4 per km<sup>2</sup>).

*This data is sourced from the British Geological Survey.*

## 20.3 BGS Measured Urban Soil Chemistry

Records within 50m

0

The locations and measured total concentrations (mg/kg) of Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Tin and Zinc in urban topsoil samples from 23 urban centres across Great Britain. These are collected at a sample density of 4 per km<sup>2</sup>.

*This data is sourced from the British Geological Survey.*

## 21 Railway infrastructure and projects

### 21.1 Underground railways (London)

Records within 250m	0
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Details of all active London Underground lines, including approximate tunnel roof depth and operational hours.

*This data is sourced from publicly available information by Groundsure.*

### 21.2 Underground railways (Non-London)

Records within 250m	0
---------------------	---

Details of the Merseyrail system, the Tyne and Wear Metro and the Glasgow Subway. Not all parts of all systems are located underground. The data contains location information only and does not include a depth assessment.

*This data is sourced from publicly available information by Groundsure.*

### 21.3 Railway tunnels

Records within 250m	0
---------------------	---

Railway tunnels taken from contemporary Ordnance Survey mapping.

*This data is sourced from the Ordnance Survey.*

### 21.4 Historical railway and tunnel features

Records within 250m	0
---------------------	---

Railways and tunnels digitised from historical Ordnance Survey mapping as scales of 1:1,250, 1:2,500, 1:10,000 and 1:10,560.

*This data is sourced from Ordnance Survey/Groundsure.*

### 21.5 Royal Mail tunnels

Records within 250m	0
---------------------	---

The Post Office Railway, otherwise known as the Mail Rail, is an underground railway running through Central London from Paddington Head District Sorting Office to Whitechapel Eastern Head Sorting Office. The line is 10.5km long. The data includes details of the full extent of the tunnels, the depth of the tunnel, and the depth to track level.



*This data is sourced from Groundsure/the Postal Museum.*

## 21.6 Historical railways

Records within 250m	0
---------------------	---

Former railway lines, including dismantled lines, abandoned lines, disused lines, historic railways and razed lines.

*This data is sourced from OpenStreetMap.*

## 21.7 Railways

Records within 250m	0
---------------------	---

Currently existing railway lines, including standard railways, narrow gauge, funicular, trams and light railways.

*This data is sourced from Ordnance Survey and OpenStreetMap.*

## 21.8 Crossrail 1

Records within 500m	0
---------------------	---

The Crossrail railway project links 41 stations over 100 kilometres from Reading and Heathrow in the west, through underground sections in central London, to Shenfield and Abbey Wood in the east.

*This data is sourced from publicly available information by Groundsure.*

## 21.9 Crossrail 2

Records within 500m	0
---------------------	---

Crossrail 2 is a proposed railway linking the national rail networks in Surrey and Hertfordshire via an underground tunnel through London.

*This data is sourced from publicly available information by Groundsure.*

## 21.10 HS2

Records within 500m	0
---------------------	---

HS2 is a proposed high speed rail network running from London to Manchester and Leeds via Birmingham. Main civils construction on Phase 1 (London to Birmingham) of the project began in 2019, and it is currently anticipated that this phase will be fully operational by 2026. Construction on Phase 2a (Birmingham to Crewe) is anticipated to commence in 2021, with the service fully operational by 2027. Construction on Phase 2b (Crewe to Manchester and Birmingham to Leeds) is scheduled to begin in 2023 and be operational by 2033.

*This data is sourced from HS2 Ltd.*





## Data providers

Groundsure works with respected data providers to bring you the most relevant and accurate information. To find out who they are and their areas of expertise see <https://www.groundsure.com/sources-reference>.

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## APPENDIX C RISK ASSESSMENT METHODOLOGY

The methods of assessment used to create this report are developed in accordance with the Statutory Guidance on Contaminated Land<sup>5</sup>, model procedures for the management of land contamination<sup>6</sup> and guidelines for environmental risk assessment and management<sup>7</sup>. Other relevant technical guidance is provided by CIRIA<sup>8</sup>. Investigations are designed with reference to the British Standard<sup>9</sup>.

These best practise methods, which are accepted by regulators, require the development of a site specific assessment using "source-pathway-receptor pollution linkages". For risk to exist each stage of the pollution linkage must be present. If there is no pollution linkage, then there is no risk. If a pollution linkage is established, the assessment will then consider the level of risk and whether any further works or actions are required to clarify, manage or mitigate the risk.

While land contamination is a material consideration in ensuring a site is suitable for its planned use, references to the phrase "contaminated land" in this report, relate to the statutory definition of Contaminated Land under the Environmental Protection Act 1990: Part IIa Contaminated Land, unless otherwise stated.

That definition is:

"any land which appears to the Local Authority in whose area it is situated to be in such condition, by reason of substances on, in or under the land that:

(a) Significant harm is being caused or there is a significant possibility of such harm being caused; or

(b) Significant pollution of the water environment is being caused or there is a significant possibility of such pollution being caused".

### Risk Assessment Framework

To determine if a site presents environmental risks and whether or not the risks are acceptable is evaluated initially by development of a carefully structured process in accord with relevant guidance. This starts by reviewing historic land-use to establish if this may have caused contamination to be present, constituting a source of hazard. The environmental setting must then be reviewed to establish if anything in the nature or context of the site and its location may create pathways which allow hazards to come into contact with environmentally sensitive uses. Lastly the process must consider the current and/or proposed use of a site to establish if receptors such as site users, the water environment, property etc. may be at risk from contamination hazards. Completing this process as Stage 1 allows recommendations to be made regarding potential environmental liabilities associated with purchase or proposed development of land and what type of further information is

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<sup>5</sup> Department of the Environment, Transport and the Regions. Circular 01/2006, Statutory Guidance on Contaminated Land. September 2006.

<sup>6</sup> DEFRA/ Environment Agency, Model Procedures for the Management of Land Contamination, CLR11, September 2004.

<sup>7</sup> Department of the Environment, Transport and the Regions, Environment Agency and Institute of Environmental Health. Guidelines for Environmental Risk Assessment and Management. HMSO July 2000.

<sup>8</sup> Construction Industry Research and Information Association (CIRIA). Contaminated Land Risk Assessment. A Guide to Good Practice. CIRIA C552 2001.

<sup>9</sup> Investigation of potentially contaminated sites. Code of practice, BS10175:2011+A1:2013

required to qualify and quantify these hazards and risks and determine if remedial measures are necessary to reduce them.

### **Planned Developments**

To gain regulatory approval developments on brownfield or previously used land typically require risk assessment and where necessary remedial action to ensure land is suitable for use and not “contaminated land”. This involves submission to the Planning authority of up to 4 stages of risk assessment and management reporting. The accepted procedure for undertaking an environmental risk assessment uses the source-pathway-receptor methodology to develop a Conceptual Site Model (CSM) of risk linkages.

Risks identified at Stage 1 are indicative and speculative based on a desk study of historic activity and the environmental setting in context of development proposals. The CSM developed at Stage 1 establishes how possible contamination hazards may cause harm or pollution and an assessment of potential risk informs recommendations for Stage 2 ground investigation, to qualify and quantify hazards and pathways, and evaluate actual risk, using site data. Recommendation is made at Stage 2, as necessary, for remedial measures and a Stage 3 Remediation Implementation Plan is submitted for agreement by the Planning authority. The agreed remedial measures are then validated at Stage 4 with a Remediation Validation report of the as-built construction, providing various details, specifications, photographs and drawings of remediation. This is submitted for agreement by the Planning authority at Stage 4, demonstrating the site has been made suitable for use and is not “contaminated land” and to obtain final discharge of contaminated land planning conditions.

### **Current Land Use**

The former land uses are the principal sources of hazard which may cause concern over contamination or environmental pollution occurring on or due to a site. A walkover inspection of the site is undertaken to view the site and adjacent land in its current condition. Evidence of historic activities, derelict structures or utilities as well as the general condition of the land are noted and factored into the risk evaluation process.

### **Historical Land Use**

Information about the environmental setting and history of development at a site is obtained by review of historic Ordnance Survey maps. Some of the oldest nationwide mapping from the 19<sup>th</sup> century is available to view online free at websites such as <http://maps.nls.uk/index.html>. However a complete set of maps, including the periods of heaviest industrialisation in the mid-20<sup>th</sup> century must be purchased from a licensed environmental database provider. These provide an excellent record of the historical uses of a site, are often the best source of information and are the minimum requirement for completing a Stage 1 assessment.

On some more intensively developed areas additional databases are beneficial in compiling a history of past contaminative uses. These include licensed activities regarding storage of fuels, waste management, permitted industrial processes and registers of incidents. Historic aerial photography and postal registers can also be useful.



## **Environmental Setting**

The environmental setting of a site is reviewed to establish if anything in the context of a sites location may create pathways for hazards to cause risk. This includes a review of published information on the geology, hydrogeology and hydrology of the land. Consideration is also made of environmental sensitivity in the area, such as designated land-use as nature reserve or protected water environment.

The sensitivity is assessed using British Geological Survey (BGS) information and data on groundwater and surface water protected areas from SEPA and the local authorities. Some data on water abstractions can be purchased from environmental database companies. The vulnerability of surface water and groundwater is based on sensitivity to pollution, distance from abstractions, type and nature of groundwater and type of overlying strata.

Having established a sites environmental setting, the level of contamination, if any on site, can be evaluated in context. Soil contamination and even water pollution if present in a “non-sensitive” setting may not be a material consideration for evaluating land in its current condition or for the purpose of proposed re-development.

## **Environmental Legislation**

The need to evaluate land quality is prescribed in PartIIA of the Environmental Protection Act 1990 (EPA 1990) and the Water Resources Act 1991. These Acts address environmental protection measures for land, water and air in the UK. The Local Authority are primary regulator of air and land quality and SEPA for water quality. While some information is available from environmental database companies, other more site specific data may be requested from local authorities’ under the Environmental Information (Scotland) Regulations 2004 (sometimes at cost). This information usually identifies if the authority already has concerns about contamination at a site.

## **Environmental Risk Assessment**

The first stage of qualitative risk assessment is to develop a conceptual site model for the site specific scenario. The first consideration is to establish if a source of contamination or pollution hazard has been present or still exists on the land and define the associated potential contaminants of concern. As well as the type of source, the extent, concentration and availability of a contaminant is also assessed.

The level of risk associated with a hazard is largely governed by the sensitivity of a receptor. Receptors may typically include people, buildings, animals, plants and local resources (such as groundwater, surface waters, nature reserves). For example, if a commercial site is to be redeveloped into a residential housing estate, a residential use is considered more sensitive than a commercial use. Contamination hazards are more likely to present risks if present in a private garden than if buried under a concrete slab.

The presence of contamination (as a potential hazard) does not necessarily mean that there is a risk. It is the exposure pathway and the quantity of contamination that reaches the receptor which may determine the effect on a receptor. For example if a concrete slab covers the contamination it may be considered a barrier preventing contaminant contact with site users and preventing infiltration of rainwater from washing contamination off-site into the water environment.

The risk classification for both likelihood and consequence is based on methodology presented in Contaminated Land Risk Assessment, A Guide to Good Practice (CIRIA C552, 2001) and has been developed from procedures outlined in DETR Circular 02/2000. The DETR, with the Environment

Agency (EA), SEPA and Institute of Environment & Health, has also published guidance on risk assessment (Guidelines for Environmental Risk Assessment and Management). The guidance states that the designation of risk is based upon consideration of both:

magnitude of the consequence (severity) of risk occurring, which takes account of both the potential severity of the hazard and the sensitivity of the receptor; and

The likelihood of an event occurring (probability) which takes of both the presence of the hazard and receptor and the integrity of the pathway.

For the purpose of compiling the risk statements in the conceptual site model the receptor sensitivity, hazard severity and probability of occurrence are scored as follows:

### Millard Environmental Risk Assessment Methodology

The magnitude of consequence (severity) and likelihood (probability) are defined in the CIRIA guidance, together with examples. Scores are allocated in this report to receptor sensitivity and hazard severity (table 1) to enable a matrix evaluation of the relative magnitude of consequence if a pollution linkage were to exist.

Table 1 Relative scoring for risk assessments used in the report

	receptor sensitivity	hazard severity	Likelihood definition	Likelihood score
High	3	3	Likely	5
Medium	2	2	Moderately Likely	4
Low	1	1	Low Likelihood	3
			Unlikely	2
			Very Unlikely	1

The magnitude of consequence is defined from the Table 1 matrix by 5 bands of then considered in relation to the environmental setting and current or proposed land-use using The likelihood of a pollution linkage existing or being realised during development of a proposed new land-use is then applied to evaluate the potential risks.

Estimation of risk for each pollution linkage ranges from “very high risk” to “very low risk” (table 2). A description of the risks and likely actions required is presented in Table 3.

Table 2 Comparison of consequence against probability

		Consequence				
		Severe	Substantial	Medium	Mild	Minor
Probability	High likelihood	Very high	High	High	Moderate	Moderate/low
	Likely	High	High	Moderate	Moderate/low	Low
	Low likelihood	Moderate	Moderate	Moderate/low	Low	Very low
	Unlikely	Moderate/ low	Moderate/low	Low	Very low	Very low
	Very Unlikely	Low	Low	Very Low	Very Low	Very Low

The estimation of risk in this way has distinct advantages in maintaining an objective focus on the relevant magnitude of risks in context of current or planned use at the site and enables re-evaluation at any stage when new information comes available. For example elevated risks at Stage 1 will likely need to be qualified and quantified by ground investigation. When this information comes available the Stage 1 assessment is amended and re-scored accordingly at Stage 2 when potential risk are either confirmed or refuted. The process may conclude at either Stage 1 or 2. If remedial measures are recommended to manage risks at the conclusion of Stage 2, then a Remediation Implementation Plan and Verification Report are required to complete Stages 3 and 4.

Table 3 Description of the classified risks and likely action required

Level of Risk	Description of Classification
Very High	There is a distinct probability that severe harm could arise to a sensitive receptor from a significant hazard, or there is evidence that severe harm to a receptor is currently happening. This risk may already be realised or is likely. It will result in significant health impacts, environmental or financial liability to current and/or future site owners/occupiers. Urgent investigation (if not already undertaken) and remediation will be required.
High	Hazards are present which can cause substantial harm, which is more likely than not to occur. The high risk is either due to the severity of the hazard or the sensitivity of the receptor and the probability that a risk linkage is in place or will be in place. If risk is realised, it is likely to present a substantial health impact, environmental or financial liability to current and/or future site owners/occupiers. Urgent investigation (if not already undertaken) is required and remediation work may be necessary in the short term and likely over the longer term, which may include works in advance of any development.
Moderate / Low	Hazards are present which may range in severity from high to low, which may combine with receptors also ranging in sensitivity from high to low. A range of probabilities from unlikely to likely results in certain scenarios where mild consequences may be more likely to occur and severe to substantial consequences are unlikely to occur. Moderate / low risks need to be considered more specifically to determine if risk realisation is a concern for current or future planned use. Investigation is normally required to clarify the risk and determine the potential health impacts, environmental or financial liability. Some remedial works may be required, though not necessarily if the site is left undeveloped and during development may be incorporated into the building fabric and groundworks.
Low	Hazards and receptors may combine in such a way that high tends to cancel out low and even if probability is likely the consequences would be minor. Alternatively if substantial consequences could occur it would be very unlikely. In some scenarios both hazard severity and receptor sensitivity are low, though a risk linkage is likely occurring. Low risks need to be considered more specifically in context, since remedial work may or may not be required. Investigation would be advisable to inform decisions for development proposals, dependant on the sensitivity of the receptor and view point of those of interest. Under current use no remedial work may be necessary. Any remedial works for development may be limited.
Very Low	Any harm that could arise to a receptor would be mild or minor with a low probability of occurrence. This is due to low hazard severity, low sensitivity of receptors and generally low probability. No remediation would be required. The risk assessment and management plan may already have implemented remediation and risks reduced as a result of hazard removal or receptor protection.



The acceptability of risk will always depend upon the view point of those of interest, whether it is an occupier of a site, a regulator or stakeholder. As a result, it could be that action will be required to deal with a level of risk even if it is classified as very low.

The completion of a structured risk assessment using the foregoing procedure is highly advisable for regulatory acceptance of recommendations and conclusions. It provides a valid and justifiably reproducible basis for promoting informed discussion on the degree of risk management required on land to demonstrate it is or can be made suitable for a proposed use and is not "contaminated land".

## APPENDIX D NOTES ON LIMITATIONS

### MILLARD CONSULTING, ENVIRONMENTAL AND GEOTECHNICAL CONSULTANCY SERVICES

#### General

Millard Consulting have completed the attached report for the use of the Client detailed on the front cover and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed.

Third parties should not use or rely upon the contents of the report unless written approval has been gained from Millard Consulting; (due to legal requirements, a charge may be levied against such approval).

Millard Consulting accepts no responsibility or liability for:

- a) The consequences of this documentation being used for any purpose or project other than that for which it was commissioned, and
- b) This document to any third party with whom approval for use has not been agreed.

#### Stage I Environmental Risk Assessments, Desk Studies and Site Audits

The work completed and utilised to provide this report comprises a study of available documentation. The opinions and results presented in this report have been arrived at by utilising the finite amount of data available at the time of writing and are relevant only to the purpose for which the report was commissioned. The data which has been reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative information pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, Millard Consulting reserves the right to review this information and, if warranted, to modify the opinions presented in the report accordingly.

It should be noted that the risks which are identified in this report are perceived risks based on the available information at the time of writing and that the actual risks associated can only be assessed following a physical investigation of the site.

**Dundee**

Seabraes

18 Greenmarket

Dundee

DD1 4QB

**t** 01382 227380

**f** 01382 229291

**e** [dundee@millardconsulting.co.uk](mailto:dundee@millardconsulting.co.uk)