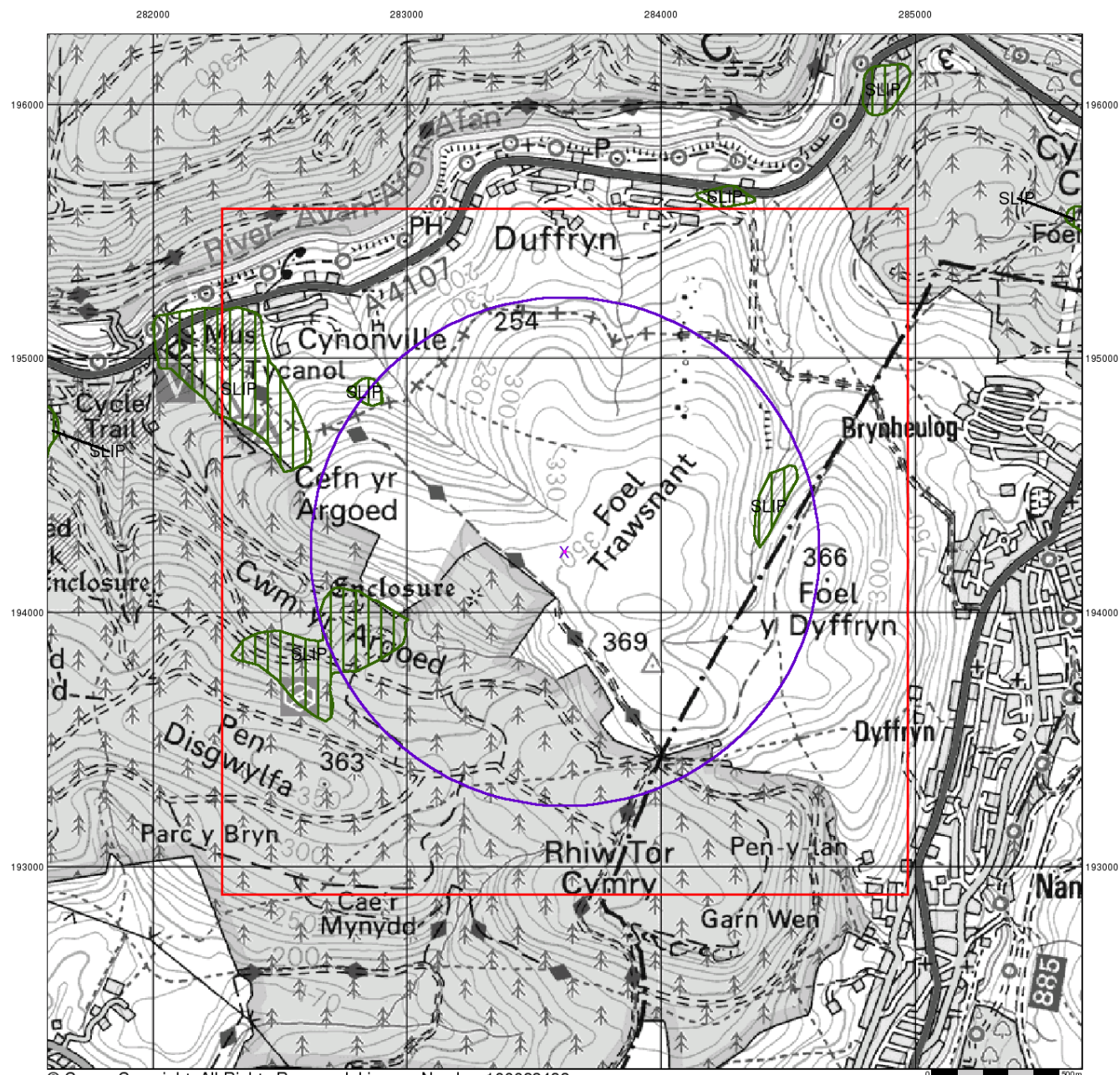




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Intégral Géotechnique

Artificial Ground and Landslip

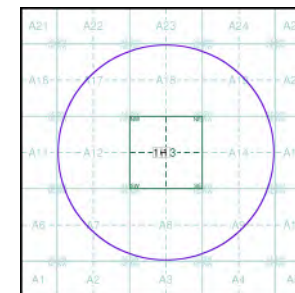
Artificial ground is a term used by BGS for those areas where the ground surface has been significantly modified by human activity. Information about previously developed ground is especially important, as it is often associated with potentially contaminated material, unpredictable engineering conditions and unstable ground.

Artificial ground includes:

- Made ground - man-made deposits such as embankments and spoil heaps on the natural ground surface.
- Worked ground - areas where the ground has been cut away such as quarries and road cuttings.
- Infilled ground - areas where the ground has been cut away then wholly or partially backfilled.
- Landscaped ground - areas where the surface has been reshaped.
- Disturbed ground - areas of ill-defined shallow or near surface mineral workings where it is impracticable to map made and worked ground separately.

Mass movement (landslip) deposits on BGS geological maps are primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground. The dataset also includes foundered strata, where the ground has collapsed due to subsidence.

Artificial Ground and Landslip Map - Slice A



Order Details:

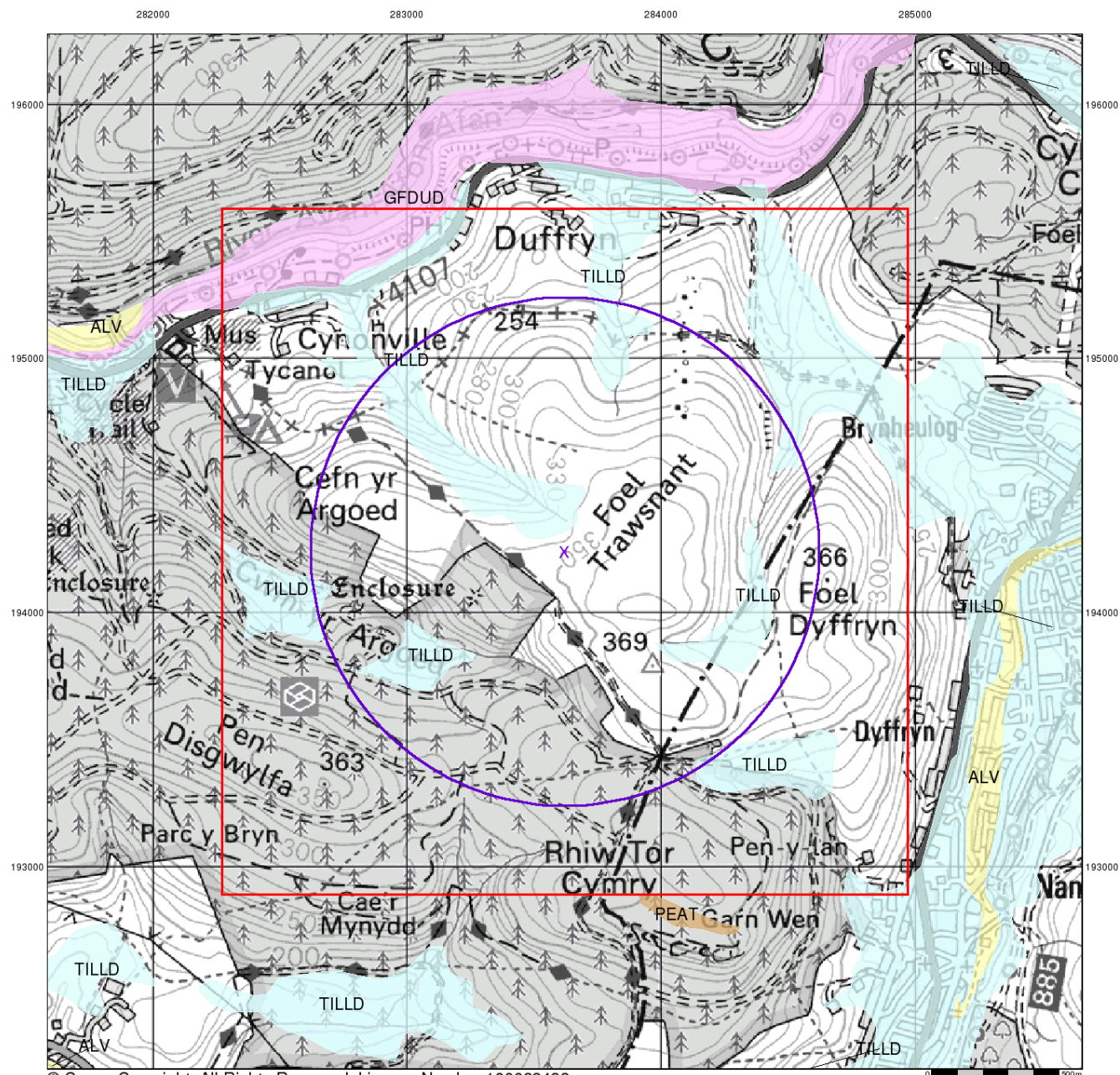
Order Number:	279012478_1_1
Customer Reference:	12826/RAH
National Grid Reference:	283620, 194240
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details:

Foel Trawsnant Windfarm

Landmark
INFORMATION GROUP

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Intégral Géotechnique

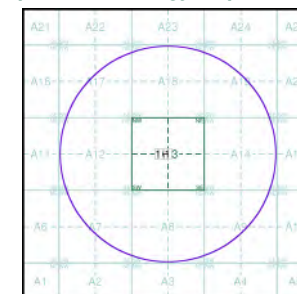
Superficial Geology

Superficial Deposits are the youngest geological deposits formed during the most recent period of geological time, the Quaternary, which extends back about 1.8 million years from the present.

They rest on older deposits or rocks referred to as Bedrock. This dataset contains Superficial deposits that are of natural origin and 'in place'. Other superficial strata may be held in the Mass Movement dataset where they have been moved, or in the Artificial Ground dataset where they are of man-made origin.

Most of these Superficial deposits are unconsolidated sediments such as gravel, sand, silt and clay, and onshore they form relatively thin, often discontinuous patches or larger spreads.

Superficial Geology Map - Slice A



Order Details:

Order Number: 279012478_1_1
Customer Reference: 12826/RAH
National Grid Reference: 283620, 194240
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 1000

Site Details:

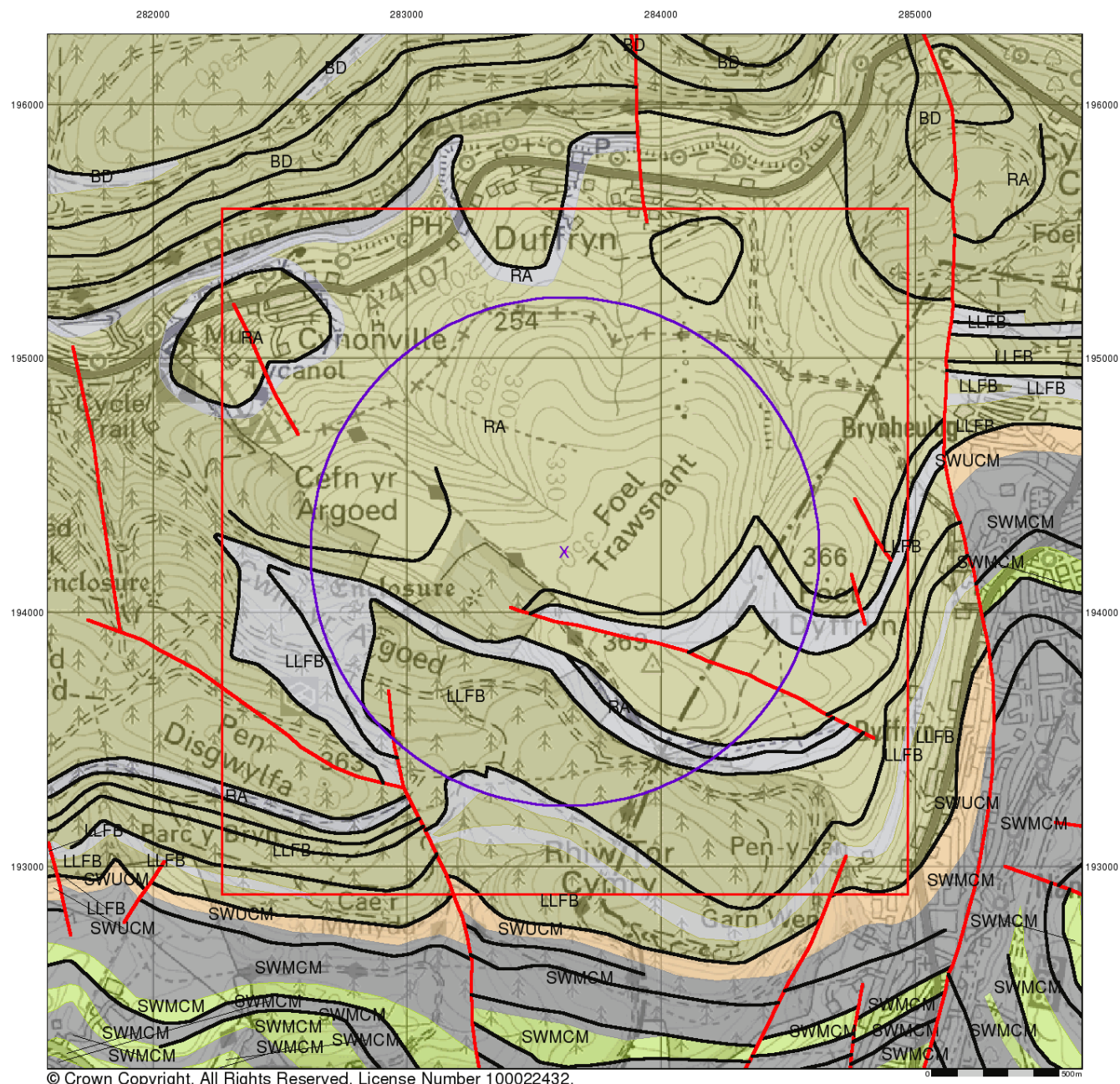
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Landmark
INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.ernirocheck.co.uk

v15.0 20-May-2021

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Intégral Géotechnique

Bedrock and Faults

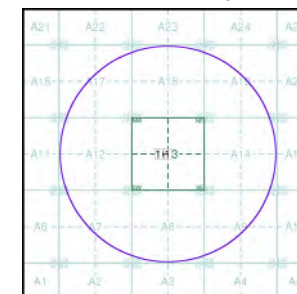
Bedrock geology is a term used for the main mass of rocks forming the Earth and are present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

The bedrock has formed over vast lengths of geological time ranging from ancient and highly altered rocks of the Proterozoic, some 2500 million years ago, or older, up to the relatively young Pliocene, 1.8 million years ago.

The bedrock geology includes many lithologies, often classified into three types based on origin: igneous, metamorphic and sedimentary.

The BGS Faults and Rock Segments dataset includes geological faults (e.g. normal, thrust), and thin beds mapped as lines (e.g. coal seam, gypsum bed). Some of these are linked to other particular 1:50,000 Geology datasets, for example, coal seams are part of the bedrock sequence, most faults and mineral veins primarily affect the bedrock but cut across the strata and post date its deposition.

Bedrock and Faults Map - Slice A



Order Details:

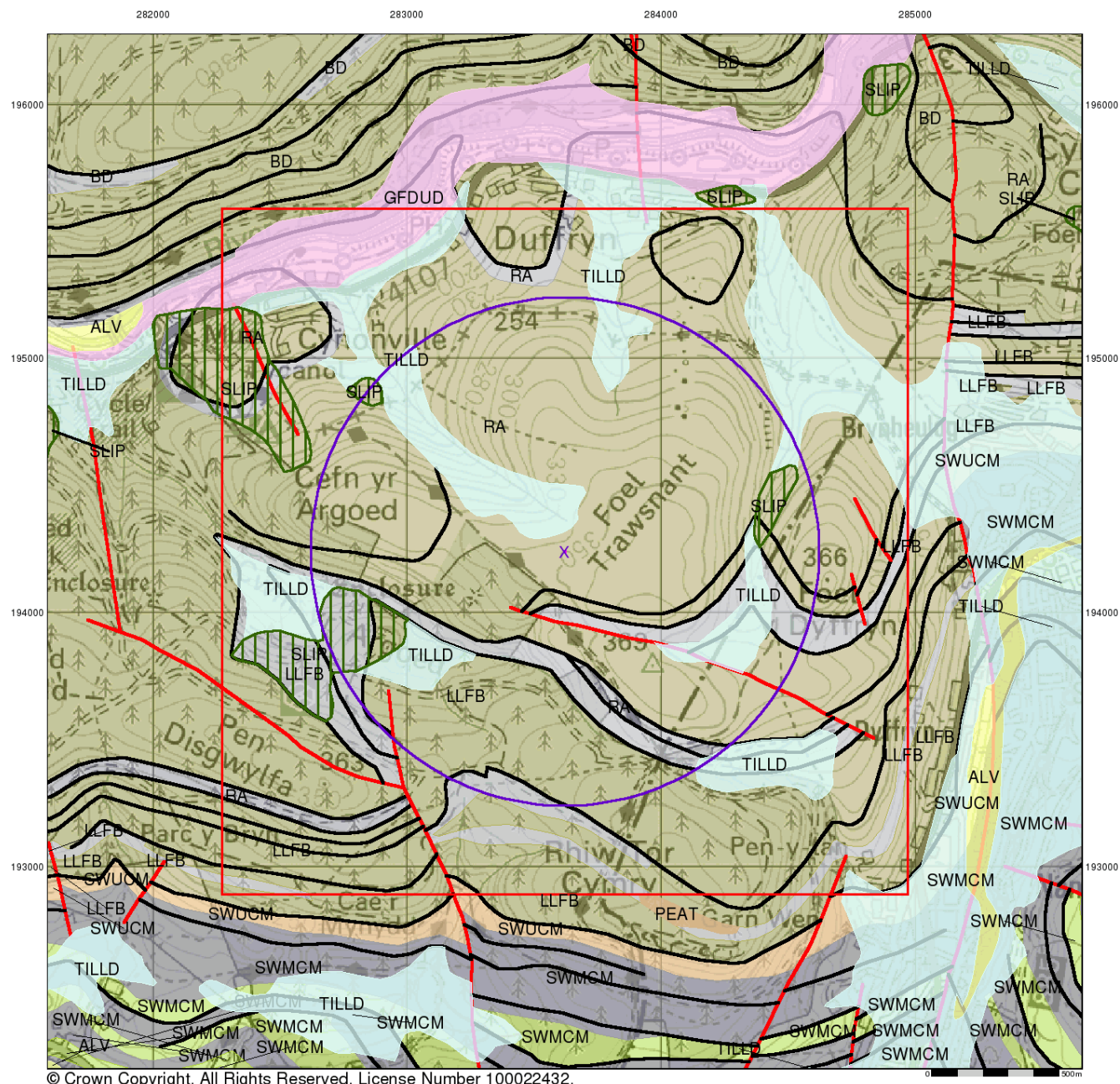
Order Number: 279012478_1_1
Customer Reference: 12826/RAH
National Grid Reference: 283620, 194240
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 1000

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Intégral Géotechnique

Combined Surface Geology

The Combined Surface Geology map combines all the previous maps into one combined geological overview of your site.

Please consult the legends to the previous maps to interpret the Combined "Surface Geology" map.

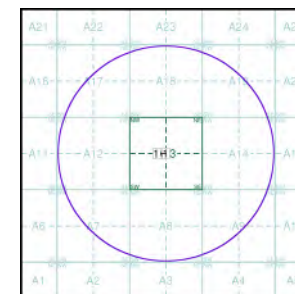
Additional Information

More information on 1:50,000 Geological mapping and explanations of rock classifications can be found on the BGS website. Using the LEX Codes in this report, further descriptions of rock types can be obtained by interrogating the 'BGS Lexicon of Named Rock Units'. This database can be accessed by following the 'Information and Data' link on the BGS website.

Contact

British Geological Survey
Kingsley Dunham Centre
Keyworth
Nottingham
NG12 5GG
Telephone: 0115 936 3143
Fax: 0115 936 3276
email: enquiries@bgs.ac.uk
website: www.bgs.ac.uk

Combined Geology Map - Slice A



Order Details:

Order Number: 279012478_1_1
Customer Reference: 12826/RAH
National Grid Reference: 283620, 194240
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 1000

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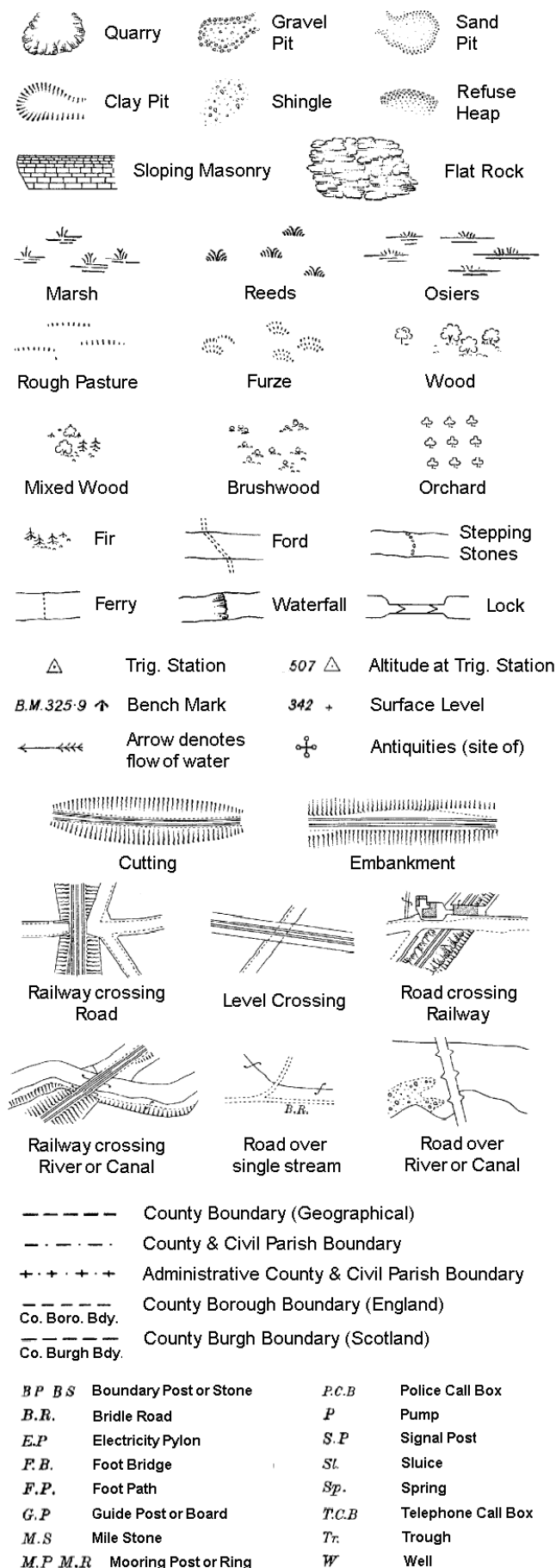
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Landmark
INFORMATION GROUP

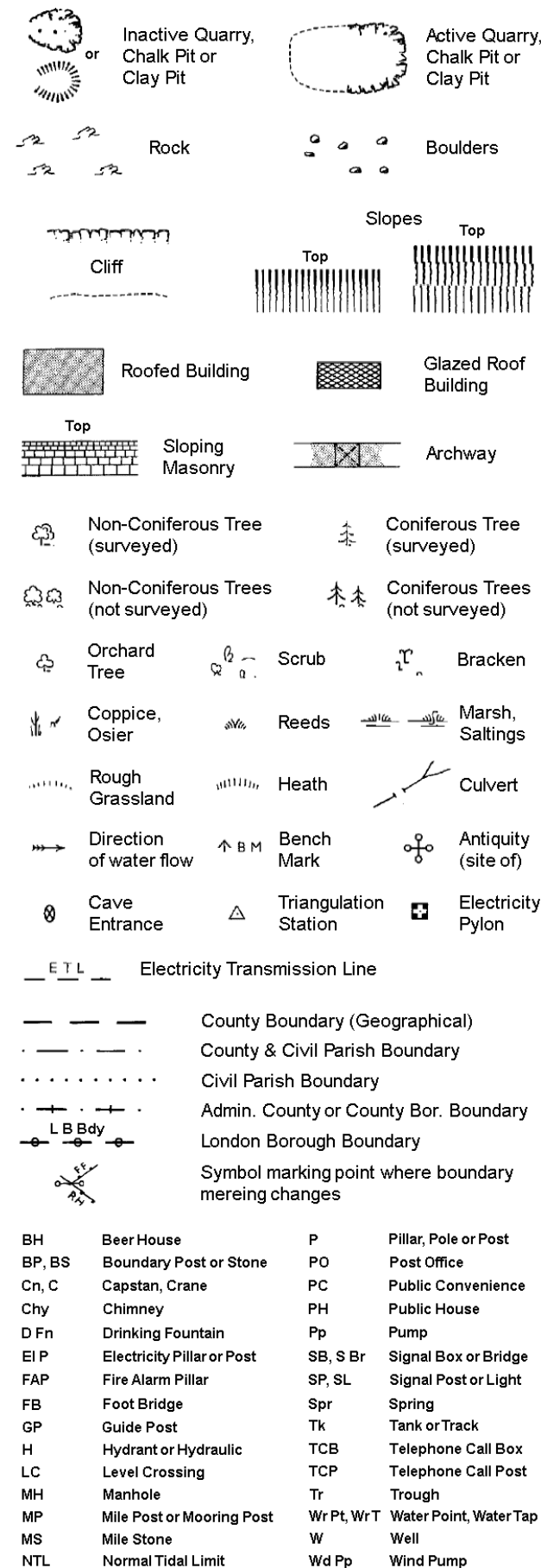
Tel: 0844 844 9952
Fax: 0844 844 9951
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Historical Mapping Legends

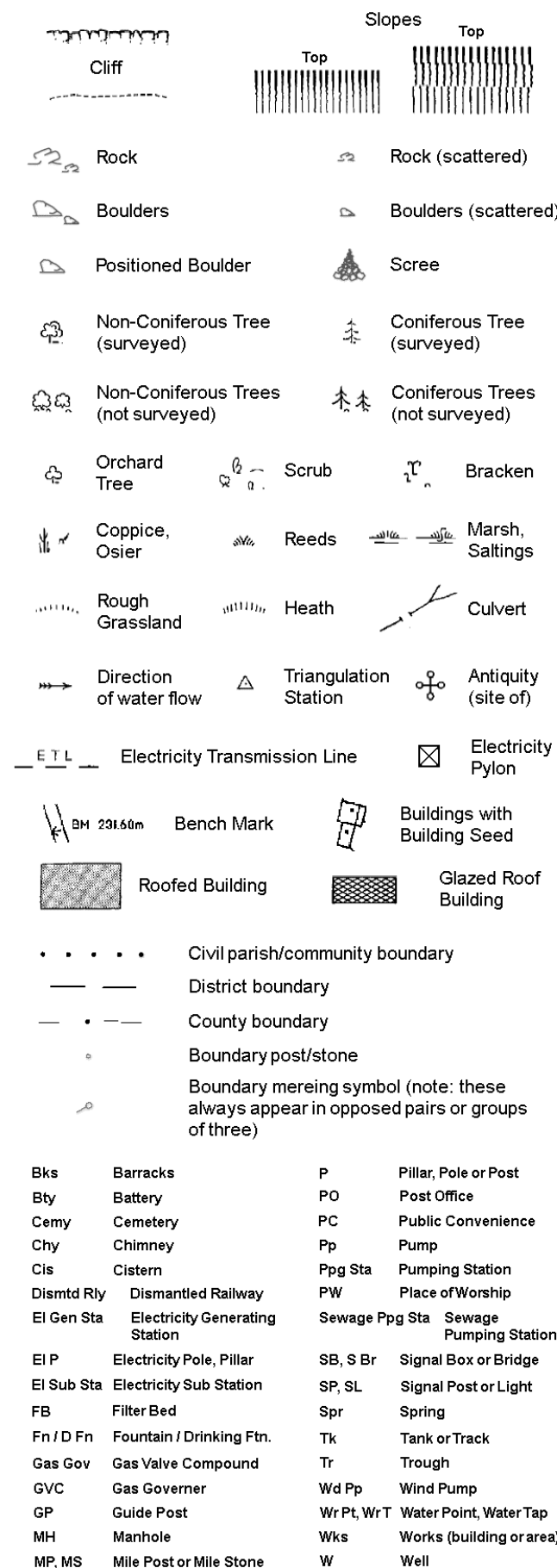
Ordnance Survey County Series and Ordnance Survey Plan 1:2,500



Ordnance Survey Plan, Additional SIMs and Supply of Unpublished Survey Information 1:2,500 and 1:1,250



Large-Scale National Grid Data 1:2,500 and 1:1,250

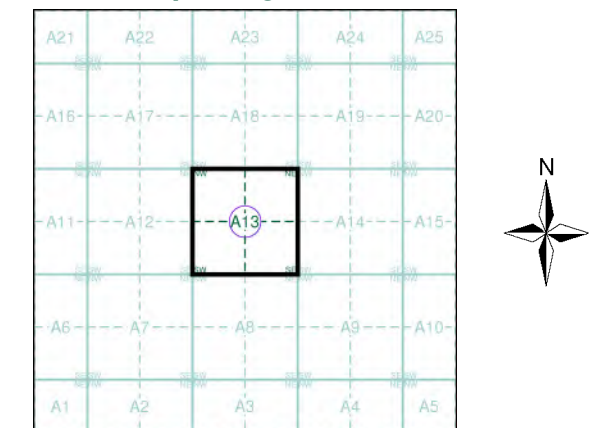


Intégral Géotechnique

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Glamorganshire	1:2,500	1877	2
Glamorganshire	1:2,500	1899	3
Glamorganshire	1:2,500	1918	4
Glamorganshire	1:2,500	1940	5
Ordnance Survey Plan	1:2,500	1962	6
Large-Scale National Grid Data	1:2,500	1993	7
Historical Aerial Photography	1:2,500	2000	8

Historical Map - Segment A13



Order Details

Order Number: 279012478_1_1
Customer Ref: 12826/RAH
National Grid Reference: 283620, 194240
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 100

Site Details

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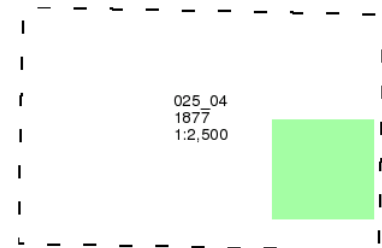
Glamorganshire

Published 1877

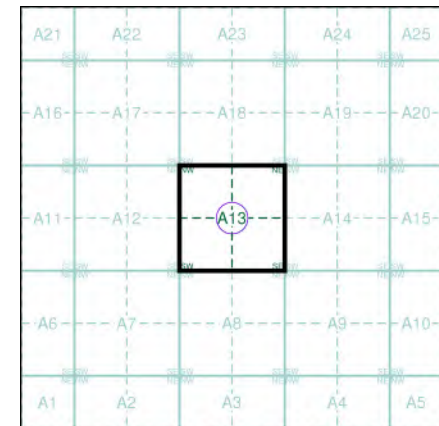
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

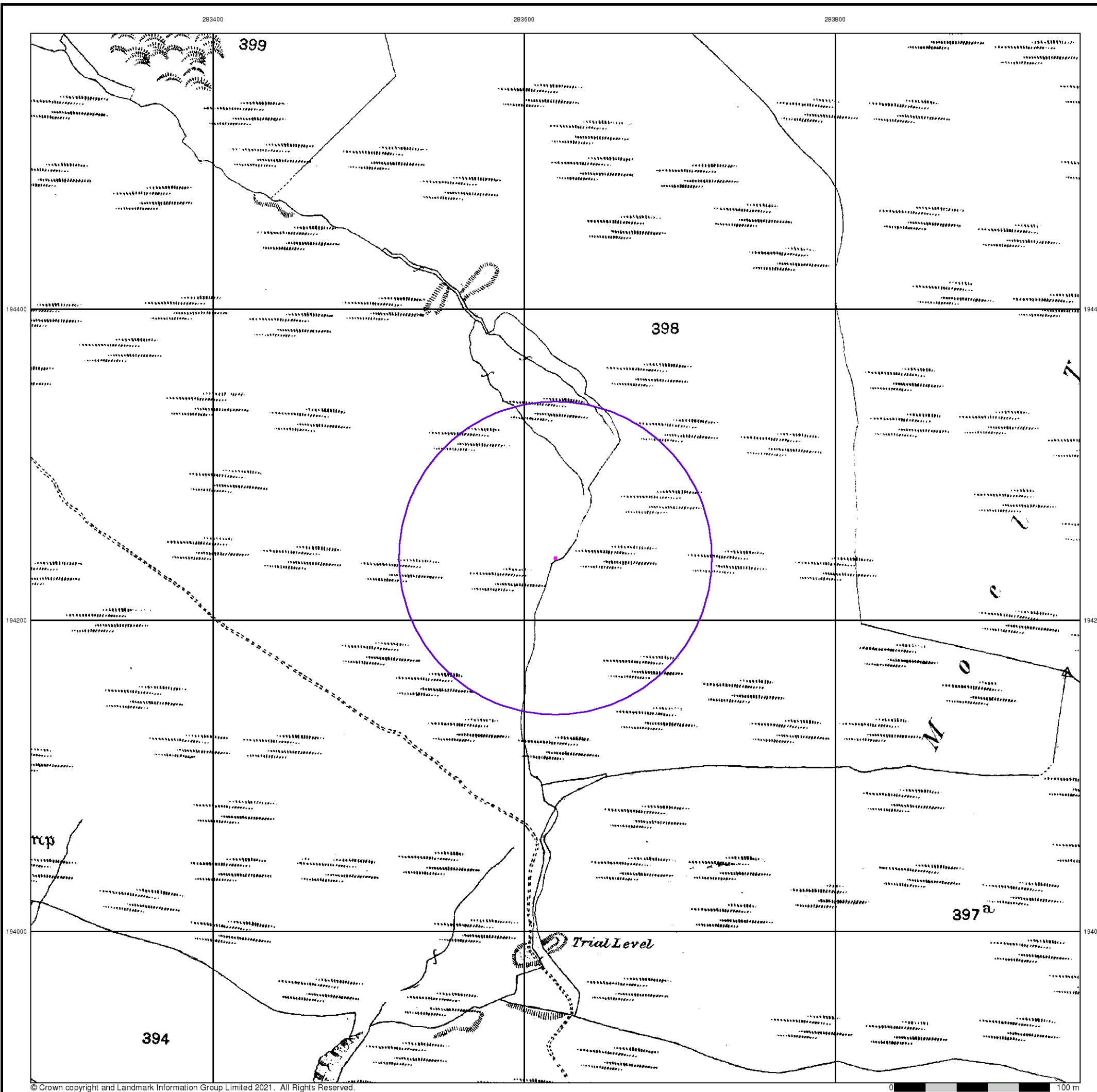
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Site Details

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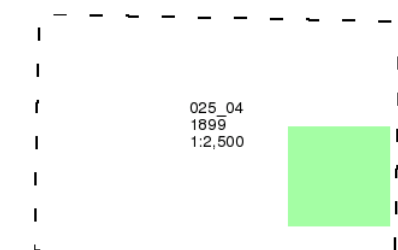


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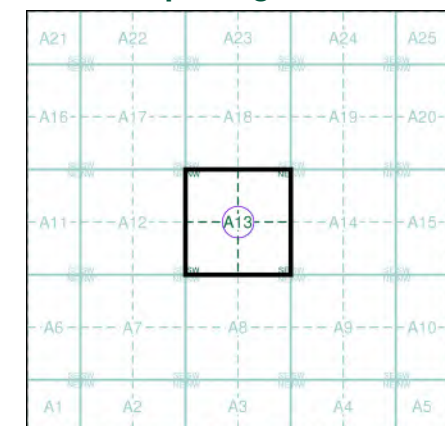


The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13

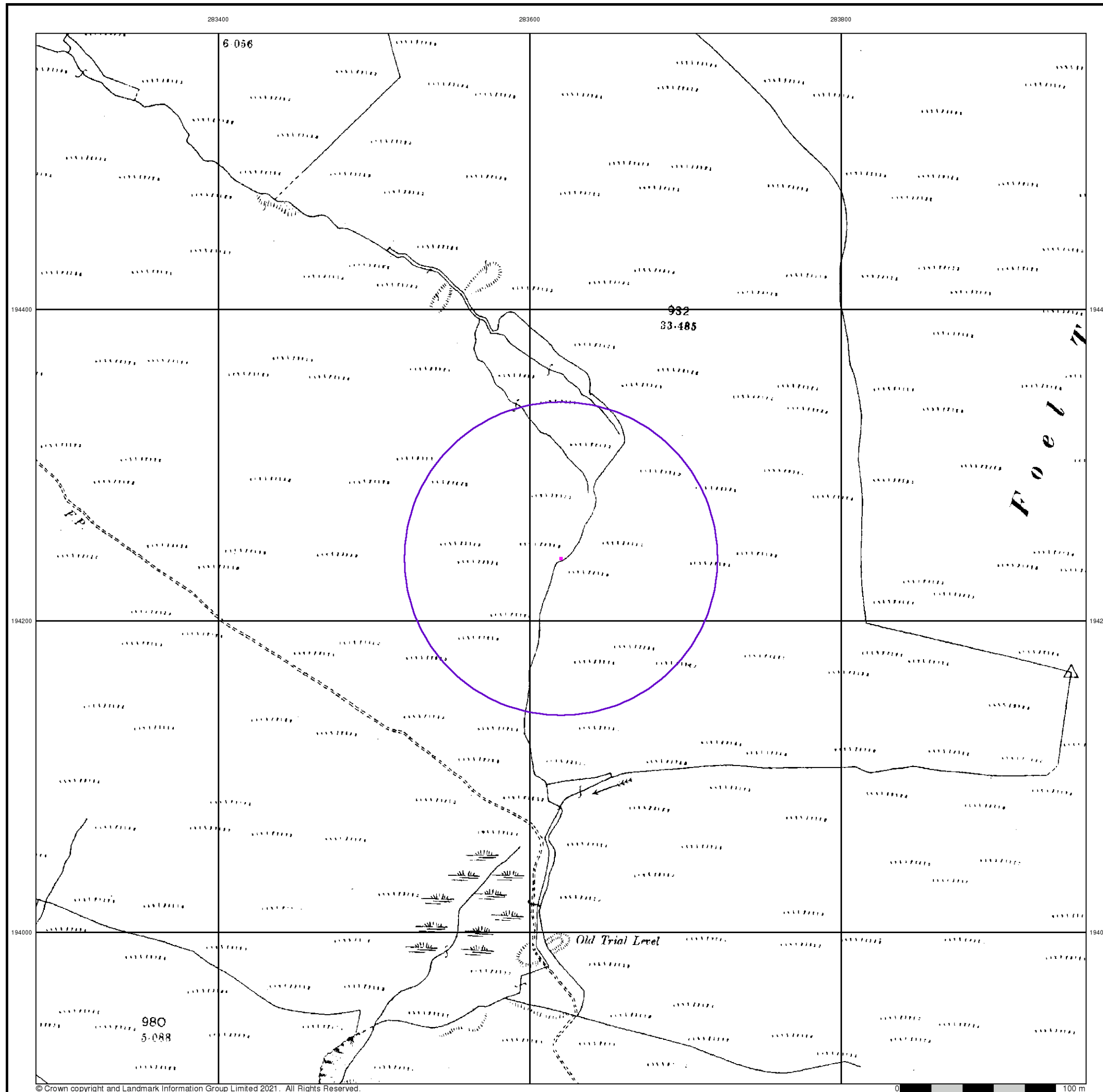


Order Details

Order Number: 279012478_1_1
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Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 100

Site Details

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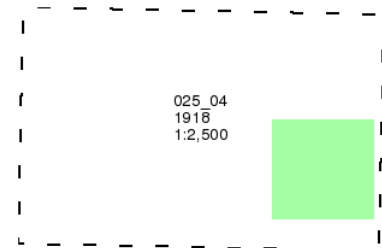
Glamorganshire

Published 1918

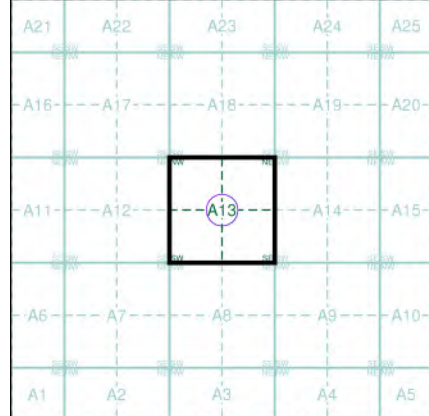
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

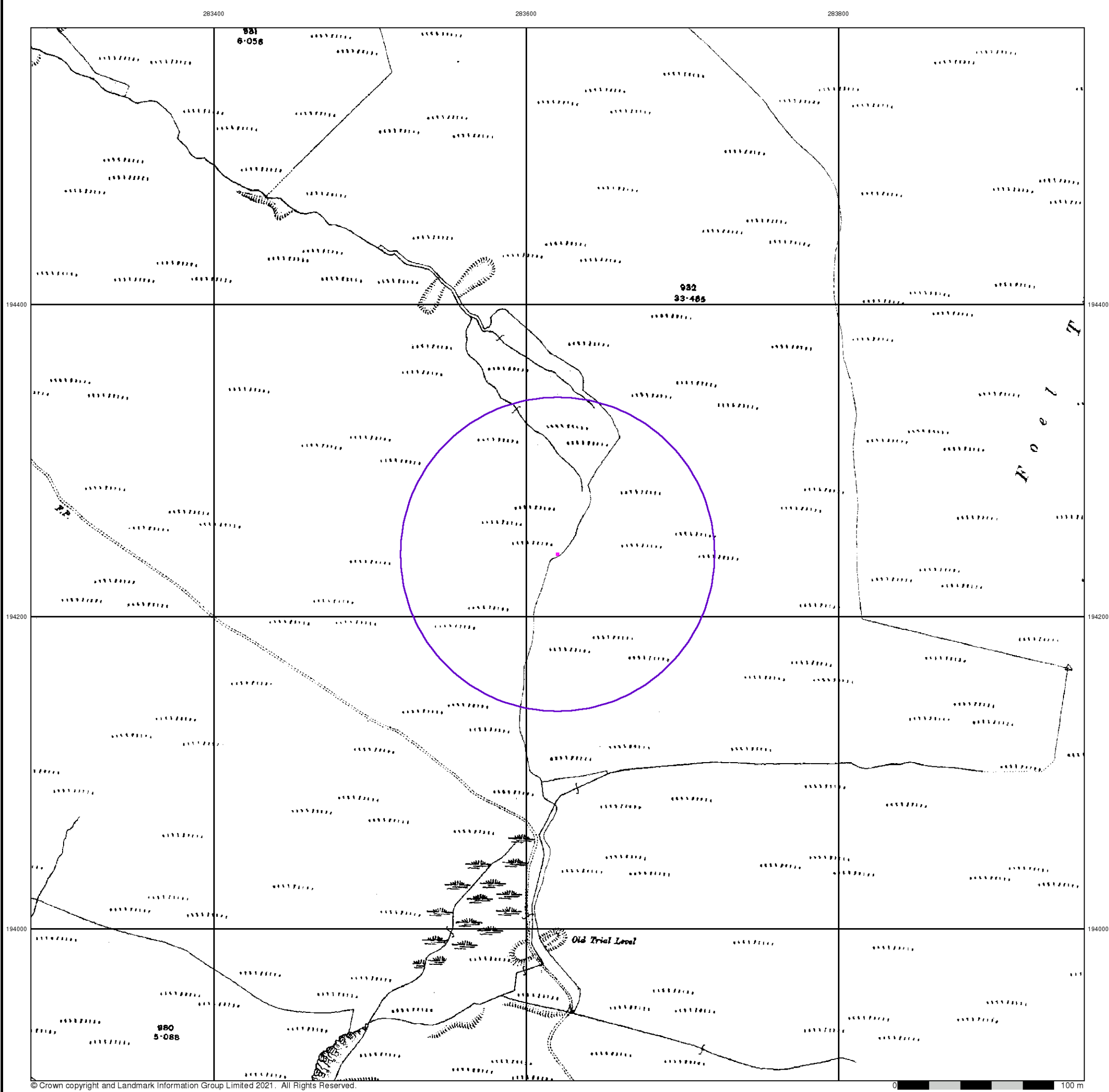
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Site Area (Ha): 0.01
Search Buffer (m): 100

Site Details

Foel Trawsnant Windfarm

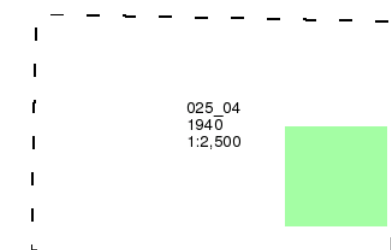


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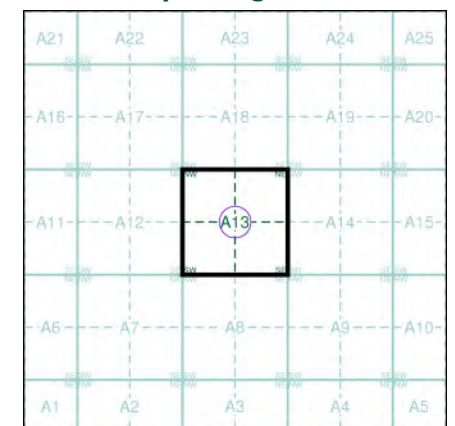


The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13

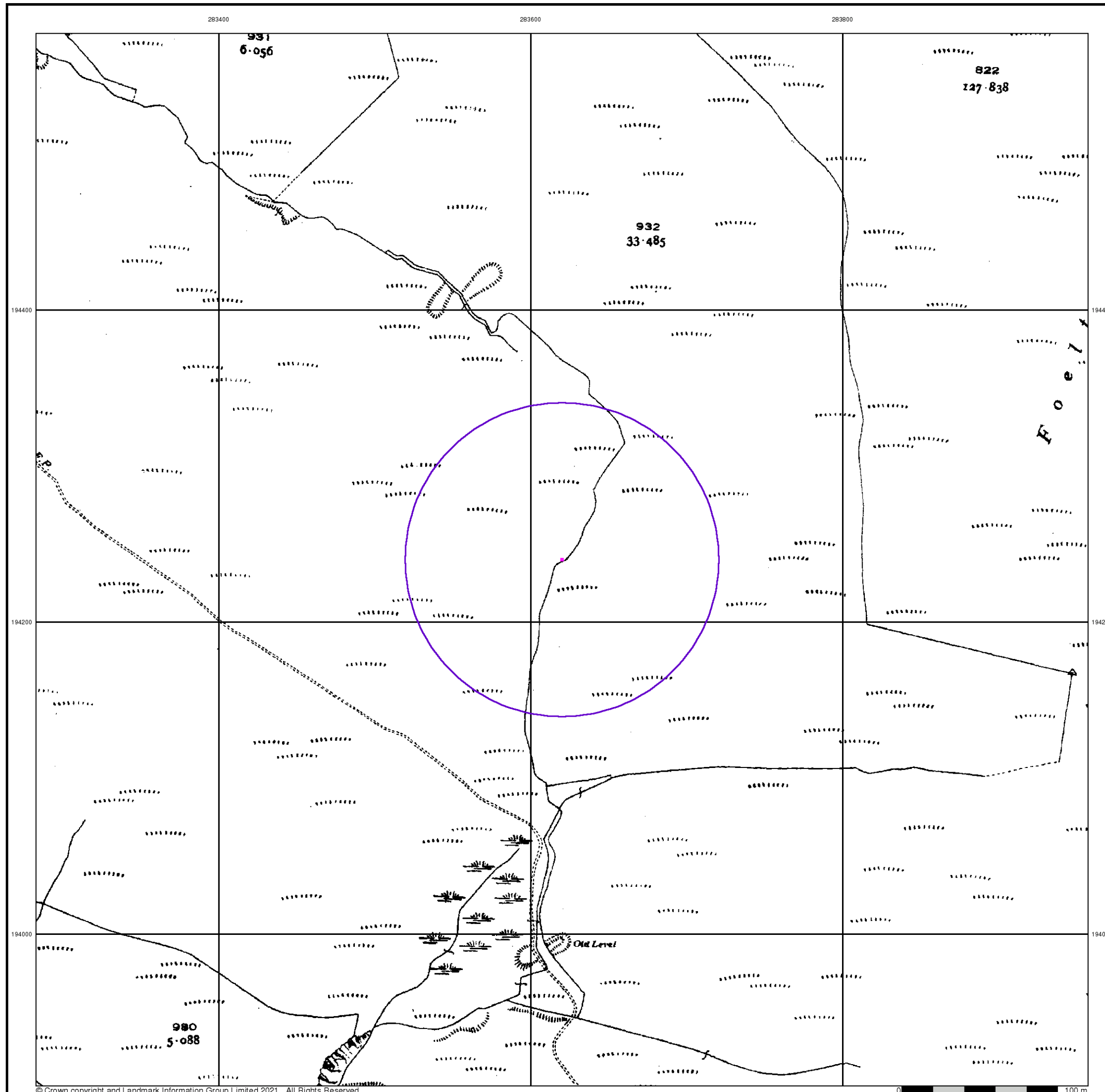


Order Details

Order Number: 279012478_1_1
Customer Ref: 12826/RAH
National Grid Reference: 283620, 194240
Slice: A
Site Area (Ha): 0.01
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Site Details

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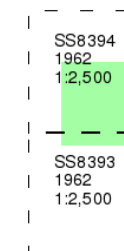
Ordnance Survey Plan

Published 1962

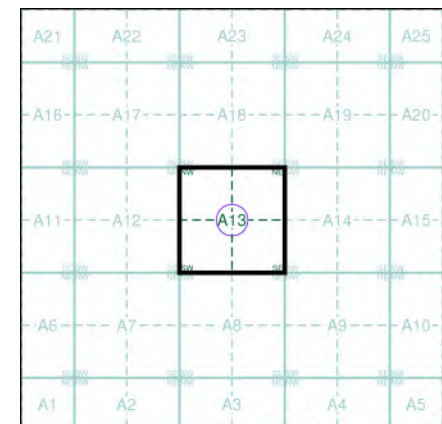
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

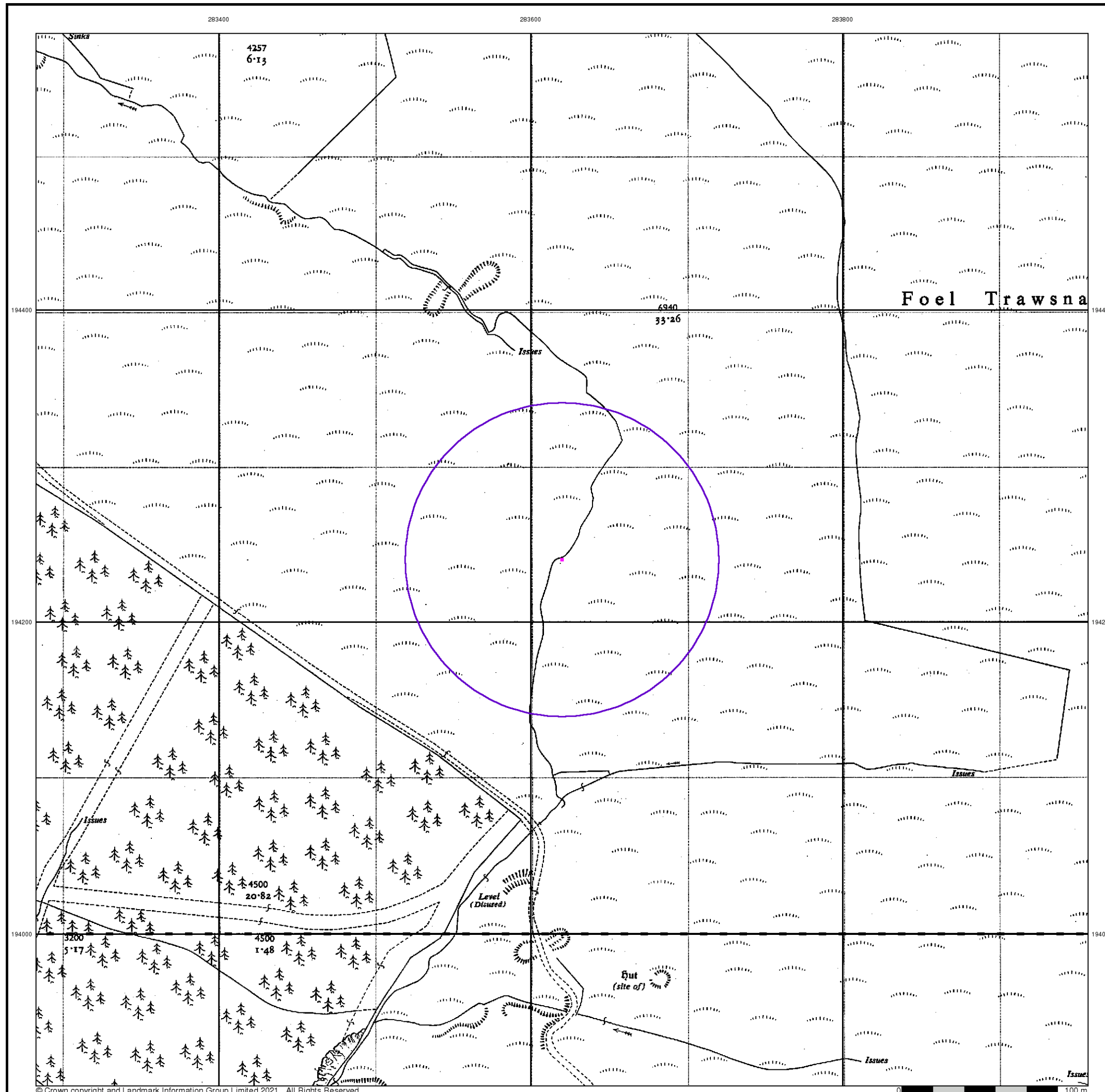
Order Number: 279012478_1_1
Customer Ref: 12826/RAH
National Grid Reference: 283620, 194240
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 100

Site Details

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Large-Scale National Grid Data

Published 1993

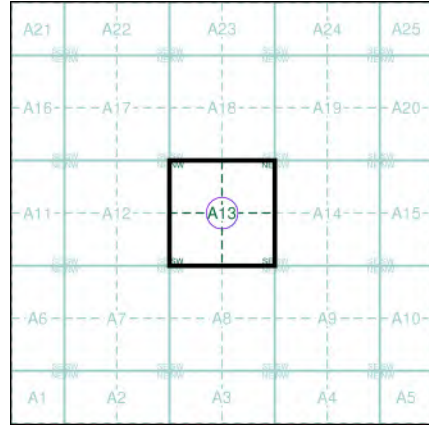
Source map scale - 1:2,500

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

SS8394	1993	1:2,500
SS8393	1993	1:2,500

Historical Map - Segment A13



Order Details

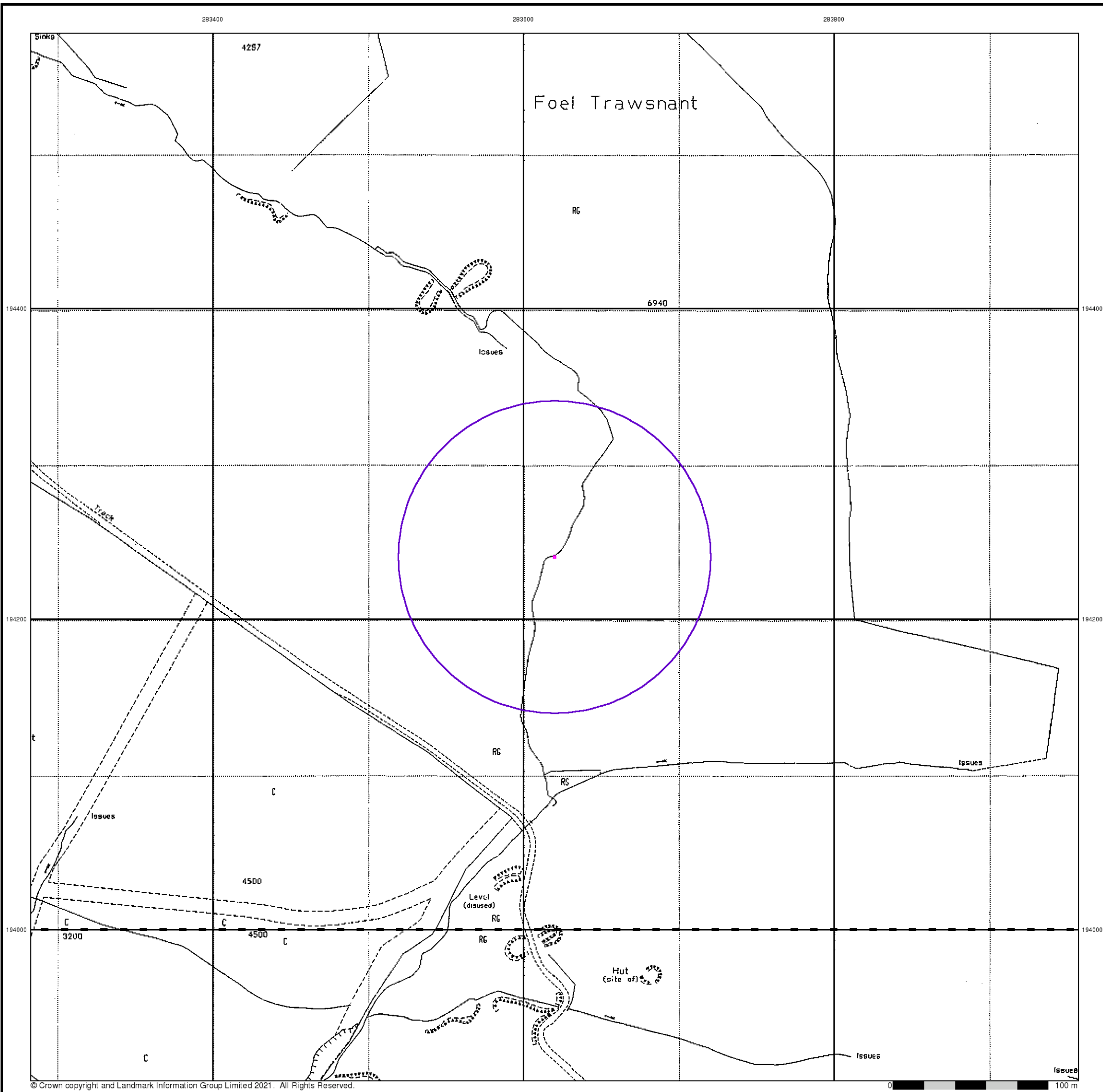
Order Number: 279012478_1_1
Customer Ref: 12826/RAH
National Grid Reference: 283620, 194240
Slice: A
Site Area (Ha): 0.01
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Site Details

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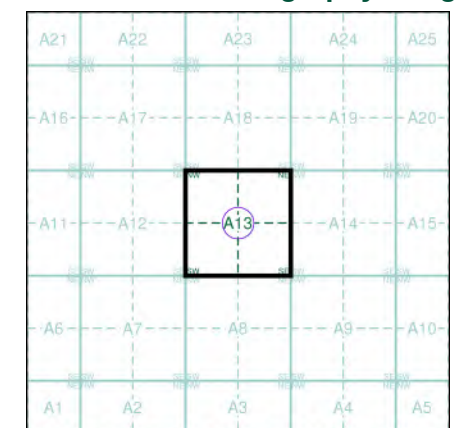


Historical Aerial Photography

Published 2000

This aerial photography was produced by Getmapping, these vertical aerial photographs provide a seamless, full colour survey of the whole of Great Britain

Historical Aerial Photography - Segment A13



Order Details

Order Number: 279012478_1_1
Customer Ref: 12826/RAH
National Grid Reference: 283620, 194240
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 100

Site Details

Foel Trawsnant Windfarm

Historical Mapping Legends

Ordnance Survey County Series 1:10,560

	Gravel Pit		Sand Pit		Other Pits
	Quarry		Shingle		Orchard
	Osiers		Reeds		Marsh
	Mixed Wood		Deciduous		Brushwood
	Fir		Furze		Rough Pasture
	Arrow denotes flow of water		Trigonometrical Station		
	Site of Antiquities		Bench Mark		
	Pump, Guide Post, Signal Post		Well, Spring, Boundary Post		
	•285 Surface Level				
	Sketched Contour		Instrumental Contour		
	Main Roads		Minor Roads		
	Sunken Road		Raised Road		
	Road over Railway		Railway over River		
	Railway over Road		Level Crossing		
	Road over River or Canal		Road over Stream		
	Road over Stream				
	County Boundary (Geographical)				
	County & Civil Parish Boundary				
	Administrative County & Civil Parish Boundary				
	County Borough Boundary (England)				
	County Burgh Boundary (Scotland)				
	Rural District Boundary				
	Civil Parish Boundary				

Ordnance Survey Plan 1:10,000

	Chalk Pit, Clay Pit or Quarry		Gravel Pit
	Sand Pit		Disused Pit or Quarry
	Refuse or Slag Heap		Lake, Loch or Pond
	Dunes		Boulders
	Coniferous Trees		Non-Coniferous Trees
	Orchard		Scrub
	Bracken		Heath
	Marsh		Reeds
	Building		Glasshouse
	Sloping Masonry		Pylon
	Cutting		Embankment
	Road Under		Road Over
	Level Crossing		Foot Bridge
	Standard Gauge Multiple Track		Standard Gauge Single Track
	Siding, Tramway or Mineral Line		Narrow Gauge
	Geographical County		Administrative County, County Borough or County of City
	Municipal Borough, Urban or Rural District, Burgh or District Council		Borough, Burgh or County Constituency
	Civil Parish		
	BP, BS Boundary Post or Stone		Police Station
	Church		Post Office
	Club House		Public Convenience
	Fire Engine Station		Public House
	Foot Bridge		Signal Box
	Fountain		Spring
	Guide Post		Telephone Call Box
	Mile Post		Telephone Call Post
	Mile Stone		Well

1:10,000 Raster Mapping

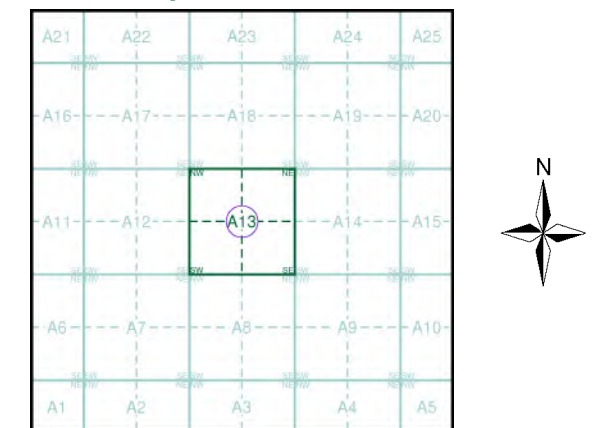
	Gravel Pit		Refuse tip or slag heap
	Rock		Rock (scattered)
	Boulders		Boulders (scattered)
	Shingle		Mud
	Sand		Sand Pit
	Slopes		Top of cliff
	General detail		Underground detail
	Overhead detail		Narrow gauge railway
	Multi-track railway		Single track railway
	County boundary (England only)		Civil, parish or community boundary
	District, Unitary, Metropolitan, London Borough boundary		Constituency boundary
	Area of wooded vegetation		Non-coniferous trees
	Non-coniferous trees (scattered)		Coniferous trees
	Coniferous trees (scattered)		Positioned tree
	Orchard		Coppice or Osiers
	Rough Grassland		Heath
	Scrub		Marsh, Salt Marsh or Reeds
	Water feature		Flow arrows
	Mean high water (springs)		Mean low water (springs)
	Telephone line (where shown)		Electricity transmission line (with poles)
	Bench mark (where shown)		Triangulation station
	Point feature (e.g. Guide Post or Mile Stone)		Pylon, flare stack or lighting tower
	Site of (antiquity)		Glasshouse
	General Building		Important Building

Intégral
Géotechnique

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Glamorganshire	1:10,560	1884	2
Glamorganshire	1:10,560	1900	3
Glamorganshire	1:10,560	1921	4
Glamorganshire	1:10,560	1938 - 1951	5
Historical Aerial Photography	1:10,560	1949	6
Glamorganshire	1:10,560	1953	7
Ordnance Survey Plan	1:10,000	1964	8
Ordnance Survey Plan	1:10,000	1988	9
Ordnance Survey Plan	1:10,000	1990	10
10K Raster Mapping	1:10,000	1999	11
10K Raster Mapping	1:10,000	2006	12
VectorMap Local	1:10,000	2021	13

Historical Map - Slice A



Order Details

Order Number: 279012478_1_1
Customer Ref: 12826/RAH
National Grid Reference: 283620, 194240
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 1000

Site Details

Foel Trawsant Windfarm

Landmark
INFORMATION GROUP

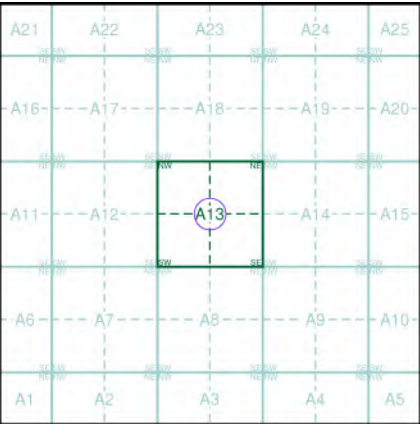
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

01600 1884 1:10,560	01700 1884 1:10,560
02500 1884 1:10,560	02600 1884 1:10,560

Historical Map - Slice A



Order Details

Order Number: 279012478_1_1
Customer Ref: 12826/RAH
National Grid Reference: 283620, 194240
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 1000

Site Details

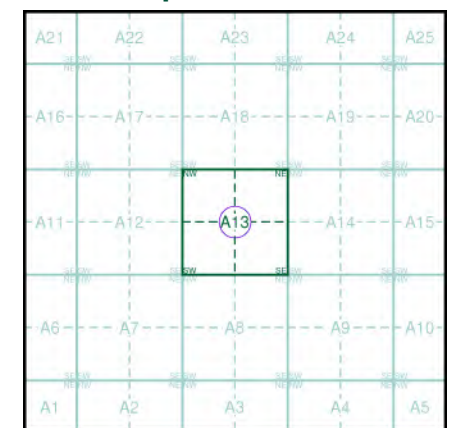
Foel Trawsant Windfarm

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

016SE 1900 1:10,560	017SW 1900 1:10,560
025NE 1900 1:10,560	026NW 1900 1:10,560

Historical Map - Slice A



Order Details

Order Number: 279012478_1_1
Customer Ref: 12826/RAH
National Grid Reference: 283620, 194240
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 1000

Site Details

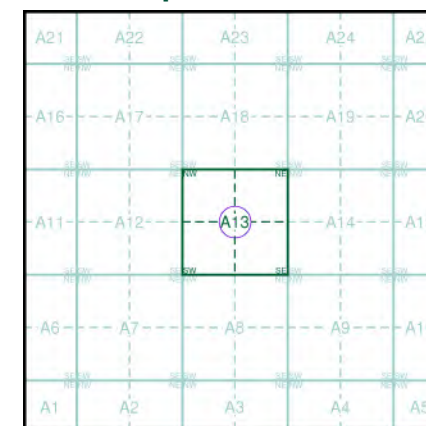
Foel Trawsant Windfarm

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

016SE 1921 1:10,560	017SW 1921 1:10,560
025NE 1921 1:10,560	026NW 1921 1:10,560

Historical Map - Slice A



Order Details

Order Number: 279012478_1_1
Customer Ref: 12826/RAH
National Grid Reference: 283620, 194240
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 1000

Site Details

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Glamorganshire

Published 1938 - 1951

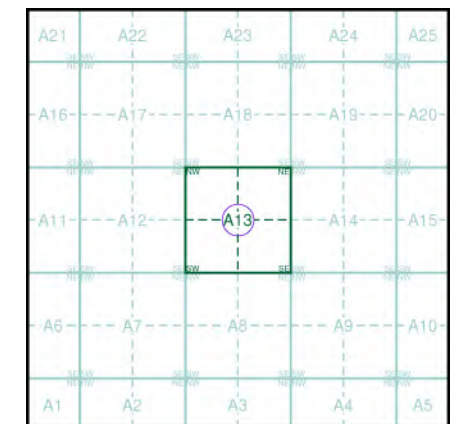
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

016SE 1951 1:10,560	017SW 1938 1:10,560
025NE 1951 1:10,560	026NW 1947 1:10,560

Historical Map - Slice A

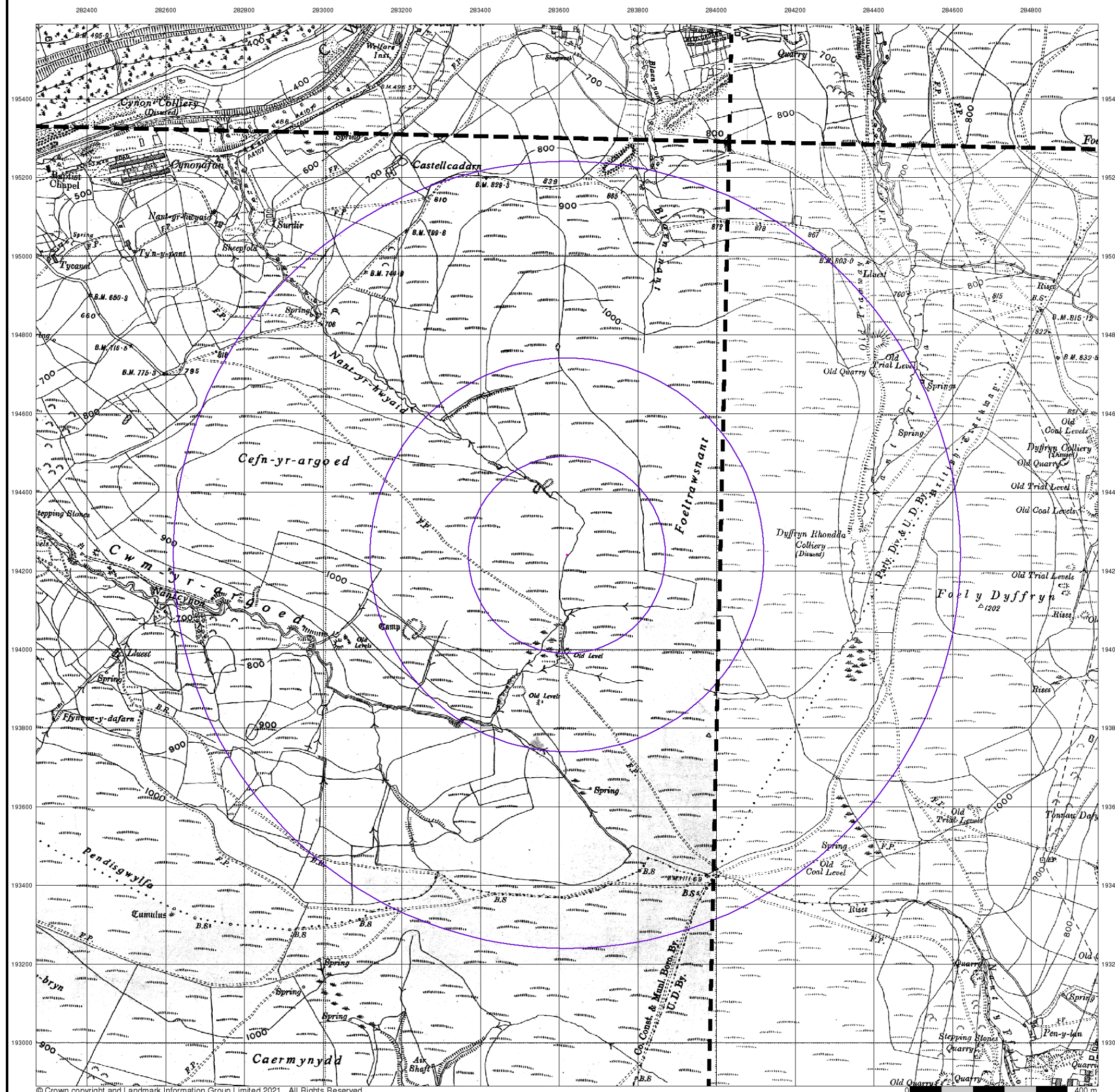


Order Details

Order Number: 279012478_1_1
Customer Ref: 12826/RAH
National Grid Reference: 283620, 194240
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 1000

Site Details

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Historical Aerial Photography

Published 1949

Source map scale - 1:10,560

The Historical Aerial Photos were produced by the Ordnance Survey at a scale of 1:1,250 and 1:10,560 from Air Force photography. They were produced between 1944 and 1951 as an interim measure, pending preparation of conventional mapping, due to post war resource shortages. New security measures in the 1950's meant that every photograph was re-checked for potentially unsafe information with security sites replaced by fake fields or clouds. The original editions were withdrawn and only later made available after a period of fifty years although due to the accuracy of the editing, without viewing both revisions it is not easy to spot the edits. Where available Landmark have included both revisions.

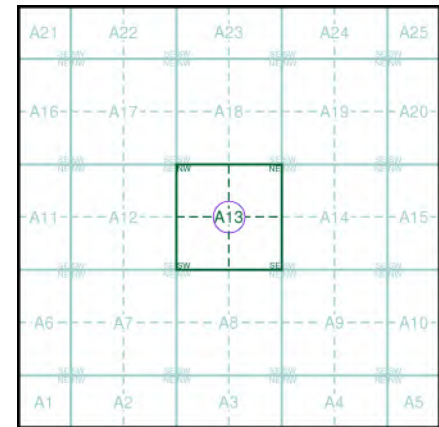
© Landmark Information Group and/or Data Suppliers 2010.

Map Name(s) and Date(s)

SS89NW
1949
1:10,560

SS89SW
1949
1:10,560

Historical Aerial Photography - Slice A



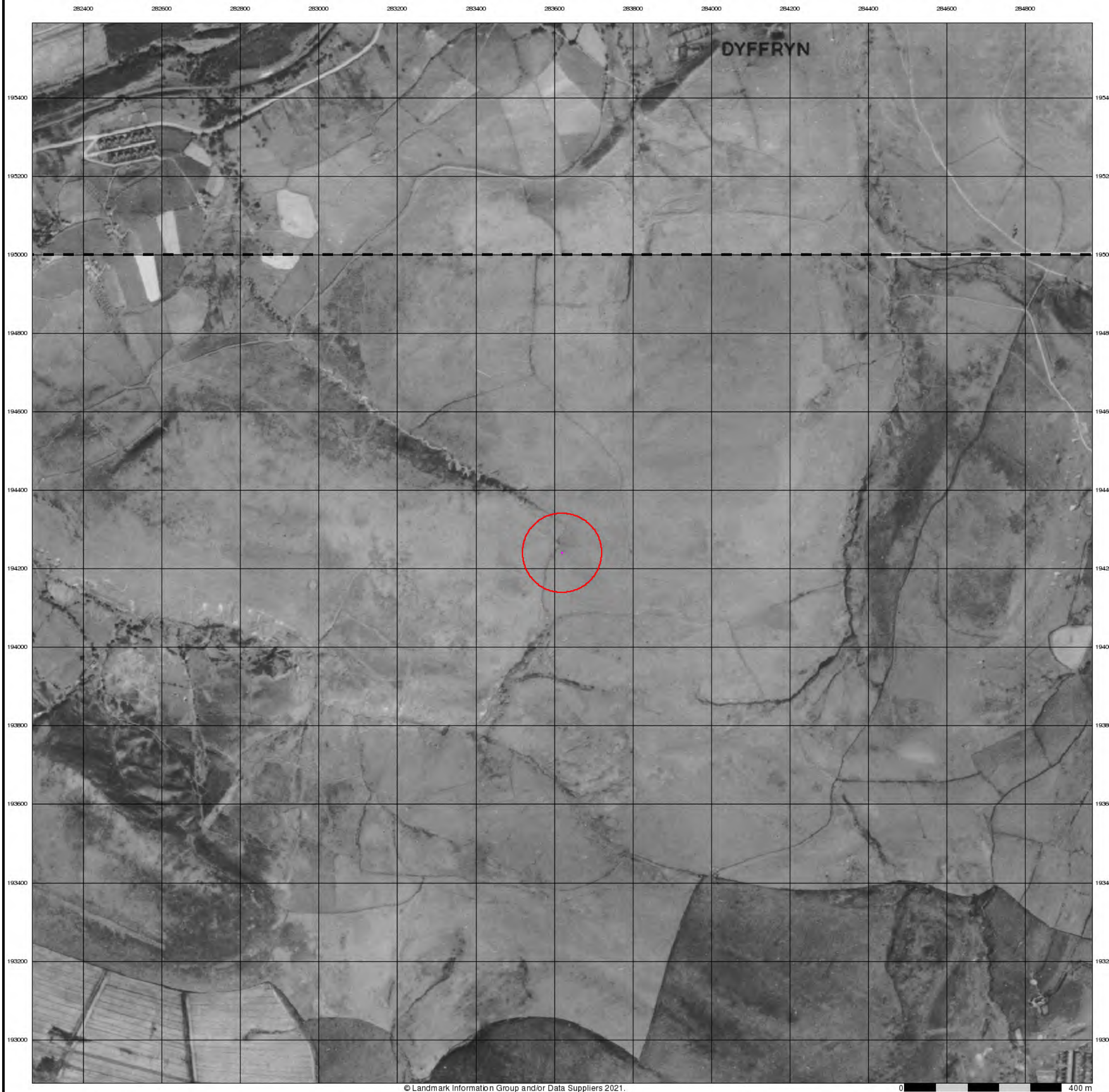
LIBRARY
HSILIRB

Order Details

Order Number: 279012478_1_1
Customer Ref: 12826/RAH
National Grid Reference: 283620, 194240
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 1000

Site Details

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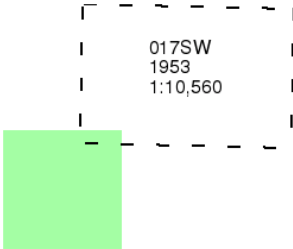
Glamorganshire

Published 1953

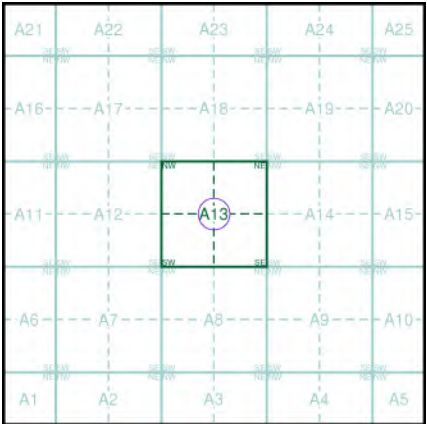
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number: 279012478_1_1
Customer Ref: 12826/RAH
National Grid Reference: 283620, 194240
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 1000

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Ordnance Survey Plan

Published 1964

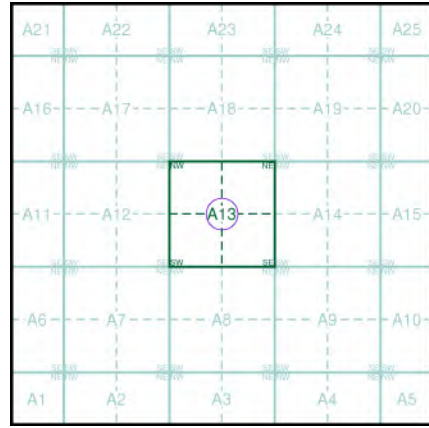
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

SS89NW	1964
SS89SW	1964

Historical Map - Slice A



Order Details

Order Number: 279012478_1_1
Customer Ref: 12826/RAH
National Grid Reference: 283620, 194240
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 1000

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Ordnance Survey Plan

Published 1988

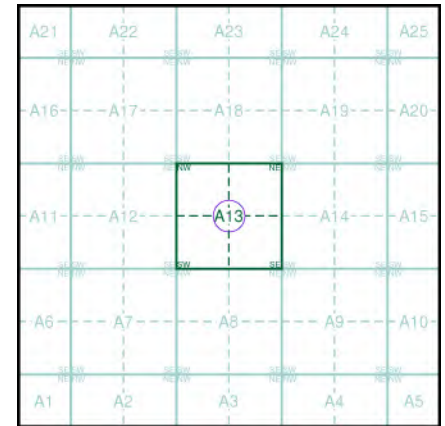
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

SS89NW	1988	1:10,000
SS89SW	1988	1:10,000

Historical Map - Slice A



Order Details

Order Number: 279012478_1_1
Customer Ref: 12826/RAH
National Grid Reference: 283620, 194240
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 1000

Site Details

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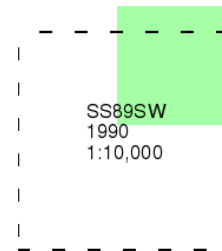
Ordnance Survey Plan

Published 1990

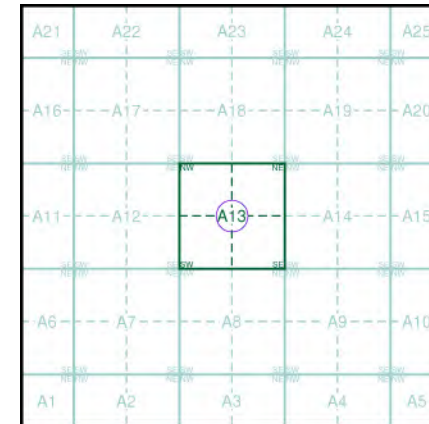
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number: 279012478_1_1
Customer Ref: 12826/RAH
National Grid Reference: 283620, 194240
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 1000

Site Details

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10k Raster Mapping

Published 1999

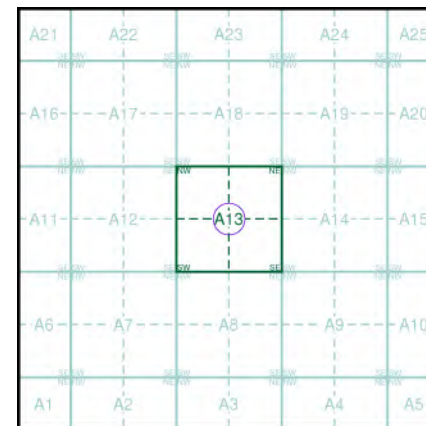
Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey's 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)

SS89NW	1999	1:10,000
SS89SW	1999	1:10,000

Historical Map - Slice A



Order Details

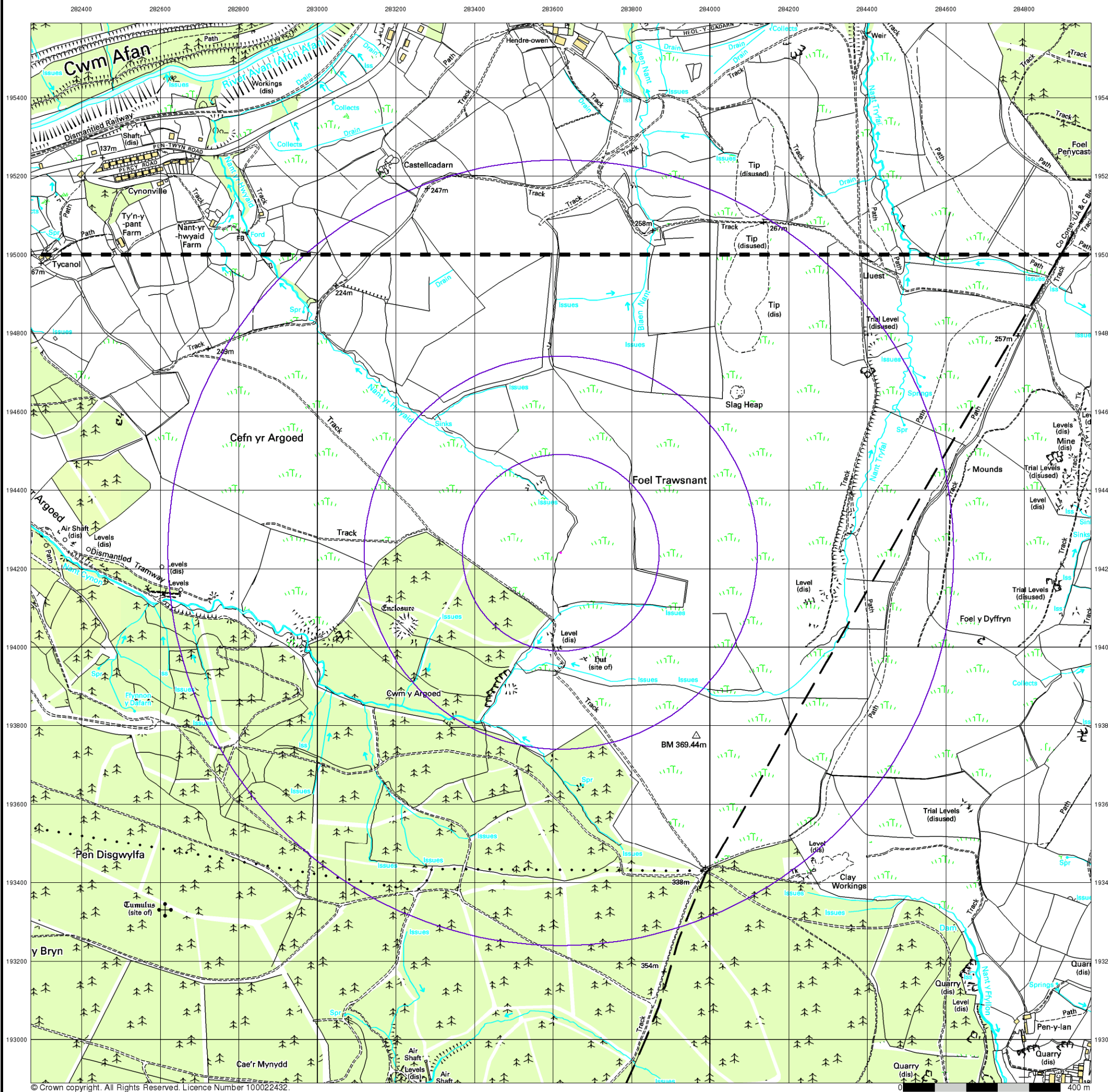
Order Number: 279012478_1_1
Customer Ref: 12826/RAH
National Grid Reference: 283620, 194240
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 1000

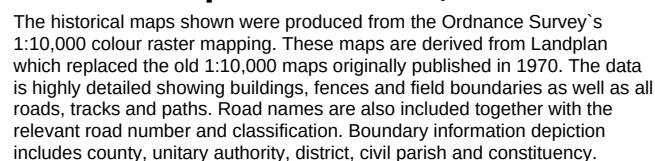
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SS89NW
2006
1:10,000

SS89SW
2006
1:10,000



Order Number: 279012478_1_1
Customer Ref: 12826/RAH
National Grid Reference: 283620, 194240
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 1000

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VectorMap Local

Published 2021

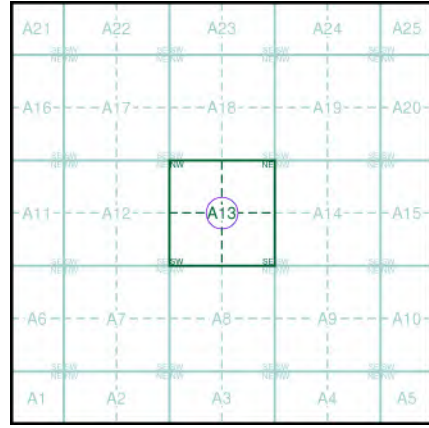
Source map scale - 1:10,000

VectorMap Local (Raster) is Ordnance Survey's highest detailed 'backdrop' mapping product. These maps are produced from OS's VectorMap Local, a simple vector dataset at a nominal scale of 1:10,000, covering the whole of Great Britain, that has been designed for creating graphical mapping. OS VectorMap Local is derived from large-scale information surveyed at 1:1250 scale (covering major towns and cities), 1:2500 scale (smaller towns, villages and developed rural areas), and 1:10 000 scale (mountain, moorland and river estuary areas).

Map Name(s) and Date(s)

SS89NW	2021	Variable
SS89SW	2021	Variable

Historical Map - Slice A



Order Details

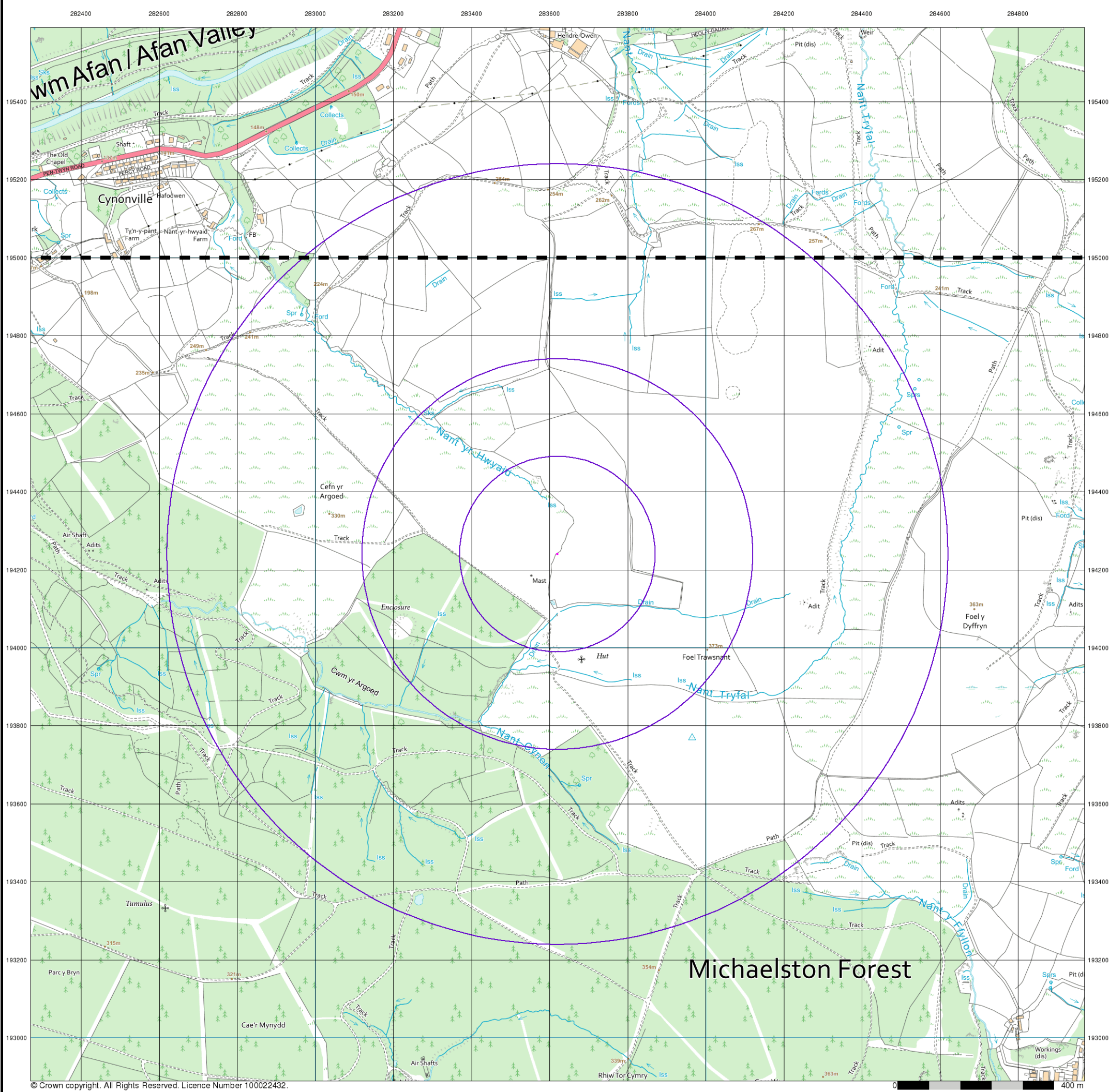
Order Number: 279012478_1_1
Customer Ref: 12826/RAH
National Grid Reference: 283620, 194240
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 1000

Site Details

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Historical Land Use Information (1:10,000)

General

- Specified Site Specified Buffer(s) Bearing Reference Point Map ID
Several of Type at Location

Potentially Contaminative Industrial Uses (Past Land Uses - Mining)

	Point	Line	Polygon
Air Shafts			
Disturbed Ground			
General Quarrying			
Heap, unknown constituents			
Mineral Railway			
Mining and Quarrying General			
Mining of Coal & Lignite			
Quarrying of Sand and Clay, Operation of Sand and Gravel Pits			

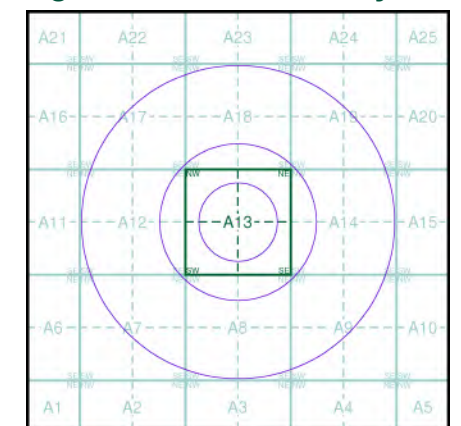
Historical Land Use

	Point	Line	Polygon
Potentially Infilled Land (Non-Water)			
Potentially Infilled Land (Water)			
Former Marsh			

Mining Data

- Potential Mining Area
BGS Recorded Mineral Site

Mining and Ground Stability - Slice A

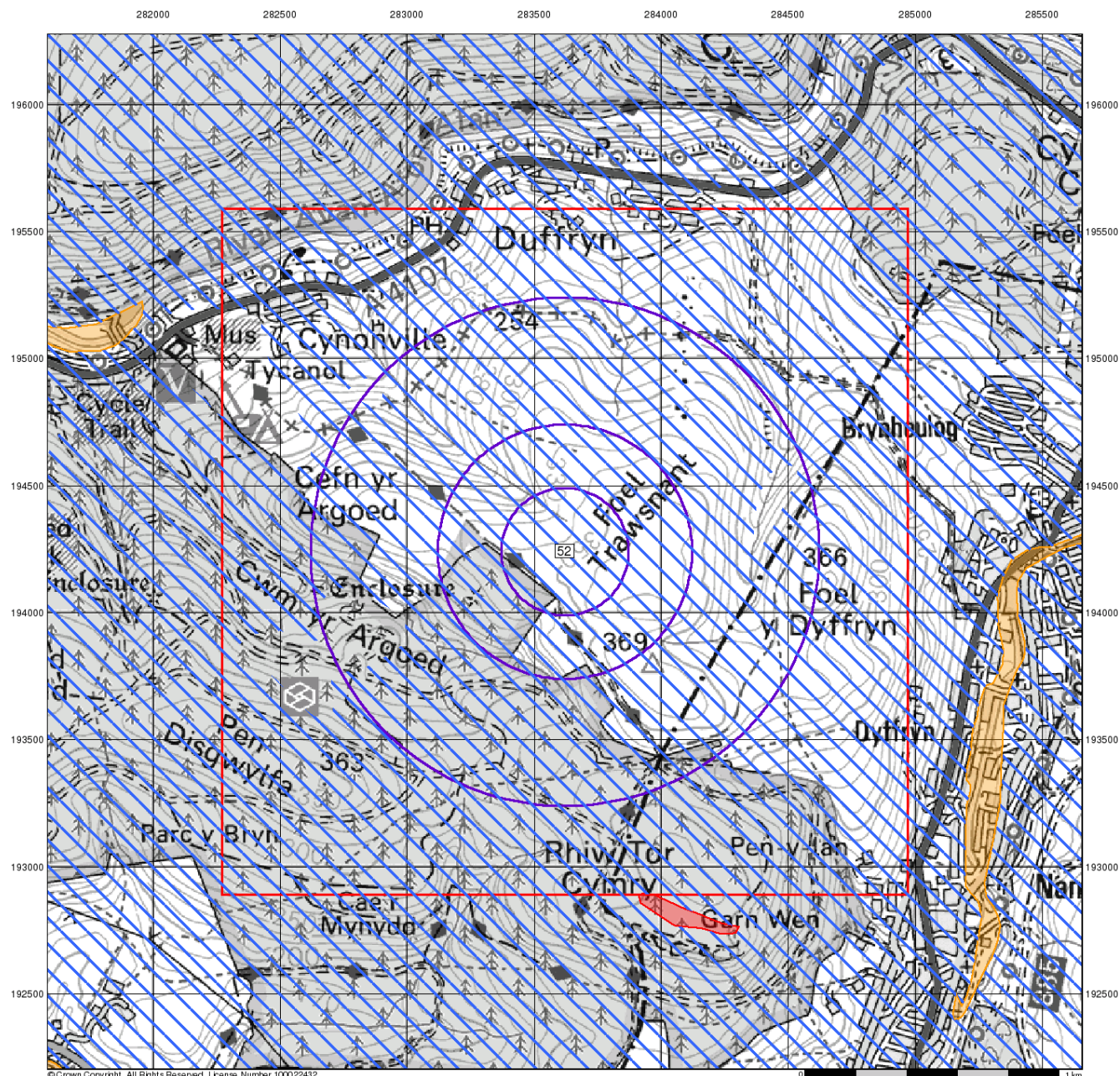


Order Details

Order Number: 279012478_1_1
Customer Ref: 12826/RAH
National Grid Reference: 283620, 194240
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 1000

Site Details

Foel Trawsnant Windfarm



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Intégral Géotechnique

Ground Stability Data (1:50,000)

General

- ▭ Specified Site
- Specified Buffer(s)
- X Bearing Reference Point
- ▭ Slice
- ⊞ Map ID

Potential for Compressible Ground Stability Hazards

- ▭ High
- ▭ Low
- ▭ Moderate
- ▭ Very Low

Potential for Collapsible Ground Stability Hazards

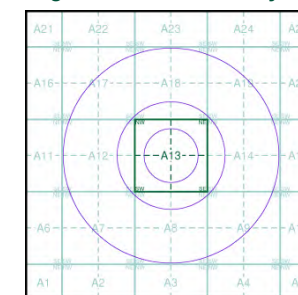
- ▭ High
- ▭ Low
- ▭ Moderate
- ▭ Very Low

Brine Pumping and Salt Mining

- Brine Pumping Related Feature
- Salt Mining Related Feature

- | Point | Polygon |
|--------------------------------------|--------------------------------------|
| ▲ | ▭ |
| ▲ | ▭ |

Mining and Ground Stability - Slice A



Order Details

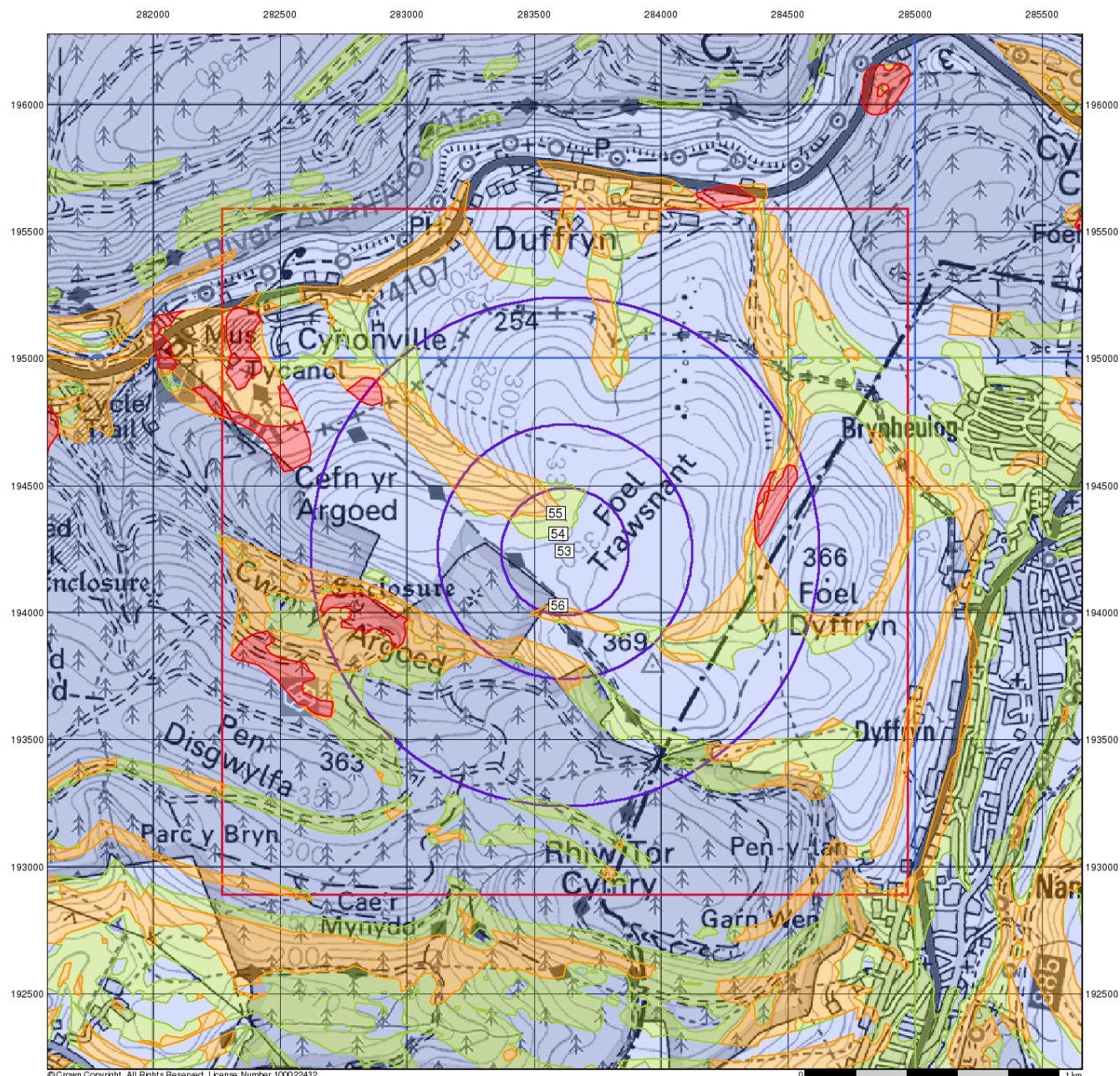
Order Number: 279012478_1_1
 Customer Ref: 12826/RAH
 National Grid Reference: 283620, 194240
 Slice: A
 Site Area (Ha): 0.01
 Search Buffer (m): 1000

Site Details

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0 1 km

Intégral Géotechnique

Ground Stability Data (1:50,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Slice
- Map ID

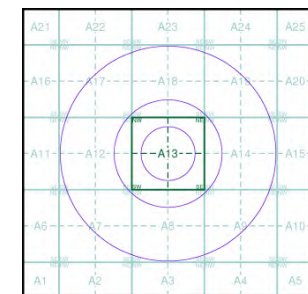
Potential for Landslide Ground Stability Hazards

- High
- Moderate
- Low
- Very Low

Potential for Ground Dissolution Stability Hazards

- High
- Moderate
- Low
- Very Low

Mining and Ground Stability - Slice A



Order Details

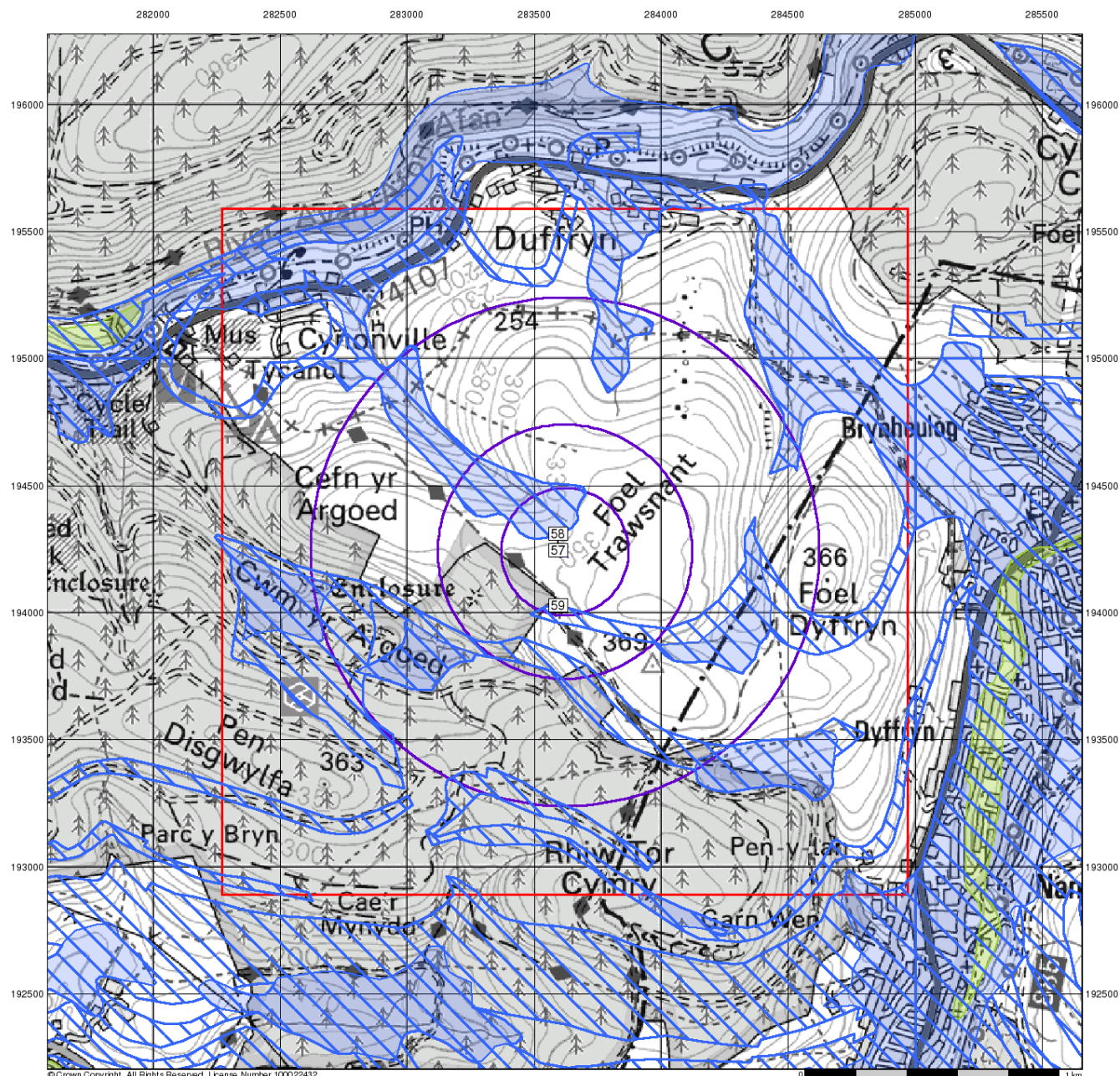
Order Number: 279012478_1_1
 Customer Ref: 12826/RAH
 National Grid Reference: 283620, 194240
 Slice: A
 Site Area (Ha): 0.01
 Search Buffer (m): 1000

Site Details

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Intégral Géotechnique

Ground Stability Data (1:50,000)

General

- ◇ Specified Site
- Specified Buffer(s)
- X Bearing Reference Point
- Slice
- B Map ID

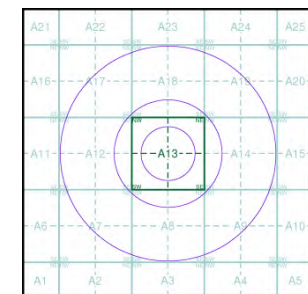
Potential for Running Sand Ground Stability Hazards

- High
- Moderate
- Low
- Very Low

Potential for Shrinking or Swelling Clay Ground Stability Hazards

- ▨ High
- ▨ Moderate
- ▨ Low
- ▨ Very Low

Mining and Ground Stability - Slice A



Order Details

Order Number: 279012478_1_1
 Customer Ref: 12826/RAH
 National Grid Reference: 283620, 194240
 Slice: A
 Site Area (Ha): 0.01
 Search Buffer (m): 1000

Site Details

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Envirocheck[®] Report:

Mining and Ground Stability Datasheet

Order Details:

Order Number:

279012478_1_1

Customer Reference:

12826/RAH

National Grid Reference:

283620, 194240

Slice:

A

Site Area (Ha):

0.01

Search Buffer (m):

1000

Site Details:

Foel Trawsnant Windfarm

Client Details:

MR H Pritchard
Integral Geotechnique
Integral House
7 Beddau Way
Castlegate Business Park
Caerphilly
CF83 2AX

Report Section and Details	Page Number
Summary	-
The Summary section provides an overview of the data contained within the report, detailing the number of data set features or the existence of a data set in relation to the buffer selected. For ease of reference, the report is broken down into 4 sections of data; Mining and Natural Cavities Data, Historical Land Use Information (1:2,500), Historical Land Use Information (1:10,000) and Ground Stability Data (1:50,000).	
Mining and Natural Cavities Data	1
The Mining and Natural Cavities Data section features data sets related to the existence of mining areas and their potential hazards; and details of naturally formed cavities. Data sets within this section are not plotted, with the exception of BGS Recorded Mineral Sites and Potential Mining Areas which feature on the Historical Land Use Information (1:10,000) map.	
Historical Land Use Information (1:2,500)	-
The Historical Land Use Information (1:2,500) section contains data captured from analysis carried out by Landmark of 1:1,250 and 1:2,500 scale historical Ordnance Survey mapping, identifying areas where, historically, the land uses were potentially contaminative. For the purpose of this Envirocheck module, only historical data relating to mining and ground stability has been included and plotted on the corresponding Historical Land Use Information (1:2,500) map. This section also includes the Subterranean Features data set, which details various man-made and man-used underground spaces obtained from the Subterranea Britannica society.	
Historical Land Use Information (1:10,000)	5
The Historical Land Use (1:10,000) section covers data captured from the systematic analysis carried out by Landmark of 1:10, 560 and 1:10,000 scale historical Ordnance Survey mapping dating back to the mid-19th century, identifying potentially contaminative past industrial land uses. For the purpose of this Envirocheck module, only data relating to mining and ground stability has been included and plotted on the accompanying Historical Land Use Information (1:10,000) map.	
Ground Stability Data (1:50,000)	7
The Ground Stability (1:50,000) section includes the BGS Geosure data suite, reporting features to 250m and plotted onto 3 separate maps. Also reported is brine subsidence, brine mining and salt mining data sets, of which Brine Pumping and Salt Mining Related Features are plotted, and subsidence insurance claims and insurance investigations data, which is not plotted.	
Historical Map List	8
The Historical Map List section details the historical mapping that has been analysed for your site, in relation to the Historical Land Use Information sections.	
Data Currency	9
Data Suppliers	10
Useful Contacts	11

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The brine subsidence data relating to the Driotwich area as provided in this report is derived from JPB studies and physical monitoring undertaken annually over more than 35 years. For more detailed interpretation contact enquiries@jpb.co.uk. JPB retain the copyright and intellectual rights to this data and accept no liability for any loss or damage, including in direct or consequential loss, arising from the use of this data.

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Report Version v53.0

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m
Mining and Natural Cavities Data					
BGS Recorded Mineral Sites	pg 1		1	2	5
Coal Mining Affected Areas	pg 2	Yes	n/a	n/a	n/a
Man Made Mining Cavities					
Mining Instability	pg 2	Yes	n/a	n/a	n/a
Natural Cavities					
Non Coal Mining Areas of Great Britain				n/a	n/a
Potential Mining Areas	pg 2	3	2		15
Historical Land Use Information (1:2,500)					
Extractive Industries or Potential Excavations from 1855-1909 (100m)				n/a	n/a
Extractive Industries or Potential Excavations from 1893-1915 (100m)				n/a	n/a
Extractive Industries or Potential Excavations from 1906-1937 (100m)				n/a	n/a
Extractive Industries or Potential Excavations from 1924-1949 (100m)				n/a	n/a
Extractive Industries or Potential Excavations from 1950-1980 (100m)				n/a	n/a
Subterranean Features (100m)				n/a	n/a
Historical Land Use Information (1:10,000)					
Air Shafts					
Disturbed Ground					
General Quarrying	pg 5				1
Heap, unknown constituents	pg 5				5
Mineral Railway	pg 5				2
Mining & quarrying general	pg 5				2
Mining of coal & lignite	pg 5		1	3	5
Quarrying of sand & clay, operation of sand & gravel pits					
Former Marshes					
Potentially Infilled Land (Non-Water)	pg 5			1	4
Potentially Infilled Land (Water)					
Ground Stability Data (1:50,000)					
CBSCB Compensation District			n/a	n/a	n/a
Brine Pumping Related Features					
Brine Subsidence Solution Area					
Potential for Collapsible Ground Stability Hazards	pg 7	Yes		n/a	n/a
Potential for Compressible Ground Stability Hazards	pg 7	Yes		n/a	n/a
Potential for Ground Dissolution Stability Hazards	pg 7	Yes		n/a	n/a
Potential for Landslide Ground Stability Hazards	pg 7	Yes	Yes	n/a	n/a
Potential for Running Sand Ground Stability Hazards	pg 7	Yes	Yes	n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 7	Yes	Yes	n/a	n/a
Salt Mining Related Features					

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
1	BGS Recorded Mineral Sites Site Name: Foel Trawsnant Location: Dyffryn, Neath, West Glamorgan Source: British Geological Survey, National Geoscience Information Service Reference: 156479 Type: Underground Status: Ceased Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Carboniferous Geology: Llynfi Member Commodity: Coal - Deep Positional Accuracy: Located by supplier to within 10m	A13SE (S)	247	1	283622 193994
2	BGS Recorded Mineral Sites Site Name: Foel Trawsnant Location: Dyffryn, Neath, West Glamorgan Source: British Geological Survey, National Geoscience Information Service Reference: 156480 Type: Underground Status: Ceased Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Carboniferous Geology: Rhondda Member Commodity: Coal - Deep Positional Accuracy: Located by supplier to within 10m	A8NW (S)	370	1	283498 193891
3	BGS Recorded Mineral Sites Site Name: Foel Trawsnant Location: Dyffryn, Neath, West Glamorgan Source: British Geological Survey, National Geoscience Information Service Reference: 156498 Type: Underground Status: Ceased Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Carboniferous Geology: Llynfi Member Commodity: Coal - Deep Positional Accuracy: Located by supplier to within 10m	A8NW (S)	385	1	283554 193861
4	BGS Recorded Mineral Sites Site Name: Argoed Colliery Location: Dyffryn, Neath, West Glamorgan Source: British Geological Survey, National Geoscience Information Service Reference: 156482 Type: Underground Status: Ceased Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Carboniferous Geology: Rhondda Member Commodity: Coal - Deep Positional Accuracy: Located by supplier to within 10m	A12SE (W)	603	1	283059 194019
5	BGS Recorded Mineral Sites Site Name: Argoed Colliery Location: Dyffryn, Neath, West Glamorgan Source: British Geological Survey, National Geoscience Information Service Reference: 156481 Type: Underground Status: Ceased Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Carboniferous Geology: Rhondda Member Commodity: Coal - Deep Positional Accuracy: Located by supplier to within 10m	A12SW (W)	836	1	282792 194132
6	BGS Recorded Mineral Sites Site Name: Lluest Location: Duffryn, Maesteg, West Glamorgan Source: British Geological Survey, National Geoscience Information Service Reference: 156747 Type: Opencast Status: Ceased Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Carboniferous Geology: Rhondda Member Commodity: Sandstone Positional Accuracy: Located by supplier to within 10m	A19SE (NE)	905	1	284398 194701

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
7	BGS Recorded Mineral Sites Site Name: Lluest Location: Duffryn, Maesteg, West Glamorgan Source: British Geological Survey, National Geoscience Information Service Reference: 156837 Type: Underground Status: Ceased Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Carboniferous Geology: Rhondda Member Commodity: Coal - Deep Positional Accuracy: Located by supplier to within 10m	A19SE (NE)	956	1	284409 194779
8	BGS Recorded Mineral Sites Site Name: Blaen Nant Location: Duffryn, Neath, West Glamorgan Source: British Geological Survey, National Geoscience Information Service Reference: 156526 Type: Underground Status: Ceased Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Carboniferous Geology: Rhondda Member Commodity: Coal - Deep Positional Accuracy: Located by supplier to within 10m	A18NE (N)	961	1	283812 195181
	Coal Mining Affected Areas Description: In an area which may be affected by coal mining activity. It is recommended that a coal mining report is obtained from the Coal Authority. Contact details are included in the Useful Contacts section of this report.	A13NE (NE)	0	2	283620 194240
	Mining Instability Mining Evidence: Inconclusive Coal Mining Source: Ove Arup & Partners Boundary Quality: As Supplied	A13NE (NE)	0	3	283620 194240
	Non Coal Mining Areas of Great Britain No Hazard				
9	Potential Mining Areas Name: Argoed Ceased Operation: 1927 Commodity: Coal; Field; Wernddu; Wernddu Rider; Wernpistyll Rider; White Reference: 9094 Alternate: Not Supplied Name/Mine: Not Supplied Custodian: Not Supplied	A13NE (NE)	0	4	283620 194240
10	Potential Mining Areas Name: Duffryn Gelly Ceased Operation: Not Supplied Commodity: Coal; Probably Wernddu Reference: Not Supplied Alternate: Not Supplied Name/Mine: Not Supplied Custodian: Ed. Daniel and Co., Worcester Chambers, Swansea.	A13NE (NE)	0	4	283620 194240
11	Potential Mining Areas Name: Duffryn Rhondda Ceased Operation: 1925 Commodity: Coal; No.2 Rhondda or Wernddu Reference: 8205 Alternate: No. 2 Name/Mine: Not Supplied Custodian: Not Supplied	A13NE (NE)	0	4	283620 194240
12	Potential Mining Areas Name: Drysiog Ceased Operation: 1866 Commodity: Coal; White; Clay; Jonah; Blackband Reference: Not Supplied Alternate: Not Supplied Name/Mine: Not Supplied Custodian: Baldwins Ltd., 45 Wind Street, Swansea.	A13SW (S)	148	4	283617 194093

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
13	Potential Mining Areas Name: Glynccorwg Ceased Operation: Not Supplied Commodity: Coal Reference: Not Supplied Alternate: Not Supplied Name/Mine: Not Supplied Custodian: Not Supplied	A13SW (S)	148	4	283617 194093
14	Potential Mining Areas Name: Tonhir Ceased Operation: Not Supplied Commodity: Coal; White; Clay; Golden Reference: Not Supplied Alternate: Not Supplied Name/Mine: Not Supplied Custodian: Conway Williams, Queen Street, Neath.	A8NW (S)	550	4	283608 193691
15	Potential Mining Areas Name: Garn Wen Ceased Operation: 1866 Commodity: Coal; White Reference: Not Supplied Alternate: Nos. 4, 6, 7, 9, 11 Name/Mine: Not Supplied Custodian: North's Navigation Collieries (1889) Ltd., Maesteg.	A8NW (S)	550	4	283608 193691
16	Potential Mining Areas Name: Bryn Mercantile Ceased Operation: 1927 Commodity: Coal; White; Black Band; Victoria; Jonah Clay Reference: 8371 Alternate: Daniel's Old Name/Mine: Not Supplied Alternate: Drysiog Name/Mine: Not Supplied Custodian: Not Supplied	A8NW (S)	550	4	283608 193691
17	Potential Mining Areas Name: Tonhir Ceased Operation: 1928 Commodity: Coal; Golden Reference: 6847 Alternate: Not Supplied Name/Mine: Not Supplied Custodian: Not Supplied	A8NW (S)	550	4	283608 193691
18	Potential Mining Areas Name: Llangynwyd Higher Ceased Operation: Not Supplied Commodity: Coal Reference: Not Supplied Alternate: Not Supplied Name/Mine: Not Supplied Custodian: Not Supplied	A9NW (SE)	675	4	283999 193682
19	Potential Mining Areas Name: Parc-y-Bryn Ceased Operation: 1922 Commodity: Coal; Field; Wernddu; Wernpistyll Rider; Wernpistyll; No.2 Rhondda Reference: 7420 Alternate: Not Supplied Name/Mine: Not Supplied Custodian: Not Supplied	A7NE (SW)	688	4	283194 193700
20	Potential Mining Areas Name: Duffryn Rhondda Ceased Operation: 1925 Commodity: Coal; Field Reference: 8207 Alternate: No. 2 Name/Mine: Not Supplied Custodian: Not Supplied	A19SW (NE)	765	4	284025 194889
21	Potential Mining Areas Name: Cynon Ceased Operation: 1922 Commodity: Coal; Field; Wernddu or No.2 Rhondda Reference: 7590 Alternate: Not Supplied Name/Mine: Not Supplied Custodian: Not Supplied	A17SE (NW)	777	4	283220 194906

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
22	Potential Mining Areas Name: Duffryn Rhondda Ceased Operation: 1925 Commodity: Coal; Wernpistill Rider Reference: 8206 Alternate: No. 2 Name/Mine: Custodian: Not Supplied	A14NE (E)	833	4	284418 194478
23	Potential Mining Areas Name: Caerau Ceased Operation: 1927 Commodity: Coal; No.2 Rhondda Reference: 9495 Alternate: Not Supplied Name/Mine: Custodian: Not Supplied	A14NE (E)	833	4	284418 194478
24	Potential Mining Areas Name: Cynon Ceased Operation: 1905 Commodity: Coal; Wernddu Reference: Not Supplied Alternate: Not Supplied Name/Mine: Custodian: Forster Brown and Rees, Guildhall Chambers, Cardiff.	A12NW (W)	855	4	282810 194513
25	Potential Mining Areas Name: Drysiog Ceased Operation: Not Supplied Commodity: Coal; White; Clay; Jonah; Blackband Reference: Not Supplied Alternate: Nos. 1, 2, 3, 5, 6, 7, 8 Name/Mine: Custodian: Baldwins Ltd., 45 Wind Street, Swansea.	A8SW (S)	952	4	283600 193289
26	Potential Mining Areas Name: Garn Wen Ceased Operation: 1862-1890 Commodity: Coal; Clay Reference: Not Supplied Alternate: Nos. 3, 5, 6, 10, 12 Name/Mine: Custodian: North's Navigation Collieries (1889) Ltd., Maesteg.	A8SW (S)	952	4	283600 193289
27	Potential Mining Areas Name: Cwmavon Ceased Operation: Not Supplied Commodity: Coal; White; Clay; Jonah; Ironstone; Blackband Reference: Not Supplied Alternate: Nos. 5, 6, 7, 12 Name/Mine: Custodian: (i) Forster Brown and Rees, Guildhall Chambers, Cardiff. (ii) Lawrence, Davies and Causton, 6 Park Place, Cardiff.	A8SW (S)	952	4	283600 193289
28	Potential Mining Areas Name: Cwmavon Ceased Operation: 1866 Commodity: Coal; White; Tormynydd Reference: Not Supplied Alternate: No. 27 Name/Mine: Custodian: Baldwins Ltd., 45 Wind Street, Swansea.	A7NW (SW)	984	4	282792 193708

Historical Land Use Information (1:10,000)

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
29	General Quarrying Use: Not Supplied Date of Mapping: 1900	A19SE (NE)	900	-	284390 194704
30	Heap, unknown constituents Use: Not Supplied Date of Mapping: 1964	A19SW (NE)	605	-	284069 194645
31	Heap, unknown constituents Use: Not Supplied Date of Mapping: 1964	A19SW (NE)	683	-	284062 194760
32	Heap, unknown constituents Use: Not Supplied Date of Mapping: 1964	A19SW (NE)	775	-	284079 194864
33	Heap, unknown constituents Use: Not Supplied Date of Mapping: 1951	A18NE (N)	965	-	283719 195200
34	Heap, unknown constituents Use: Not Supplied Date of Mapping: 1964	A19NW (NE)	979	-	284092 195097
35	Mineral Railway Use: Not Supplied Date of Mapping: 1900	A14NE (E)	723	-	284338 194317
36	Mineral Railway Use: Not Supplied Date of Mapping: 1921	A12SW (W)	879	-	282749 194131
37	Mining & quarrying general Use: Not Supplied Date of Mapping: 1900	A19SE (NE)	914	-	284397 194722
38	Mining & quarrying general Use: Not Supplied Date of Mapping: 1884	A18NE (N)	962	-	283813 195182
39	Mining of coal & lignite Use: Not Supplied Date of Mapping: 1884	A13SW (S)	250	-	283619 193990
40	Mining of coal & lignite Use: Not Supplied Date of Mapping: 1900	A8NW (S)	372	-	283498 193889
41	Mining of coal & lignite Use: Not Supplied Date of Mapping: 1884	A8NW (S)	394	-	283547 193853
42	Mining of coal & lignite Use: Not Supplied Date of Mapping: 1900	A12SE (SW)	418	-	283255 194038
43	Mining of coal & lignite Use: Not Supplied Date of Mapping: 1900	A12SE (W)	599	-	283065 194016
44	Mining of coal & lignite Use: Not Supplied Date of Mapping: 1964	A14SW (E)	642	-	284251 194129
45	Mining of coal & lignite Use: Not Supplied Date of Mapping: 1900	A14NE (E)	710	-	284328 194284
46	Mining of coal & lignite Use: Not Supplied Date of Mapping: 1900	A12SW (W)	792	-	282839 194112
46	Mining of coal & lignite Use: Not Supplied Date of Mapping: 1900	A12SW (W)	827	-	282801 194125
47	Potentially Infilled Land (Non-Water) Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1990	A12SE (SW)	418	-	283255 194038
48	Potentially Infilled Land (Non-Water) Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1990	A12SE (W)	599	-	283065 194016

Historical Land Use Information (1:10,000)

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
49	Potentially Infilled Land (Non-Water) Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1990	A12SW (W)	792	-	282839 194112
50	Potentially Infilled Land (Non-Water) Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1990	A12SW (W)	827	-	282801 194125
51	Potentially Infilled Land (Non-Water) Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1988	A18NE (N)	962	-	283813 195182

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	CBSCB Compensation District The site does not fall within the brine compensation area.				
	Brine Subsidence Solution Area The site does not fall within the brine subsidence solution area.				
52	Potential for Collapsible Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	283620 194240
	Potential for Compressible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	283620 194240
	Potential for Ground Dissolution Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	283620 194240
53	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	283620 194240
54	Potential for Landslide Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A13NW (N)	74	1	283593 194309
55	Potential for Landslide Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A13NW (N)	155	1	283586 194390
56	Potential for Landslide Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A13SW (S)	215	1	283594 194027
57	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NW (N)	74	1	283593 194309
	Potential for Running Sand Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	283620 194240
58	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NW (N)	74	1	283593 194309
59	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SW (S)	215	1	283594 194027
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	283620 194240

The following mapping has been analysed for Historical Land Use Information (1:2,500):

1:2,500	Mapsheet	Published Date
Glamorganshire	025_04	1877
Glamorganshire	025_04	1899
Glamorganshire	025_04	1918
Glamorganshire	025_04	1940
Ordnance Survey Plan	SS8393	1962
Ordnance Survey Plan	SS8394	1962

The following mapping has been analysed for Historical Land Use Information (1:10,000):

1:10,560	Mapsheet	Published Date
Glamorganshire	016_00	1884
Glamorganshire	017_00	1884
Glamorganshire	025_00	1884
Glamorganshire	026_00	1884
Glamorganshire	016_SE	1900
Glamorganshire	017_SW	1900
Glamorganshire	025_NE	1900
Glamorganshire	026_NW	1900
Glamorganshire	016_SE	1921
Glamorganshire	017_SW	1921
Glamorganshire	025_NE	1921
Glamorganshire	026_NW	1921
Glamorganshire	017_SW	1938
Glamorganshire	026_NW	1947
Glamorganshire	016_SE	1951
Glamorganshire	025_NE	1951
Ordnance Survey Plan	SS89NW	1964
Ordnance Survey Plan	SS89SW	1964
1:10,000	Mapsheet	Published Date
Ordnance Survey Plan	SS89NW	1988
Ordnance Survey Plan	SS89SW	1990

Mining and Cavities Data	Version	Update Cycle
BGS Recorded Mineral Sites British Geological Survey - National Geoscience Information Service	November 2020	Bi-Annually
Coal Mining Affected Areas The Coal Authority - Property Searches	March 2014	Annual Rolling Update
Man Made Mining Cavities Stantec UK Ltd	November 2020	Bi-Annually
Mining Instability Ove Arup & Partners	October 2000	Not Applicable
Natural Cavities Stantec UK Ltd	November 2020	Bi-Annually
Non Coal Mining Areas of Great Britain British Geological Survey - National Geoscience Information Service	May 2015	Not Applicable
Historical Land Use Information (1:2,500)	Version	Update Cycle
Subterranean Features Landmark Information Group Limited	February 2020	Bi-Annually
Ground Stability Data (1:50,000)	Version	Update Cycle
CBSCB Compensation District Cheshire Brine Subsidence Compensation Board (CBSCB)	August 2011	Not Applicable
Potential for Collapsible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	April 2020	Annually
Potential for Compressible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Ground Dissolution Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Landslide Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Running Sand Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Shrinking or Swelling Clay Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Brine Subsidence Solution Area Johnson Poole & Bloomer	December 2020	Annual Rolling Update

A selection of organisations who provide data within this report

Data Supplier	Data Supplier Logo
Ordnance Survey	
British Geological Survey	 British Geological Survey NATURAL ENVIRONMENT RESEARCH COUNCIL
The Coal Authority	
Ove Arup	
Stantec UK Ltd	
Wardell Armstrong	
Johnson Poole & Bloomer	

Contact	Name and Address	Contact Details
1	British Geological Survey - Enquiry Service British Geological Survey, Environmental Science Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
2	The Coal Authority - Property Searches 200 Lichfield Lane, Mansfield, Nottinghamshire, NG18 4RG	Telephone: 0345 762 6848 Fax: 01623 637 338 Email: groundstability@coal.gov.uk Website: www2.groundstability.com
3	Ove Arup & Partners Central Square, Forth Street, Newcastle upon Tyne, Tyne and Wear, NE1 3PL	Telephone: 0191 261 6080 Fax: 0191 261 7879
4	Landmark Information Group Limited Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9960 Fax: 0844 844 9951 Email: customerservice@promap.co.uk Website: www.landmarkinfo.co.uk
-	Landmark Information Group Limited Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9952 Fax: 0844 844 9951 Email: customerservices@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk

General

Specified Site Specified Buffer(s) Bearing Reference Point Map ID
Several of Type at Location

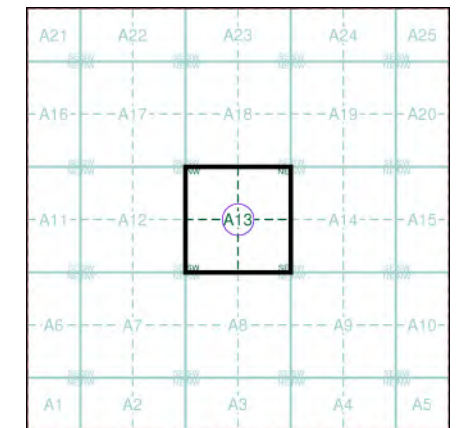
Potentially Contaminative Industrial Uses
(Extractive Industries Activity)

	Point	Line	Polygon
Extractive Industries Activity from 1855 - 1909	▲	—	■
Extractive Industries Activity from 1893 - 1915	▲	—	■
Extractive Industries Activity from 1906 - 1937	▲	—	■
Extractive Industries Activity from 1924 - 1949	▲	—	■
Extractive Industries Activity from 1950 - 1960	▲	—	■

Subterranean Features

	Point	Line	Polygon
Subterranean Features	▼	---	■

Mining and Ground Stability - Segment A13

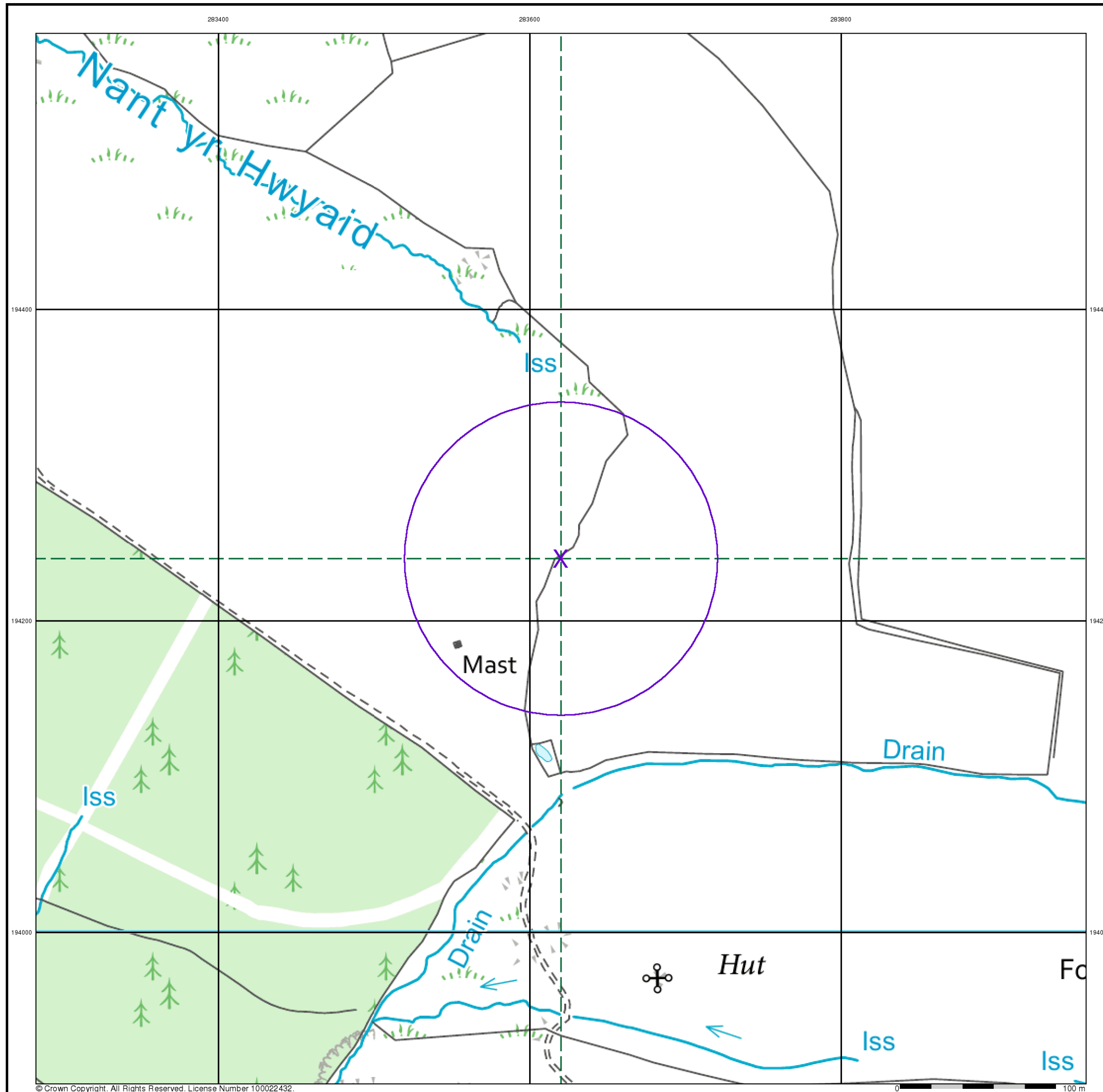


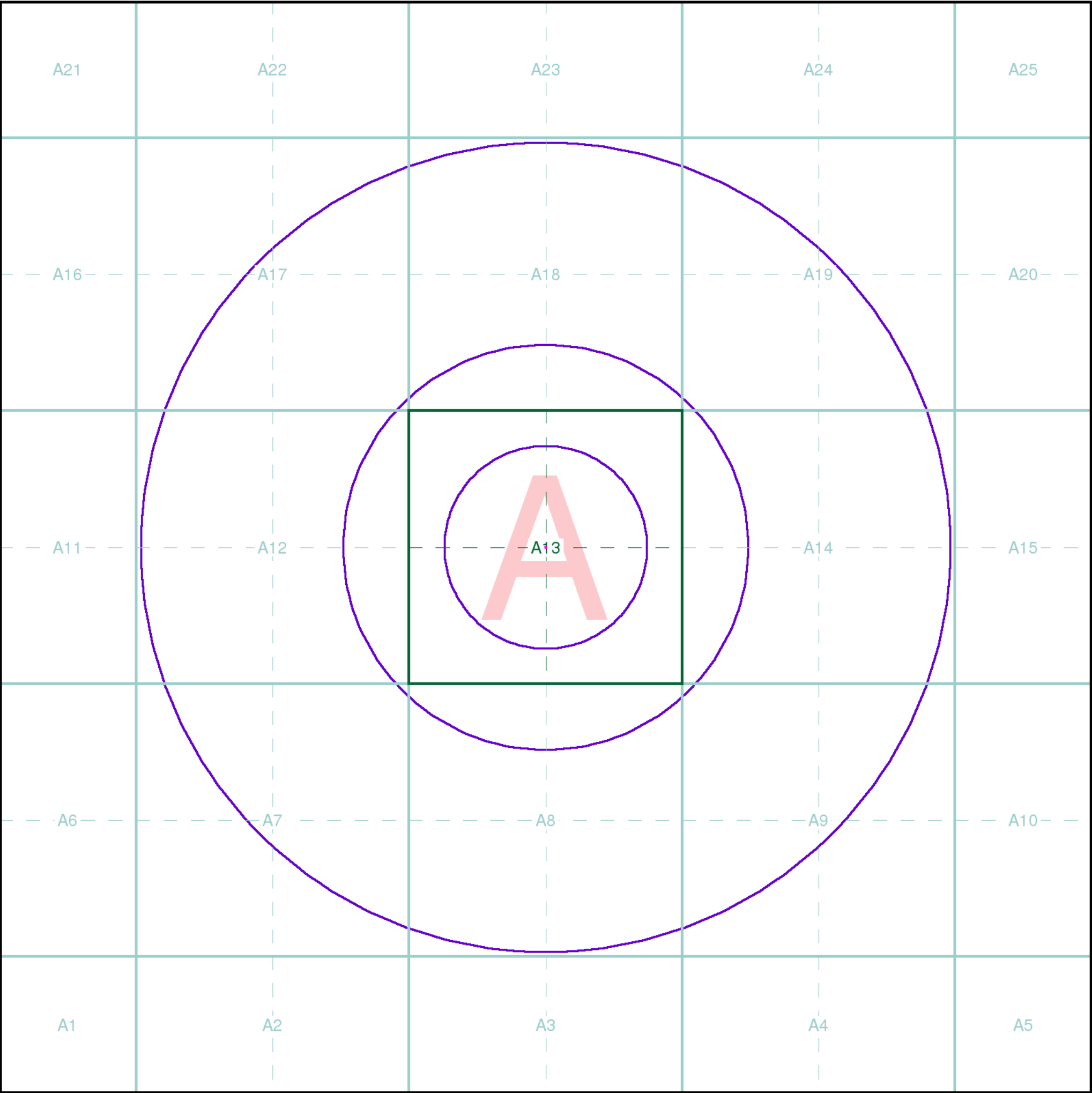
Order Details

Order Number: 279012478_1_1
Customer Ref: 12826/RAH
National Grid Reference: 283620, 194240
Slice: A
Site Area (Ha): 0.01
Plot Buffer (m): 100

Site Details

Foel Trawsnant Windfarm





Index Map

For ease of identification, your site and buffer have been split into Slices, Segments and Quadrants. These are illustrated on the Index Map opposite and explained further below.

Slice
Each slice represents a 1:10,000 plot area (2.7km x 2.7km) for your site and buffer. A large site and buffer may be made up of several slices (represented by a red outline), that are referenced by letters of the alphabet, starting from the bottom left corner of the slice "grid". This grid does not relate to National Grid lines but is designed to give best fit over the site and buffer.

Segment
A segment represents a 1:2,500 plot area. Segments that have plot files associated with them are shown in dark green, others in light blue. These are numbered from the bottom left hand corner within each slice.

Quadrant
A quadrant is a quarter of a segment. These are labelled as NW, NE, SW, SE and are referenced in the datasheet to allow features to be quickly located on plots. Therefore a feature that has a quadrant reference of A7NW will be in Slice A, Segment 7 and the NW Quadrant.

A selection of organisations who provide data within this report:



Envirocheck reports are compiled from 136 different sources of data.

Client Details
MR H Pritchard, Integral Geotechnique, Integral House, 7
Beddau Way, Castlegate Business Park, Caerphilly, CF83
2AX

Order Details
Order Number: 279012478_1_1
Customer Ref: 12826/RAH
National Grid Reference: 283620, 194240
Site Area (Ha): 0.01
Search Buffer (m): 1000

Site Details
Foel Trawsnant Windfarm

Full Terms and Conditions can be found on the following link:
<http://www.landmarkinfo.co.uk/Terms/Show/515>

APPENDIX C

COAL AUTHORITY REPORT



The Coal
Authority

Resolving the **impacts** of mining

CON29M

Non-Residential Mining Report

FOEL TRAWSNANT PROPOSED WIND
FARM
S OF DUFFRYN AND NW OF
NANTFFYLLON
FOEL TRAWSNANT (NAME OF HILL)
NEATH PORT TALBOT



Date of enquiry: 19 April 2018
Date enquiry received: 19 April 2018
Issue date: 20 April 2018

Our reference: 51001821145001
Your reference:

CON29M Non-Residential Mining Report

This report is based on, and limited to, the records held by the Coal Authority and the Cheshire Brine Subsidence Compensation Board's records, at the time we answer the search.

Client name

WOOD. E & I

Enquiry address

FOEL TRAWSNANT PROPOSED WIND FARM , S OF
DUFFRYN AND NW OF NANTFFYLLON , FOEL
TRAWSNANT (NAME OF HILL) , NEATH PORT
TALBOT

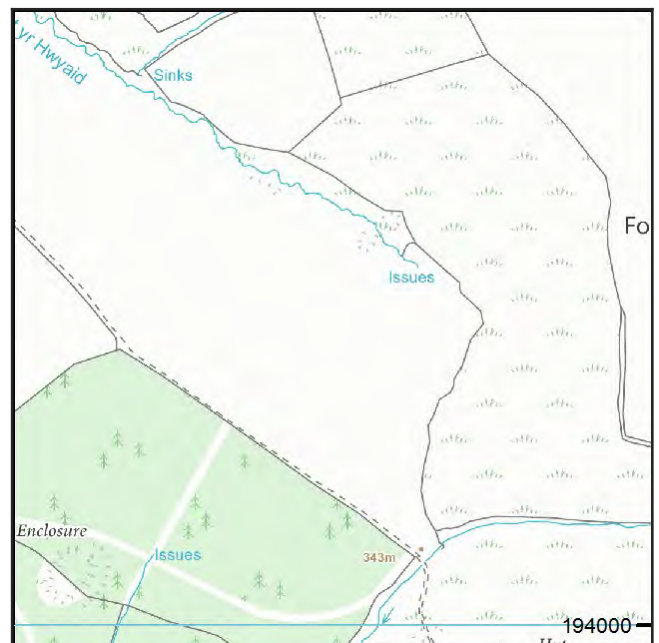
How to contact us

0345 762 6848 (UK)
+44 (0)1623 637 000 (International)

200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

www.groundstability.com

 /company/the-coal-authority
 /thecoalauthority
 /coalauthority



Approximate position of property



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Summary

Has the search report highlighted evidence or potential of		
1	Past underground coal mining	Yes
2	Present underground coal mining	No
3	Future underground coal mining	Yes
4	Mine entries	Yes
5	Coal mining geology	No
6	Past opencast coal mining	No
7	Present opencast coal mining	No
8	Future opencast coal mining	No
9	Coal mining subsidence	No
10	Mine gas	No
11	Hazards related to coal mining	No
12	Withdrawal of support	Yes
13	Working facilities order	No
14	Payments to owners of former copyhold land	No
15	Information from the Cheshire Brine Subsidence Compensation Board	No

Further recommended reports
Mine entry interpretive report
Mine entry plan and data sheets

For detailed findings, please go to page 4.

Detailed findings

1. Past underground coal mining

The property is in a surface area that could be affected by underground mining in 11 seams of coal at shallow to 780m depth, and last worked in 1980.

2. Present underground coal mining

The property is not within a surface area that could be affected by present underground mining.

3. Future underground coal mining

The property is not in an area where the Coal Authority has plans to grant a licence to remove coal using underground methods.

The property is not in an area where a licence has been granted to remove or otherwise work coal using underground methods.

The property is not in an area likely to be affected from any planned future underground coal mining.

However, reserves of coal exist in the local area which could be worked at some time in the future.

No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

4. Mine entries

Within, or within 20 metres of, the boundary of the property there are 3 mine entries, the approximate positions of which are shown on the enquiry boundary plot.

Our records disclose the following information:

283193-008. No treatment details.

284193-036. Adit sealed with compacted brick rubble and backfilled with soil. 4.3m square fence erected. (CCD/92/34).

283193-007. No treatment details.

There may however be mine entries/additional mine entries in the local area which the Coal Authority has no knowledge of.

For an additional fee, the Coal Authority can provide a Mine Entry Interpretive Report. The report will provide a separate assessment for the mine entry/entries referred to in this report. It gives an opinion on the likelihood of mining subsidence damage caused from ground movement as a consequence of the mine entry/entries. It also gives details of the remedies available for subsidence damage where the mine entry was sunk in connection with coal mining.

Please note that it may not be possible to produce a report if the main building to the property cannot be identified from Coal Authority plans (ie for development sites and new build).

For further advice on how to order this additional information please visit www.groundstability.com.

5. Coal mining geology

The Coal Authority is not aware of any damage due to geological faults or other lines of weakness that have been affected by coal mining.

6. Past opencast coal mining

The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.

7. Present opencast coal mining

The property does not lie within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods.

8. Future opencast coal mining

There are no licence requests outstanding to remove coal by opencast methods within 800 metres of the boundary.

The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

9. Coal mining subsidence

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31st October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

10. Mine gas

The Coal Authority has no record of a mine gas emission requiring action.

11. Hazards related to coal mining

The property has not been subject to remedial works, by or on behalf of the Authority, under its Emergency Surface Hazard Call Out procedures.

12. Withdrawal of support

The property is in an area where notices to withdraw support were given in 1946, 1948, 1954, 1956 and 1975.

The property is not in an area where a notice has been given under section 41 of the Coal Industry Act 1994, cancelling the entitlement to withdraw support.

13. Working facilities order

The property is not in an area where an order has been made, under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof.

14. Payments to owners of former copyhold land

The property is not in an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

15. Information from the Cheshire Brine Subsidence Compensation Board

The property lies outside the Cheshire Brine Compensation District.

Comments on the Coal Authority information

The Coal Authority own the copyright in this report and the information used is protected by our database right.

The boundary plot shows the approximate location of the disused mine entry/entries referred to in this report. For reasons of clarity, mine entry symbols may not be drawn to the same scale as the plan.

Property owners have the benefit of statutory protection (under the Coal Mining Subsidence Act 1991*). This contains provision for the making good, to the reasonable satisfaction of the owner, of physical damage from disused coal mine workings including disused coal mine entries. A leaflet setting out the rights and obligations of either the Coal Authority or other responsible persons under the 1991 Act can be obtained by visiting www.groundstability.com.

If you wish to discuss the relevance of any of the information contained in this report, you should seek the advice of a qualified mining engineer or surveyor. If you or your advisor wish to examine the source plans from which the information has been taken, these are available to view, free of charge, at our Head Office in Mansfield. To book an appointment please ring 01623 637225. Should you or your advisor wish to carry out a physical investigation that may enter, disturb or interfere with any disused mine entry, prior permission of the owner must be sought. For coal mine entries, the owner will normally be the Coal Authority.

The Coal Authority, regardless of responsibility and in conjunction with other public bodies, provide an emergency call out facility in coalfield areas to assess the public safety implications of mining features (including disused mine entries). Our emergency telephone number is 01623 646333.

*Note, this Act does not apply where coal was worked or gotten by virtue of the grant of a gale in the Forest of Dean, or any other part of the Hundred of St. Briavels in the county of Gloucester.

In view of the mining circumstances a prudent developer would seek appropriate technical advice before any works are undertaken.

Therefore if development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment should be obtained before

beginning work on site. All proposals should apply good engineering practice developed for mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or mines of coal without the permission of the Coal Authority. Developers should be aware that the investigation of coal seams/former mines of coal may have the potential to generate and/or displace underground gases and these risks both under and adjacent to the development should be fully considered in developing any proposals. The need for effective measures to prevent gases entering into public properties either during investigation or after development also needs to be assessed and properly addressed. This is necessary due to the public safety implications of any development in these circumstances.

Additional remarks

Information provided by the Coal Authority in this report is compiled in response to the Law Society's Con29M Coal Mining and Brine Subsidence Claim enquiries. The said enquiries are protected by copyright owned by the Law Society of 113 Chancery Lane, London WC2A 1PL. Please note that Brine Subsidence Claim enquiries are only relevant for England and Wales. This report is prepared in accordance with the Law Society's Guidance Notes 2006, the User Guide 2006 and the Coal Authority and Cheshire Brine Board's Terms and Conditions applicable at the time the report was produced.

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Alternative formats

If you would like this report in an alternative format, please contact our communications team.

Enquiry boundary

The map image is too large for this page and will be sent in a separate document

How to contact us

0345 762 6848 (UK)
+44 (0)1623 637 000 (International)

200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

www.groundstability.com

 [/company/the-coal-authority](#)

 [/thecoalauthority](#)

 [/coalauthority](#)

VAT receipt

Issued by	The Coal Authority 200 Lichfield Lane Mansfield Nottinghamshire NG18 4RG
Tax point date	19 April 2018
Issued to	WOOD. E & I 25 CANADA SQUARE LONDON TOWER HAMLETS E14 5LQ
Property search for	FOEL TRAWSNANT PROPOSED WIND FARM S OF DUFFRYN AND NW OF NANTFFYLLON FOEL TRAWSNANT (NAME OF HILL) NEATH PORT TALBOT
Reference number	51001821145001
Date of issue	20 April 2018
Cost	£204.15
VAT @ 20%	£40.83
Total received	£244.98
VAT registration	598 5850 68

Enquiry boundary

Key

Approximate position of enquiry boundary shown

Disused adit

How to contact us

0345 762 6848 (UK)
+44 (0)1623 637 000 (International)

200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

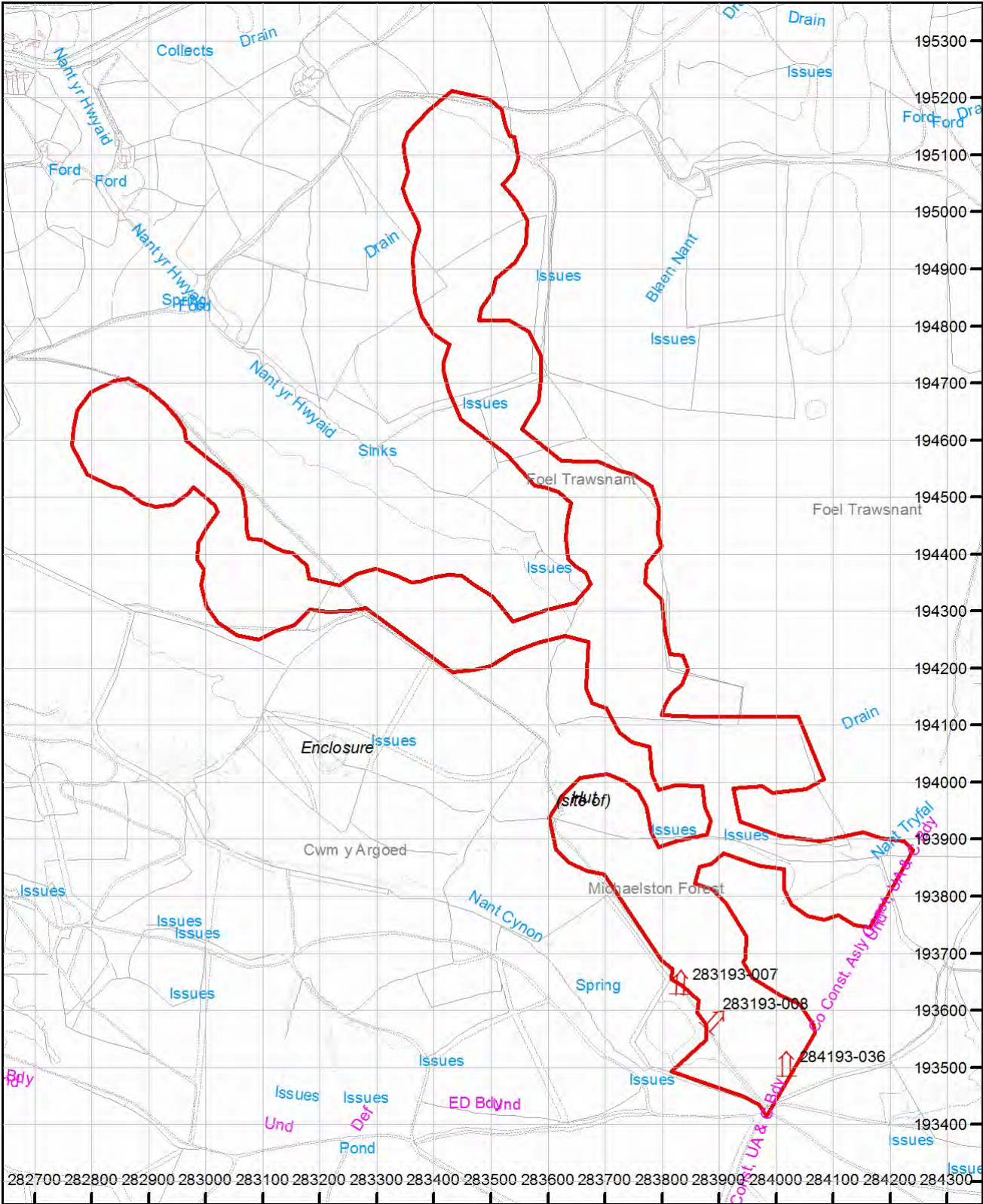
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APPENDIX D

GEOPHYSICAL SURVEY

GEOPHYSICAL SURVEY REPORT

Project

Seismic refraction survey at a proposed windfarm

Location

Foel Trawsnant, Maesteg, County of Neath Port Talbot

Client

Intégral Géotechnique

**Head Office
Unit 1
Link Trade Park
Penarth Road
Cardiff CF11 8TQ
United Kingdom**

**Telephone: +44 (0)2920 700127
www.terradat.co.uk**

**Job reference: 7299
Date: April 2021
Version: 1**

GEOPHYSICAL SURVEY REPORT

Project

Seismic refraction survey at a proposed windfarm

Location

Foel Trawsnant, Maesteg, County of Neath Port Talbot

Client

Intégral Géotechnique

Project Geophysicists: Andrew Thomas BSc MSc FGS

Reviewer: Rob McDonald BSc PhD
S Hughes PhD BSc FGS

Job Reference: 7299

Date: 9th April 2021

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Appendices

1 EXECUTIVE SUMMARY

A geophysical report was carried out as part of the ground investigation for five proposed wind turbines at Foel Trawsnant, Maesteg, County of Neath Port Talbot. The survey work was commissioned by Intégral Géotechnique (The Client) and took place on the 24th and 25th of March 2021. The key aims of the geophysical survey were to determine the depth to rock and characterise ground conditions.

The main geophysical element comprised Seismic refraction (P and S-wave) and Multichannel Analysis of Surface Waves (MASW) at the five proposed locations.

Analysis of the compressional (P) wave and shear (S) wave seismic data has provided low-error layer models of the surface sediments, weathered overburden and bedrock. There is generally a very good correlation between the corresponding P and S wave velocity boundaries, and the seismic sections provide detailed information about the rockhead geometry and the distinct velocity layers to help gain an understanding of the bulk engineering properties of the shallow sub-surface.

2 INTRODUCTION

This report describes a geophysical survey carried out as part of the ground investigation for the proposed wind farm at Foel Trawsnant. The geophysical survey work was commissioned by Intégral Géotechnique (The Client) and took place on the 24th and 25th of March 2021. The key aims of the geophysical survey were to determine the depth to rock and characterise ground conditions.

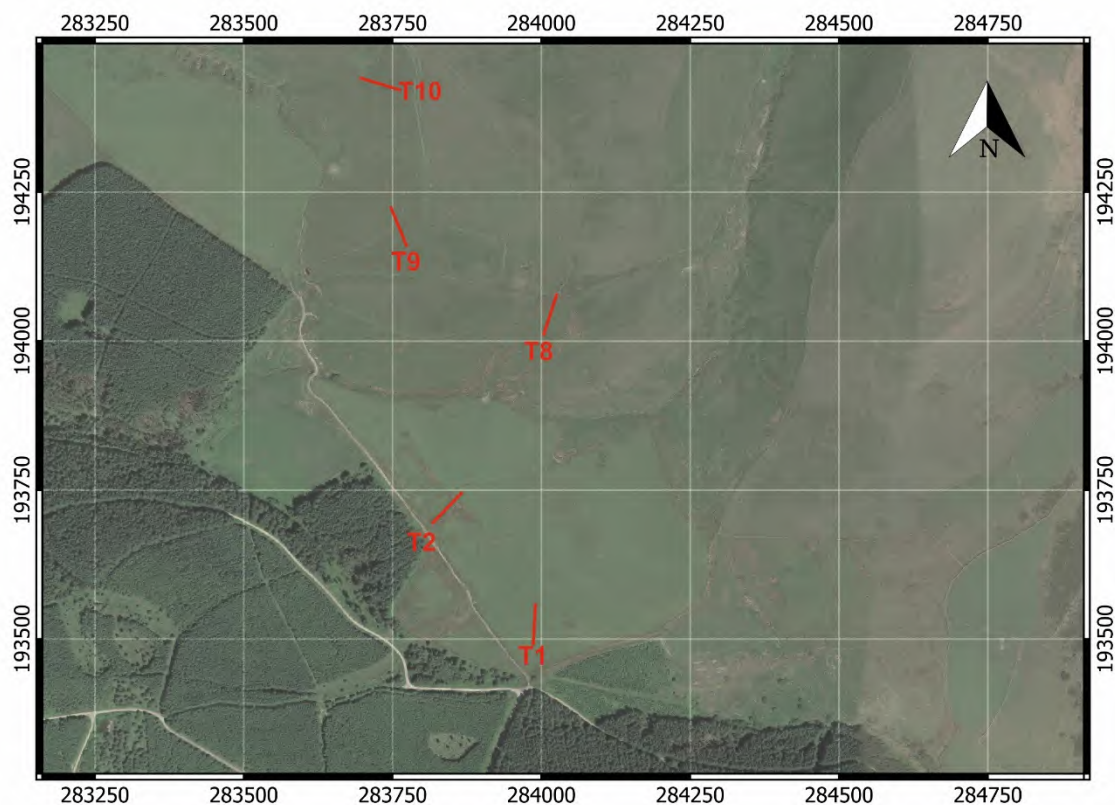


Plate 1: Map showing the location of the proposed wind turbines T1, T2, T8, T9 and T10.

2.1 Site description

The Foel Trawsnant Wind Farm site is located approximately 2.3km to the northwest of Maesteg, Bridgend, and lies entirely within the Neath Port Talbot local authority area. The proposed wind farm comprises open moorland used primarily for grazing of livestock.



Plate 2: Left – Location T1 looking south. **Right** – Location T8 looking north.

2.2 Geological setting

British Geological Survey (BGS) records (NERC,2019) indicates the Foel Trawsnant survey area is underlain by Rhondda Member and Llynfi Member Sandstone. The overlying superficial geology has not been mapped, nor is any intrusive data available at this time.

2.3 Survey objectives

The primary objectives of the survey are as follows:

- Provide information on the thickness of superficial deposits.
- Provide information on the depth to bedrock.
- Characterise the material velocities to help gain an understanding of the bulk engineering properties of the sub-surface.

2.4 Survey design

Given the scope of the survey objectives, it was decided, under client direction, to adopt an integrated survey approach utilising the following techniques:

- **P-wave Seismic Refraction** – to provide seismic velocity (P-wave) sections along the selected profile lines.
- **S-wave Seismic Refraction** – to provide seismic velocity (S-wave) sections along the selected profile lines.
- **MASW** (Multichannel Analysis of Surface Waves) – to determine the S-wave velocity structure where favourable conditions are encountered (considered optional depending on the suitability of the preferred S-wave refraction method).

A single seismic profile was acquired at each of the five turbine locations. Due to the anticipated shallow bedrock and soft surface sediments, it was thought likely that the MASW technique would be limited, but to ensure survey integrity, MASW data were still acquired.

Background information for the survey method is provided in the appendices, and descriptions of the actual survey work carried out on site are provided in the sections below.

2.5 Quality control

The geophysical data are collected in line with normal operating procedures as outlined by the instrument manufacturer and TerraDat Ltd. company policy. On completion of the survey, the data are downloaded from the survey instrument on to a computer and backed up appropriately. The acquired data set is initially checked for errors that may be caused by instrument noise, low batteries, positional discrepancies etc. and any field notes are either written up or incorporated in the initial data processing stage. The data set is processed using the standard processing routines, and once completed, the resulting plots are subject to peer review to ensure the integrity of the interpretation. Our quality control standards are BS EN ISO 9001: 2015 certified.

3 SURVEY DESCRIPTION

The survey was carried out using the following geophysical methods:

- P-wave seismic refraction (employs compressional waves)
- S-wave seismic refraction (employs shear waves)
- MASW (Multichannel Analysis of Surface Waves)

Background information for the survey method is provided in the appendices, and descriptions of the actual survey work carried out on site are provided in the sections below.

3.1 Survey layout

Seismic data were acquired along the specified profile lines, and the results are presented as interpreted cross-sections indicating the location and physical characteristics of identified features together with a text description. The Client provided the coordinates of the turbines, and the orientation of each seismic profile was determined by the Client based on appropriate ground conditions and terrain for each location, respectively. The proposed wind turbine positions and extents of seismic sections are shown in Table 1.

Turbine ID	Start	End	Proposed wind turbine location
T10	283761.988 E 194421.583 N	283658.548 E 194451.848 N	283728 E 194431 N
T9	283773.575 E 194160.183 N	283747.778 E 194223.336 N	283761 E 194191 N
T8	284004.391 E 194011.402 N	284025.633 E 194077.073 N	284015 E 194045 N
T2	283818.341 E 193695.327 N	283865.695 E 193744.653 N	283842 E 193719 N
T1	283968.583 E 193492.174 N	283990.228 E 193557.123 N	283979 E 193524 N

Table 1: Proposed locations of wind turbines and start and end positions of the corresponding seismic refraction profiles.

All geophone and off-end shot locations were surveyed using a *Trimble R8s GNSS* instrument, with an accuracy of +/- 25mm, and referenced to British National Grid (OSTN15) using the Trimble RTK VRS system.

3.2 Seismic survey - P and S-wave refraction

A seismic survey involves generating a shock wave signal at the surface to investigate the geological structure beneath a chosen profile line. A series of vibration sensors (geophones) are deployed along the line and are used to record the travel times of incident seismic signal as it returns from below ground. Features such as rock-head, the water table, soft sediments, and dense till all have distinct velocity ranges and can be imaged in cross-section using a seismic refraction survey. A description of the field activity is provided below, and some further background information on the survey method is found in the Appendix.

3.2.1 Seismic survey field activity - P-wave refraction

P-wave seismic refraction data were acquired along a series of profile lines using a high precision 48-channel *GEODE* (Plate 3) seismic system. In order to target the anticipated shallow depth range, the low frequency (10Hz) geophones were deployed at 1.5 m intervals, providing individual geophone spread lengths of up to 70.5 m. For many of the profile lines,

the seismic wave generated by a sledgehammer striking a plate was sufficient. However, for the others, a Buffalo Gun firing blank shotgun cartridges (10-gauge) were required to overcome the signal attenuation caused by the near-surface peat/organic layers. In order to build up a refraction section, seismic shots were taken at several positions along the geophone spread and at set distances beyond each end.

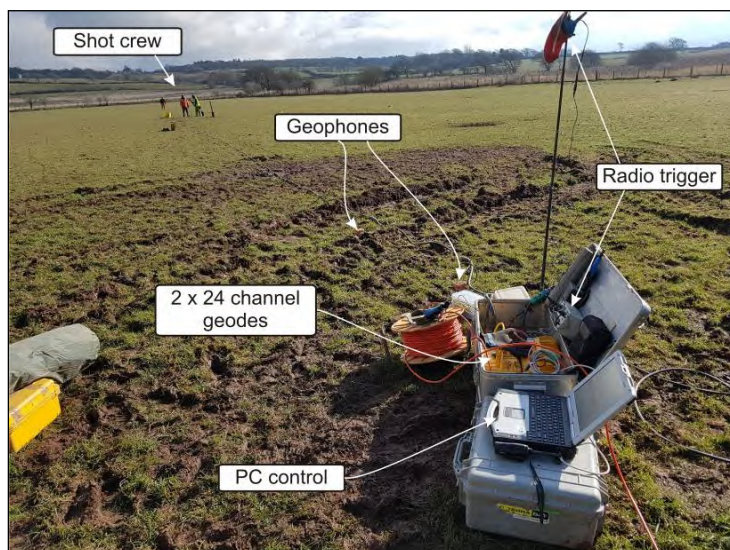


Plate 3: seismic field setup (library picture)

3.2.2 Seismic survey field activity - S-wave Refraction (Shear)

S-wave seismic refraction data were also acquired using a 48-channel *GEODE* seismic system. To target possible weathered rock within a shallow depth range, horizontally mounted geophones were once again deployed at 1.5 m intervals producing individual geophone spread lengths of up to 70.5 m. A weighted S-wave plate struck sideways with a sledgehammer was used as the source (Plate 4). At each shot location, the S-wave plate was aligned perpendicularly to the profile line and subsequently struck on both ends to generate two sets of shear wave recordings that have opposite polarity. Shots were deployed at several positions along the geophone spread and beyond both ends.



Plate 4: S-wave source plate (library picture)

3.2.3 Seismic survey data processing – P and S-wave refraction

The data processing was carried out using PICKWIN and PLOTREFA software. The first stage involved accurate determination of the first-arrival times of the seismic signal (time from the shot going off to each recording geophone) for every shot record using PICKWIN. Time-distance graphs showing the first-arrival times were then generated for each seismic line and analysed using PLOTREFA software to determine the number of seismic velocity layers. Modelled depth profiles for the observed seismic velocity layers were produced by a tomographic inversion procedure that was revised iteratively to develop a best-fit model.

The final output of a seismic refraction survey is a velocity model section of the subsurface. The section is based on an observed layer sequence with measured velocities that correspond to physical properties such as levels of compaction/saturation in the case of sediments and strength/rippability in the case of bedrock. A transitional velocity model may be considered if distinct layers are not expected, or velocity contrasts between layers are marginal. However, a layered model appears most appropriate at this site. The final sections were exported to CorelDraw for annotation and presentation.

3.3 Seismic survey - MASW

MASW (Multichannel Analysis of Surface Waves) is a seismic technique that can provide a characterisation of shear-wave velocity (V_s) for the near-surface (<30 m). It utilises Rayleigh-type surface waves that are normally considered noise in seismic refraction/reflection surveys and called “ground roll”. The waves are generated by a seismic source and recorded via

multiple geophones deployed on an even spacing and connected to a common recording device (seismograph).

3.3.1 Seismic survey field activity - MASW

The field setup for the MASW seismic survey is similar to the refraction setup, however instead of a discrete number of shot points, shots are acquired at each geophone position along the profile. For this particular survey, the geophones were set at 1.5 m intervals, and the data were acquired using a 10lb sledgehammer source.

3.3.2 Seismic survey data processing - MASW

Analysis of surface waves recorded on multichannel shot records was carried out using *SurfSeis* software, which considers the dispersion properties of all types of waves (both body and surface waves) through a wave field-transformation method. This directly converts the multichannel record into an image, where a dispersion pattern is recognised, and the necessary dispersion properties are extracted. These dispersion properties are used to generate modal dispersion curves that are subsequently inverted and used to produce the resultant shear-wave velocity (V_s) profile. The final sections were exported to CorelDraw for annotation and presentation.

4 RESULTS AND DISCUSSION

The results of the seismic refraction cross-sections are presented in Figures 2 to 6 as a series of modelled velocity sections. A general description of the interpretation process and summary findings for each technique is given below.

4.1 Seismic Refraction – compressional (P) and shear (S) wave

The interpretation of the refraction sections is based on the widely understood and published velocities of typical sub-surface materials. The quality of the seismic data was very good for both P and S wave producing low error layer models of the subsurface sediments, weathered overburden and bedrock; however, due to unfavourable ground conditions, the MASW data were deemed unreliable and has not been used in the interpretation.

4.1.1 Compressional (P) wave

Analysis of the P-wave refraction data suggests up to five distinct layers of contrasting velocity (V_p). A typical soil/rock description of each layer is given in Table 2 below. The seismic refraction section represents the measured bulk characteristics of the subsurface, and in some cases, it can prove difficult to correlate with point source data (borehole/trial pits) where the underlying material is variable.

COMPRESSION (P) WAVE KEY:	
	Layer P1 (150 - 230 m/s) Unsaturated surface material comprising weak soils and fibrous peat.
	Layer P2a (480 - 670 m/s) Comprising moderately compacted, unsaturated sediments
	Layer P2b (1010 - 1530 m/s) Comprising stiff, compacted, partially saturated sediments
	Layer P3 (1430 - 1450 m/s) - Transition layer comprising stiff soils / weak (soft) rock**
	Layer P4 (2900 - 3030 m/s) - Bedrock
** Applicable to T1 4-layer model only.	

Table 2: A guide to P-wave velocities related to superficial/rock description for the Foel Trawsnant site; Interpreted by correlation with standard tables and the S-wave dataset.

Given the highly variable velocities of Layer P2, the layer has been subdivided into P2a and P2b to distinguish dryer moderately compacted sediments from stiffer, partially saturated sediments (Table 3). Further, layer P3 is unique to the 4-layer P-wave model for T1.

When comparing the resulting S-wave and P-wave velocity sections, there is a rough 'rule of thumb' with regards to the ratio of the velocities. For unconsolidated sediment, the V_p/V_s ratio is usually between 4.0 and 8.0, while for consolidated rocks, the V_p/V_s ratio can vary between 1.5 and 2.0. Even though these are accepted values, they can vary between sites depending on the geology and ground conditions.

When correlating between the respective S-wave and P-wave refraction boundaries, in some instances, there can be differences in the observed depths of those boundaries. The degree of deviation between layers identified by P and S-wave surveys depends primarily on the prevailing geology, most notably the weathering profile, lithology, bedding structure, presence of groundwater, and to a lesser degree, the survey parameters (horizontal/vertical polarised S-waves, spacing, etc.). It has been noted on some sites that an S-wave or P-wave refractor can correlate with a particularly hard internal bedding unit as opposed to a weaker rockhead immediately above.

4.1.2 Shear (S) wave

Analysis of the S-wave refraction data has identified up to four distinct layers of contrasting velocity (V_s), and a typical description of each layer is given below (Table 3). The quality of the S-wave refraction data was good, and shot examples are provided in the Appendix.

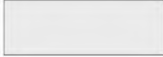
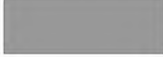
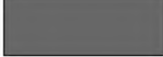
Rock / Soil Description (top 30m)	S-wave velocity (m/s)	SHEAR (S) WAVE KEY:	
Hard rock (<i>strong*</i>)	> 1,500		Layer (S1) 54 - 100 m/s - Very soft soils*.
Rock (<i>moderately strong*</i>)	760 - 1,500		Layer (S2) 280 - 320 m/s - Stiff soils*.
Very dense soil / soft (<i>weak*</i>) rock	360 - 760		Layer (S3) 410 - 790 m/s - Very dense soil / soft (<i>weak*</i>) rock
Stiff soil	180 - 360		Layer (S4) 910 - 1360 m/s - Moderately strong bedrock*.
Soft soil	<180		
The NEHRP Recommended Provisions for seismic regulation for new buildings, (FEMA-222A and FEMA-223A, 1994) * UK equivalent classification (Waltham, 1994)			

Table 3: A guide to the shear (S) wave velocity structure for the Foel Trawsnant site, based on the correlation between standard tables and the observed velocity layers identified by the survey.

As a guide, the resolution of a given refraction boundary is typically considered to be approximately 10% of its depth below ground level, which for a boundary at 10m depth would be +/- 1m. However, at very shallow depths, the resolution may vary/decrease as a function of geophone spacing and ground consistency. It is worth noting that seismic refraction sections represent the measured bulk characteristics of the subsurface. In certain rare cases, it can prove difficult to correlate a seismic section with point source data (boreholes/trial pits) where the underlying material is variable in character and samples obtained by invasive means are not broadly representative of the geology along a particular survey line. However, information from online boreholes and trial pits is always very valuable for calibrating seismic sections and gaining an understanding of the lithologies and how they relate to seismic layering in more detail.

A further consideration is the potential presence of a 'hidden layer', which can occur either when a buried slow layer is overlain by a faster layer, i.e., 'velocity inversion', or alternatively when a very 'thin layer' overlies a significantly faster layer, and the refracted rays of the deeper faster layer arrive first. Depending on the significance of the hidden layer, this can cause a slight over-estimation of the modelled depth to bedrock in a 'velocity inversion' scenario or a slight underestimation of the depth in a 'thin layer' scenario.

In general, the shear-wave velocity (V_s) is much more sensitive than the P-wave velocity (V_p), where the ground becomes abruptly stiffer due to increases in strength. For this reason, it is possible to use the V_s to distinguish between sediments and ‘rock’ (i.e. cemented) material, which is particularly useful for refining the P-wave interpretation. A further advantage of shear waves is that they are unaffected by the groundwater table.

4.2 Seismic Refraction – Detailed Discussion

Turbine T10 (Figure 2)

The results from the seismic refraction survey at location T10 can be seen in Figure 2. The layer boundaries for the P and S waves correlate very well, providing confidence in the modelled sections. The subsurface layers dip roughly parallel to the surface topography. The P and S wave velocities for Layer P4 and S4, 2900 to 3030 m/s and 990 to 1290 m/s, respectively, reveal an undulating boundary of moderately strong bedrock at a depth ranging between 4 to 6 meters below ground level (bgl). Subtle variations in the calculated S-wave velocities (Layer S4) suggest a slight increase in rock strength towards the southeast of the section.

Overlying this is layer P2a and S2, where calculated P-wave and S-Wave velocities of 460 to 670 m/s and 300 - 320 m/s suggests a ‘stiff soils’ layer and forms a roughly uniform thickness along the section.

The near-surface Layers P1 and S1 are interpreted to comprise a thin layer of weak soils and fibrous peat exhibiting velocities of 150 m/s and 70 m/s and range in depth of ~0.5 and 1 m.

Turbine T9

The results from the seismic refraction survey at location T9 can be seen in Figure 3. Similar to T10, the P and S wave velocities (2420 – 2480 m/s and 1150 – 1270 m/s) reveal moderately strong bedrock at a depth ranging from 4 to 6 meters bgl. The modelled sections reveal a slight divergence between the deepest P-wave and S-wave boundary, with the S-wave (layer S4) boundary revealing bedrock at shallower horizons. A deviation between the P and S wave boundaries can be relatively common on sites where there are local variations in

the lithology/groundwater and/or weathering processes. Given the S-wave velocities of the layer, S4 are indicative of moderately strong rock; this overlap may indicate a zone transitioning from weathered/weaker to relatively stronger rock.

Overlying this is layer P2b and S3, where calculated P-wave and S-Wave velocities of 1010 to 1100 m/s and 410 - 500 m/s suggests a layer comprising very dense soil and/or soft, weathered rock. The over-deepening of Layer P2b between 5 and 30 meters chainage may suggest some differential weathering and/or a subtle change in lithology/groundwater.

Turbine T8

The three-layered seismic refraction profiles for T8 are presented in Figure 4. The P and S wave velocities for Layer P4 and S4, 1960 to 2030 m/s and 920 to 1120 m/s, respectively, reveal an undulating boundary of moderately strong bedrock at a depth ranging between 2 to 6 meters bgl. The deepest P-wave and S-wave boundaries correlate well, with subtle divergences being interpreted to represent local variations in the weathering/consolidation of the superficial deposits.

Overlying this is Layers P2b and S3, where calculated P-wave and S-wave velocities of 1010 – 1040 m/s and 540 – 560 m/s suggest a layer of very dense soil / soft (weak) rock.

From 0m and 40m chainage, the bedrock boundary between P4/S4 and P2b/S3 dips northeast where a subtle decrease in S-wave velocities (Layer S4) and an increase in thickness of the overlying layers P2b and S3 are evident, indicative of either a subtle change in the lithology and/or localised zones of differential weathering.

Turbine T2

The results from the seismic refraction survey at location T2 are presented in Figure 5. The resulting sections are very consistent with T10 and T9 and reveal moderately strong bedrock overlain by very dense soils/soft (weak) rock; however, the P and S wave boundaries at chainage 35m to 70m diverge considerably, reducing the confidence in the modelling and its reliability in this area. At chainage 0 - 35m, the P-wave and S-wave velocities reveal a moderately strong bedrock layer (Layer P4 (V_p 1820 – 2050 m/s) and S4 (V_s 920 – 1120 m/s))

at a depth of around 1 to 4 m bg and overlain by a 2 to 3 m thick layer of very dense soils/weak rock.

Beneath the NE part of the section (chainage 30m to 50m), an increase in depth to bedrock and a corresponding increase in the thickness of layer P2b may indicate a localised increase in weathering. Given the apparent variability of the model sections and the poor quality of the S-wave signal in this area, it is anticipated that better ground conditions are likely to be encountered beneath the SW half of the survey line.

Turbine T1

The results from the seismic refraction survey at the southernmost location T1 is presented in Figure 6. The P and S wave models correlate very well; however, the P-wave model reveals four distinct layers of contrasting velocity, whereas the S-wave model is unable to define the deepest refraction boundary, either due to reduced ground penetration or limited contrast in the S-wave velocity with the overlying material. The interpreted, moderately strong bedrock layer (Layer P4 (V_p 2520 – 2880 m/s)) can be seen at a depth of around 12 to 13 m bgl.

Overlying this is Layer P3 and S3, where calculated P-wave and S-wave velocities of 1430 – 1450 m/s and 720 – 790 m/s reveal a relatively thick (9 – 10m), uniform layer of soft (weak) rock. Layer P3, not seen at the other four locations, may indicate a change in lithology associated with the Llynfi Beds.

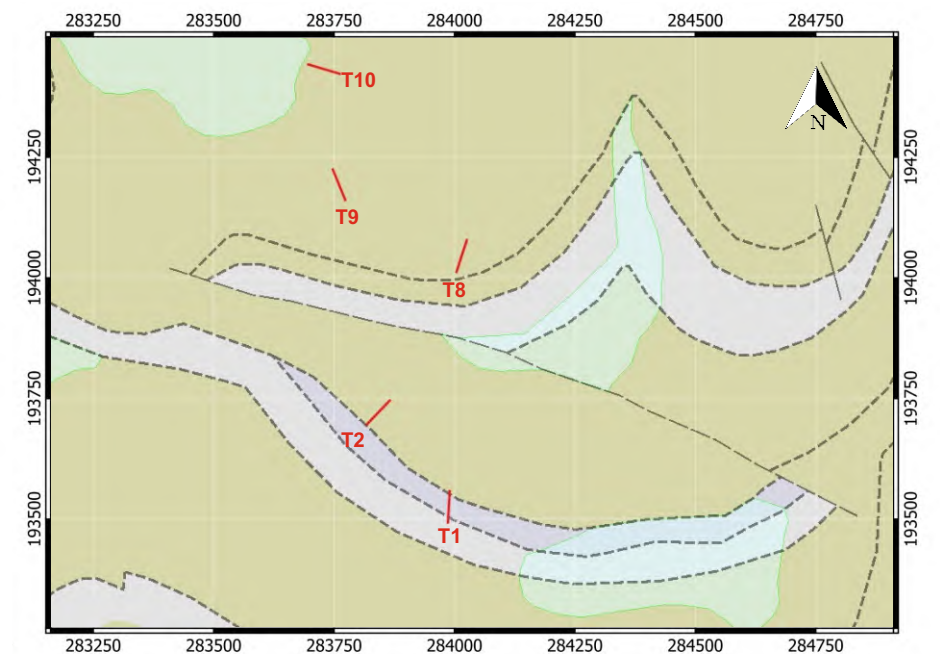
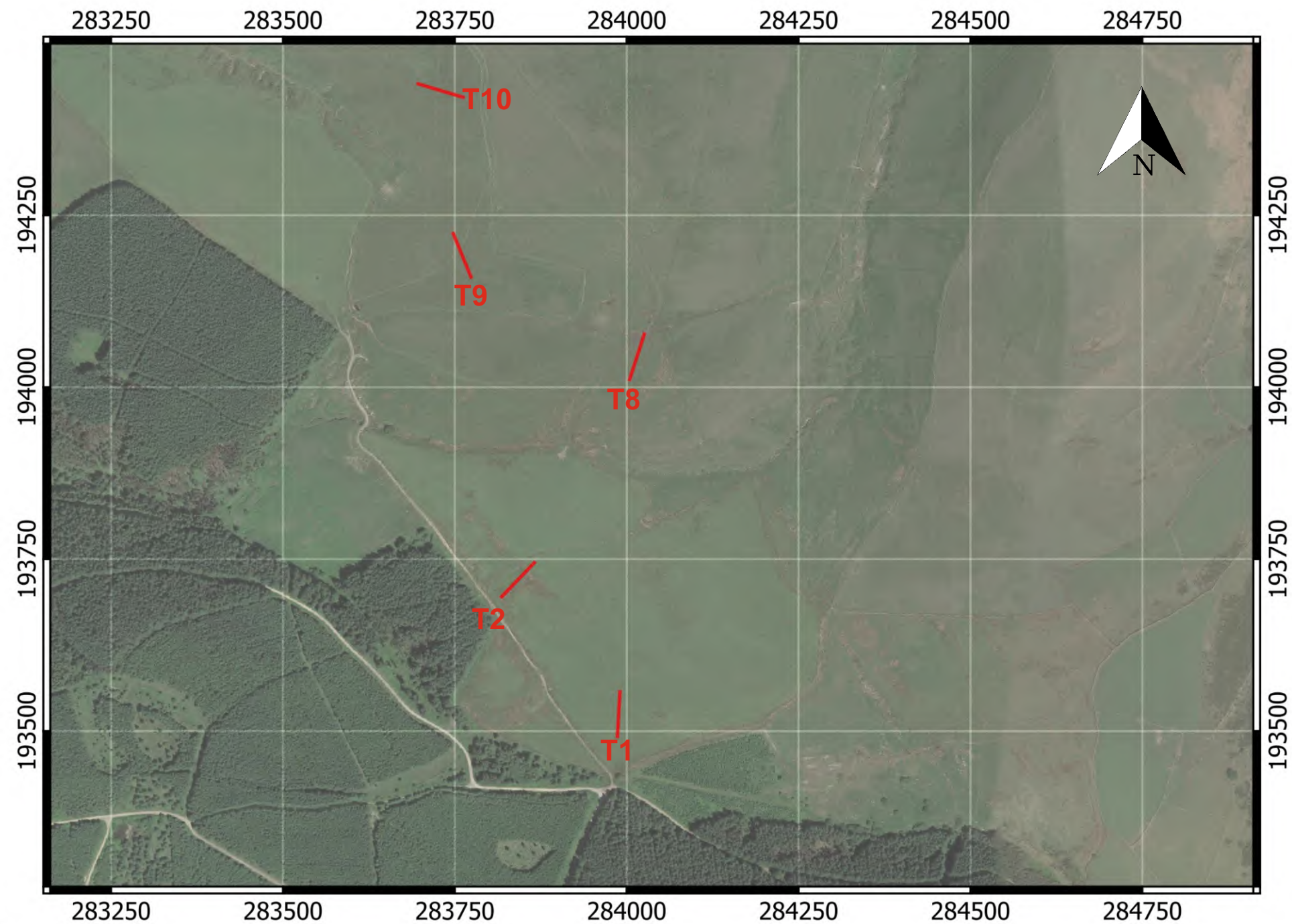
5 CONCLUSIONS

- Analysis of the compressional (P) wave and shear (S) wave seismic data has provided low-error layer models of the surface sediments, weathered overburden and bedrock. The seismic sections provide detailed information about the rockhead geometry and the material velocities to help gain an understanding of the bulk engineering properties of the sub-surface in the proposed wind farm area.
- There is generally a very good correlation between the corresponding P and S wave velocity boundaries, and any small disparities most likely reflect local differential weathering and/or subtle changes in the lithology.
- At turbine location T2, the S-wave survey results were adversely affected by shallow ground conditions along the NW half of the survey line. Based on the seismic survey results, it is anticipated that the ground conditions along the SW half of the survey line at T2 are more consistent with those encountered at the other turbine locations.
- If any additional geophysical data / intrusive information becomes available, it may be possible to extend/refine the interpretations and calibrate the acquired dataset.

Disclaimer

This report represents an opinionated interpretation of the geophysical data. It is intended for guidance with follow-up invasive investigation. Features that do not produce measurable geophysical anomalies or are hidden by other features may remain undetected. Geophysical surveys complement invasive/destructive methods and provide a tool for investigating the subsurface; they do not produce data that can be taken to represent all of the ground conditions found within the surveyed area. Areas that have not been surveyed due to obstructed access or any other reason are excluded from the interpretation.

FIGURES



Not to scale

REGIONAL GEOLOGY: (Ref. British Geological Survey):

BEDROCK:

- Rhondda Member - mandstone
- Rhondda Member - mudstone, miltstone and mandstone
- Llynfi Member - mudstone, miltstone and mandstone

SUPERFICIAL DEPOSITS:

- Devensian Glacial Till - Diamicton

KEY:

T10

Wind turbine ID and location

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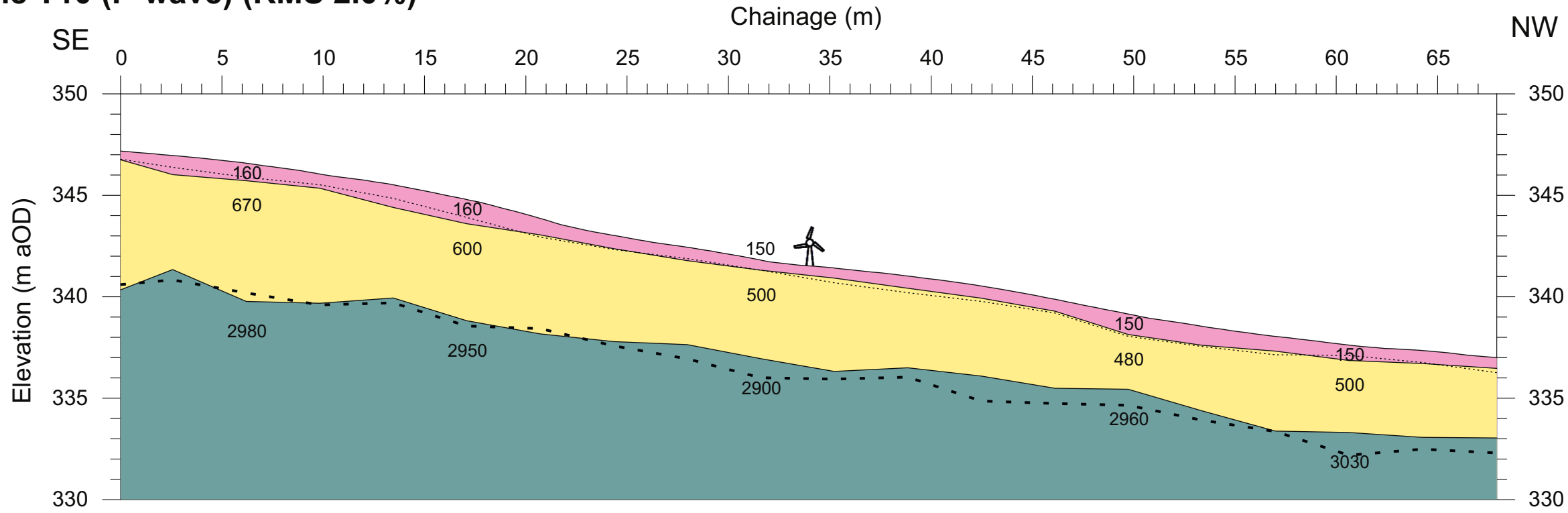
Title:
LOCATION / GEOLOGY PLAN

Project:
FOEL TRAWSNANT WIND FARM

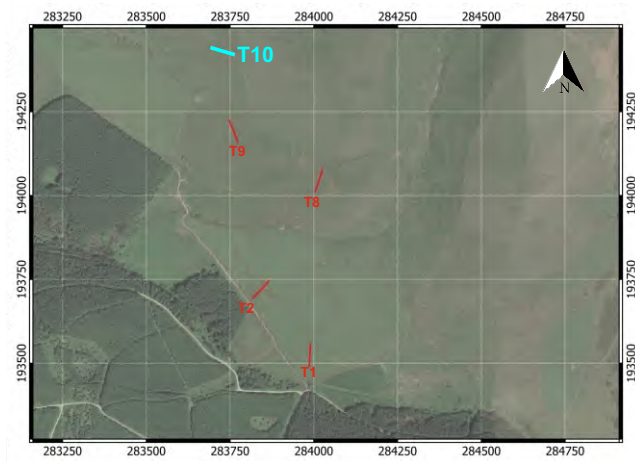
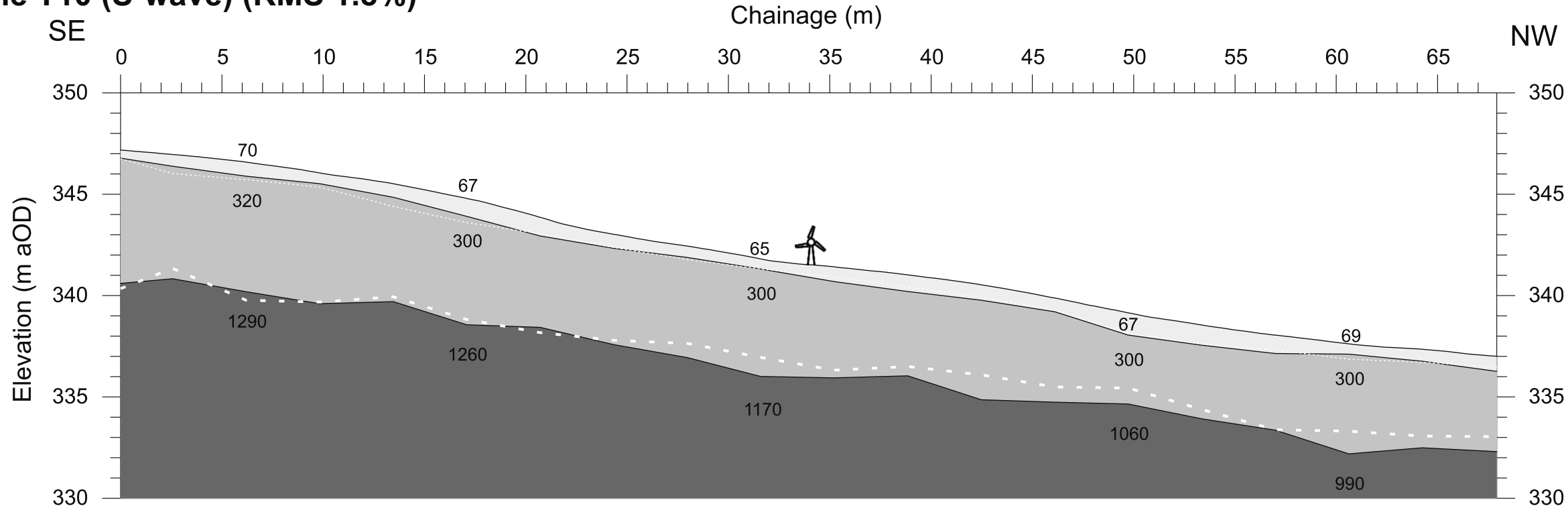
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Drawn by/Ref: AT/7299/1
Date: APRIL 2021

FIGURE 1

Line T10 (P-wave) (RMS 2.0%)



Line T10 (S-wave) (RMS 1.8%)



COMPRESSION (P) WAVE KEY:

Layer P1 150 - 160 m/s - Unsaturated surface material comprising weak soils and fibrous peat.

Layer P2a 460 - 670 m/s - Comprising stiff, compacted, unsaturated sediments.

Layer P4 2900 - 3030 m/s - Bedrock (Rhondda member).

SHEAR (S) WAVE KEY:

Layer S1 65 - 70 m/s - Very soft, unconsolidated soil*.

Layer S2 300 - 320 m/s - Stiff soils*.

Layer S4 990 - 1290 m/s - Moderately strong bedrock*.

Rock / Soil Description (top 30m)	S-wave velocity (m/s)
Hard rock (<i>strong</i> *)	> 1,500
Rock (<i>moderately strong</i> *)	760 - 1,500
Very dense soil / soft (<i>weak</i> *) rock	360 - 760
Stiff soil	180 - 360
Soft soil	<180

The NEHRP Recommended Provisions for seismic regulation for new buildings, (FEMA-222A and FEMA-223A, 1994)

* UK equivalent classification (Waltham, 1994)

KEY:

Proposed position of wind turbine along seismic section.

S-wave boundaries superimposed on P-wave sections.

P-wave boundaries superimposed S-wave sections.

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SEISMIC SURVEY RESULTS - T10

Project:

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Scale:

1:1250 @ A3

Drawn by/Ref:

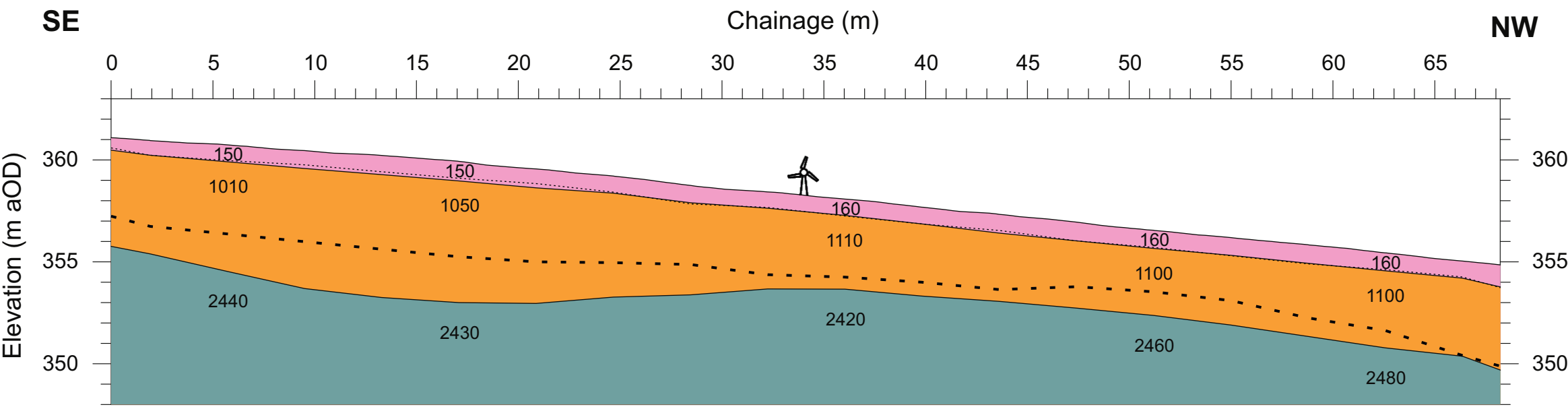
AT/7299/2

Date:

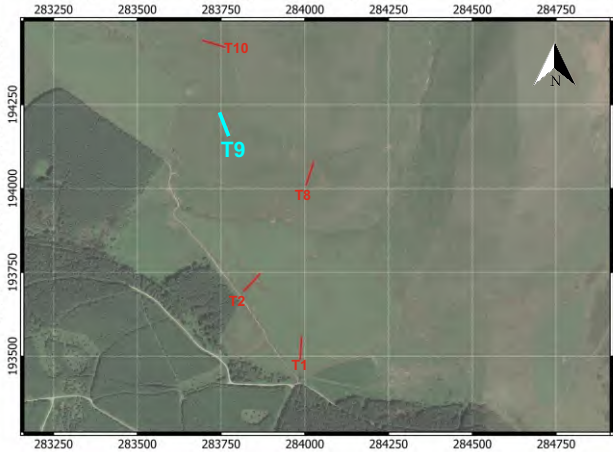
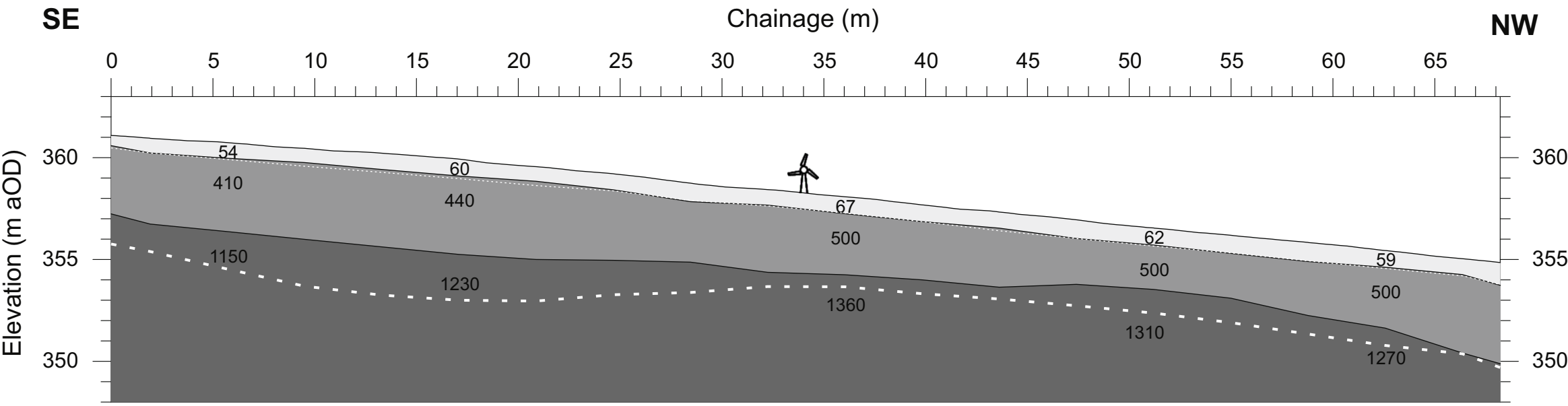
APRIL 2021

FIGURE 2

Line T9 (P-wave) (RMS 2.3%)



Line T9 (S-wave) (RMS 2.2%)



COMPRESSION (P) WAVE KEY:

- Layer P1 ~150 m/s** - Unsaturated surface material comprising weak soils / fibrous peat.
- Layer P2b 1010 - 1100 m/s** - Comprising very stiff, compacted, partially saturated sediments at shallow horizons, transitioning into weathered / weak rock.
- Layer P4 2420 - 2480 m/s** - Bedrock (Rhondda member).

SHEAR (S) WAVE KEY:

- Layer S1 54 - 67 m/s** - Very soft, unconsolidated soil*.
- Layer S3 410 - 500 m/s** - Very dense soil / soft (weak) weathered rock*.
- Layer S4 1150 - 1270 m/s** - Moderately strong bedrock*.

Rock / Soil Description (top 30m)	S-wave velocity (m/s)
Hard rock (<i>strong</i> *)	> 1,500
Rock (<i>moderately strong</i> *)	760 - 1,500
Very dense soil / soft (<i>weak</i> *) rock	360 - 760
Stiff soil	180 - 360
Soft soil	<180

The NEHRP Recommended Provisions for seismic regulation for new buildings, (FEMA-222A and FEMA-223A, 1994)
* UK equivalent classification (Waltham, 1994)

KEY:

- Proposed position of wind turbine along seismic section.
- S-wave boundaries superimposed on P-wave sections.
- P-wave boundaries superimposed S-wave sections.

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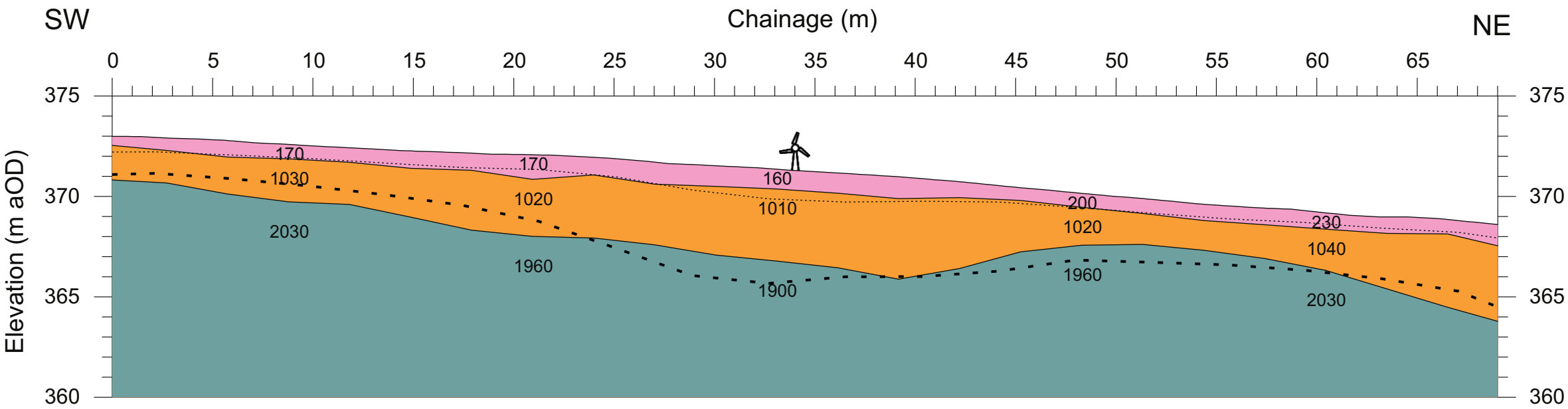
Title:
SEISMIC SURVEY RESULTS - T9

Project:
FOEL TRAWSNANT WIND FARM

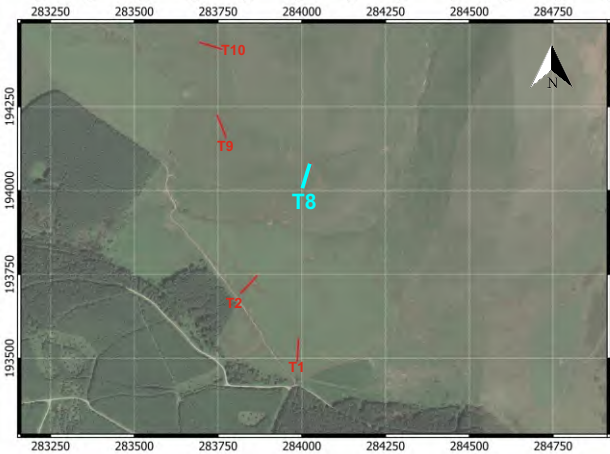
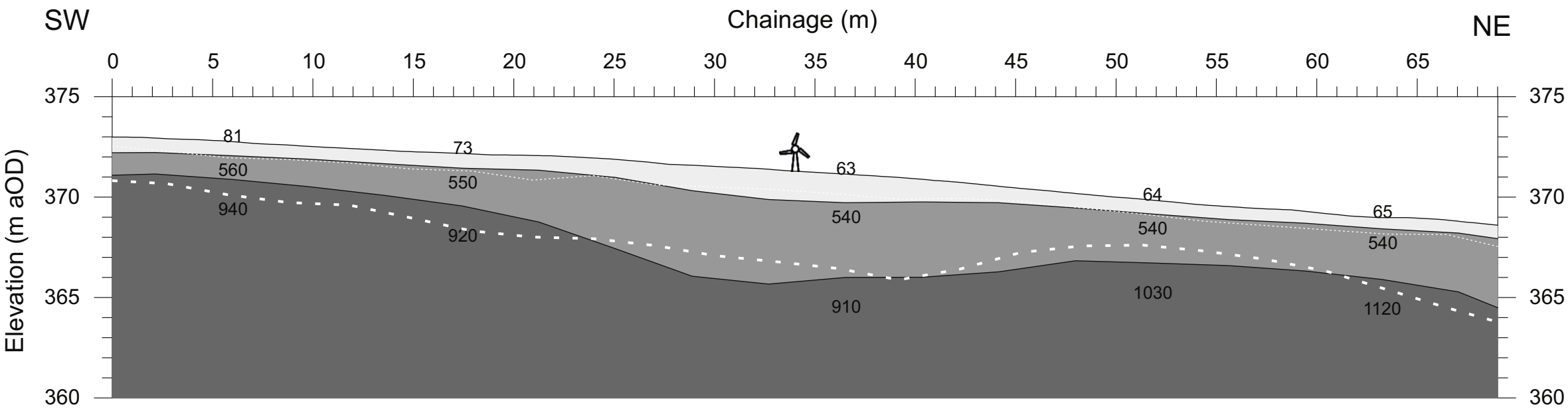
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Drawn by/Ref:	AT/7299/3
Date:	APRIL 2021

FIGURE 3

Line T8 (P-wave) (RMS 3.3%)



Line T8 (S-wave) (RMS 3.7%)



COMPRESSION (P) WAVE KEY:

- Layer P1 170 - 230 m/s** - Unsaturated surface material comprising weak soils and fibrous peat.
- Layer P2b 1010 - 1040 m/s** - Comprising very stiff, compacted, partially saturated sediments at shallow horizons, transitioning into weathered bedrock.
- Layer P4 1960 - 2030 m/s** - Bedrock (Rhondda member)

SHEAR (S) WAVE KEY:

- Layer S1 64 - 81 m/s** - Very soft, unconsolidated soil*.
- Layer S3 540 - 560 m/s** - Very dense soil / weak(soft) weathered rock*.
- Layer S4 920 - 1120 m/s** - Moderately strong bedrock*.

Rock / Soil Description (top 30m)	S-wave velocity (m/s)
Hard rock (<i>strong</i> *)	> 1,500
Rock (<i>moderately strong</i> *)	760 - 1,500
Very dense soil / soft (<i>weak</i> *) rock	360 - 760
Stiff soil	180 - 360
Soft soil	<180

The NEHRP Recommended Provisions for seismic regulation for new buildings, (FEMA-222A and FEMA-223A, 1994)
* UK equivalent classification (Waltham, 1994)

KEY:

- Proposed position of wind turbine along seismic section.
- S-wave boundaries superimposed on P-wave sections.
- P-wave boundaries superimposed S-wave sections.



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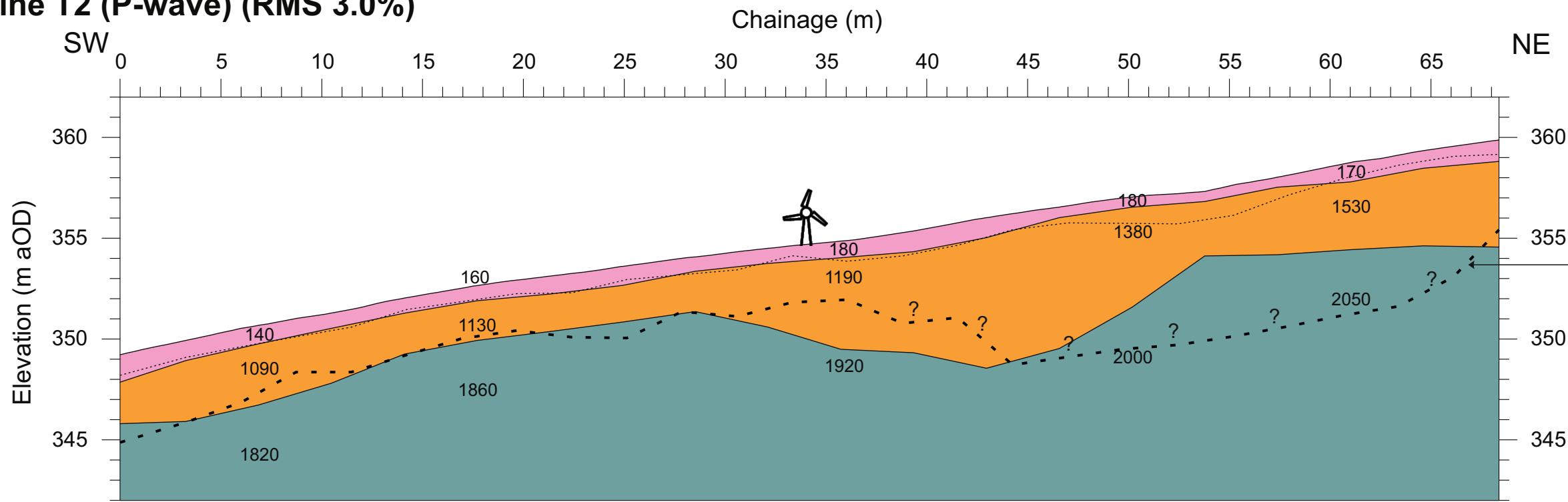
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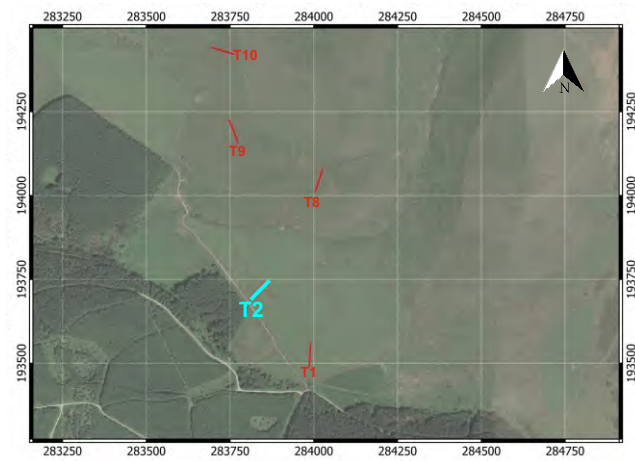
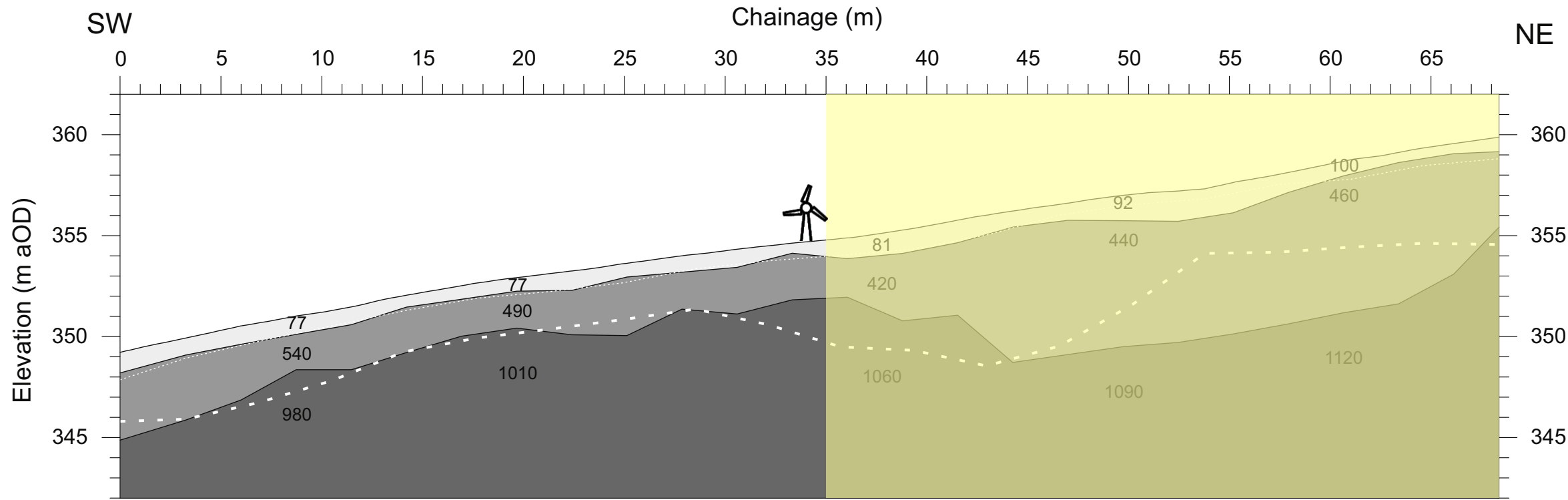
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FIGURE 4

Line T2 (P-wave) (RMS 3.0%)



Line T2 (S-wave) (RMS 4.7%)



COMPRESSION (P) WAVE KEY:

Layer P1 140 - 180 m/s - Unsaturated surface material comprising weak soils and fibrous peat.

Layer P2b 1090 - 1530 m/s - Comprising very stiff, compacted, partially saturated sediments at shallow horizons, transitioning into weathered / weak rock.

Layer P4 1820 - 2050 m/s - Bedrock (Rhondda member)

SHEAR (S) WAVE KEY:

Layer S1 77 - 100 m/s - Very soft, unconsolidated soil*.

Layer S3 490 - 540 m/s - Very dense soil / soft (weak) weathered rock*.

Layer S4 920 - 1120 m/s - Moderately strong bedrock*.

Rock / Soil Description (top 30m)	S-wave velocity (m/s)
Hard rock (<i>strong</i> *)	> 1,500
Rock (<i>moderately strong</i> *)	760 - 1,500
Very dense soil / soft (<i>weak</i> *) rock	360 - 760
Stiff soil	180 - 360
Soft soil	<180

The NEHRP Recommended Provisions for seismic regulation for new buildings, (FEMA-222A and FEMA-223A, 1994)

* UK equivalent classification (Waltham, 1994)

KEY:

Section of S-wave profile with reduced reliability / reduced confidence.

Proposed position of wind turbine along seismic section.

S-wave boundaries superimposed on P-wave sections.

P-wave boundaries superimposed S-wave sections.

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SEISMIC SURVEY RESULTS - T2

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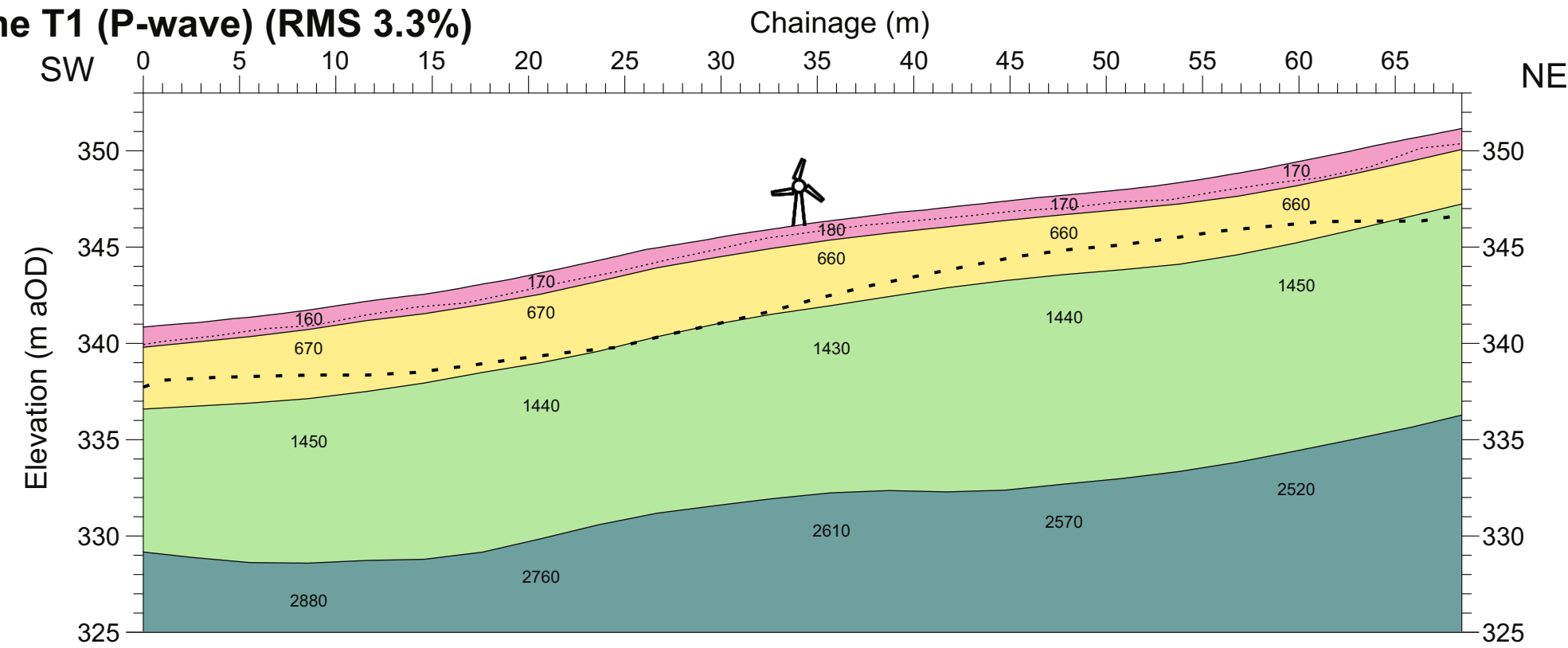
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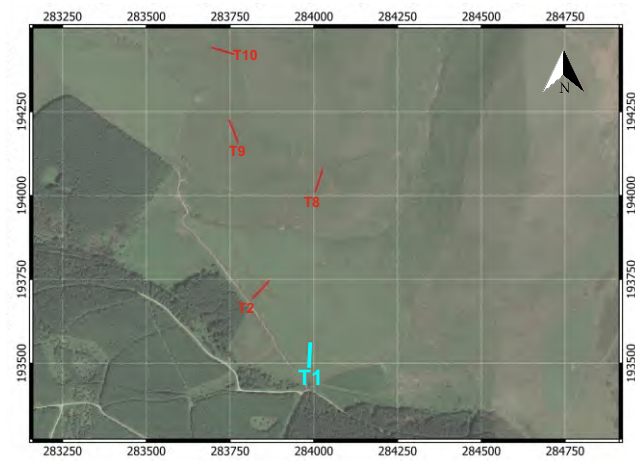
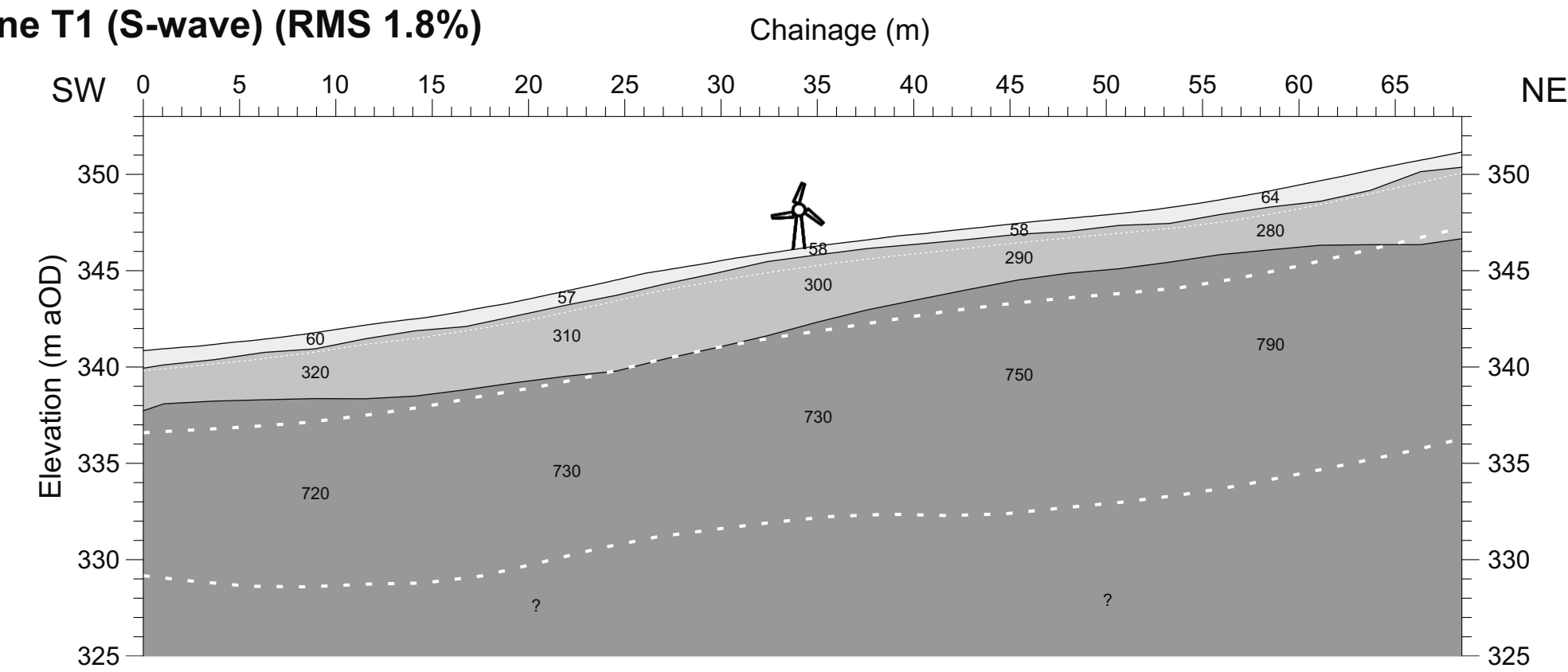
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FIGURE 5

Line T1 (P-wave) (RMS 3.3%)



Line T1 (S-wave) (RMS 1.8%)



COMPRESSION (P) WAVE KEY:

- Layer P1 ~150 m/s** - Unsaturated surface material comprising weak soils and fibrous peat.
- Layer P2a 460 - 670 m/s** - Stiff, compacted, unsaturated sediments.
- Layer P3 1430 - 1450 m/s** - Transition layer comprising stiff soils / weak (soft) rock.
- Layer P4 2520 - 2880 m/s** - Bedrock (Llynfi member).

SHEAR (S) WAVE KEY:

- Layer S1 <70 m/s** - Very soft soils*.
- Layer S2 280 - 320 m/s** - Stiff soils*.
- Layer S3 720 - 790 m/s** - Moderately strong bedrock*.

NOTE: The P and S wave models correlate very well; however, the P-wave model reveals four distinct layers of contrasting velocity whereas the S-wave model is unable to define the deepest refraction boundary, either due to reduced ground penetration or limited contrast in the S-wave velocity with the overlying material.

Rock / Soil Description (top 30m)	S-wave velocity (m/s)
Hard rock (<i>strong</i> *)	> 1,500
Rock (<i>moderately strong</i> *)	760 - 1,500
Very dense soil / soft (<i>weak</i> *) rock	360 - 760
Stiff soil	180 - 360
Soft soil	<180

The NEHRP Recommended Provisions for seismic regulation for new buildings, (FEMA-222A and FEMA-223A, 1994)
* UK equivalent classification (Waltham, 1994)

KEY:

- Proposed position of wind turbine along seismic section.
- S-wave boundaries superimposed on P-wave sections.
- P-wave boundaries superimposed S-wave sections.

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FIGURE 6

APPENDICES

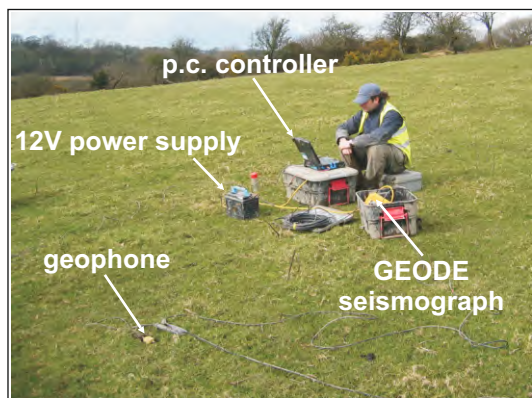
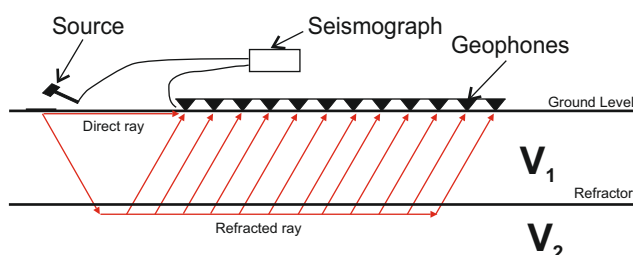
Appendix - Seismic Refraction Survey

Seismic refraction is a useful method for investigating geological structure and rock properties. The technique involves the observation of a seismic signal that has been refracted between layers of contrasting seismic velocity, i.e., at a geological boundary between a high velocity layer and an overlying lower velocity layer.

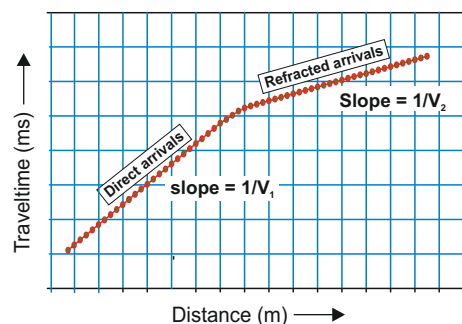
Shots are deployed at the surface and recordings made via a linear array of sensors (geophones or hydrophones). Refracted seismic signal travels laterally through the higher velocity layer (refractor) and generates a 'head-wave' that returns to surface. Beyond a certain distance away from the shot, the signal that has been refracted at depth is observed as first-arrival signal at the geophones. Observation of the travel-times of refracted signal from selectively deployed shots enables derivation of the depth profile of the refractor layer. Shots are typically fired at locations at and beyond both ends of the geophone spread and at regular intervals along its length.

The results of the seismic refraction survey are usually presented in the form of seismic velocity boundaries on interpreted cross-sections. Seismic sections represent the measured bulk properties of the subsurface and enable correlation between point source datasets (boreholes/trialpits) where underlying material is variable. Reference to the published seismic velocity tables enables derivation of rippability values.

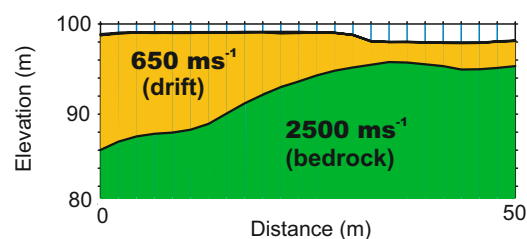
Typical field set-up



Travel-time curve



Modelled velocity section

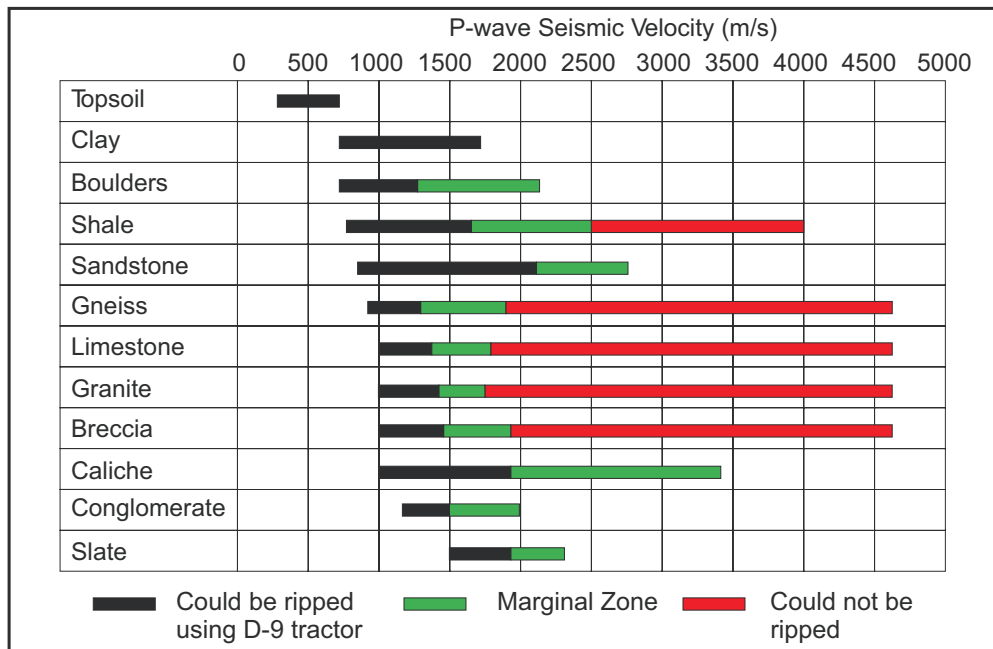


The data processing is carried out using PICKWIN & PLOTREFA (OYO ver2.2) software. The first stage involves accurate determination of the first-arrival times of the seismic signal (time from the hammer blow to each recording hydrophone) for every shot record, using PICKWIN. Time-distance graphs showing the first-arrival times were then generated for each seismic shot record and analysed using PLOTREFA software to determine the number of seismic velocity layers. Modelled depth profiles for the observed seismic velocity layers are produced by a tomographic inversion procedure that is revised iteratively to develop a best fit-model. The final output of a seismic refraction survey is a velocity model section of the subsurface based on an observed layer sequence with measured velocities that correspond to physical properties such as levels of compaction/ saturation in the case of sediments and strength/rippability in the case of bedrock.

Constraints

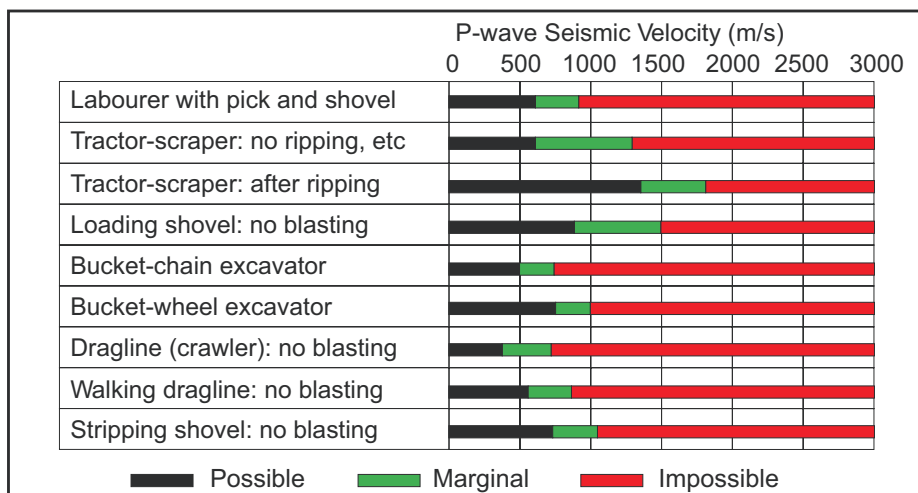
Layer velocity (density) must increase with depth; true in most instances. Layers must be of sufficient thickness to be detectable. Data collected directly over loose fill (landfills) or in the presence of excessive cultural noise may result in sub-standard results. In places where compact clay-rich tills and/or shallow water overly weak bedrock an S-wave survey may be used to profile rockhead where insufficient velocity contrast may prevent use of a P-wave survey.

Appendix - Seismic velocity tables



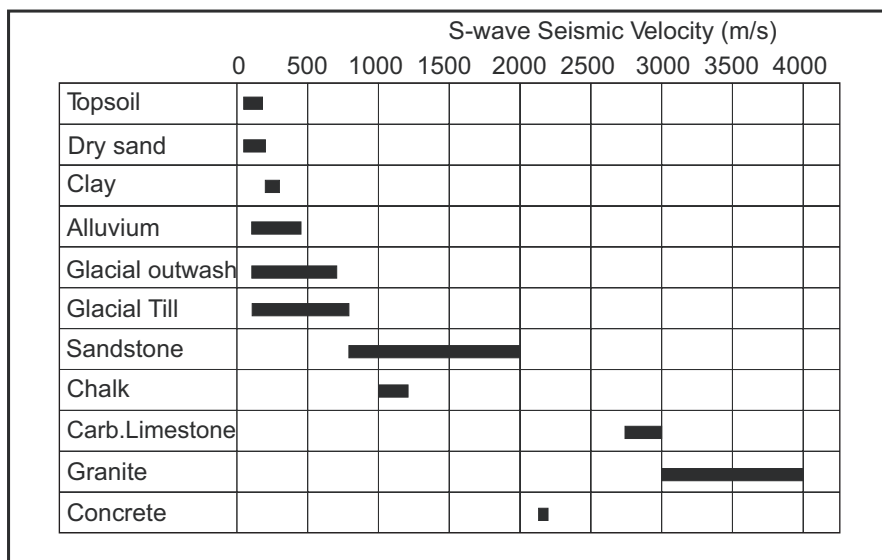
Rippability Chart

from *Geology and Construction*, 1995



Diggability Chart

from *Seismic velocities for determining diggability*, Atkinson 1971



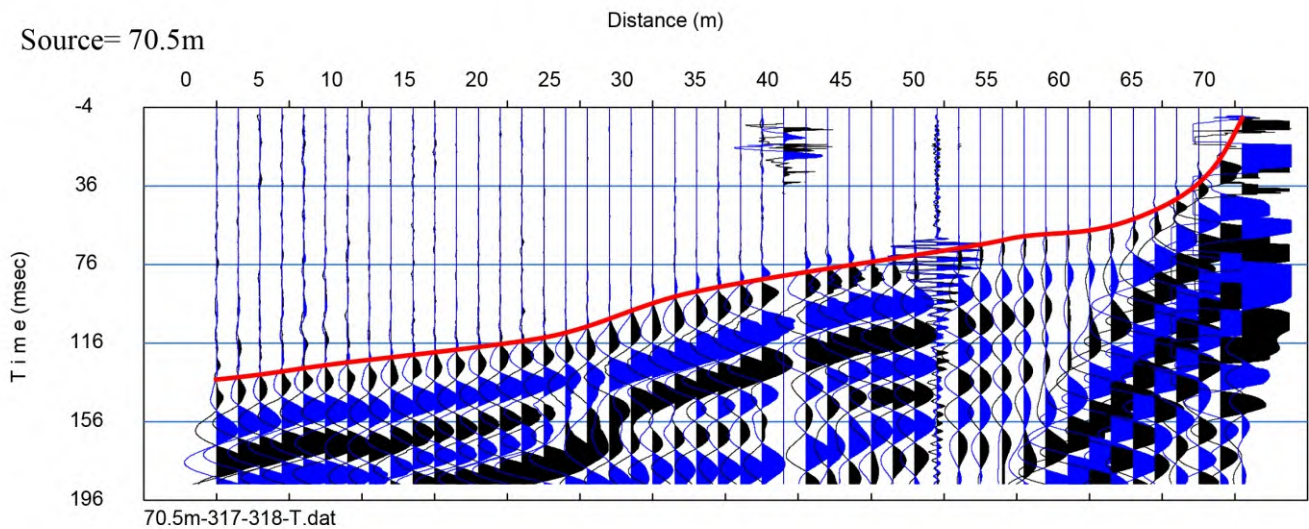
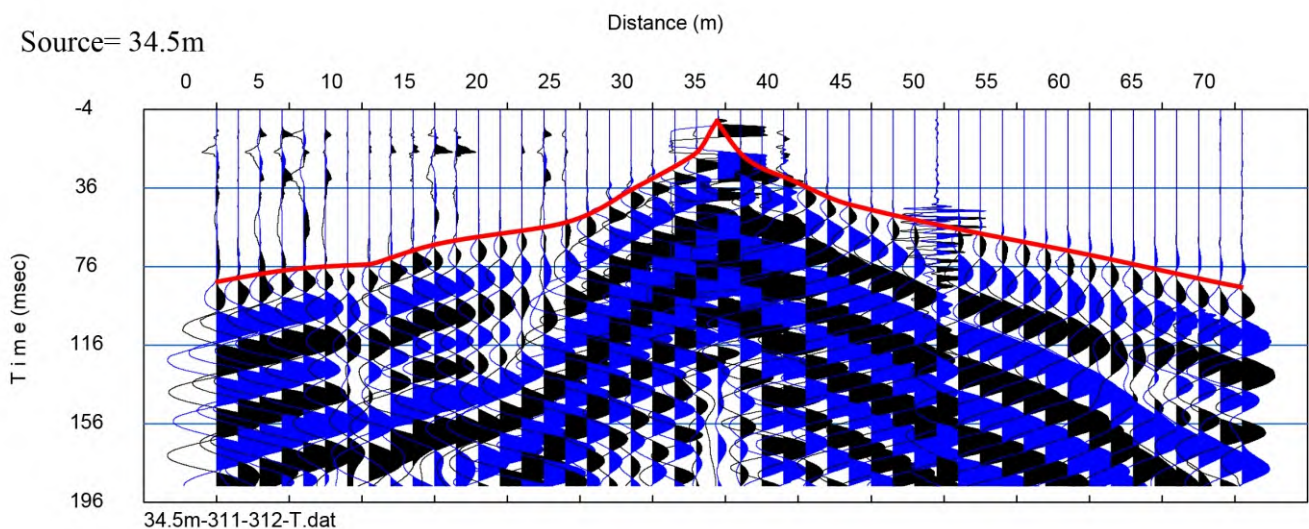
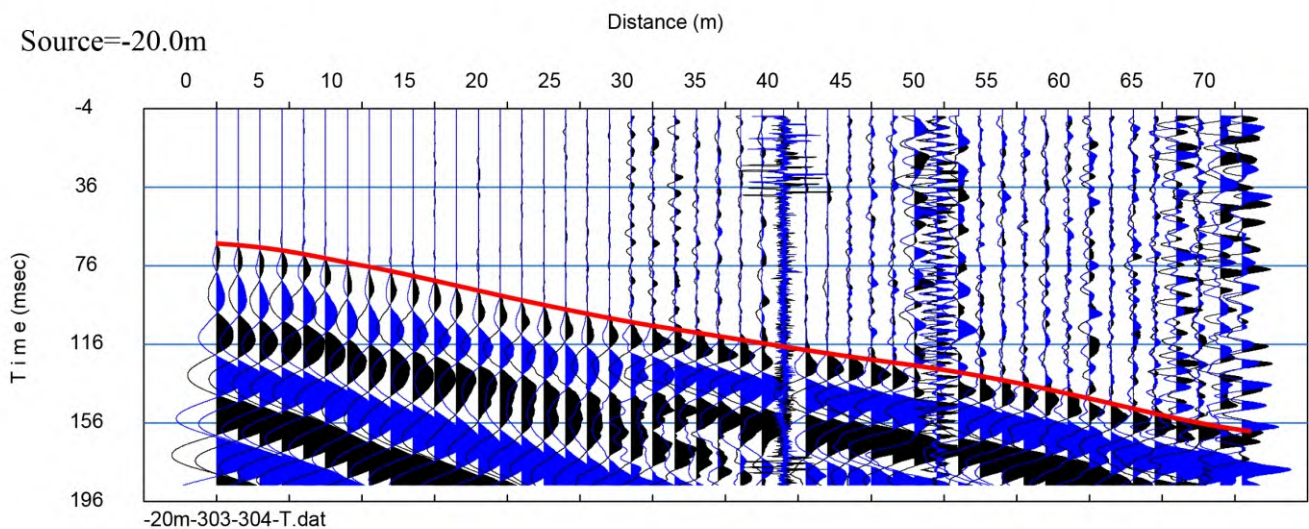
from a compilation of published sources

Rock / Soil Description	S-wave velocity (m/s) Top 30m
Hard rock	> 1,500
Rock	760 - 1,500
Very dense soil / soft rock	360 - 760
Stiff soil	180 - 360
Soft soil	<180

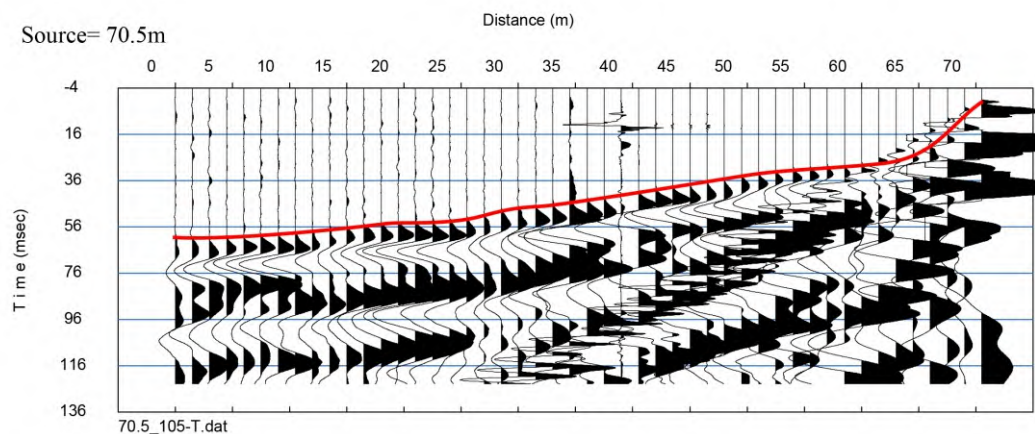
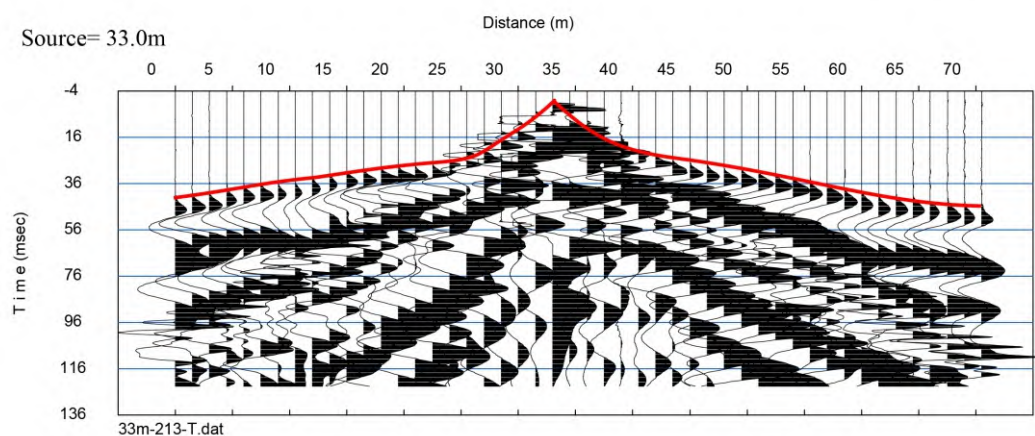
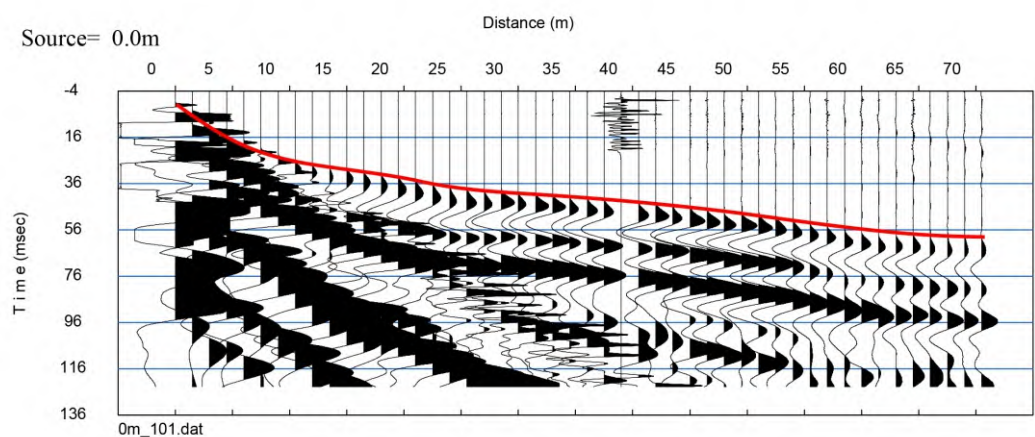
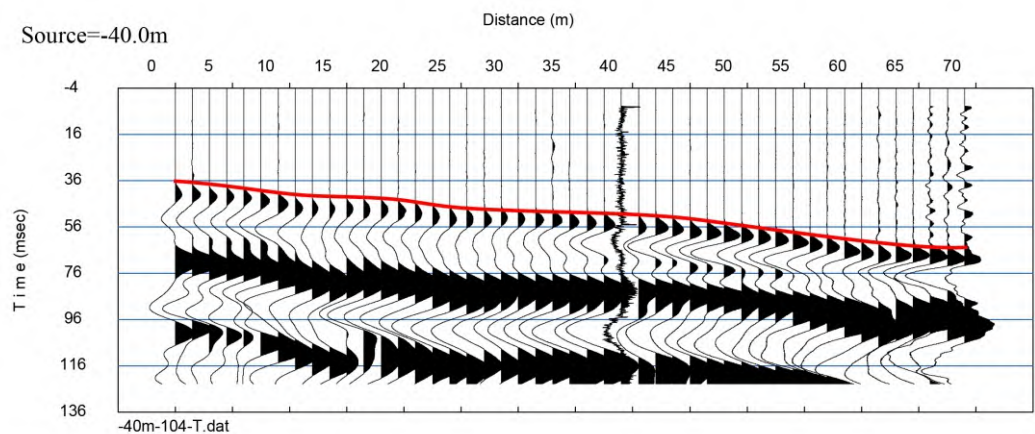
from *National Earthquake Hazard Reduction Prog.*

Shear Waves

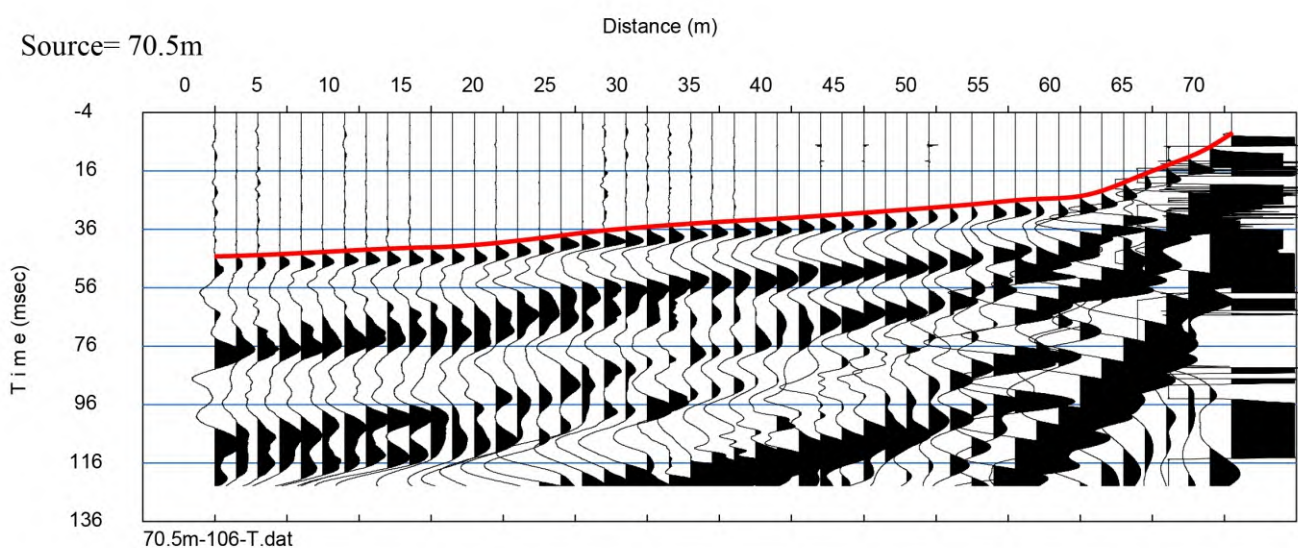
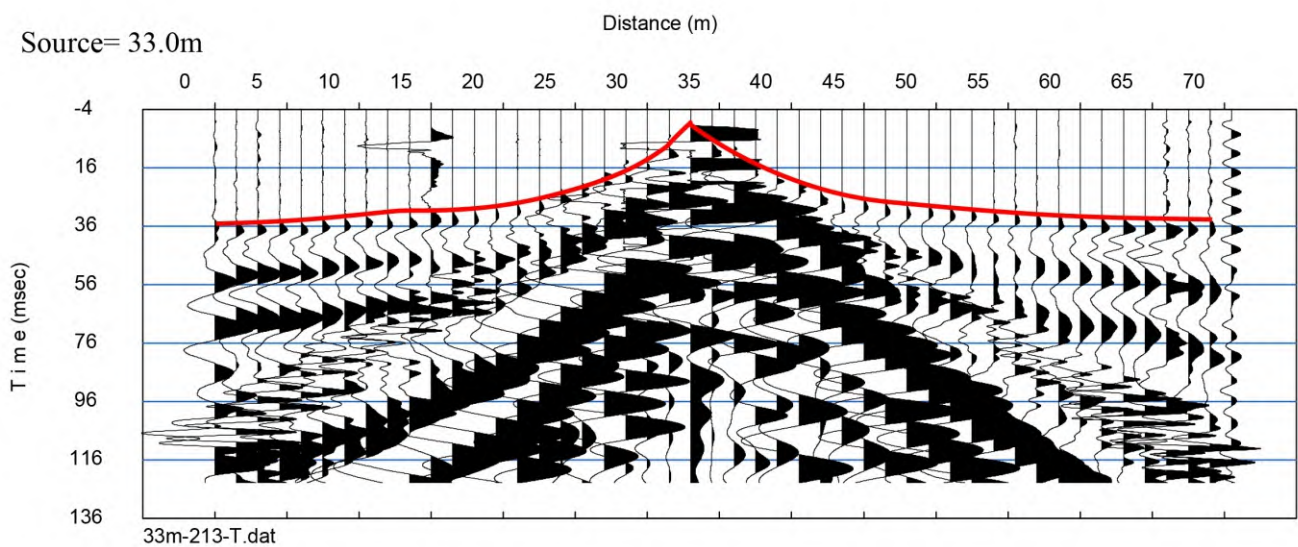
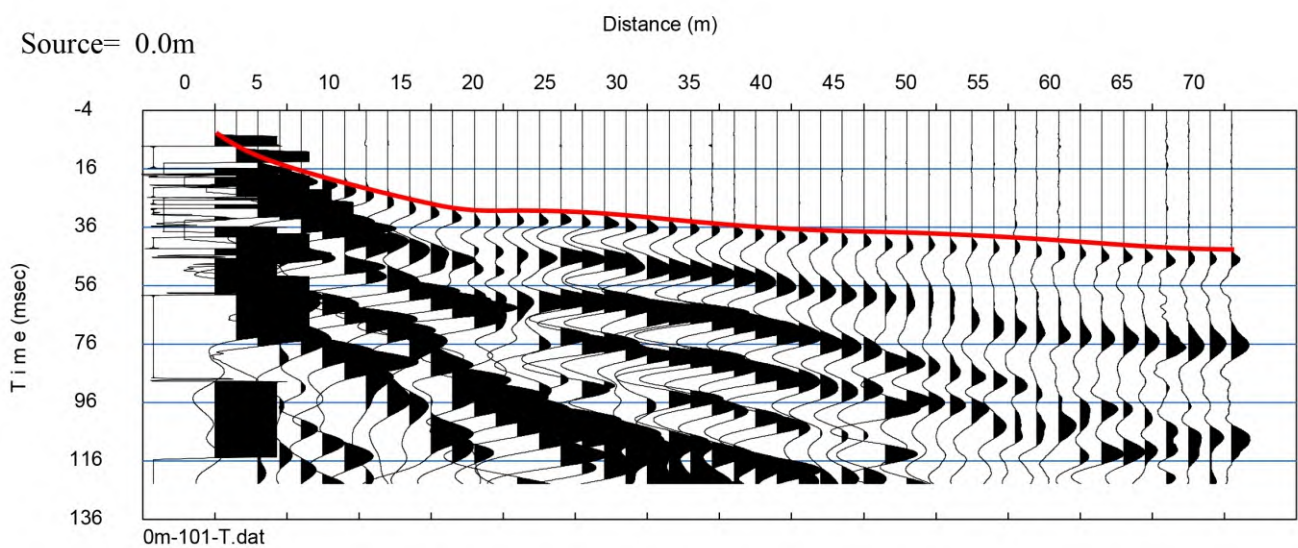
Shot Record Example - Line 1 - Shear Wave



Shot Record Example - Line 1 - P-Wave



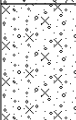
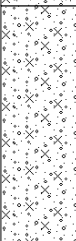
Shot Record Example - Line 10 - P-Wave



APPENDIX E

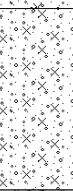
TRIAL PIT LOGS

 Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com			Project Name: Foel Trawsnant Windfarm			Project No.: 12826		Trial Pit No.: TP01 Sheet 1 of 1	
Location: Maesteg			Client: Pennant Walters (FOELT) Ltd			Logged By: RAH		Scale 1:25	
Equipment: Komatsu 138			Coordinates:			Dimensions Depth : 3.50m 4.30m			
Date Excavated: 02/07/2021			Level:						
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
			0.40			North end: Grass over, soft brown slightly gravelly slightly sandy silty CLAY with abundant rootlets. Gravel comprises fine to medium sub-angular sandstone. (Topsoil/subsoil) Encountered to between 0.3m and 0.4mbgl. South end: Grass over, soft dark brown to black very slightly sandy peaty silty CLAY with abundant rootlets. Encountered to between 0.2m and 0.3mbgl. Grading into brown sandy clay. Firm to stiff orange brown sandy gravelly to very gravelly silty CLAY. Gravel comprises fine to coarse sub-angular to angular tabular and blocky sandstone. (Glacial Till)			
			0.70						
			1.50			(Medium dense) light brown very silty/clayey sandy GRAVEL with high cobble content. Gravel and cobbles comprises fine to coarse sub-angular to angular tabular and blocky sandstone. (Glacial Till/Highly Weathered Bedrock) Below 1.2mbgl is becoming silty/clayey.			
						(Medium dense) dark brown to brown silty/clayey sandy GRAVEL and COBBLES of sub-angular to angular tabular and blocky sandstone. (Highly Weathered Bedrock) Low boulder content with depth (up to 0.3 x 0.2 x 0.2m) ...Below 2.0mbgl - Possible closely fractured sandstone in-situ. Less silt/clay and sand content. Grading into sandstone.			
			3.00			Sandstone encountered from 2.6m on west side and 3.0m on east side. Medium strong to strong closely fractured grey mottled brown medium grained SANDSTONE. (Moderately Weathered Bedrock) Excavated as brown gravelly cobbles and boulders of blocky angular sandstone. Apparent dip is sub-horizontal to 20° towards the north.			
			3.50			End of Trialpit at 3.50 m			
Remarks: 1. Trial pit terminated at 3.5mbgl - Target depth reached, sandstone bedrock encountered.			Groundwater: Groundwater not encountered. Slightly damp to damp down to 2.6mbgl.			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			
			Stability: Minor spalling observed.						

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Location: Maesteg			Client: Pennant Walters (FOELT) Ltd			Logged By: RAH		Scale 1:25	
Equipment: Komatsu 138			Coordinates:			Dimensions Depth : 2.90m 4.30m			
Date Excavated: 02/07/2021			Level:						
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
0.50			0.30			Grass over, soft dark brown to black sandy peaty silty CLAY with abundant rootlets. (Topsoil/ subsoil)			
						Grading to brown (acidic staining/leaching) sandy silty CLAY below 0.2m.			
						Firm to stiff orange brown gravelly silty CLAY/fine SAND with occasional rootlets. Gravel comprises fine to medium sub-angular sandstone. (Glacial Till)			
0.80 - 1.20			0.80			(Medium dense) light brown very silty/clayey sandy GRAVEL of fine to coarse sub-angular to angular blocky sandstone. (Glacial Till/Highly Weathered Bedrock)			
						Becoming fine to coarse with depth.			
						(Dense) light brown silty/clayey sandy GRAVEL of fine to coarse sub-angular to angular tabular and blocky sandstone with medium cobble content. (Highly Weathered to Moderately Weathered Bedrock)			
						Excavation is slow.			
			1.20			Sandstone encountered from 1.6m on west side and 2.0m on east side.			
			2.00			Medium strong to strong closely fractured grey mottled brown and rusty brown medium grained SANDSTONE with some silty sand between fractures. (Moderately Weathered Bedrock)			
						Excavated as light brown gravelly cobbles and boulders of blocky, tabular and angular sandstone. Boulders up to 0.4m x 0.3 x 0.1m.			
						Apparent dip is sub-horizontal to 20° towards the north.			
			2.90			End of Trialpit at 2.90 m			
Remarks: 1. Trial pit terminated at 2.9mbgl - Target depth reached and hard dig.			Groundwater: Groundwater not encountered. Slightly damp to damp down to base.			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			
			Stability: Minor spalling observed.						

Intégral Géotechnique			Project Name: Foel Trawsnant Windfarm			Project No.: 12826		Trial Pit No.: TP03 Sheet 1 of 1			
Location: Maesteg			Client: Pennant Walters (FOELT) Ltd			Logged By: RAH		Scale 1:25			
Equipment: Komatsu 138			Coordinates:			Dimensions 4.50m					
Date Excavated: 02/07/2021			Level:			Depth : 3.20m					
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description					
Depth (m)	Type	Results									
			0.30			Grass over, soft dark brown to black peaty silty CLAY with abundant rootlets. (Topsoil/subsoil)					
						Grading to an intermittent light brown (acidic staining/leaching) sandy silty CLAY below 0.2m.					
						0.70		Soft to firm grey and orange brown sandy gravelly silty CLAY. Gravel comprises fine to coarse sub-angular sandstone. Damp to wet. (Glacial Till)			
								Encountered to between 0.5m and 0.7mbgl.			
						0.90		Firm to stiff orange brown sandy gravelly to very gravelly silty CLAY. Gravel comprises fine to coarse sub-angular sandstone. Tending to clayey sandy gravel. (Glacial Till)			
								(Medium dense) light brown silty/clayey sandy to very sandy GRAVEL of fine to medium sub-angular to angular sandstone. (Glacial Till/Highly Weathered Bedrock) ...Below 1.5mbgl is medium dense to dense and fine to coarse.			
						1.90		(Dense) light brown slightly silty sandy GRAVEL and COBBLES of fine to coarse angular tabular and blocky sandstone/Medium strong very closely to closely fractured SANDSTONE. (Highly Weathered to Moderately Weathered Bedrock)			
								No clear structure. Medium strong to strong very closely to closely fractured grey fine to medium SANDSTONE with some silty sand between fractures. (Moderately Weathered Bedrock)			
						2.20		Excavated at sandy gravel and cobbles of angular, blocky and tabular sandstone. <i>Locally apparent sub-vertical dip seen in tabular cobbles in south-west face only.</i> <i>No clear structure in north-east face.</i>			
3.20					End of Trialpit at 3.20 m						
Remarks: 1. Trial pit terminated at 3.2mbgl - Target depth reached and hard dig.			Groundwater: Groundwater not encountered. Slightly damp to damp down to base.			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample					
			Stability: Some spalling observed.								

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Location: Maesteg			Client: Pennant Walters (FOELT) Ltd			Logged By: RAH		Scale 1:25	
Equipment: Komatsu 138			Coordinates:			Dimensions Depth : 3.20m 5.40m			
Date Excavated: 02/07/2021			Level:			Depth : 3.20m 1.50m			
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
0.40			0.30			Grass over, firm dark brown slightly sandy peaty silty CLAY with abundant rootlets. (Topsoil/ subsoil) Grading to an intermittent brown (acidic staining/leaching) silty CLAY below 0.2m.			
			0.60			Firm to stiff orange brown sandy gravelly silty CLAY with low boulder content and occasional rootlets. Gravel and boulders comprise fine to coarse sub-angular sandstone (up to 0.4m x 0.2m x 0.3m). (Glacial Till)			
1.80 - 2.00			1.40			Extends to between 0.5m and 0.6mbgl. (Medium dense) light brown silty very sandy GRAVEL with low to medium cobble content. Gravel and cobbles comprise sub-angular to angular tabular and blocky sandstone. (Glacial Till/Highly Weathered Bedrock)			
			3.20			Medium strong to strong closely fractured grey medium grained SANDSTONE with some silty sandy between fractures. (Moderately Weathered Bedrock) Excavated as brown sandy gravelly cobbles and boulders of angular and tabular sandstone. <i>Apparent dip is sub-horizontal towards the north/north-east. West face is seen as cobbles and boulders, east face exhibits no clear structure.</i>			
						End of Trialpit at 3.20 m			
Remarks: 1. Trial pit terminated at 3.2mbgl - Target depth reached, sandstone bedrock encountered.			Groundwater: Groundwater not encountered. Slightly damp to damp down to base.			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			
			Stability: Some spalling of west side observed.						

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Location: Maesteg			Client: Pennant Walters (FOELT) Ltd			Logged By: RAH		Scale 1:25	
Equipment: Komatsu 138			Coordinates:			Dimensions Depth : 2.80m 4.50m			
Date Excavated: 02/07/2021			Level:						
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
			0.25		 Grass over, firm dark brown slightly sandy slightly peaty silty CLAY with abundant rootlets. (Topsoil/subsoil) Extends to between 0.2m and 0.25mbgl.				
			0.60		 Firm to stiff orange brown sandy gravelly silty CLAY with occasional rootlets. Gravel comprises fine to coarse sub-angular to sub-rounded sandstone. (Glacial Till)				
			1.20		 (Medium dense) light brown silty/clayey very sandy GRAVEL of fine to coarse sub-rounded to angular sandstone with low cobble content. (Glacial Till)				
			2.60		 (Medium dense) light brown slightly silty sandy GRAVEL and COBBLES of fine to coarse sub-angular to angular, blocky and tabular sandstone with low boulder content. (Highly Weathered Bedrock) <i>Locally loose/easy to excavate, due to fissile nature and spalling during excavation.</i>				
			2.80		 Excavated as BOULDERS of angular blocky medium grained sandstone. (Highly Weathered Bedrock) Possible medium strong medium spaced fractured sandstone in-situ. No clear structure.	End of Trialpit at 2.80 m			
Remarks: 1. Trial pit terminated at 2.8mbgl - Due to spalling.			Groundwater: Groundwater not encountered. Slightly damp to damp down to base.			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			
			Stability: Significant spalling of west side observed.						

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Location: Maesteg			Client: Pennant Walters (FOELT) Ltd			Logged By: RAH		Scale 1:25	
Equipment: Komatsu 138			Coordinates:			Dimensions Depth : 2.90m 4.00m			
Date Excavated: 05/07/2021			Level:						
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
						Grass over, firm dark brown peaty silty CLAY with abundant rootlets. (Topsoil/subsoil)			
			0.25			Firm grey brown slightly gravelly very sandy silty CLAY with abundant rootlets. Gravel comprises fine to coarse sub-angular sandstone. (Glacial Till)			
			0.40			Firm to stiff orange brown sandy gravelly silty CLAY tending to sand with occasional rootlets. Gravel comprises fine to coarse sub-angular to sub-rounded sandstone. (Glacial Till)			
			0.70			(Medium dense) light brown silty sandy GRAVEL of fine to coarse sub-angular to angular, tabular sandstone with low cobble content. (Highly Weathered Sandstone)			
			1.40			(Medium dense to dense) light brown and brown slightly silty sandy very gravelly COBBLES of fine to coarse sub-angular to angular, blocky sandstone. (Highly Weathered Bedrock) Becoming dark brown with depth.			
			1.90			Medium strong to strong closely to medium spaced fractured brown, weathered to dark brown, medium grained SANDSTONE with rare silty sandy between fractures. (Moderately Weathered Bedrock) Excavated as brown gravelly cobbles and boulders of angular sandstone, up to 0.6m x 0.5m x 0.3m. <i>Apparent dip is sub-horizontal towards the north/north-east.</i>			
			2.90			End of Trialpit at 2.90 m			
Remarks: 1. Trial pit terminated at 2.9mbgl - Target depth reached and hard dig.			Groundwater: Groundwater not encountered. Slightly damp to damp down to base.			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			
			Stability: Some spalling below 1.5mbgl observed.						

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Location: Maesteg			Client: Pennant Walters (FOELT) Ltd			Logged By: RAH		Scale 1:25	
Equipment: Komatsu 138			Coordinates:			Dimensions Depth : 1.90m 4.50m			
Date Excavated: 05/07/2021			Level:			Depth : 1.90m 1.40m			
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
0.10 - 0.20			0.30			Grass over, soft dark brown sandy peaty silty CLAY with abundant rootlets. (Topsoil/subsoil)			
						Grading to brown (acidic staining/leaching) silty CLAY below 0.2m.			
						Firm to stiff orange brown sandy gravelly silty CLAY with occasional rootlets. Gravel comprises fine to coarse sub-rounded to angular sandstone. (Glacial Till)			
						(Medium dense) brown silty very sandy GRAVEL of fine to coarse sub-angular to angular sandstone with low cobble content. Locally weathered dark brown to black. (Highly Weathered Bedrock)			
						Medium strong to strong grey, weathered to brown, closely fractured fine to medium grained SANDSTONE.			
			1.00			Excavated as brown gravelly cobbles and boulders of angular sandstone.			
						...Below 1.3 is very hard dig.			
						1.0m - 1.3m: Locally looser to excavate and some gravelly sand between fractures.			
						Apparent dip is sub-horizontal towards the north/north-east in south face only.			
						End of Trialpit at 1.90 m			
			1.90						
Remarks: 1. Trial pit terminated at 1.9mbgl - Due to hard dig.			Groundwater: Groundwater not encountered. Slightly damp to damp down to base.			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			
			Stability: Some spalling observed.						

Intégral Géotechnique			Project Name: Foel Trawsnant Windfarm			Project No.: 12826		Trial Pit No.: TP08 Sheet 1 of 1	
Location: Maesteg			Client: Pennant Walters (FOELT) Ltd			Logged By: RAH		Scale 1:25	
Equipment: Komatsu 138			Coordinates:			Dimensions 4.00m			
Date Excavated: 05/07/2021			Level:			Depth : 3.20m 1.40m			
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
0.40 - 0.65			0.40			Grass over, soft dark brown to black peaty silty CLAY with abundant rootlets. (Topsoil/subsoil) Grading to grey brown (acidic staining/leaching) slightly sandy silty CLAY below 0.2m.			
						Firm to stiff orange brown sandy gravelly silty CLAY with low to medium cobble content. Gravel and cobbles comprise fine to coarse sub-rounded to angular sandstone. (Glacial Till)			
						Firm to stiff brown sandy very gravelly slightly silty CLAY with low to medium cobble content. Gravel and cobbles comprise fine to coarse sub-angular to angular sandstone. Sandstone is fine grained and bordering siltstone. (Glacial Till/Highly Weathered Bedrock)			
						(Medium dense) brown silty gravelly SAND with low to medium cobble content. Gravel and cobbles comprise fine to coarse sub-angular to angular sandstone. Sandstone is fine grained and bordering siltstone. (Highly Weathered Bedrock)			
						(Medium dense) brown slightly sandy silty/clayey GRAVEL of fine to coarse sub-angular to angular, blocky, sandstone and mudstone with high cobble content. Locally weathered to rusty brown and dark brown. (Highly Weathered Bedrock)			
						Strong closely fractured grey, weathered to brown, medium grained SANDSTONE. (Weathered Bedrock) Fractures predominantly sub-horizontal along bedding planes, estimated thinly to very thinly bedded.			
3.20						Excavated as angular blocky gravelly cobbles. Apparent sub-horizontal dip towards the north seen in the south face only. No clear structure in north face.			
						End of Trialpit at 3.20 m			
Remarks:			Groundwater:			Key:			
1. Trial pit terminated at 3.2mbgl - Target depth reached and hard dig.			Slightly damp to damp down to base.			D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			
			Stability:			Some spalling of sandstone observed.			

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Location: Maesteg			Client: Pennant Walters (FOELT) Ltd			Logged By: RAH		Scale 1:25	
Equipment: Komatsu 138			Coordinates:			Dimensions Depth : 2.90m 4.20m			
Date Excavated: 05/07/2021			Level:						
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
1.00			0.30			Grass over, soft dark brown to black slightly gravelly sandy peaty silty CLAY with abundant rootlets. Gravel comprises fine to medium subrounded quartz. (Topsoil/subsoil)			
			0.50			Grading to brown (acidic staining/leaching) sandy silty CLAY below 0.2m.			
			1.30			Firm to stiff orange brown sandy gravelly silty CLAY with occasional rootlets. Gravel comprises fine to coarse sub-rounded to sub-angular sandstone. (Glacial Till)			
			1.70			(Medium dense) brown silty/clayey gravelly SAND tending to firm to stiff very sandy gravelly silty clay. Gravel comprises fine to coarse sub-rounded to angular sandstone. (Glacial Till)			
			2.60			(Medium dense) brown slightly silty slightly clayey very sandy GRAVEL of fine to coarse sub-rounded to angular sandstone with low cobble content. (Glacial Till)			
			2.90			(Medium dense) dark brown to black slightly silty very sandy GRAVEL of fine to coarse sub-angular to angular, blocky sandstone with medium cobble content. (Highly Weathered Bedrock)			
			2.90			Abundant manganese staining.			
			2.90			...Below 2.2mbgl with increasing cobbles (high cobble content).			
Remarks: 1. Trial pit terminated at 2.9mbgl - Target depth reached and hard dig.			Groundwater: Groundwater not encountered. Slightly damp down to base, sandstone is damp.			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			

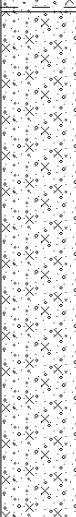
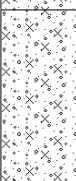
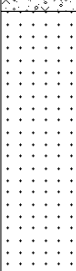
 Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com			Project Name: Foel Trawsnant Windfarm			Project No.: 12826		Trial Pit No.: TP10 Sheet 1 of 1	
Location: Maesteg			Client: Pennant Walters (FOELT) Ltd			Logged By: RAH		Scale 1:25	
Equipment: Komatsu 138			Coordinates:			Dimensions Depth : 2.40m 4.40m			
Date Excavated: 05/07/2021			Level:						
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
0.80 - 0.90			0.30			Grass over, soft dark brown to black peaty silty CLAY with abundant rootlets. (Topsoil/subsoil) Extends to between 0.2m and 0.3mbgl.			
			0.40			Firm to stiff orange brown sandy gravelly silty CLAY with occasional rootlets. Gravel comprises fine to coarse sub-rounded to angular sandstone. (Glacial Till) Stiff brown gravelly very sandy slightly silty CLAY with low cobble content. Gravel and cobbles comprise fine to coarse sub-rounded to angular sandstone. (Glacial Till)			
			0.75			(Medium dense) brown silty very sandy GRAVEL of fine to coarse sub-angular to angular sandstone with low to medium cobble content. (Glacial Till/Highly Weathered Bedrock) Tending to sand from 0.75m to 0.9m. ...Becoming high cobble content with depth.			
			1.40			(Medium dense to dense) brown slightly silty sandy GRAVEL and COBBLES of fine to coarse sub-angular to angular, blocky sandstone. (Highly Weathered Bedrock)			
			2.00			Strong closely fractured grey, weathered to brown, medium grained SANDSTONE. (Weathered Bedrock) Fractures predominantly sub-horizontal along bedding planes, estimated thinly to very thinly bedded.			
			2.40			Excavated as angular blocky gravelly cobbles.			
			2.40			...Below 2.2m is very hard to excavate. Scratching at base, very hard dig.			
						End of Trialpit at 2.40 m			

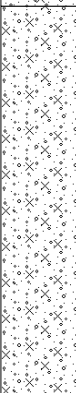
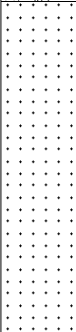
Remarks: 1. Trial pit terminated at 2.4mbgl - Target depth reached and hard dig.	Groundwater: Groundwater not encountered. Slightly damp down to base.	Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample	
	Stability: Minor spalling observed.		

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Location: Maesteg			Client: Pennant Walters (FOELT) Ltd			Logged By: RAH		Scale 1:25	
Equipment: Komatsu 138			Coordinates:			Dimensions Depth : 2.40m 4.70m			
Date Excavated: 05/07/2021			Level:						
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
			0.30			Grass over, soft dark brown to black peaty silty CLAY with abundant rootlets. (Topsoil/subsoil) Extends to between 0.2m and 0.3mbgl.			
			0.40						
			1.70			Firm to stiff orange brown sandy gravelly silty CLAY with occasional rootlets. Gravel comprises fine to coarse sub-rounded to angular sandstone. (Glacial Till) (Medium dense) brown silty sandy GRAVEL of fine to coarse sub-angular to angular sandstone with low cobble content. (Glacial Till/Highly Weathered Bedrock) More silty/clayey between 0.4m and 0.7m, tending to stiff very gravelly clay.			
			1.90						
			2.40			(Medium dense to dense) brown slightly silty sandy GRAVEL and COBBLES of fine to coarse sub-angular to angular, blocky sandstone. (Highly Weathered Bedrock) Strong closely fractured grey, weathered to brown, medium grained SANDSTONE. (Weathered Bedrock) Fractures predominantly sub-horizontal along bedding planes, estimated thinly to very thinly bedded. Excavated as angular tabular and blocky gravelly cobbles.			
			2.40						
...Below 2.2m is very hard to excavate. Apparent sub-horizontal dip towards the north. Scratching at base, very hard dig.						End of Trialpit at 2.40 m			
Remarks: 1. Trial pit terminated at 2.4mbgl - Target depth reached and hard dig.						Groundwater: Groundwater not encountered. Slightly damp down to base.		Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample	
						Stability: Some spalling of sandstone observed, generally minor.			

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Location: Maesteg			Client: Pennant Walters (FOELT) Ltd			Logged By: RAH		Scale 1:25	
Equipment: Komatsu 138			Coordinates:			Dimensions 4.50m			
Date Excavated: 05/07/2021			Level:			Depth : 3.30m 1.40m			
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
			0.30			Grass over, soft dark brown to black peaty silty CLAY with abundant rootlets. (Topsoil/subsoil)			
						Grading to brown (acidic staining/leaching) sandy silty CLAY below 0.1/0.2m.			
						Extends to between 0.2m and 0.3mbgl.			
						0.60		Firm to stiff orange brown, mottled brown and grey brown, sandy gravelly silty CLAY with occasional rootlets. Gravel comprises fine to coarse sub-rounded to angular sandstone. (Glacial Till)	
								Firm to stiff light brown sandy gravelly silty CLAY with low cobble content. Gravel and cobbles comprise sub-rounded to angular sandstone. (Glacial Till)	
0.85		(Medium dense) light brown silty sandy GRAVEL of sub-rounded to angular and blocky sandstone with high cobble content. (Glacial Till/Highly Weathered Bedrock)							
		1.90		Medium strong to strong, locally weak, closely to very closely fractured grey weathered to rusty brown and dark brown to black, medium grained SANDSTONE with some slightly silty sand between fractures.					
3.30				Excavated as slightly silty slightly sandy sub-angular to angular blocky gravel and cobbles. No clear structure or discernible bedding. Possible sub-horizontal dip towards the north.					
		End of Trialpit at 3.30 m							
Remarks: 1. Trial pit terminated at 3.3mbgl - Target depth reached, sandstone bedrock encountered.			Groundwater: Groundwater not encountered. Slightly damp down to base.			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			
			Stability: Minor spalling observed.						

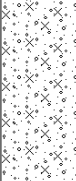
 Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com		Project Name: Foel Trawsnant Windfarm		Project No.: 12826		Trial Pit No.: TP13 Sheet 1 of 1	
Location: Maesteg		Client: Pennant Walters (FOELT) Ltd		Logged By: RAH		Scale 1:25	
Equipment: Komatsu 138		Coordinates:		Dimensions 4.50m Depth : 3.20m 1.40m			
Date Excavated: 05/07/2021		Level:					
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.50 - 0.80			0.30		 Grass over, soft dark brown to brown peaty silty CLAY with abundant rootlets. (Topsoil/subsoil) Grading to brown (acidic staining/leaching) sandy silty CLAY below 0.1/0.2m.		
			0.90		Extends to between 0.2m and 0.3mbgl. Firm to stiff orange brown, mottled brown and grey brown, sandy gravelly silty CLAY with occasional rootlets (down to 0.5mbgl only). Gravel comprises fine to coarse sub-rounded to angular sandstone. (Glacial Till)		
			2.50		(Medium dense) light brown silty sandy to very sandy GRAVEL of fine to coarse sub-angular to angular sandstone. (Glacial Till/Weathered Bedrock) ...Becoming dense between 1.8m with low cobble content.		
			3.20		(Dense) brown slightly silty slightly sandy GRAVEL and COBBLES of sub-angular to angular sandstone. (Weathered Bedrock) Possible very closely to closely fractured sandstone in-situ. No clear structure.		
					End of Trialpit at 3.20 m		
Remarks: 1. Trial pit terminated at 3.2mbgl - Target depth reached.				Groundwater: Groundwater not encountered. Slightly damp down to base.		Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample	
				Stability: Minor spalling observed.			

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Location: Maesteg			Client: Pennant Walters (FOELT) Ltd			Logged By: RAH		Scale: 1:25	
Equipment: Komatsu 138			Coordinates:			Dimensions: 4.80m			
Date Excavated: 06/07/2021			Level:			Depth : 3.90m			
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description			
0.60			0.20			Grass over, soft dark brown to black slightly sandy peaty silty CLAY with abundant rootlets. (Topsoil/subsoil)			
			0.70			Soft to firm, locally firm to stiff, mottled brown grey and orange brown gravelly silty CLAY/ SAND. Gravel comprises fine to coarse sub-rounded to angular sandstone. (Glacial Till) <i>Up gradient end of TP is firmer and present to 0.5m. Down gradient end is soft and damp to wet, present to 0.7mbgl.</i>			
			2.40			(Medium dense) brown silty/clayey sandy GRAVEL of fine to coarse sub-rounded to angular sandstone and occasional siltstone with medium cobble content and low boulder content. Cobbles are boulders are blocky sandstone up to 0.8m x 0.4m x 0.25m. (Glacial Till)			
			3.00			(Medium dense) brown silty sandy GRAVEL of fine to coarse sub-angular to angular sandstone with high cobble content. (Weathered Bedrock)			
			3.90			Medium strong medium spaced fractured grey, weathered to brown, fine to medium grained SANDSTONE with much sandy clay between fractures. (Weathered Bedrock) Fractures are open and irregular. Excavated as cobbles and boulders of angular blocky sandstone.			
						End of Trialpit at 3.90 m			
Remarks: 1. Trial pit terminated at 3.9mbgl - Target depth reached and hard dig.			Groundwater: Groundwater not encountered. Slightly damp down to base.			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			
			Stability: Minor spalling observed.						

 Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com			Project Name: Foel Trawsnant Windfarm			Project No.: 12826		Trial Pit No.: TP15 Sheet 1 of 1	
Location: Maesteg			Client: Pennant Walters (FOELT) Ltd			Logged By: RAH		Scale 1:25	
Equipment: Komatsu 138			Coordinates:			Dimensions 4.70m			
Date Excavated: 06/07/2021			Level:			Depth : 2.90m 1.40m			
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
0.50 - 0.70			0.30			Grass over, soft dark brown to black sandy peaty silty CLAY with abundant rootlets. (Topsoil/ subsoil) Extends to between 0.2m and 0.3mbgl.			
			0.50			Firm orange brown sandy gravelly silty CLAY with occasional rootlets. Gravel comprises fine to coarse sub-rounded to angular sandstone. (Glacial Till)			
						(Medium dense) light brown silty sandy GRAVEL of fine to coarse sub-angular to angular sandstone with low cobble content. (Highly Weathered Bedrock) ...Below 1.0m is high cobble content and slightly silty. Firm to stiff light brown slightly sandy very gravelly silty CLAY. Intermittent Layer.			
			1.80			Weak to medium strong closely fractured grey, weathered to brown, dark brown and rusty brown, thinly bedded medium grained SANDSTONE with rare silty sand between fractures. (Weathered Bedrock) Fractures are generally sub-horizontal, along bedding planes, and open, planar and rough. Excavated as gravelly cobbles of angular tabular sandstone, occasionally blocky. Apparent sub-horizontal dip towards the north.			
			2.90			End of Trialpit at 2.90 m			
Remarks: 1. Trial pit terminated at 2.9mbgl - Target depth reached, sandstone bedrock encountered.			Groundwater: Groundwater not encountered. Slightly damp down to base.			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			
			Stability: Some spalling of sandstone observed.						

 Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com			Project Name: Foel Trawsnant Windfarm			Project No.: 12826		Trial Pit No.: TP16 Sheet 1 of 1	
Location: Maesteg			Client: Pennant Walters (FOELT) Ltd			Logged By: RAH		Scale 1:25	
Equipment: Komatsu 138			Coordinates:			Dimensions 1.40m			
Date Excavated: 06/07/2021			Level:			Depth : 2.80m			
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
0.50 - 0.70			0.25			Grass over, soft dark brown to black sandy peaty silty CLAY with abundant rootlets. (Topsoil/ subsoil)			
			0.40			Grading to brown (acidic staining/leaching) sandy silty CLAY below 0.1/0.2m.			
						Extends to between 0.2m and 0.25mbgl.			
						Soft to firm orange brown sandy gravelly silty CLAY with occasional rootlets. Gravel comprises fine to coarse sub-rounded to angular sandstone. (Glacial Till)			
						Stiff/(Medium dense) light brown clayey gravelly SAND/SILT. Gravel comprises fine to coarse sub-rounded to angular sandstone. (Glacial Till)			
			0.70			(Medium dense to dense) light brown slightly silty sandy to very sandy GRAVEL and COBBLES of sub-angular to angular, tabular and blocky sandstone. (Weathered Bedrock)			
			1.40			(Medium strong closely fractured grey weathered to brown, dark brown and rusty brown thinly bedded medium grained SANDSTONE with rare silty sand between fractures. (Weathered Bedrock)			
						Fractures are generally sub-horizontal along bedding planes, open, rough and planar.			
						Excavated as very slightly silty sandy gravelly cobbles/cobbles and boulders with depth.			
						...Becoming strong and medium spaced fractured below approximately 2.6mbgl. Very hard to dig.			
						<u>Apparent sub-horizontal dip towards the north.</u>			
						<u>1.8m - 2.8m: Much black sand of completely weathered coal in south face.</u>			
			2.80			End of Trialpit at 2.80 m			
Remarks: 1. Trial pit terminated at 2.8mbgl - Target depth reached and very hard dig.			Groundwater: Groundwater not encountered. Slightly damp down to base.			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			
			Stability: Significant spalling associated with cobble and boulder removal.						

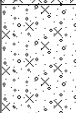
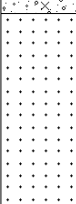
Intégral Géotechnique Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com			Project Name: Foel Trawsnant Windfarm			Project No.: 12826		Trial Pit No.: TP17 Sheet 1 of 1	
Location: Maesteg			Client: Pennant Walters (FOELT) Ltd			Logged By: RAH		Scale 1:25	
Equipment: Komatsu 138			Coordinates:			Dimensions 5.00m			
Date Excavated: 06/07/2021			Level:			Depth : 2.10m 1.40m			
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
1.00 - 1.40			0.25			Grass over, soft dark brown to black sandy peaty silty CLAY with abundant rootlets. (Topsoil/subsoil) Grading to brown (acidic staining/leaching) sandy silty CLAY below 0.1/0.2m. Extends to between 0.2m and 0.25mbgl. Firm orange brown slightly gravelly silty CLAY/SAND with occasional rootlets. Gravel comprises fine to coarse sub-rounded to angular sandstone. (Glacial Till) Firm to stiff light brown sandy very gravelly CLAY tending to clayey sandy gravel. Gravel comprises fine to coarse sub-rounded to angular sandstone. (Glacial Till)			
			0.40						
			0.70			(Medium dense to dense) light brown slightly silty sandy to very sandy GRAVEL and COBBLES of sub-angular to angular, tabular and blocky sandstone. (Weathered Bedrock)			
			1.50			Medium strong closely fractured grey weathered to brown, dark brown and rusty brown thinly bedded medium grained SANDSTONE with rare to some silty sand between fractures. (Weathered Bedrock) Fractures are generally sub-horizontal along bedding planes, open, rough and planar.			
			2.10			Excavated as very slightly silty sandy gravelly cobbles/cobbles and boulders with depth. <u>Apparent sub-horizontal dip towards the north.</u> End of Trialpit at 2.10 m			
Remarks:			Groundwater:			Key:			
1. Trial pit terminated at 2.1mbgl - Target depth reached and hard dig.			Slightly damp down to base.			D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			
			Stability:			Some spalling observed.			

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Location: Maesteg			Client: Pennant Walters (FOELT) Ltd			Logged By: RAH		Scale 1:25	
Equipment: Komatsu 138			Coordinates:			Dimensions Depth : 1.70m			
Date Excavated: 07/07/2021			Level:						
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
			0.25		 Grass over, soft dark brown to black very peaty silty CLAY with abundant rootlets. (Topsoil/ subsoil) Extends to between 0.2m and 0.25mbgl.				
			0.50		 Soft to firm brown slightly gravelly sandy silty CLAY with occasional rootlets. Slightly organic. Gravel comprises fine to coarse sub-rounded to sub- angular sandstone. (Glacial Till)				
			0.75		 Firm to stiff, largely stiff, light brown mottled grey slightly gravelly sandy silty CLAY with low cobble content. Gravel and cobbles comprise fine to coarse sub-rounded to angular sandstone. (Glacial Till)				
			1.40		 (Medium dense) brown mottled grey and rusty brown silty sandy GRAVEL of fine to coarse angular to sub-angular tabular sandstone with high cobble content. (Highly Weathered Bedrock) ...Becoming (Dense) GRAVEL and COBBLES.				
			1.70		 Weak to medium strong closely fractured grey, weathered to rusty brown, very thinly bedded fine grained SANDSTONE. (Weathered Bedrock) Fractures are generally sub-horizontal, along bedding planes, rough, planar and tight/partially open.				
			1.70		Excavated as gravelly cobbles of angular tabular sandstone. Scratching at base - Hard dig.	End of Trialpit at 1.70 m			
Remarks: 1. Trial pit terminated at 1.7mbgl - Hard dig.			Groundwater: Groundwater not encountered. Seepages from ground level/topsoil.			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			
			Stability: Minor spalling observed.						

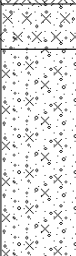
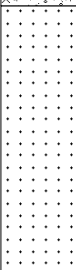
Intégral Géotechnique Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com			Project Name: Foel Trawsnant Windfarm			Project No.: 12826		Trial Pit No.: TP19 Sheet 1 of 1	
Location: Maesteg			Client: Pennant Walters (FOELT) Ltd			Logged By: RAH		Scale 1:25	
Equipment: Komatsu 138			Coordinates:			Dimensions 4.20m			
Date Excavated: 07/07/2021			Level:			Depth : 2.00m 1.40m			
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
0.80 - 1.00			0.30			Grass over, soft dark brown to black peaty silty CLAY with abundant rootlets. (Topsoil/subsoil)			
						Grading to brown (acidic staining/leaching) sandy silty CLAY below 0.2m.			
						Soft to firm brown slightly gravelly sandy silty CLAY with occasional rootlets. Slightly organic. Gravel comprises fine to coarse sub-rounded to sub- angular sandstone. (Glacial Till)			
						Stiff mottled grey and brown sandy gravelly silty CLAY with low cobble content. Gravel and cobbles comprise fine to coarse sub-rounded to angular sandstone.			
						(Medium dense) light brown silty sandy GRAVEL of fine to coarse sub-angular to angular, tabular and blocky sandstone with high cobble content.			
						...Becoming GRAVEL and COBBLES below approximately 1.0mbgl.			
1.20			1.20			Weak to medium strong closely to very closely fractured grey, weathered to dark brown, black and rusty brown, very thinly bedded fine to medium grained SANDSTONE. (Weathered Bedrock)			
						Fractures are generally sub-horizontal, along bedding planes, smooth, planar and tight/partially open. Frequent irregular sub-vertical fractures.			
						Excavated as gravelly cobbles of angular tabular sandstone.			
2.00			2.00			...Becoming medium strong and closely fractured with depth.			
						End of Trialpit at 2.00 m			
Remarks: 1. Trial pit terminated at 2.0mbgl - Hard dig.			Groundwater: Groundwater not encountered. Slight seepage from peat/Topsoil. Slightly damp down to base.			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			
			Stability: Minor spalling observed.						

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Location: Maesteg			Client: Pennant Walters (FOELT) Ltd			Logged By: RAH		Scale 1:25							
Equipment: Komatsu 138			Coordinates:			Dimensions 4.20m									
Date Excavated: 07/07/2021			Level:			Depth : 1.65m 1.40m									
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description									
Depth (m)	Type	Results													
0.80			0.30			Grass over soft dark brown to black peaty silty CLAY with abundant rootlets. (Topsoil/subsoil)									
						Grading to brown (acidic staining/leaching) sandy silty CLAY below 0.2m.									
						0.50		Soft to firm grey brown sandy gravelly silty CLAY. Gravel comprises fine to coarse sub-rounded to angular sandstone. (Glacial Till)							
								(Medium dense) light brownish grey silty very sandy GRAVEL of fine to coarse sub-rounded to angular sandstone with low cobble content. (Glacial Till) <i>Firm to stiff light grey sandy gravelly silty CLAY. Intermittent Layer.</i>							
						0.90		(Medium dense) brown and rusty brown very slightly silty slightly sandy GRAVEL of fine to coarse sub-angular to angular and tabular sandstone with high cobble content. (Highly Weathered Bedrock)							
								Very weak to weak very closely fractured grey and brown, weathered to rusty brown, very thinly bedded fine grained SANDSTONE with localised interbedded siltstone bands. (Weathered Bedrock)							
						1.50		Fractures are generally sub-horizontal along bedding planes, smooth and planar. Or sub-vertical and rough. With occasional sandy clay infill.							
								Excavated as slightly sandy gravel with cobbles of platy and tabular sandstone. Occasional relict rootlet. Scratching at base. Very hard dig. [Strong less fractured sandstone]							
						1.65			1.65			End of Trialpit at 1.65 m			
						1.65			1.65						
Remarks: 1. Trial pit terminated at 1.65mbgl - Hard dig.			Groundwater: Groundwater not encountered. Slight seepage from peat/Topsoil. Slightly damp down to base.			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample									
			Stability: Minor spalling observed.												

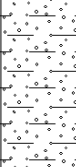
Intégral Géotechnique Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com			Project Name: Foel Trawsnant Windfarm			Project No.: 12826		Trial Pit No.: TP21 Sheet 1 of 1			
Location: Maesteg			Client: Pennant Walters (FOELT) Ltd			Logged By: RAH		Scale 1:25			
Equipment: Komatsu 138			Coordinates:			Dimensions 4.00m					
Date Excavated: 07/07/2021			Level:			Depth : 1.65m 1.40m					
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description					
Depth (m)	Type	Results									
0.40 - 0.60			0.30			Grass over soft dark brown to black peaty silty CLAY with abundant rootlets. (Topsoil/subsoil)					
						Grading to brown (acidic staining/leaching) sandy silty CLAY below 0.2m.					
						0.60		Firm slightly clayey gravelly very sandy SILT with occasional rootlets. Tending to silty gravelly sand. Gravel comprises fine to coarse sub-rounded to angular sandstone. (Glacial Till)			
								(Medium dense) light brown silty sandy GRAVEL of sub-angular to angular and tabular sandstone with medium cobble content and very occasional rootlets. (Weathered Bedrock)			
								...Becoming slightly silty sandy GRAVEL and COBBLES with depth.			
1.10		1.10		Weak closely fractured grey thinly bedded medium grained SANDSTONE with rare silty sand between fractures (Weathered Bedrock)							
				Fractures are generally sub-horizontal along bedding planes, smooth, planar and tight/ partially open. Or sub-vertical, rough and partially open.							
				Excavated as gravel with cobbles of tabular and blocky sandstone. <u>Apparent sub-horizontal dip towards the north.</u>							
1.65		1.65			Scratching at base. Very hard dig. [Medium strong to strong less fractured sandstone]						
1.65		1.65			End of Trialpit at 1.65 m						
Remarks: 1. Trial pit terminated at 1.65mbgl - Hard dig.			Groundwater: Groundwater not encountered. Slight seepage from peat/Topsoil. Slightly damp down to base.			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample					
Stability: Minor spalling observed.											

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Location: Maesteg			Client: Pennant Walters (FOELT) Ltd			Logged By: RAH		Scale 1:25	
Equipment: Komatsu 138			Coordinates:			Dimensions Depth : 1.70m			
Date Excavated: 07/07/2021			Level:						
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
			0.30						
			0.60						
			1.00						
			1.70						
			1.70						
Remarks: 1. Trial pit terminated at 1.7mbgl - Hard dig.			Groundwater: Groundwater not encountered. Slightly damp down to base.			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			

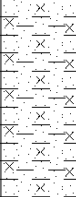
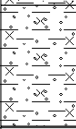
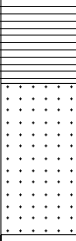
 Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com			Project Name: Foel Trawsnant Windfarm			Project No.: 12826		Trial Pit No.: TP23 Sheet 1 of 1	
Location: Maesteg			Client: Pennant Walters (FOELT) Ltd			Logged By: RAH		Scale 1:25	
Equipment: Komatsu 138			Coordinates:			Dimensions Depth : 2.50m 4.30m			
Date Excavated: 07/07/2021			Level:						

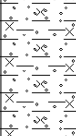
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
			0.35			Grass over soft dark brown to black slightly sandy peaty silty CLAY with abundant rootlets. (Topsoil/subsoil) Grading to grey brown (acidic staining/leaching) silty CLAY below 0.2m.	
			0.50			Extends to between 0.3m and 0.35mbgl. Soft to firm orange brown, mottled dark grey, gravelly very sandy SILT with occasional rootlets. Gravel comprises fine to coarse sub-rounded to angular sandstone. (Glacial Till) (Medium dense) light brown silty very sandy GRAVEL of fine to coarse sub-angular to angular tabular sandstone with high cobble content. (Weathered Bedrock) Coarsening with depth.	1
			1.20			Medium strong closely fractured grey, weathered to brown thinly bedded medium grained SANDSTONE. (Weathered Bedrock) Fractures are generally sub-horizontal along bedding planes, smooth, planar and tight/ partially open. Or sub-vertical, rough and partially open. Excavated as slightly silty slightly sandy gravelly cobbles and occasional boulders of tabular and blocky angular sandstone.	2
			2.10			Medium strong to strong closely to medium spaced fractured grey thinly bedded medium grained SANDSTONE. (Weathered Bedrock)	
			2.30			Fractures are generally sub-horizontal along bedding planes, smooth, planar and tight/ partially open. Or sub-vertical, rough and partially open.	
			2.50			Excavated as gravelly cobbles and boulders of tabular and blocky angular sandstone. Excavator scratching on suspected strong sandstone (2.3m in south end and 2.5m in north end). ----- End of Trialpit at 2.50 m -----	3
							4
							5

Remarks: 1. Trial pit terminated at 2.3m/2.5mbgl - Hard dig. Shallower outcrop in south end of trial pit.		Groundwater: Groundwater not encountered. Slightly damp down to base.	Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample	
		Stability: Some spalling observed.		

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Location: Maesteg			Client: Pennant Walters (FOELT) Ltd			Logged By: RAH		Scale 1:25	
Equipment: Komatsu 138			Coordinates:			Dimensions Depth : 3.40m 4.50m			
Date Excavated: 08/07/2021			Level:						
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
0.60			0.30			Grass over soft dark brown to black peaty silty CLAY with abundant rootlets. (Topsoil/subsoil)			
			0.90			Soft, locally very soft and firm, mottled orange brown, yellow brown and grey, slightly gravelly very sandy silty CLAY tending to SAND with occasional rootlets. Gravel comprises fine to coarse sub-rounded to sub-angular sandstone. Wet. (Glacial Till)			
			1.30			Very soft to soft mottled yellow brown and grey sandy gravelly silty CLAY. Gravel comprises fine to coarse sub-rounded to angular sandstone. Wet. (Glacial Till)			
			1.50			...Becoming mottled dark grey with depth.			
			2.10			Firm to stiff dark blue grey silty CLAY with abundant sandy to fine gravel sized angular to sub-angular mudstone lithorelicts. Wet. (Completely Weathered Bedrock)			
			3.40			(Medium dense) orange brown, becoming rusty brown, slightly clayey fine to medium angular to sub-angular GRAVEL of extremely weak mudstone. (Highly Weathered Bedrock) Frequent cobble sized fragments of mudstone gravel bordering on extremely weak mudstone recovered. Extremely weak to very weak very closely to closely fractured mottled brown, red brown, black and orange MUDSTONE. (Weathered Bedrock) Fractures are tight and irregular with no clear uniformity. Excavated as slightly clayey gravel with high cobble content of blocky mudstone. ...Below 2.5m is very weak and mudstone is micaceous. 3.2m - 3.4m: Harder to dig, becoming very weak to weak. End of Trialpit at 3.40 m			
Remarks: 1. Trial pit terminated at 3.4mbgl - Target depth reached and hard dig.			Groundwater: Groundwater not encountered.			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			
			Stability: Minor spalling observed.						

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Location: Maesteg			Client: Pennant Walters (FOELT) Ltd			Logged By: RAH		Scale 1:25	
Equipment: Komatsu 138			Coordinates:			Dimensions Depth : 4.00m 4.70m			
Date Excavated: 08/07/2021			Level:						
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
						Reeds over, very soft dark brown silty clayey PEAT with abundant rootlets. (Topsoil/subsoil)			
			0.60			Very soft mottled light brown and grey sandy gravelly silty CLAY. Gravel comprises fine to coarse sub-rounded to sub-angular sandstone. Very wet. (Glacial Till)			
			0.90			Soft to firm grey sandy gravelly silty CLAY with low cobble content. Gravel and cobbles comprise fine to coarse sub-rounded to sub-angular sandstone. Wet. (Glacial Till)			1
			1.10			(Medium dense) grey silty sandy GRAVEL of fine to coarse sub-rounded to angular sandstone with high cobble content. (Glacial Till/Highly Weathered Bedrock)			
						COAL thins out moving downslope to 2.0m - 2.2mbgl in down gradient end of TP.			2
			2.20			(Very loose to loose) black gravelly sand of weathered COAL. Gravel is of sub-angular to angular coal fragments. (Weathered Bedrock)			
			2.60			Medium groundwater ingress from base of coal in up gradient end of TP.			
						Firm to stiff grey mottled dark brown and yellow brown silty CLAY with abundant fine to medium sub-angular to angular mudstone lithorelicts bordering on extremely weak mudstone gravel. (Weathered Bedrock)			3
			3.20			Extremely weak to very weak very closely fractured mottled grey and yellow brown MUDSTONE/(Medium dense) silty clayey GRAVEL of fine to coarse sub-angular to angular mudstone. (Weathered Bedrock)			
						Excavated as slightly clayey gravel of mudstone bordering on lithorelicts. Probably extremely weak mudstone in-situ.			
			4.00			End of Trialpit at 4.00 m			4
									5
Remarks: 1. Trial pit terminated at 4.0mbgl - Target depth reached and groundwater ingress.				Groundwater: Medium groundwater ingress from coal layer in north (upslope) end of trial pit only.		Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			
				Stability: Minor spalling of coal only.					

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Location: Maesteg			Client: Pennant Walters (FOELT) Ltd			Logged By: RAH		Scale 1:25		
Equipment: Komatsu 138			Coordinates:			Dimensions Depth : 2.70m 5.30m				
Date Excavated: 08/07/2021			Level:							
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description				
Depth (m)	Type	Results								
			0.20		 Grass over, very soft dark brown silty clayey PEAT with abundant rootlets. (Topsoil/subsoil)					
					 Very soft to soft yellow brown slightly sandy silty CLAY. Wet. (Glacial Till)					
			0.90		 Soft to firm grey mottled yellow brown slightly gravelly silty CLAY with low cobble content. Gravel and cobbles comprise fine to coarse sub-angular to angular mudstone with frequent coarse sand to fine gravel sized mudstone lithorelicts. (Weathered Bedrock)	1				
			1.30		 Extremely weak, becoming very weak, very closely to closely fractured grey weathered to rusty brown MUDSTONE. (Weathered Bedrock) Excavated as angular platy gravel of mudstone. <i>1.4m: Minor groundwater seepage.</i> <i>Top of SANDSTONE/SILTSTONE is recorded at 1.4m in downslope end of TP (scratching at base), 1.7m in the centre of the TP, gently dipping towards the north/north-east and recorded at 2.2mbgl in the upslope end of the TP.</i>	2				
			2.20		 Weak closely fractured grey thinly bedded SANDSTONE and SILTSTONE. (Weathered Bedrock) Fractures are predominantly shallow/sub-horizontal, along bedding planes.					
			2.70		End of Trialpit at 2.70 m				3	
										4
										5
Remarks: 1. Trial pit terminated at 1.5/2.7mbgl - Hard dig. Weak sandstone and siltstone encountered at 1.5mbgl in south (downslope) end and below 2.2m in north (upslope) end.			Groundwater: Slight groundwater seepage at approximately 1.4mbgl with wet soils. Stability: Sides stable.			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample				

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Location: Maesteg			Client: Pennant Walters (FOELT) Ltd			Logged By: RAH		Scale 1:25		
Equipment: Komatsu 138			Coordinates:			Dimensions Depth : 2.20m 4.40m				
Date Excavated: 08/07/2021			Level:			Depth : 2.20m 1.30m				
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description				
Depth (m)	Type	Results								
1.60 - 1.80			0.20			Grass over, very soft dark brown silty clayey PEAT with abundant rootlets. (Topsoil/subsoil)				
			0.40			Soft to firm grey brown silty CLAY with rootlets. (Completely Weathered Bedrock)				
			0.90			Firm mottled grey and orange brown/yellow brown silty CLAY with frequent fine to coarse sub-angular to angular mudstone lithorelicts. (Weathered Bedrock)				
			1.30			Extremely weak, becoming very weak, very closely to closely fractured grey MUDSTONE. (Weathered Bedrock)				1
			2.20			Excavated as slightly silty, slightly clayey angular platy and tabular gravel of mudstone.				
						Weak to medium strong closely to medium spaced fractured grey weathered to brown fine grained SANDSTONE. (Weathered Bedrock) <i>Top of SANDSTONE is recorded at 1.3m in the downslope end of the TP, dipping gently towards the north/north-east (up to 30°) and recorded at 2.0mbgl in the upslope end of the TP.</i>				2
						End of Trialpit at 2.20 m				3
										4
										5
Remarks: 1. Trial pit terminated at 1.3/2.2mbgl - Hard dig. Weak sandstone encountered at 1.3mbgl in south (downslope) end and below 2.0m in centre of trial pit. Sandstone not encountered down to 2.2mbgl in north (upslope) end.			Groundwater: Groundwater not encountered.			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample				
			Stability: Minor spalling.							

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Location: Maesteg			Client: Pennant Walters (FOELT) Ltd			Logged By: RAH		Scale 1:25	
Equipment: Komatsu 138			Coordinates:			Dimensions 4.50m			
Date Excavated: 08/07/2021			Level:			Depth : 2.40m 1.40m			
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
			0.20			Grass over, soft dark brown sandy silty CLAY with abundant rootlets. (Topsoil/subsoil)			
			0.50			Firm orange brown very sandy gravelly silty CLAY tending to silty clayey gravelly sand with occasional rootlets. Gravel comprises fine to coarse sub-angular sandstone. (Glacial Till)			
			1.60			(Medium dense to dense) brown slightly silty sandy GRAVEL and COBBLES of fine to coarse sub-angular to angular, blocky sandstone. (Highly Weathered Bedrock)			
			2.20			Weak to medium strong closely to medium spaced fractured grey and brown medium grained SANDSTONE with rare silty sand between fractures. (Weathered Bedrock) Fractures are partially open, rough, irregular but frequently sub-horizontal. Excavated as gravelly cobbles with occasional blocky boulders up to 0.5m x 0.3m x 0.2m. <i>No clear structure or discernible bedding. Possible sub-horizontal dip towards the north.</i>			
			2.40			Medium strong medium spaced fractured grey and brown medium grained SANDSTONE with rare silty sand between fractures. (Weathered Bedrock) Fractures are partially open, rough, irregular but frequently sub-horizontal. Excavated as gravelly cobbles with occasional blocky boulders up to 0.5m x 0.3m x 0.2m. Scratching at base - Hard dig.			
						End of Trialpit at 2.40 m			
Remarks: 1. Trial pit terminated at 2.4mbgl - Target depth reached and hard dig.						Groundwater: Groundwater not encountered. Slightly damp down to base.		Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample	
						Stability: Some spalling observed.			

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Location: Maesteg			Client: Pennant Walters (FOELT) Ltd			Logged By: RAH		Scale 1:25	
Equipment: Komatsu 138			Coordinates:			Dimensions 4.00m			
Date Excavated: 08/07/2021			Level:			Depth : 3.10m			

Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
2.00			0.20			Grass over, soft dark brown sandy silty CLAY with abundant rootlets. (Topsoil/subsoil)	
			0.40			Firm orange brown sandy gravelly silty CLAY tending to silty clayey gravelly SAND with occasional rootlets. Gravel comprises fine to coarse sub-angular sandstone. (Glacial Till)	
			0.60			(Medium dense) brown silty very sandy GRAVEL of fine to coarse sub-rounded to sub-angular sandstone. (Glacial Till)	
			0.80			Stiff light brown mottled light grey gravelly silty CLAY with low cobble content. Gravel and cobbles comprise fine to medium sub-angular to angular mudstone lithorelicts/extremely weak mudstone. (Weathered Bedrock)	
						Black bright COAL. Recovered as (loose) gravelly to very gravelly sand. Gravel comprises fine to medium angular to sub-angular coal. (Weathered Bedrock)	1
			1.50			COAL dips gently towards the north (estimated 10°). Irregular thicknesses - thicker in north end and west face. In general top depth is 1.3mbgl in south sloping to 1.5m in north.	
			1.80			(Medium dense) light grey mottled brown slightly clayey GRAVEL of fine to medium, occasionally coarse angular to sub-angular mudstone. (Weathered Bedrock)	
						Extremely weak to very weak very closely fractured mottled grey and yellow brown and rusty brown MUDSTONE. (Weathered Bedrock)	2
						Excavated as gravel of fine to coarse angular mudstone.	
			2.50			Extremely weak to very weak very closely fractured grey mottled yellow brown and rusty brown MUDSTONE. (Weathered Bedrock)	
					Excavated as gravel of fine to coarse angular mudstone.		
		3.10			End of Trialpit at 3.10 m	3	
					End of Trialpit at 3.10 m	4	
					End of Trialpit at 3.10 m	5	

Remarks: 1. Trial pit terminated at 3.1mbgl - Target depth reached.		Groundwater: Groundwater not encountered.		Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample		
		Stability: Sides stable.				

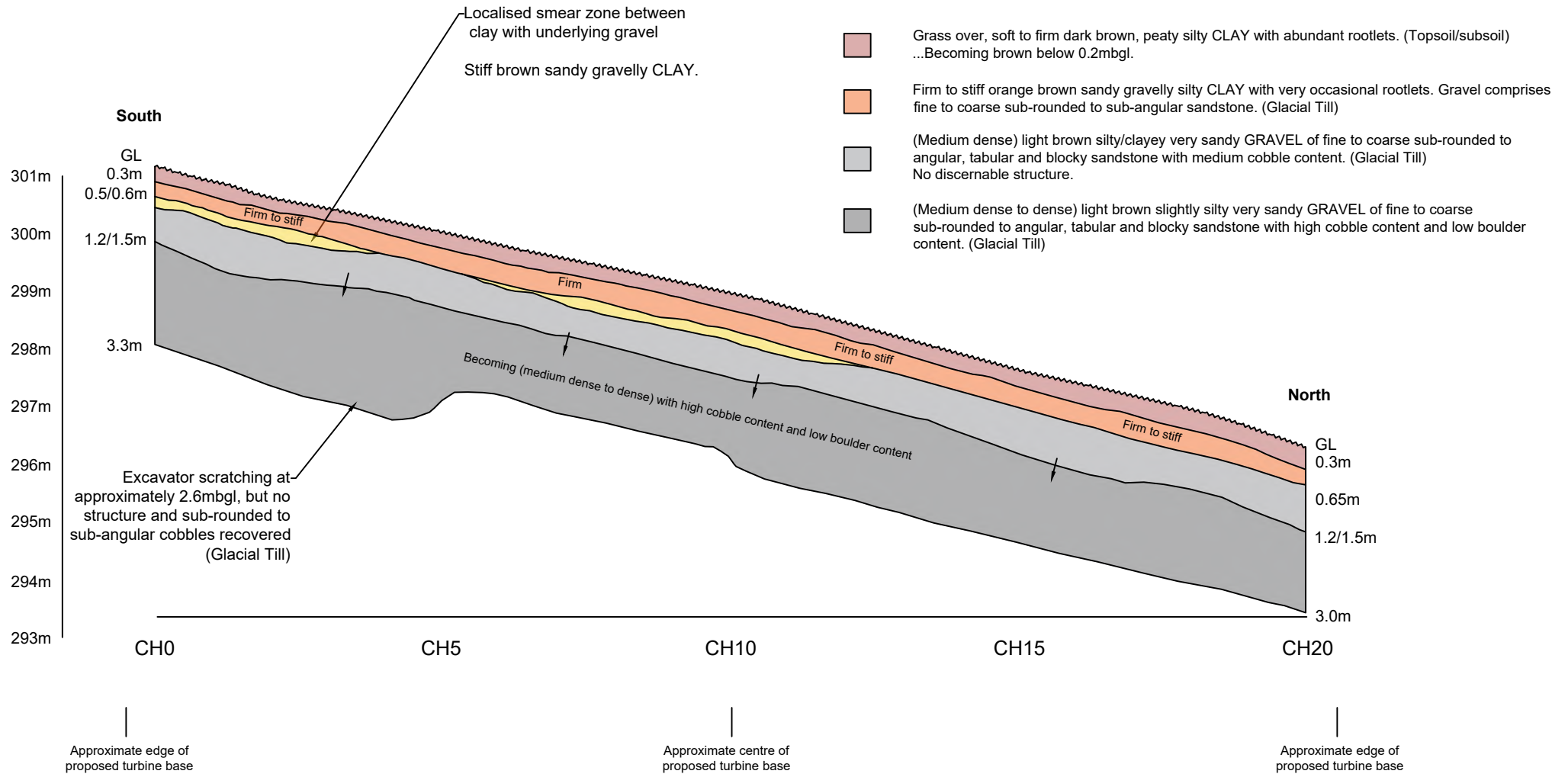
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Location: Maesteg			Client: Pennant Walters (FOELT) Ltd			Logged By: RAH		Scale 1:25	
Equipment: Komatsu 138			Coordinates:			Dimensions Depth : 2.70m 5.00m			
Date Excavated: 09/07/2021			Level:						
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
0.70 - 0.85			0.20			Grass over, dark brown slightly sandy silty CLAY with abundant rootlets. (Topsoil/subsoil)			
						Soft to firm yellow brown and light grey slightly sandy silty CLAY with occasional mudstone lithorelicts and occasional rootlets. (Glacial Till)			
			0.50			Firm to stiff mottled grey and brown silty CLAY with abundant fine to medium sub-angular to angular mudstone lithorelicts. (Completely to Highly Weathered Bedrock)			
			0.75			Stiff to very stiff grey brown mottled grey silty CLAY with abundant fine to coarse sub-angular to angular mudstone lithorelicts. (Completely to Highly Weathered Bedrock)			
			1.70			(Medium dense) yellow brown and grey slightly silty/clayey fine to coarse GRAVEL of extremely weak to very weak angular mudstone. (Weathered Bedrock)			
			2.10			Possible extremely to very weak very closely fractured mudstone in-situ. Very weak very closely fractured mottled yellow brown, brown and grey MUDSTONE. (Weathered Bedrock)			
			2.70			Excavated as fine to coarse gravel of mudstone. <i>Apparent sub-horizontal dip towards the north.</i>			
						End of Trialpit at 2.70 m			
Remarks: 1. Trial pit terminated at 2.7mbgl - Target depth reached, mudstone bedrock encountered.						Groundwater: Groundwater not encountered. Slightly damp down to base.		Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample	
						Stability: Minor spalling of mudstone observed.			

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Location: Maesteg			Client: Pennant Walters (FOELT) Ltd			Logged By: RAH		Scale 1:25	
Equipment: Komatsu 138			Coordinates:			Dimensions 4.50m			
Date Excavated: 09/07/2021			Level:			Depth : 2.90m 1.40m			
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
1.80 - 2.00			0.25			Grass over, dark brown slightly sandy silty CLAY with abundant rootlets. (Topsoil/subsoil)			
			0.40			Soft to firm mottled grey and yellow brown slightly sandy silty CLAY with occasional rootlets. (Glacial Till)			
			0.60			Firm to stiff mottled grey and brown silty CLAY with abundant fine to medium sub-angular to angular mudstone lithorelicts. (Completely to Highly Weathered Bedrock)			
						Stiff to very stiff mottled yellow brown and grey silty CLAY with abundant fine to coarse sub-angular to angular mudstone lithorelicts. (Completely to Highly Weathered Bedrock)			
						HSV @ 0.7m = 70kPa			
						(Medium dense) yellow brown mottled brown and grey silty/clayey fine to coarse GRAVEL of extremely weak to very weak angular mudstone. (Weathered Bedrock)			
						...Becoming coarser with depth with low cobble content.			
						Very weak very closely fractured mottled orange brown, brown and grey MUDSTONE. (Weathered Bedrock)			
						Excavated as fine to coarse gravel of mudstone with low cobble content. No clear structure or discernible bedding.			
						Very weak to weak very closely to closely fractured mottled orange brown, brown and grey MUDSTONE. (Weathered Bedrock)			
					Excavated as fine to coarse gravelly cobbles. Excavation becoming difficult. End of Trialpit at 2.90 m				
Remarks: 1. Trial pit terminated at 2.9mbgl - Target depth reached, mudstone bedrock encountered.			Groundwater: Groundwater not encountered. Slightly damp down to base.			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			
			Stability: Sides stable.						

APPENDIX F

TRIAL TRENCH SECTIONS

Trial Trench 1 (Turbine 6)



Trench Section: TT1

Project: Foel Trawsnant Windfarm

Client: Pennant Walters (FOELT) Ltd

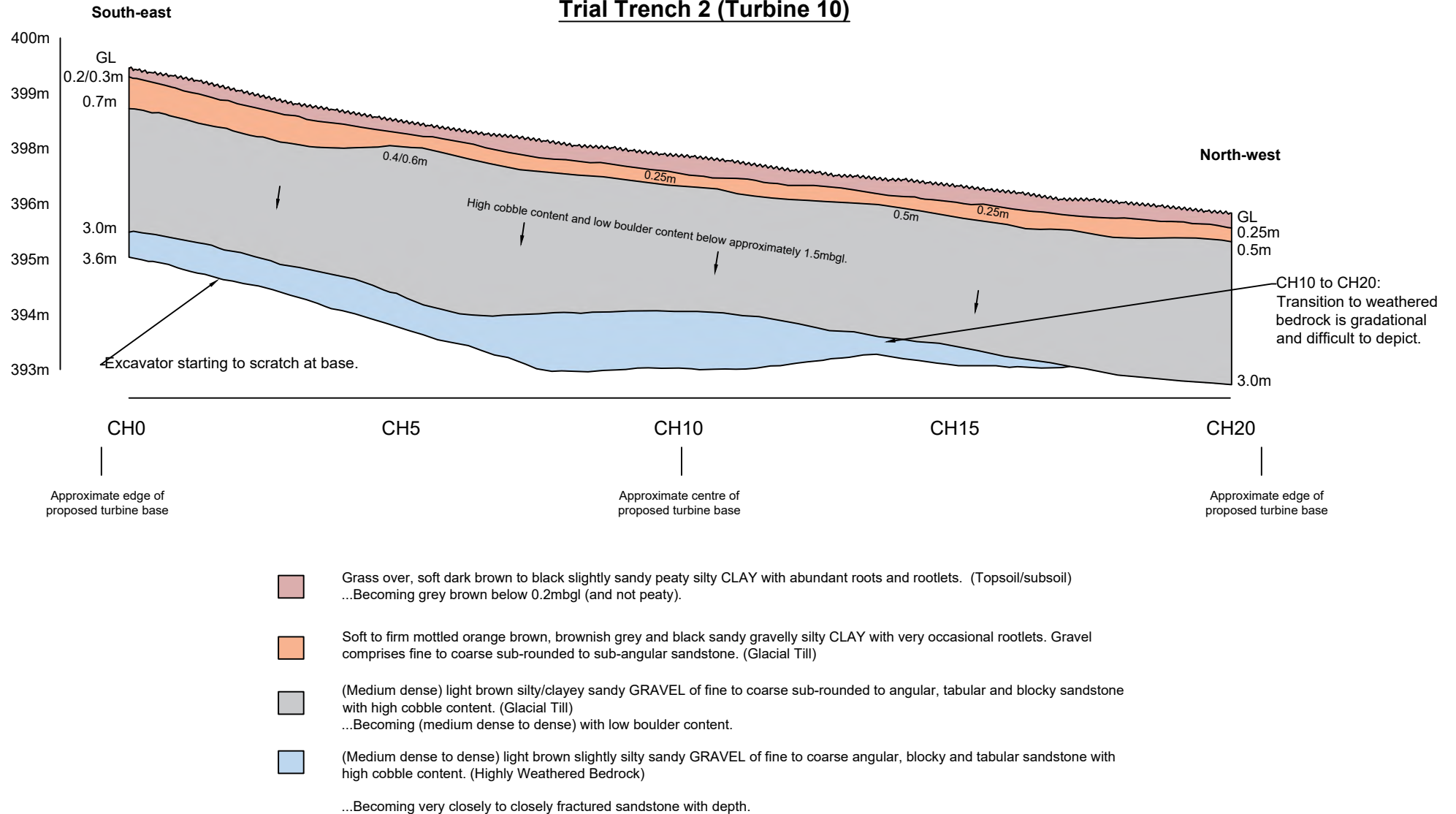
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Trial Trench 2 (Turbine 10)



Trench Section: TT2

Project: Foel Trawsnant Windfarm

Client: Pennant Walters (FOELT) Ltd

Job No.: 12826

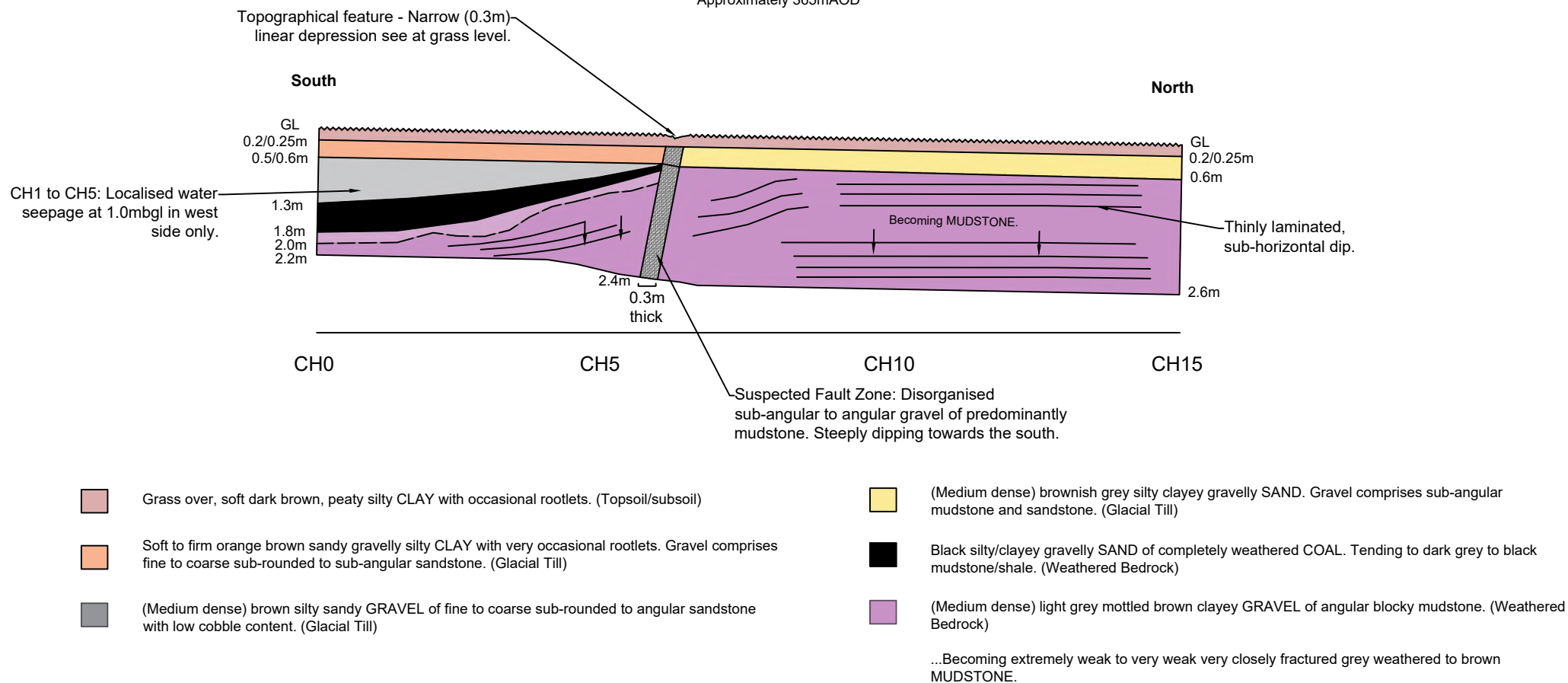
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Trial Trench 3 (Jubilee Slide)

Approximately 365mAOD



Trench Section: TT3

Project: Foel Trawsnant Windfarm

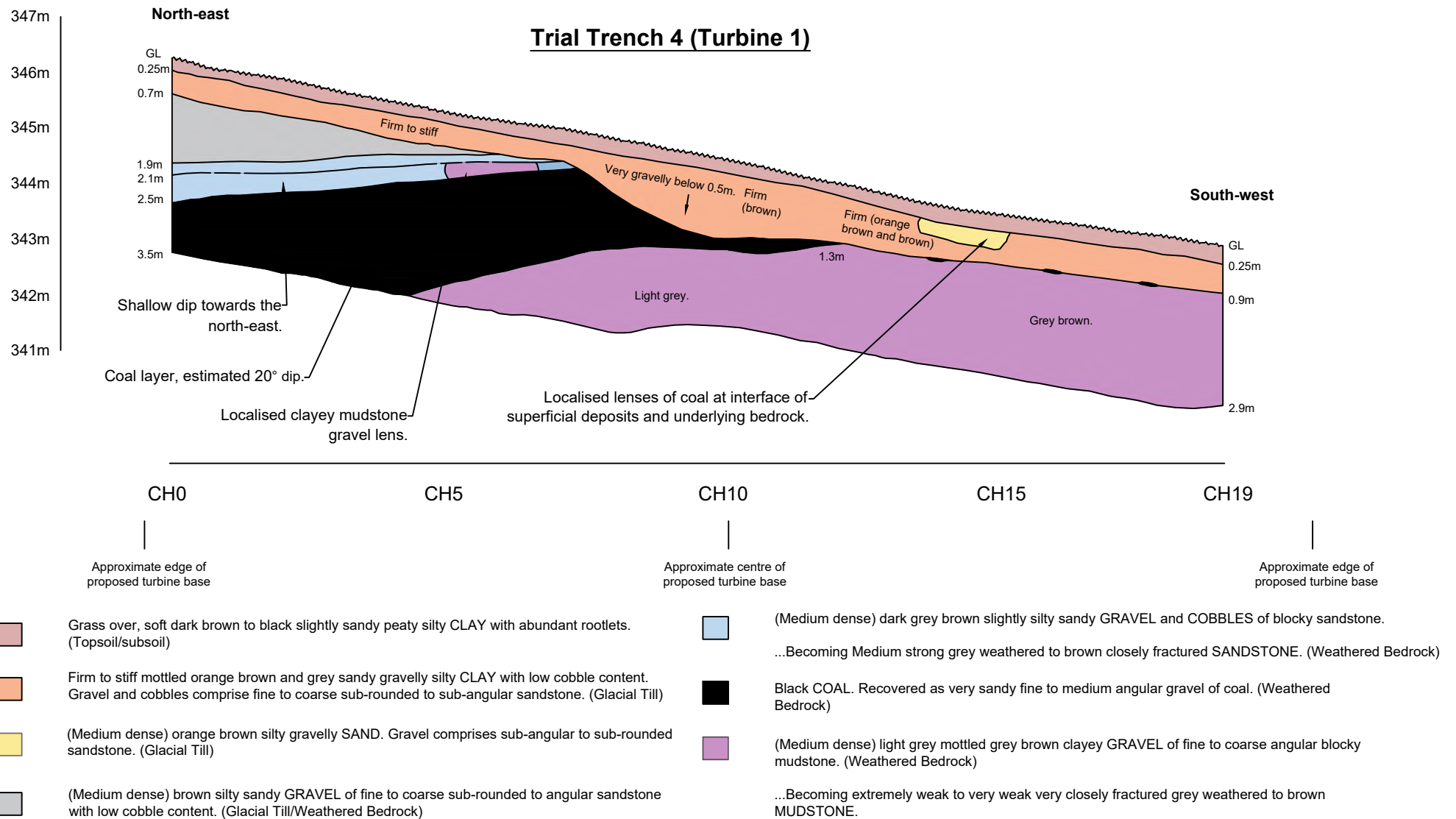
Job No.: 12826

Client: Pennant Walters (FOELT) Ltd

Scale: 1:100 at A4

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Trench Section: TT4

Project: Foel Trawsnant Windfarm

Job No.: 12826

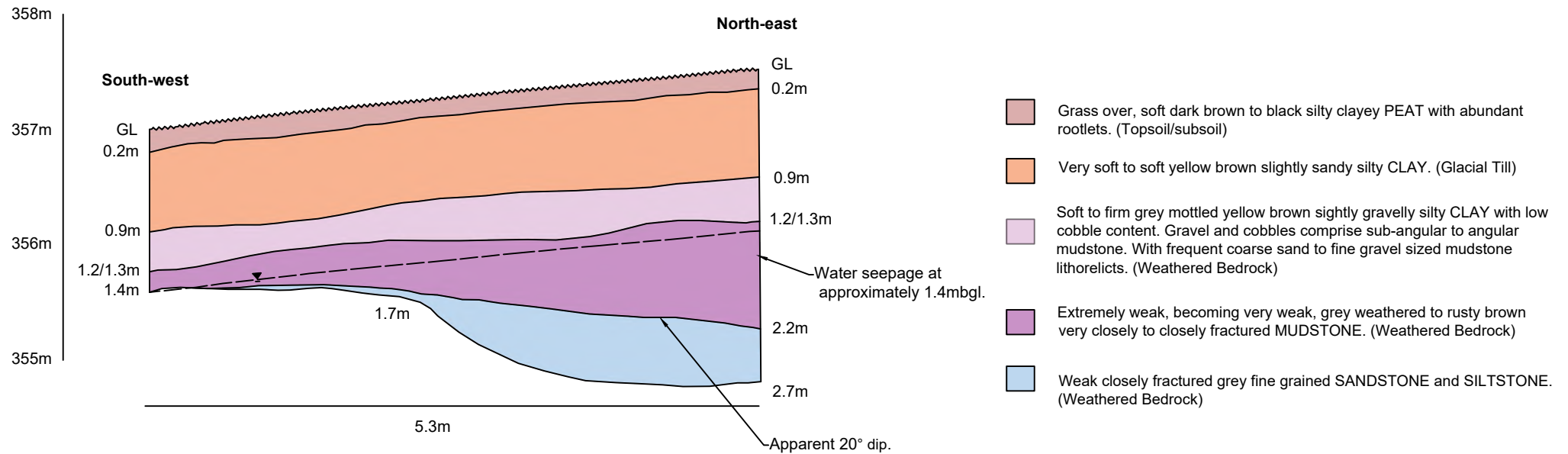
Client: Pennant Walters (FOELT) Ltd

Scale: 1:100 at A4

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TP26 (Turbine 2)



Trench Section: TP26

Project: Foel Trawsnant Windfarm

Client: Pennant Walters (FOELT) Ltd

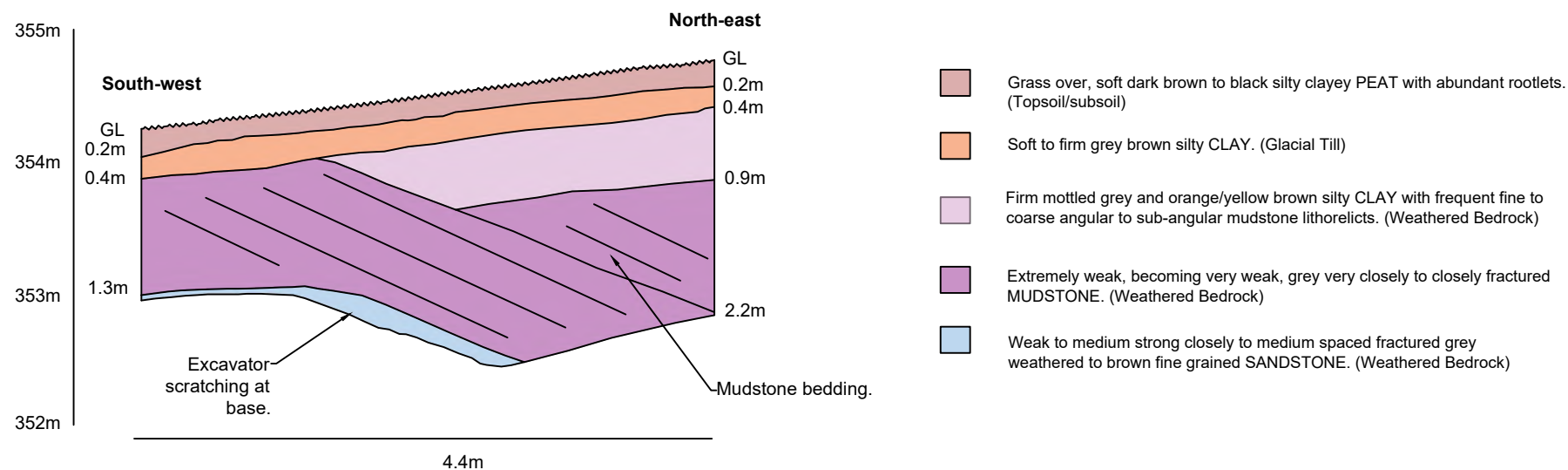
Job No.: 12826

Scale: 1:50 at A4

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TP27 (Turbine 2 Compound)



Trench Section: TP27

Project: Foel Trawsnant Windfarm

Job No.: 12826

Client: Pennant Walters (FOELT) Ltd

Scale: 1:50 at A4

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CF83 2AX.
Tel: 029 2080 7991

APPENDIX G

TRIAL PIT AND TRIAL TRENCH PHOTOGRAPHS



Trial Pit Photographs: TP01

12826: Foel Trawsnant Windfarm

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Trial Pit Photographs: TP03

12826: Foel Trawsnant Windfarm

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Trial Pit Photographs: TP03

12826: Foel Trawsnant Windfarm

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Trial Pit Photographs: TP04

12826: Foel Trawsnant Windfarm

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Trial Pit Photographs: TP05

12826: Foel Trawsnant Windfarm

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Trial Pit Photographs: TP06

12826: Foel Trawsnant Windfarm

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Trial Pit Photographs: TP07

12826: Foel Trawsnant Windfarm

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Trial Pit Photographs: TP08

12826: Foel Trawsnant Windfarm

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Caerphilly
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