REDSTART

Tylorstown Landslide

Environmental Impact Assessment
Volume 3 - Appendices

Series 10 Contaminated Land, Geology, Soils and Waste

December 2021

REDSTART

Appendix 10.1

Preliminary Sources Study Report

REDSTART

APPENDIX B

GROUNDSURE INSIGHT REPORT

Groundsure LOCATION INTELLIGENCE

Enviro+Geo Insight

Tylorstown, Pontypridd, CF37 3PH

Order Details

Date: 22/09/2020

Your ref: PO_4800455895

Our Ref: GS-7076729

Client: Capita Property and Infrastructure Limited

Site Details

Location: 301646 195956

Area: 20.69 ha

Authority: Rhondda Cynon Taf County Borough Council

Contact us with any questions at:
info@groundsure.com
08444 159 000

Summary of findings

Page	Section	Past land use	On site	0-50m	50-250m	250-500m	500-2000m
13	1.1	Historical industrial land uses	20	24	55	58	-
19	1.2	Historical tanks	0	0	0	3	-
20	1.3	Historical energy features	0	0	3	3	-
20	1.4	Historical petrol stations	0	0	0	0	-
21	1.5	Historical garages	0	0	0	4	-
21	1.6	Historical military land	0	0	0	0	-
Page	Section	Past land use - un-grouped	On site	0-50m	50-250m	250-500m	500-2000m
22	2.1	Historical industrial land uses	27	30	69	77	-
30	2.2	Historical tanks	0	0	0	5	-
30	2.3	Historical energy features	0	0	5	8	-
31	2.4	Historical petrol stations	0	0	0	0	-
31	2.5	Historical garages	0	0	0	5	-
Page	Section	Waste and landfill	On site	0-50m	50-250m	250-500m	500-2000m
33	3.1	Active or recent landfill	0	0	0	0	-
33	3.2	Historical landfill (BGS records)	0	0	0	0	-
34	3.3	Historical landfill (LA/mapping records)	0	0	0	0	-
34	3.4	Historical landfill (EA/NRW records)	0	0	0	0	-
34	3.5	Historical waste sites	0	0	0	0	-
34	3.6	Licensed waste sites	0	0	0	0	-
34	3.7	Waste exemptions	0	0	1	0	-
Page	Section	Current industrial land use	On site	0-50m	50-250m	250-500m	500-2000m
36	4.1	Recent industrial land uses	0	0	3	-	-
37	4.2	Current or recent petrol stations	0	0	0	1	-
37	4.3	Electricity cables	0	0	0	0	-
37	4.4	Gas pipelines	0	0	0	0	-
37	4.5	Sites determined as Contaminated Land	0	0	0	0	-

37	4.6	Control of Major Accident Hazards (COMAH)	0	0	0	0	-
38	4.7	Regulated explosive sites	0	0	0	0	-
38	4.8	Hazardous substance storage/usage	0	0	0	0	-
38	4.9	Historical licensed industrial activities (IPC)	0	0	0	0	-
38	4.10	Licensed industrial activities (Part A(1))	0	0	0	0	-
38	**4.11**	**Licensed pollutant release (Part A(2)/B)**	0	0	0	1	-
39	4.12	Radioactive Substance Authorisations	0	0	0	0	-
39	**4.13**	**Licensed Discharges to controlled waters**	0	0	0	7	-
40	4.14	Pollutant release to surface waters (Red List)	0	0	0	0	-
40	4.15	Pollutant release to public sewer	0	0	0	0	-
41	4.16	List 1 Dangerous Substances	0	0	0	0	-
41	4.17	List 2 Dangerous Substances	0	0	0	0	-
41	**4.18**	**Pollution Incidents (EA/NRW)**	0	1	1	2	-
42	4.19	Pollution inventory substances	0	0	0	0	-
42	4.20	Pollution inventory waste transfers	0	0	0	0	-
42	4.21	Pollution inventory radioactive waste	0	0	0	0	-

Page	Section	Hydrogeology	On site	0-50m	50-250m	250-500m	500-2000m
43	**5.1**	**Superficial aquifer**	Identified (within 500m)				
45	**5.2**	**Bedrock aquifer**	Identified (within 500m)				
47	**5.3**	**Groundwater vulnerability**	Identified (within 50m)				
49	5.4	Groundwater vulnerability- soluble rock risk	None (within 0m)				
50	5.5	Groundwater vulnerability- local information	None (within 0m)				
51	5.6	Groundwater abstractions	0	0	0	0	0
52	**5.7**	**Surface water abstractions**	0	0	0	0	11
54	**5.8**	**Potable abstractions**	0	0	0	0	8
56	5.9	Source Protection Zones	0	0	0	0	-
56	5.10	Source Protection Zones (confined aquifer)	0	0	0	0	-

Page	Section	Hydrology	On site	0-50m	50-250m	250-500m	500-2000m
57	**6.1**	**Water Network (OS MasterMap)**	27	20	54	-	-

65	6.2	Surface water features	1	14	35	-	-
66	6.3	WFD Surface water body catchments	2	-	-	-	-
66	6.4	WFD Surface water bodies	0	1	0	-	-
67	6.5	WFD Groundwater bodies	1	-	-	-	-

Page	Section	River and coastal flooding	On site	0-50m	50-250m	250-500m	500-2000m
68	7.1	Risk of Flooding from Rivers and Sea (RoFRaS)	High (within 50m)				
69	7.2	Historical Flood Events	0	0	0	-	-
69	7.3	Flood Defences	0	0	0	-	-
69	7.4	Areas Benefiting from Flood Defences	0	0	0	-	-
69	7.5	Flood Storage Areas	0	0	0	-	-
70	7.6	Flood Zone 2	Identified (within 50m)				
71	7.7	Flood Zone 3	Identified (within 50m)				

Page	Section	Surface water flooding	
72	8.1	Surface water flooding	1 in 30 year, Greater than 1.0m (within 50m)

Page	Section	Groundwater flooding	
74	9.1	Groundwater flooding	Low (within 50m)

Page	Section	Environmental designations	On site	0-50m	50-250m	250-500m	500-2000m
75	10.1	Sites of Special Scientific Interest (SSSI)	0	0	0	0	0
76	10.2	Conserved wetland sites (Ramsar sites)	0	0	0	0	0
76	10.3	Special Areas of Conservation (SAC)	0	0	0	0	0
76	10.4	Special Protection Areas (SPA)	0	0	0	0	0
76	10.5	National Nature Reserves (NNR)	0	0	0	0	0
77	10.6	Local Nature Reserves (LNR)	0	0	0	0	0
77	10.7	Designated Ancient Woodland	1	2	1	3	41
79	10.8	Biosphere Reserves	0	0	0	0	0
79	10.9	Forest Parks	0	0	0	0	0
79	10.10	Marine Conservation Zones	0	0	0	0	0
79	10.11	Green Belt	0	0	0	0	0
80	10.12	Proposed Ramsar sites	0	0	0	0	0

80	10.13	Possible Special Areas of Conservation (pSAC)	0	0	0	0	0
80	10.14	Potential Special Protection Areas (pSPA)	0	0	0	0	0
80	10.15	Nitrate Sensitive Areas	0	0	0	0	0
81	10.16	Nitrate Vulnerable Zones	0	0	0	0	0
82	10.17	SSSI Impact Risk Zones	0	-	-	-	-
82	10.18	SSSI Units	0	0	0	0	0
Page	Section	Visual and cultural designations	On site	0-50m	50-250m	250-500m	500-2000m
83	11.1	World Heritage Sites	0	0	0	-	-
83	11.2	Area of Outstanding Natural Beauty	0	0	0	-	-
83	11.3	National Parks	0	0	0	-	-
83	11.4	Listed Buildings	0	0	0	-	-
84	11.5	Conservation Areas	0	0	0	-	-
84	11.6	Scheduled Ancient Monuments	0	0	0	-	-
84	11.7	Registered Parks and Gardens	0	0	0	-	-
Page	Section	Agricultural designations	On site	0-50m	50-250m	250-500m	500-2000m
85	**12.1**	**Agricultural Land Classification**	Grade 4 (within 250m)				
86	**12.2**	**Open Access Land**	2	2	0	-	-
87	12.3	Tree Felling Licences	0	0	0	-	-
87	12.4	Environmental Stewardship Schemes	0	0	0	-	-
87	12.5	Countryside Stewardship Schemes	0	0	0	-	-
Page	Section	Habitat designations	On site	0-50m	50-250m	250-500m	500-2000m
88	13.1	Priority Habitat Inventory	0	0	0	-	-
88	13.2	Habitat Networks	0	0	0	-	-
88	13.3	Open Mosaic Habitat	0	0	0	-	-
88	13.4	Limestone Pavement Orders	0	0	0	-	-
Page	Section	Geology 1:10,000 scale	On site	0-50m	50-250m	250-500m	500-2000m
89	**14.1**	**10k Availability**	Identified (within 500m)				
90	14.2	Artificial and made ground (10k)	0	0	0	0	-
91	14.3	Superficial geology (10k)	0	0	0	0	-

91	14.4	Landslip (10k)	0	0	0	0	-
92	14.5	Bedrock geology (10k)	0	0	0	0	-
92	14.6	Bedrock faults and other linear features (10k)	0	0	0	0	-
Page	Section	Geology 1:50,000 scale	On site	0-50m	50-250m	250-500m	500-2000m
93	**15.1**	**50k Availability**	Identified (within 500m)				
94	15.2	Artificial and made ground (50k)	0	0	0	0	-
94	15.3	Artificial ground permeability (50k)	0	0	-	-	-
95	**15.4**	**Superficial geology (50k)**	2	0	2	1	-
96	**15.5**	**Superficial permeability (50k)**	Identified (within 50m)				
96	15.6	Landslip (50k)	0	0	0	0	-
96	15.7	Landslip permeability (50k)	None (within 50m)				
97	**15.8**	**Bedrock geology (50k)**	5	0	1	1	-
98	**15.9**	**Bedrock permeability (50k)**	Identified (within 50m)				
98	**15.10**	**Bedrock faults and other linear features (50k)**	5	1	2	3	-
Page	Section	Boreholes	On site	0-50m	50-250m	250-500m	500-2000m
100	**16.1**	**BGS Boreholes**	0	1	5	-	-
Page	Section	Natural ground subsidence					
102	**17.1**	**Shrink swell clays**	Very low (within 50m)				
103	**17.2**	**Running sands**	Very low (within 50m)				
105	**17.3**	**Compressible deposits**	Negligible (within 50m)				
106	**17.4**	**Collapsible deposits**	Very low (within 50m)				
107	**17.5**	**Landslides**	Moderate (within 50m)				
109	**17.6**	**Ground dissolution of soluble rocks**	Negligible (within 50m)				
Page	Section	Mining, ground workings and natural cavities	On site	0-50m	50-250m	250-500m	500-2000m
111	18.1	Natural cavities	0	0	0	0	-
112	**18.2**	**BritPits**	0	1	7	5	-
114	**18.3**	**Surface ground workings**	21	19	61	-	-
118	**18.4**	**Underground workings**	2	5	9	9	19
120	18.5	Historical Mineral Planning Areas	0	0	0	0	-

120	**18.6**	**Non-coal mining**	0	0	1	0	0
120	18.7	Mining cavities	0	0	0	0	0
120	**18.8**	**JPB mining areas**	Identified (within 0m)				
121	**18.9**	**Coal mining**	Identified (within 0m)				
121	18.10	Brine areas	None (within 0m)				
121	18.11	Gypsum areas	None (within 0m)				
122	18.12	Tin mining	None (within 0m)				
122	18.13	Clay mining	None (within 0m)				

Page	Section	Radon	
123	**19.1**	**Radon**	Between 3% and 5% (within 0m)

Page	Section	Soil chemistry	On site	0-50m	50-250m	250-500m	500-2000m
125	**20.1**	**BGS Estimated Background Soil Chemistry**	25	19	-	-	-
127	20.2	BGS Estimated Urban Soil Chemistry	0	0	-	-	-
128	20.3	BGS Measured Urban Soil Chemistry	0	0	-	-	-

Page	Section	Railway infrastructure and projects	On site	0-50m	50-250m	250-500m	500-2000m
129	21.1	Underground railways (London)	0	0	0	-	-
129	21.2	Underground railways (Non-London)	0	0	0	-	-
130	21.3	Railway tunnels	0	0	0	-	-
130	**21.4**	**Historical railway and tunnel features**	11	16	19	-	-
132	21.5	Royal Mail tunnels	0	0	0	-	-
132	**21.6**	**Historical railways**	1	0	0	-	-
132	21.7	Railways	0	0	0	-	-
132	21.8	Crossrail 1	0	0	0	0	-
133	21.9	Crossrail 2	0	0	0	0	-
133	21.10	HS2	0	0	0	0	-

Recent aerial photograph

Capture Date: 26/05/2017

Site Area: 20.69ha

Recent site history - 2014 aerial photograph

Capture Date: 23/07/2014

Site Area: 20.69ha

Recent site history - 2010 aerial photograph

Capture Date: 23/05/2010

Site Area: 20.69ha

Recent site history - 2009 aerial photograph

Capture Date: 12/10/2009

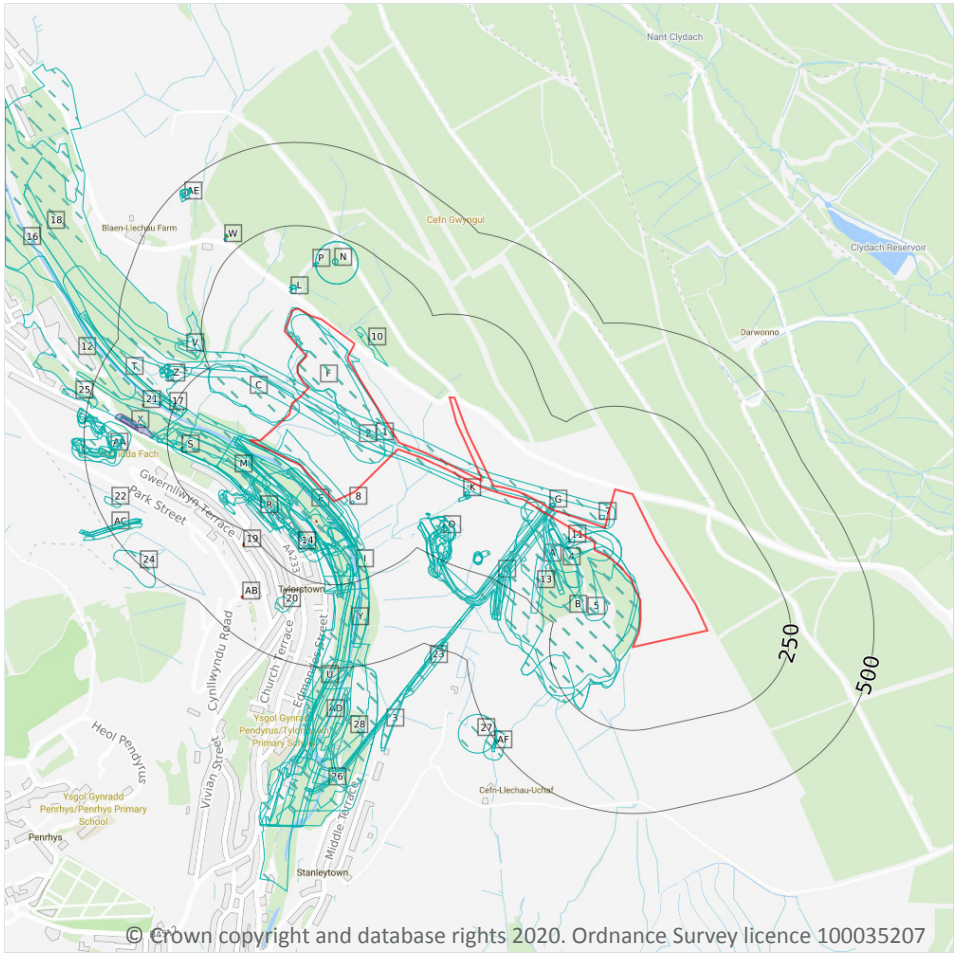
Site Area: 20.69ha

Recent site history - 2000 aerial photograph

Capture Date: 18/06/2000

Site Area: 20.69ha

1 Past land use



Site Outline

Search buffers in metres (m)

Historical industrial land uses

Historical tanks

Historical energy features

Historical garages

1.1 Historical industrial land uses

Records within 500m	157

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

Features are displayed on the Past land use map on **page 13**

ID	Location	Land use	Dates present	Group ID
1	**On site**	**Disused Tramway Sidings**	**1965**	**1174630**

ID	Location	Land use	Dates present	Group ID
2	**On site**	**Refuse Heap**	**1992**	**1178134**
3	**On site**	**Tramway Sidings**	**1915**	**1199817**
4	**On site**	**Tramway Sidings**	**1948**	**1257118**
5	**On site**	**Refuse Heap**	**1965**	**1191174**
A	**On site**	**Refuse Heap**	**1921**	**1195474**
A	**On site**	**Tramway Sidings**	**1921**	**1217738**
B	**On site**	**Unspecified Disused Tip**	**1974 - 1992**	**1197331**
B	**On site**	**Refuse Heap**	**1945**	**1221538**
B	**On site**	**Old Trial Level**	**1948**	**1269188**
C	**On site**	**Unspecified Disused Tip**	**1974 - 1992**	**1210261**
C	**On site**	**Unspecified Heap**	**1948 - 1965**	**1224543**
D	**On site**	**Tramway Sidings**	**1945**	**1216354**
E	**On site**	**Railway Sidings**	**1898**	**1193633**
E	**On site**	**Railway Sidings**	**1965**	**1216702**
E	**On site**	**Colliery**	**1898**	**1227289**
E	**On site**	**Railway Sidings**	**1948**	**1247861**
F	**On site**	**Unspecified Heap**	**1948 - 1965**	**1223422**
F	**On site**	**Unspecified Disused Tip**	**1974 - 1992**	**1230373**
F	**On site**	**Unspecified Ground Workings**	**1948 - 1965**	**1267998**
G	4m NE	Railway Building	1915	1246500
E	4m SW	Colliery	1948	1262170
G	5m N	Railway Building	1965	1204524
H	7m SW	Colliery	1921	1217347
6	8m SW	Railway Sidings	1945	1236936
E	8m SW	Colliery	1945	1208408
7	9m W	Railway Building	1965	1172166
I	21m SW	Railway Sidings	1992	1269450
8	22m SE	Magazine	1898	1177448

ID	Location	Land use	Dates present	Group ID
9	25m SW	Tramway Sidings	1915	1192016
10	26m NE	Refuse Heap	1965	1178142
11	27m SW	Railway Building	1965	1172165
J	28m SW	Refuse Heap	1915	1202807
J	28m SW	Refuse Heap	1915	1229671
E	29m SW	Colliery	1915	1210298
H	29m SW	Railway Sidings	1921	1251054
K	29m SW	Old Coal Level	1915	1234138
K	30m SW	Old Coal Level	1945	1261036
K	30m SW	Old Coal Level	1948	1242853
H	30m SW	Unspecified Mine	1965	1187486
12	34m SW	Unspecified Disused Tip	1974	1165252
K	40m SW	Old Coal Level	1921	1187871
K	43m SW	Coal Level	1898	1166747
L	46m N	Unspecified Quarry	1915 - 1921	1238253
M	54m SW	Refuse Heap	1921	1208190
L	58m N	Unspecified Disused Quarry	1948	1183074
H	60m SW	Unspecified Disused Tip	1974	1165251
L	61m N	Unspecified Quarry	1945	1247532
M	66m SW	Refuse Heap	1948	1249721
I	79m S	Refuse Heap	1948	1206598
I	79m S	Refuse Heap	1921	1208344
M	87m SW	Engine House	1898	1177825
N	112m N	Old Coal Level	1921	1225196
N	112m N	Old Coal Level	1948	1242714
13	122m SW	Unspecified Pit	1965	1185685
O	131m SW	Unspecified Disused Quarry	1921	1246849
O	131m SW	Unspecified Disused Quarry	1948	1266305

ID	Location	Land use	Dates present	Group ID
O	131m SW	Unspecified Quarry	1915	1223771
O	137m SW	Unspecified Quarry	1945	1210442
O	139m SW	Unspecified Quarry	1965	1270968
P	139m N	Old Coal Level	1915	1228689
P	139m N	Old Coal Level	1915	1243914
Q	142m SW	Trial Level	1898	1202249
Q	142m SW	Trial Level	1948	1225400
Q	143m SW	Old Trial Level	1915	1216575
O	143m SW	Unspecified Disused Quarry	1974 - 1992	1245526
Q	143m SW	Old Trial Level	1945	1223033
A	147m SW	Old Trial Level	1921	1256367
P	147m NE	Old Coal Level	1898	1226948
Q	152m SW	Old Trial Level	1921	1167863
R	154m SW	Railway Sidings	1915	1216733
R	154m SW	Railway Sidings	1915	1232023
M	158m SW	Cuttings	1898	1158366
O	159m SW	Tramway Sidings	1921	1232963
14	165m SW	Refuse Heap	1921	1200646
N	169m NE	Old Coal Level	1945	1201700
N	169m NE	Old Coal Level	1945	1211424
M	169m SW	Unspecified Quarry	1945 - 1948	1210321
O	175m SW	Unspecified Ground Workings	1965	1160467
D	176m S	Unspecified Disused Level	1974 - 1992	1259574
O	177m SW	Refuse Heap	1921	1193945
O	177m SW	Refuse Heap	1948	1202872
M	179m SW	Unspecified Quarry	1921	1223274
D	187m S	Refuse Heap	1915	1263165
D	190m S	Old Trial Level	1945	1271560

ID	Location	Land use	Dates present	Group ID
D	191m S	Refuse Heap	1948	1238800
D	191m S	Refuse Heap	1921	1261858
S	194m W	Unspecified Quarry	1898	1169637
D	195m S	Unspecified Disused Level	1992	1165644
D	195m S	Unspecified Heap	1965 - 1974	1264268
15	196m SW	Old Trial Level	1915	1246884
O	202m SW	Unspecified Quarry	1945	1169670
16	210m NW	Railway Sidings	1948	1237157
S	212m W	Unspecified Quarry	1898	1169638
T	220m W	Railway Sidings	1945	1261312
17	236m NW	Railway Sidings	1921	1204224
18	242m W	Colliery	1898	1268218
T	250m NW	Railway Sidings	1915	1222328
U	250m S	Refuse Heap	1948	1267996
U	254m S	Refuse Heap	1921	1252189
V	258m W	Unspecified Old Quarry	1948	1180799
V	268m W	Unspecified Disused Quarry	1974 - 1992	1232302
W	290m NW	Unspecified Tank	1921	1175761
Y	296m S	Refuse Heap	1921	1259659
Y	296m S	Refuse Heap	1948	1263296
W	296m NW	Unspecified Tank	1948	1268733
Z	296m NW	Old Trial Level	1921	1167862
W	297m NW	Unspecified Tank	1915	1245337
W	298m NW	Unspecified Tank	1945	1207674
Z	304m NW	Unspecified Ground Workings	1948	1160429
Z	306m NW	Old Trial Levels	1915	1238820
Z	307m NW	Old Trial Levels	1945	1254334
Z	307m NW	Old Trial Levels	1945	1265223

ID	Location	Land use	Dates present	Group ID
Z	312m NW	Old Trial Levels	1915	1209792
Z	317m NW	Old Trial Level	1921	1167861
20	324m SW	Unspecified Quarry	1898	1169636
Z	327m NW	Old Trial Levels	1915	1266785
Z	330m NW	Old Trial Levels	1915	1241001
AA	359m W	Unspecified Ground Workings	1965	1160430
AA	380m W	Unspecified Disused Quarry	1974 - 1992	1214886
AA	383m W	Unspecified Old Quarries	1921	1194112
AA	385m W	Unspecified Old Quarries	1948	1255122
AA	385m W	Unspecified Old Quarries	1915	1263416
AA	387m W	Unspecified Old Quarries	1945	1230730
AC	404m SW	Tramway Sidings	1915	1230815
AA	405m W	Unspecified Old Quarries	1898	1271782
AD	405m S	Tramway Sidings	1898	1198334
AC	406m SW	Tramway Sidings	1945	1236367
AA	406m W	Unspecified Old Quarries	1915	1226318
AC	407m SW	Tramway Sidings	1948	1207051
AA	408m W	Unspecified Old Quarries	1921	1218770
AC	410m SW	Tramway Sidings	1921	1248619
AD	428m S	Colliery	1915	1217674
22	434m SW	Unspecified Disused Levels	1965 - 1992	1214480
AA	436m W	Unspecified Old Quarries	1921	1232829
AA	438m W	Unspecified Old Quarries	1915	1193267
AA	439m W	Unspecified Old Quarries	1948	1269521
AA	439m W	Unspecified Old Quarries	1898	1226250
AE	458m NW	Unspecified Quarry	1921	1203656
23	465m S	Refuse Heap	1948	1235470
AE	467m NW	Unspecified Quarry	1915	1215583

ID	Location	Land use	Dates present	Group ID
AE	467m NW	Unspecified Quarry	1948	1215962
AE	467m NW	Unspecified Quarry	1898	1224505
AE	468m NW	Unspecified Quarry	1945	1191353
AF	468m SW	Old Coal Level	1921	1231926
24	468m SW	Unspecified Disused Levels	1965 - 1992	1244687
25	473m W	Unspecified Ground Workings	1915	1226627
26	474m S	Refuse Heap	1921	1244932
AD	474m S	Railway Sidings	1965	1272192
27	476m SW	Old Coal Level	1898	1253393
AD	489m S	Railway Sidings	1948	1260459
AF	493m SW	Old Coal Level	1948	1220551
AF	493m SW	Old Coal Level	1945	1192201
AF	493m SW	Old Coal Level	1945	1238233
AF	494m SW	Old Coal Level	1915	1226824
AA	494m W	Unspecified Pit	1992	1185678
28	495m S	Unspecified Mine	1965	1187487

This data is sourced from Ordnance Survey / Groundsure.

1.2 Historical tanks

Records within 500m	**3**

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

Features are displayed on the Past land use map on **page 13**

ID	Location	Land use	Dates present	Group ID
W	293m NW	Unspecified Tank	1920	186064
W	297m NW	Unspecified Tank	1957 - 1961	178405

ID	Location	Land use	Dates present	Group ID
21	337m W	Unspecified Tank	1993 - 1996	179837

This data is sourced from Ordnance Survey / Groundsure.

1.3 Historical energy features

Records within 500m	**6**

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

Features are displayed on the Past land use map on **page 13**

ID	Location	Land use	Dates present	Group ID
H	78m SW	Electricity Substation	1996	97322
M	135m SW	Electricity Substation	1972	103937
M	136m SW	Electricity Substation	1993 - 1994	104583
19	282m SW	Electricity Substation	1972 - 1994	103805
AB	395m SW	Electricity Substation	1972	108212
AB	397m SW	Electricity Substation	1993 - 1994	109962

This data is sourced from Ordnance Survey / Groundsure.

1.4 Historical petrol stations

Records within 500m	**0**

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

This data is sourced from Ordnance Survey / Groundsure.

1.5 Historical garages

Records within 500m	4

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

Features are displayed on the Past land use map on **page 13**

ID	Location	Land use	Dates present	Group ID
X	292m W	Garage	1996	34007
X	340m W	Garage	1957 - 1961	35614
X	342m W	Garage	1993	33352
X	346m W	Garage	1957	34340

This data is sourced from Ordnance Survey / Groundsure.

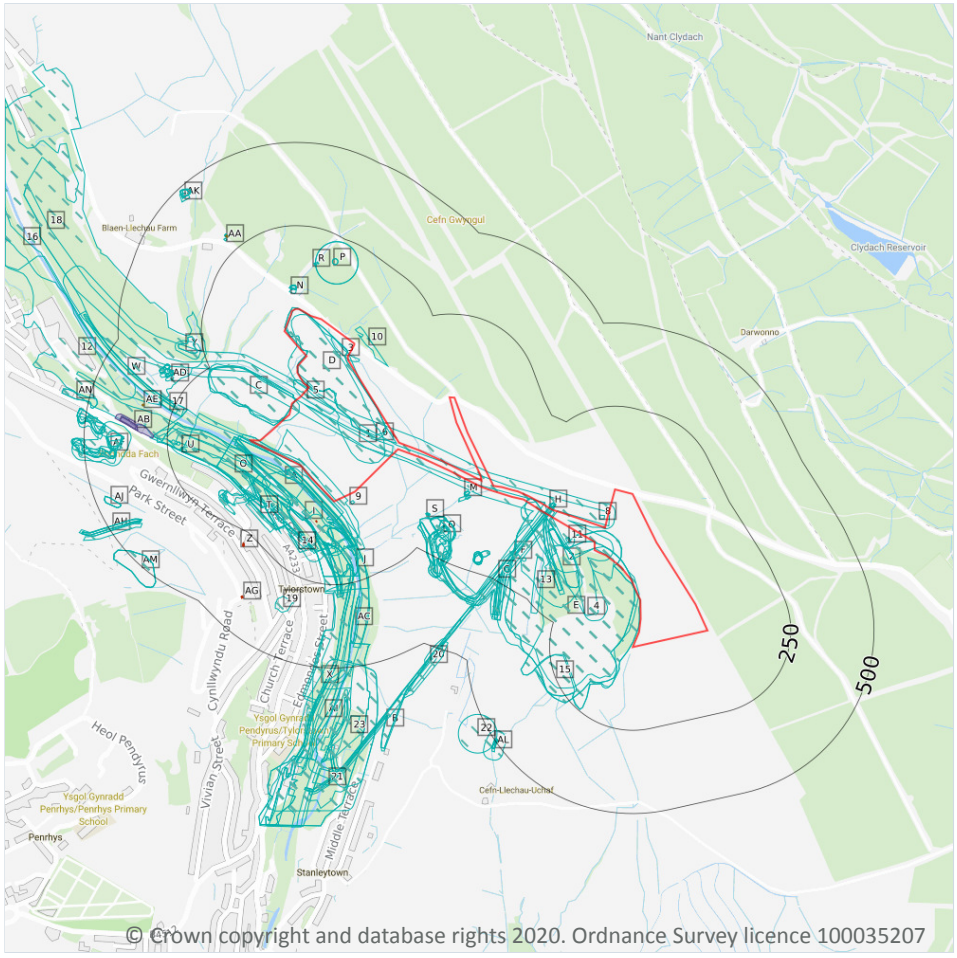
1.6 Historical military land

Records within 500m	0

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

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

2 Past land use - un-grouped



Site Outline

Search buffers in metres (m)

Historical industrial land uses

Historical tanks

Historical energy features

Historical garages

2.1 Historical industrial land uses

Records within 500m	203

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

Features are displayed on the Past land use - un-grouped map on **page 22**

ID	Location	Land Use	Date	Group ID
1	**On site**	**Refuse Heap**	**1992**	**1178134**
2	**On site**	**Tramway Sidings**	**1948**	**1257118**
3	**On site**	**Unspecified Ground Workings**	**1948**	**1267998**

ID	Location	Land Use	Date	Group ID
4	**On site**	**Refuse Heap**	**1965**	**1191174**
5	**On site**	**Unspecified Heap**	**1965**	**1223422**
6	**On site**	**Disused Tramway Sidings**	**1965**	**1174630**
A	**On site**	**Colliery**	**1898**	**1227289**
A	**On site**	**Railway Sidings**	**1898**	**1193633**
A	**On site**	**Railway Sidings**	**1948**	**1247861**
A	**On site**	**Railway Sidings**	**1965**	**1216702**
B	**On site**	**Tramway Sidings**	**1915**	**1199817**
B	**On site**	**Tramway Sidings**	**1915**	**1199817**
C	**On site**	**Unspecified Disused Tip**	**1992**	**1210261**
C	**On site**	**Unspecified Heap**	**1948**	**1224543**
C	**On site**	**Unspecified Disused Tip**	**1974**	**1210261**
C	**On site**	**Unspecified Heap**	**1965**	**1224543**
D	**On site**	**Unspecified Disused Tip**	**1992**	**1230373**
D	**On site**	**Unspecified Heap**	**1948**	**1223422**
D	**On site**	**Unspecified Disused Tip**	**1974**	**1230373**
D	**On site**	**Unspecified Ground Workings**	**1965**	**1267998**
E	**On site**	**Old Trial Level**	**1948**	**1269188**
E	**On site**	**Unspecified Disused Tip**	**1974**	**1197331**
E	**On site**	**Refuse Heap**	**1945**	**1221538**
E	**On site**	**Refuse Heap**	**1945**	**1221538**
F	**On site**	**Tramway Sidings**	**1921**	**1217738**
F	**On site**	**Refuse Heap**	**1921**	**1195474**
G	**On site**	**Tramway Sidings**	**1945**	**1216354**
H	4m NE	Railway Building	1915	1246500
H	4m NE	Railway Building	1915	1246500
A	4m SW	Colliery	1948	1262170
H	5m N	Railway Building	1965	1204524

ID	Location	Land Use	Date	Group ID
I	7m SW	Colliery	1921	1217347
7	8m SW	Railway Sidings	1945	1236936
A	8m SW	Colliery	1945	1208408
A	8m SW	Colliery	1945	1208408
8	9m W	Railway Building	1965	1172166
J	21m SW	Railway Sidings	1992	1269450
9	22m SE	Magazine	1898	1177448
K	25m SW	Tramway Sidings	1915	1192016
K	25m SW	Tramway Sidings	1915	1192016
10	26m NE	Refuse Heap	1965	1178142
11	27m SW	Railway Building	1965	1172165
L	28m SW	Refuse Heap	1915	1229671
L	28m SW	Refuse Heap	1915	1202807
A	29m SW	Colliery	1915	1210298
A	29m SW	Colliery	1915	1210298
I	29m SW	Railway Sidings	1921	1251054
M	29m SW	Old Coal Level	1915	1234138
M	29m SW	Old Coal Level	1915	1234138
M	30m SW	Old Coal Level	1945	1261036
M	30m SW	Old Coal Level	1945	1261036
M	30m SW	Old Coal Level	1948	1242853
I	30m SW	Unspecified Mine	1965	1187486
12	34m SW	Unspecified Disused Tip	1974	1165252
M	40m SW	Old Coal Level	1921	1187871
M	43m SW	Coal Level	1898	1166747
N	46m N	Unspecified Quarry	1921	1238253
O	54m SW	Refuse Heap	1921	1208190
N	58m N	Unspecified Quarry	1915	1238253

ID	Location	Land Use	Date	Group ID
N	58m N	Unspecified Quarry	1915	1238253
N	58m N	Unspecified Disused Quarry	1948	1183074
I	60m SW	Unspecified Disused Tip	1974	1165251
N	61m N	Unspecified Quarry	1945	1247532
O	66m SW	Refuse Heap	1948	1249721
J	79m S	Refuse Heap	1948	1206598
J	79m S	Refuse Heap	1921	1208344
O	87m SW	Engine House	1898	1177825
P	112m N	Old Coal Level	1948	1242714
P	112m N	Old Coal Level	1921	1225196
13	122m SW	Unspecified Pit	1965	1185685
Q	131m SW	Unspecified Disused Quarry	1948	1266305
Q	131m SW	Unspecified Disused Quarry	1921	1246849
Q	131m SW	Unspecified Quarry	1915	1223771
Q	131m SW	Unspecified Quarry	1915	1223771
Q	137m SW	Unspecified Quarry	1945	1210442
Q	139m SW	Unspecified Quarry	1965	1270968
R	139m N	Old Coal Level	1915	1243914
R	139m N	Old Coal Level	1915	1228689
S	142m SW	Trial Level	1948	1225400
S	142m SW	Trial Level	1898	1202249
S	143m SW	Old Trial Level	1915	1216575
S	143m SW	Old Trial Level	1915	1216575
Q	143m SW	Unspecified Disused Quarry	1992	1245526
Q	143m SW	Unspecified Disused Quarry	1974	1245526
S	143m SW	Old Trial Level	1945	1223033
S	143m SW	Old Trial Level	1945	1223033
F	147m SW	Old Trial Level	1921	1256367

ID	Location	Land Use	Date	Group ID
R	147m NE	Old Coal Level	1898	1226948
S	152m SW	Old Trial Level	1921	1167863
T	154m SW	Railway Sidings	1915	1216733
T	154m SW	Railway Sidings	1915	1232023
O	158m SW	Cuttings	1898	1158366
Q	159m SW	Tramway Sidings	1921	1232963
14	165m SW	Refuse Heap	1921	1200646
P	169m NE	Old Coal Level	1945	1201700
P	169m NE	Old Coal Level	1945	1211424
O	169m SW	Unspecified Quarry	1948	1210321
O	169m SW	Unspecified Quarry	1945	1210321
Q	175m SW	Unspecified Ground Workings	1965	1160467
G	176m S	Unspecified Disused Level	1992	1259574
G	176m S	Unspecified Disused Level	1974	1259574
Q	177m SW	Refuse Heap	1948	1202872
Q	177m SW	Refuse Heap	1921	1193945
O	179m SW	Unspecified Quarry	1921	1223274
G	187m S	Refuse Heap	1915	1263165
G	187m S	Refuse Heap	1915	1263165
G	190m S	Old Trial Level	1945	1271560
G	190m S	Old Trial Level	1945	1271560
G	191m S	Refuse Heap	1948	1238800
G	191m S	Refuse Heap	1921	1261858
U	194m W	Unspecified Quarry	1898	1169637
G	195m S	Unspecified Disused Level	1992	1165644
G	195m S	Unspecified Heap	1974	1264268
G	195m S	Unspecified Heap	1965	1264268
V	196m SW	Old Trial Level	1915	1246884

ID	Location	Land Use	Date	Group ID
V	196m SW	Old Trial Level	1915	1246884
15	201m W	Unspecified Disused Tip	1992	1197331
Q	202m SW	Unspecified Quarry	1945	1169670
16	210m NW	Railway Sidings	1948	1237157
U	212m W	Unspecified Quarry	1898	1169638
W	220m W	Railway Sidings	1945	1261312
17	236m NW	Railway Sidings	1921	1204224
18	242m W	Colliery	1898	1268218
W	250m NW	Railway Sidings	1915	1222328
W	250m NW	Railway Sidings	1915	1222328
X	250m S	Refuse Heap	1948	1267996
X	254m S	Refuse Heap	1921	1252189
Y	258m W	Unspecified Old Quarry	1948	1180799
Y	268m W	Unspecified Disused Quarry	1992	1232302
Y	268m W	Unspecified Disused Quarry	1974	1232302
AA	290m NW	Unspecified Tank	1921	1175761
AC	296m S	Refuse Heap	1948	1263296
AC	296m S	Refuse Heap	1921	1259659
AA	296m NW	Unspecified Tank	1948	1268733
AD	296m NW	Old Trial Level	1921	1167862
AA	297m NW	Unspecified Tank	1915	1245337
AA	297m NW	Unspecified Tank	1915	1245337
AA	298m NW	Unspecified Tank	1945	1207674
AD	304m NW	Unspecified Ground Workings	1948	1160429
AD	306m NW	Old Trial Levels	1915	1238820
AD	306m NW	Old Trial Levels	1915	1238820
AD	307m NW	Old Trial Levels	1945	1254334
AD	307m NW	Old Trial Levels	1945	1265223

ID	Location	Land Use	Date	Group ID
AD	312m NW	Old Trial Levels	1915	1209792
AD	312m NW	Old Trial Levels	1915	1209792
AD	317m NW	Old Trial Level	1921	1167861
19	324m SW	Unspecified Quarry	1898	1169636
AD	327m NW	Old Trial Levels	1915	1266785
AD	327m NW	Old Trial Levels	1915	1266785
AD	330m NW	Old Trial Levels	1915	1241001
AD	330m NW	Old Trial Levels	1915	1241001
AF	359m W	Unspecified Ground Workings	1965	1160430
AF	380m W	Unspecified Disused Quarry	1992	1214886
AF	380m W	Unspecified Disused Quarry	1974	1214886
AF	383m W	Unspecified Old Quarries	1921	1194112
AF	385m W	Unspecified Old Quarries	1948	1255122
AF	385m W	Unspecified Old Quarries	1915	1263416
AF	385m W	Unspecified Old Quarries	1915	1263416
AF	387m W	Unspecified Old Quarries	1945	1230730
AH	404m SW	Tramway Sidings	1915	1230815
AH	404m SW	Tramway Sidings	1915	1230815
AF	405m W	Unspecified Old Quarries	1898	1271782
AI	405m S	Tramway Sidings	1898	1198334
AH	406m SW	Tramway Sidings	1945	1236367
AF	406m W	Unspecified Old Quarries	1915	1226318
AF	406m W	Unspecified Old Quarries	1915	1226318
AH	407m SW	Tramway Sidings	1948	1207051
AF	408m W	Unspecified Old Quarries	1921	1218770
AH	410m SW	Tramway Sidings	1921	1248619
AI	428m S	Colliery	1915	1217674
AI	428m S	Colliery	1915	1217674

ID	Location	Land Use	Date	Group ID
AJ	434m SW	Unspecified Disused Levels	1992	1214480
AJ	434m SW	Unspecified Disused Levels	1974	1214480
AJ	434m SW	Unspecified Disused Levels	1965	1214480
AF	436m W	Unspecified Old Quarries	1921	1232829
AF	438m W	Unspecified Old Quarries	1915	1193267
AF	438m W	Unspecified Old Quarries	1915	1193267
AF	439m W	Unspecified Old Quarries	1948	1269521
AF	439m W	Unspecified Old Quarries	1898	1226250
AK	458m NW	Unspecified Quarry	1921	1203656
20	465m S	Refuse Heap	1948	1235470
AK	467m NW	Unspecified Quarry	1915	1215583
AK	467m NW	Unspecified Quarry	1915	1215583
AK	467m NW	Unspecified Quarry	1948	1215962
AK	467m NW	Unspecified Quarry	1898	1224505
AK	468m NW	Unspecified Quarry	1945	1191353
AL	468m SW	Old Coal Level	1921	1231926
AM	468m SW	Unspecified Disused Levels	1992	1244687
AM	468m SW	Unspecified Disused Levels	1974	1244687
AM	468m SW	Unspecified Disused Levels	1965	1244687
AN	473m W	Unspecified Ground Workings	1915	1226627
AN	473m W	Unspecified Ground Workings	1915	1226627
21	474m S	Refuse Heap	1921	1244932
AI	474m S	Railway Sidings	1965	1272192
22	476m SW	Old Coal Level	1898	1253393
AI	489m S	Railway Sidings	1948	1260459
AL	493m SW	Old Coal Level	1948	1220551
AL	493m SW	Old Coal Level	1945	1192201
AL	493m SW	Old Coal Level	1945	1238233

ID	Location	Land Use	Date	Group ID
AL	494m SW	Old Coal Level	1915	1226824
AL	494m SW	Old Coal Level	1915	1226824
AF	494m W	Unspecified Pit	1992	1185678
23	495m S	Unspecified Mine	1965	1187487

This data is sourced from Ordnance Survey / Groundsure.

2.2 Historical tanks

Records within 500m **5**

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

Features are displayed on the Past land use - un-grouped map on **page 22**

ID	Location	Land Use	Date	Group ID
AA	293m NW	Unspecified Tank	1920	186064
AA	297m NW	Unspecified Tank	1957	178405
AA	297m NW	Unspecified Tank	1961	178405
AE	337m W	Unspecified Tank	1996	179837
AE	337m W	Unspecified Tank	1993	179837

This data is sourced from Ordnance Survey / Groundsure.

2.3 Historical energy features

Records within 500m **13**

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

Features are displayed on the Past land use - un-grouped map on **page 22**

ID	Location	Land Use	Date	Group ID
I	78m SW	Electricity Substation	1996	97322
O	135m SW	Electricity Substation	1972	103937

ID	Location	Land Use	Date	Group ID
O	136m SW	Electricity Substation	1994	104583
O	136m SW	Electricity Substation	1993	104583
O	136m SW	Electricity Substation	1994	104583
Z	282m SW	Electricity Substation	1972	103805
Z	284m SW	Electricity Substation	1994	103805
Z	284m SW	Electricity Substation	1993	103805
Z	284m SW	Electricity Substation	1994	103805
AG	395m SW	Electricity Substation	1972	108212
AG	397m SW	Electricity Substation	1994	109962
AG	397m SW	Electricity Substation	1993	109962
AG	397m SW	Electricity Substation	1994	109962

This data is sourced from Ordnance Survey / Groundsure.

2.4 Historical petrol stations

Records within 500m	**0**

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

This data is sourced from Ordnance Survey / Groundsure.

2.5 Historical garages

Records within 500m	**5**

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

Features are displayed on the Past land use - un-grouped map on **page 22**

ID	Location	Land Use	Date	Group ID
AB	292m W	Garage	1996	34007
AB	340m W	Garage	1957	35614

ID	Location	Land Use	Date	Group ID
AB	340m W	Garage	1961	35614
AB	342m W	Garage	1993	33352
AB	346m W	Garage	1957	34340

This data is sourced from Ordnance Survey / Groundsure.

3 Waste and landfill

Site Outline

Search buffers in metres (m)

Waste exemptions

3.1 Active or recent landfill

Records within 500m	0

Active or recently closed landfill sites under Environment Agency/Natural Resources Wales regulation.

This data is sourced from the Environment Agency and Natural Resources Wales.

3.2 Historical landfill (BGS records)

Records within 500m	0

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

This data is sourced from the British Geological Survey.

3.3 Historical landfill (LA/mapping records)

Records within 500m	0

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

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

3.4 Historical landfill (EA/NRW records)

Records within 500m	0

Known historical (closed) landfill sites (e.g. sites where there is no PPC permit or waste management licence currently in force). This includes sites that existed before the waste licensing regime and sites that have been licensed in the past but where a licence has been revoked, ceased to exist or surrendered and a certificate of completion has been issued.

This data is sourced from the Environment Agency and Natural Resources Wales.

3.5 Historical waste sites

Records within 500m	0

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

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

3.6 Licensed waste sites

Records within 500m	0

Active or recently closed waste sites under Environment Agency/Natural Resources Wales regulation.

This data is sourced from the Environment Agency and Natural Resources Wales.

3.7 Waste exemptions

Records within 500m	1

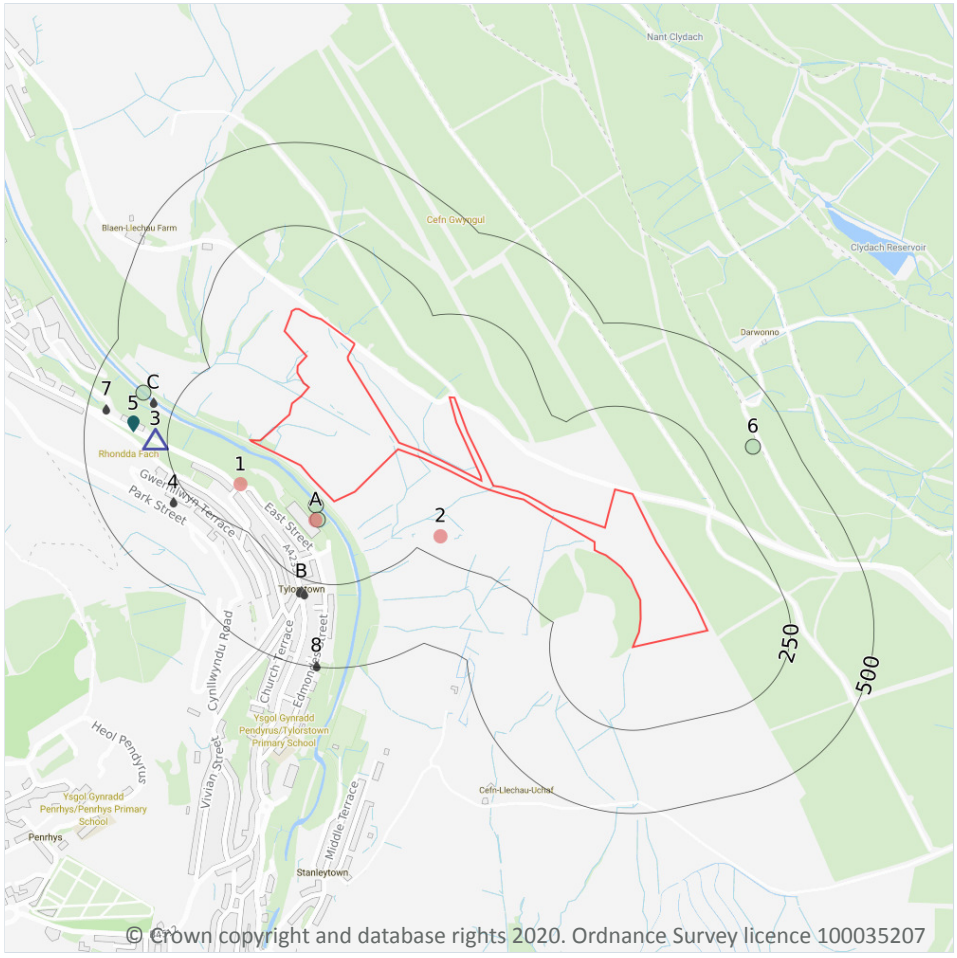
Activities involving the storage, treatment, use or disposal of waste that are exempt from needing a permit. Exemptions have specific limits and conditions that must be adhered to.

Features are displayed on the Waste and landfill map on **page 33**

ID	Location	Site	Reference	Category	Sub-Category	Description
1	202m S	Rhondda Fach Sports Centre, East Street, Tylorstown, Ferndale , Rhondda Cynon Taff, CF433HR	NRW-WME023478	Using waste exemption	Not on a farm	Use of waste in construction

This data is sourced from the Environment Agency and Natural Resources Wales.

4 Current industrial land use



Site Outline

Search buffers in metres (m)

Recent industrial land uses

Current or recent petrol stations

Licensed pollutant release (Part A(2)/B)

Licensed Discharges to controlled waters

Pollution Incidents (EA/NRW)

4.1 Recent industrial land uses

Records within 250m	3

Current potentially contaminative industrial sites.

Features are displayed on the Current industrial land use map on **page 36**

ID	Location	Company	Address	Activity	Category
A	79m SW	Electricity Sub Station	Mid Glamorgan, CF43	Electrical Features	Infrastructure and Facilities
1	132m SW	Electricity Sub Station	Mid Glamorgan, CF43	Electrical Features	Infrastructure and Facilities
2	187m SW	Quarry (Disused)	Mid Glamorgan, CF43	Unspecified Quarries Or Mines	Extractive Industries

This data is sourced from Ordnance Survey.

4.2 Current or recent petrol stations

Records within 500m	1

Open, closed, under development and obsolete petrol stations.

Features are displayed on the Current industrial land use map on **page 36**

ID	Location	Company	Address	LPG	Status
3	287m W	OBSOLETE	Dol Y Coed Terrace, Tylorstown, Ferndale, Rhondda Cynon Taf, CF43 3BW	Not Applicable	Obsolete

This data is sourced from Experian.

4.3 Electricity cables

Records within 500m	0

High voltage underground electricity transmission cables.

This data is sourced from National Grid.

4.4 Gas pipelines

Records within 500m	0

High pressure underground gas transmission pipelines.

This data is sourced from National Grid.

4.5 Sites determined as Contaminated Land

Records within 500m	0

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

This data is sourced from Local Authority records.

4.6 Control of Major Accident Hazards (COMAH)

Records within 500m	0

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

This data is sourced from the Health and Safety Executive.

4.7 Regulated explosive sites

Records within 500m	0

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

This data is sourced from the Health and Safety Executive.

4.8 Hazardous substance storage/usage

Records within 500m	0

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

This data is sourced from Local Authority records.

4.9 Historical licensed industrial activities (IPC)

Records within 500m	0

Integrated Pollution Control (IPC) records of substance releases to air, land and water. This data represents a historical archive as the IPC regime has been superseded.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.10 Licensed industrial activities (Part A(1))

Records within 500m	0

Records of Part A(1) installations regulated under the Environmental Permitting (England and Wales) Regulations 2016 for the release of substances to the environment.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.11 Licensed pollutant release (Part A(2)/B)

Records within 500m	1

Records of Part A(2) and Part B installations regulated under the Environmental Permitting (England and Wales) Regulations 2016 for the release of substances to the environment.

Features are displayed on the Current industrial land use map on **page 36**

ID	Location	Address	Details	
5	356m W	Pitstop Tyre & Exhaust Centre Ltd, Dolycoed Terrace, Ferndale, CF43 3BW	Process: Waste Oil Burner 0.4 MW Status: New Legislation Applies Permit Type: Part B	Enforcement: No Enforcements Notified Date of enforcement: No Enforcements Notified Comment: No Enforcements Notified

This data is sourced from Local Authority records.

4.12 Radioactive Substance Authorisations

Records within 500m	**0**

Records of the storage, use, accumulation and disposal of radioactive substances regulated under the Radioactive Substances Act 1993.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.13 Licensed Discharges to controlled waters

Records within 500m	**7**

Discharges of treated or untreated effluent to controlled waters under the Water Resources Act 1991.

Features are displayed on the Current industrial land use map on **page 36**

ID	Location	Address	Details	
B	288m S	East Rd Cso Tylorstown, Nr 75 East Rd, Tylorstown, Ferndale, CF43 3DE	Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: AN0119001 Permit Version: 0 Receiving Water: RHONDDA FACH RIVER	Status: Effective Issue date: 21/08/2019 Effective Date: 21/08/2019 Revocation Date: -
B	292m S	TYLORSTOWN - EAST ROAD	Effluent Type: UNSPECIFIED Permit Number: AN0119001 Permit Version: 1 Receiving Water: RHONDDA FACH	Status: NEW CONSENT, BY APPLICATION (WRA 91, SECTION 88) Issue date: 20/10/1989 Effective Date: 20/10/1989 Revocation Date: 30/03/2004
B	294m S	EAST ROAD CSO TYLORSTOWN RHONDDA, EAST ROAD CSO, ASSET NUMBER 32365, TYLORSTOWN, RHONDDA CYNON TAFF	Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: AN0119001 Permit Version: 2 Receiving Water: RHONDDA FACH	Status: Effective Issue date: 31/10/2003 Effective Date: 31/03/2004 Revocation Date: -

ID	Location	Address	Details	
4	298m SW	TYLORSTOWN BPT	Effluent Type: UNSPECIFIED Permit Number: AM0012801 Permit Version: 1 Receiving Water: SOAKAWAY	Status: CONSENT EXPIRED - TIME LIMIT Issue date: 02/10/1989 Effective Date: 02/10/1989 Revocation Date: 14/03/1994
C	313m W	Ferndale - Banana Tip Surface, Banana Tip Surface, Ferndale, Rhondda Cynon Taff, Wales	Effluent Type: TRADE DISCHARGES - SITE DRAINAGE Permit Number: AF4029004 Permit Version: 0 Receiving Water: RHONDDA FACH	Status: Effective Issue date: 02/02/1979 Effective Date: 02/02/1979 Revocation Date: -
7	442m W	MALTBY SERVICE STATION EAST ROAD T, MALTBY SERVICE STATION EAST ROAD, EAST ROAD TYLORSTOWN, TYLORSTOWN	Effluent Type: UNSPECIFIED Permit Number: AN0136601 Permit Version: 1 Receiving Water: SOAKAWAY	Status: CONSENT EXPIRED - TIME LIMIT Issue date: 28/04/1989 Effective Date: 28/04/1989 Revocation Date: 20/11/1992
8	496m S	TYLORSTOWN EDMONDES STREET SSO, EDMONDES STREET SSO	Effluent Type: UNSPECIFIED Permit Number: AE2018418 Permit Version: 1 Receiving Water: RHONDDA FACH	Status: REVOKED (WRA 91, S88 & SCHED 10 AS AMENDED BY ENV Issue date: 14/11/1963 Effective Date: 14/11/1963 Revocation Date: 31/03/2004

This data is sourced from the Environment Agency and Natural Resources Wales.

4.14 Pollutant release to surface waters (Red List)

Records within 500m	**0**

Discharges of specified substances under the Environmental Protection (Prescribed Processes and Substances) Regulations 1991.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.15 Pollutant release to public sewer

Records within 500m	**0**

Discharges of Special Category Effluents to the public sewer.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.16 List 1 Dangerous Substances

Records within 500m	0

Discharges of substances identified on List I of European Directive E 2006/11/EC, and regulated under the Environmental Damage (Prevention and Remediation) Regulations 2015.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.17 List 2 Dangerous Substances

Records within 500m	0

Discharges of substances identified on List II of European Directive E 2006/11/EC, and regulated under the Environmental Damage (Prevention and Remediation) Regulations 2015.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.18 Pollution Incidents (EA/NRW)

Records within 500m	4

Records of substantiated pollution incidents. Since 2006 this data has only included category 1 (major) and 2 (significant) pollution incidents.

Features are displayed on the Current industrial land use map on **page 36**

ID	Location	Details	
A	47m SW	Incident Date: 18/06/2001 Incident Identification: 9865 Pollutant: Sewage Materials Pollutant Description: Other Sewage Material	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
A	74m SW	Incident Date: 04/11/2002 Incident Identification: 118545 Pollutant: Inert Materials and Wastes Pollutant Description: Other Inert Material or Waste	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
C	352m NW	Incident Date: 01/06/2001 Incident Identification: 7256 Pollutant: Sewage Materials Pollutant Description: Crude Sewage	Water Impact: Category 3 (Minor) Land Impact: Category 3 (Minor) Air Impact: Category 3 (Minor)
6	386m NE	Incident Date: 09/06/2013 Incident Identification: 1120557 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Smoke	Water Impact: - Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)

This data is sourced from the Environment Agency and Natural Resources Wales.

4.19 Pollution inventory substances

Records within 500m	0

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

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

4.20 Pollution inventory waste transfers

Records within 500m	0

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

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

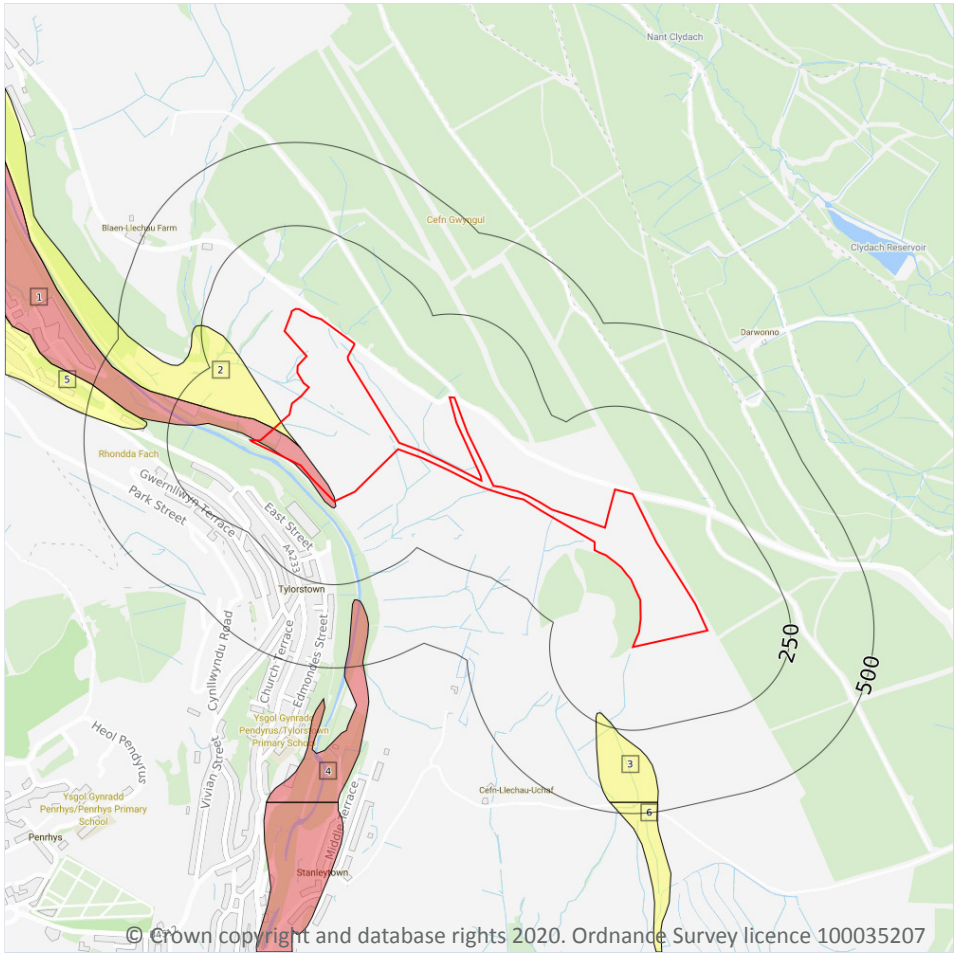
4.21 Pollution inventory radioactive waste

Records within 500m	0

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

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

5 Hydrogeology - Superficial aquifer



Site Outline

Search buffers in metres (m)

- Principal
- Secondary A
- Secondary B
- Secondary Undifferentiated
- Unproductive
- Unknown

5.1 Superficial aquifer

Records within 500m	6

Aquifer status of groundwater held within superficial geology.

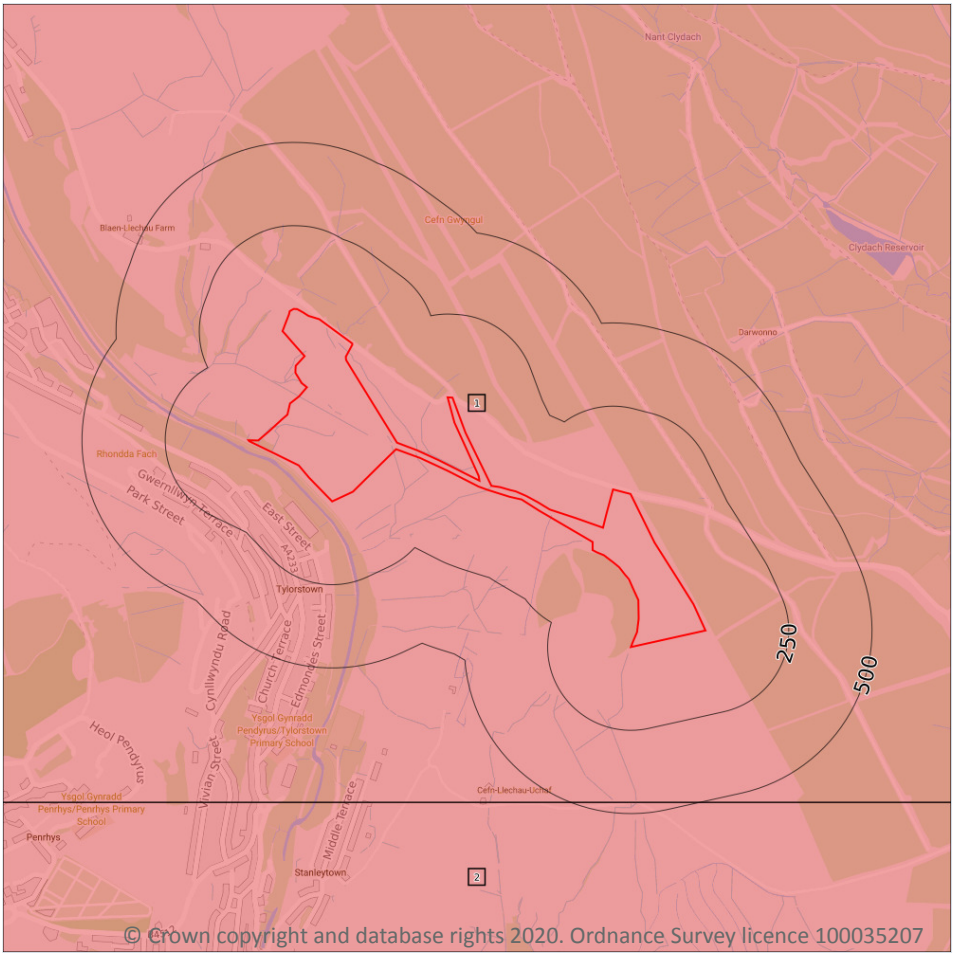
Features are displayed on the Hydrogeology map on **page 43**

ID	Location	Designation	Description
1	On site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
2	On site	Secondary Undifferentiated	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type

ID	Location	Designation	Description
3	221m SW	Secondary Undifferentiated	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
4	302m S	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
5	315m W	Secondary Undifferentiated	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
6	466m S	Secondary Undifferentiated	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.

Bedrock aquifer



Site Outline

Search buffers in metres (m)

- Principal
- Secondary A
- Secondary B
- Secondary Undifferentiated
- Unproductive

5.2 Bedrock aquifer

Records within 500m	2

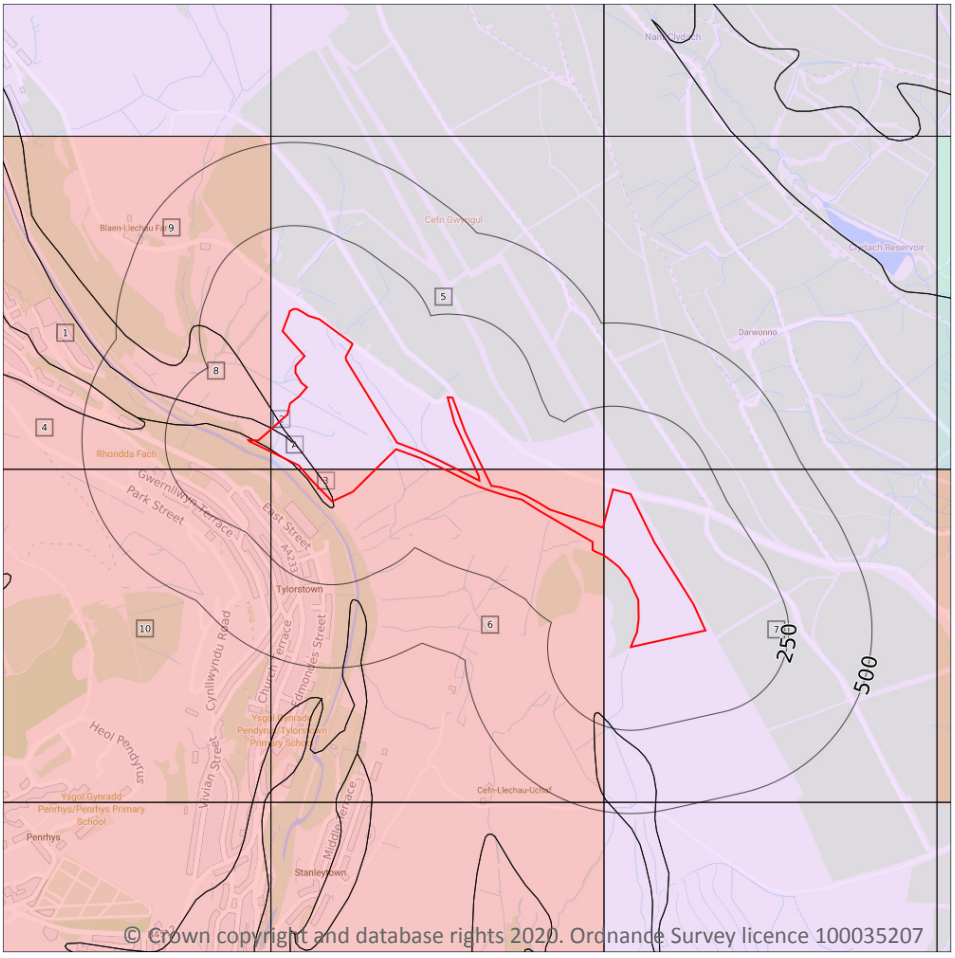
Aquifer status of groundwater held within bedrock geology.

Features are displayed on the Bedrock aquifer map on **page 45**

ID	Location	Designation	Description
1	**On site**	**Secondary A**	**Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers**
2	466m S	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.

Groundwater vulnerability



Site Outline

Search buffers in metres (m)

Superficial vulnerability

- Principal superficial aquifer, high vulnerability
- Secondary superficial aquifer, high vulnerability
- Principal superficial aquifer, medium vulnerability
- Secondary superficial aquifer, medium vulnerability
- Principal superficial aquifer, low vulnerability
- Secondary superficial aquifer, low vulnerability

Bedrock vulnerability

- Principal bedrock aquifer, high vulnerability
- Secondary bedrock aquifer, high vulnerability
- Principal bedrock aquifer, medium vulnerability
- Secondary bedrock aquifer, medium vulnerability
- Principal bedrock aquifer, low vulnerability
- Secondary bedrock aquifer, low vulnerability

Other information

- Unproductive aquifer
- Soluble rock risk
- Local information

5.3 Groundwater vulnerability

Records within 50m	12

An assessment of the vulnerability of groundwater to a pollutant discharged at ground level based on the hydrological, geological, hydrogeological and soil properties within a one kilometre square grid. Groundwater vulnerability is described as High, Medium or Low as follows:

- High - Areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.
- Medium - Intermediate between high and low vulnerability.
- Low - Areas that provide the greatest protection from pollution. They are likely to be characterised by low leaching soils and/or the presence of superficial deposits characterised by a low permeability.

Features are displayed on the Groundwater vulnerability map on **page 47**

ID	Location	Summary	Soil / surface	Superficial geology	Bedrock geology
1	On site	Summary Classification: Secondary bedrock aquifer - High Vulnerability Combined classification: Productive Bedrock Aquifer, Productive Superficial Aquifer	Leaching class: High Infiltration value: <40% Dilution value: >550mm/year	Vulnerability: Medium Aquifer type: Secondary Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: High Aquifer type: Secondary Flow mechanism: Well connected fractures
2	On site	Summary Classification: Secondary bedrock aquifer - Medium Vulnerability Combined classification: Productive Bedrock Aquifer, Productive Superficial Aquifer	Leaching class: Low Infiltration value: <40% Dilution value: >550mm/year	Vulnerability: Low Aquifer type: Secondary Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: Medium Aquifer type: Secondary Flow mechanism: Well connected fractures
3	On site	Summary Classification: Secondary bedrock aquifer - High Vulnerability Combined classification: Productive Bedrock Aquifer, Productive Superficial Aquifer	Leaching class: High Infiltration value: <40% Dilution value: >550mm/year	Vulnerability: Medium Aquifer type: Secondary Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: High Aquifer type: Secondary Flow mechanism: Well connected fractures
4	On site	Summary Classification: Secondary bedrock aquifer - High Vulnerability Combined classification: Productive Bedrock Aquifer, No Superficial Aquifer	Leaching class: High Infiltration value: <40% Dilution value: >550mm/year	Vulnerability: - Aquifer type: - Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: High Aquifer type: Secondary Flow mechanism: Well connected fractures
5	On site	Summary Classification: Secondary bedrock aquifer - Medium Vulnerability Combined classification: Productive Bedrock Aquifer, No Superficial Aquifer	Leaching class: Low Infiltration value: <40% Dilution value: >550mm/year	Vulnerability: - Aquifer type: - Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: Medium Aquifer type: Secondary Flow mechanism: Well connected fractures
6	On site	Summary Classification: Secondary bedrock aquifer - High Vulnerability Combined classification: Productive Bedrock Aquifer, No Superficial Aquifer	Leaching class: High Infiltration value: <40% Dilution value: >550mm/year	Vulnerability: - Aquifer type: - Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: High Aquifer type: Secondary Flow mechanism: Well connected fractures
7	On site	Summary Classification: Secondary bedrock aquifer - Medium Vulnerability Combined classification: Productive Bedrock Aquifer, No Superficial Aquifer	Leaching class: Low Infiltration value: <40% Dilution value: >550mm/year	Vulnerability: - Aquifer type: - Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: Medium Aquifer type: Secondary Flow mechanism: Well connected fractures

ID	Location	Summary	Soil / surface	Superficial geology	Bedrock geology
A	**On site**	**Summary Classification: Secondary bedrock aquifer - Medium Vulnerability Combined classification: Productive Bedrock Aquifer, Productive Superficial Aquifer**	**Leaching class: Low Infiltration value: <40% Dilution value: >550mm/year**	**Vulnerability: Low Aquifer type: Secondary Thickness: <3m Patchiness value: <90% Recharge potential: No Data**	**Vulnerability: Medium Aquifer type: Secondary Flow mechanism: Well connected fractures**
A	**On site**	**Summary Classification: Secondary bedrock aquifer - Medium Vulnerability Combined classification: Productive Bedrock Aquifer, No Superficial Aquifer**	**Leaching class: Low Infiltration value: <40% Dilution value: >550mm/year**	**Vulnerability: - Aquifer type: - Thickness: <3m Patchiness value: <90% Recharge potential: No Data**	**Vulnerability: Medium Aquifer type: Secondary Flow mechanism: Well connected fractures**
8	3m NW	Summary Classification: Secondary bedrock aquifer - High Vulnerability Combined classification: Productive Bedrock Aquifer, Productive Superficial Aquifer	Leaching class: High Infiltration value: <40% Dilution value: >550mm/year	Vulnerability: Medium Aquifer type: Secondary Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: High Aquifer type: Secondary Flow mechanism: Well connected fractures
9	34m W	Summary Classification: Secondary bedrock aquifer - High Vulnerability Combined classification: Productive Bedrock Aquifer, No Superficial Aquifer	Leaching class: High Infiltration value: <40% Dilution value: >550mm/year	Vulnerability: - Aquifer type: - Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: High Aquifer type: Secondary Flow mechanism: Well connected fractures
10	47m SW	Summary Classification: Secondary bedrock aquifer - High Vulnerability Combined classification: Productive Bedrock Aquifer, No Superficial Aquifer	Leaching class: High Infiltration value: <40% Dilution value: >550mm/year	Vulnerability: - Aquifer type: - Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: High Aquifer type: Secondary Flow mechanism: Well connected fractures

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.

5.4 Groundwater vulnerability- soluble rock risk

Records on site	**0**

This dataset identifies areas where solution features that enable rapid movement of a pollutant may be present within a 1km grid square.

This data is sourced from the British Geological Survey and the Environment Agency.

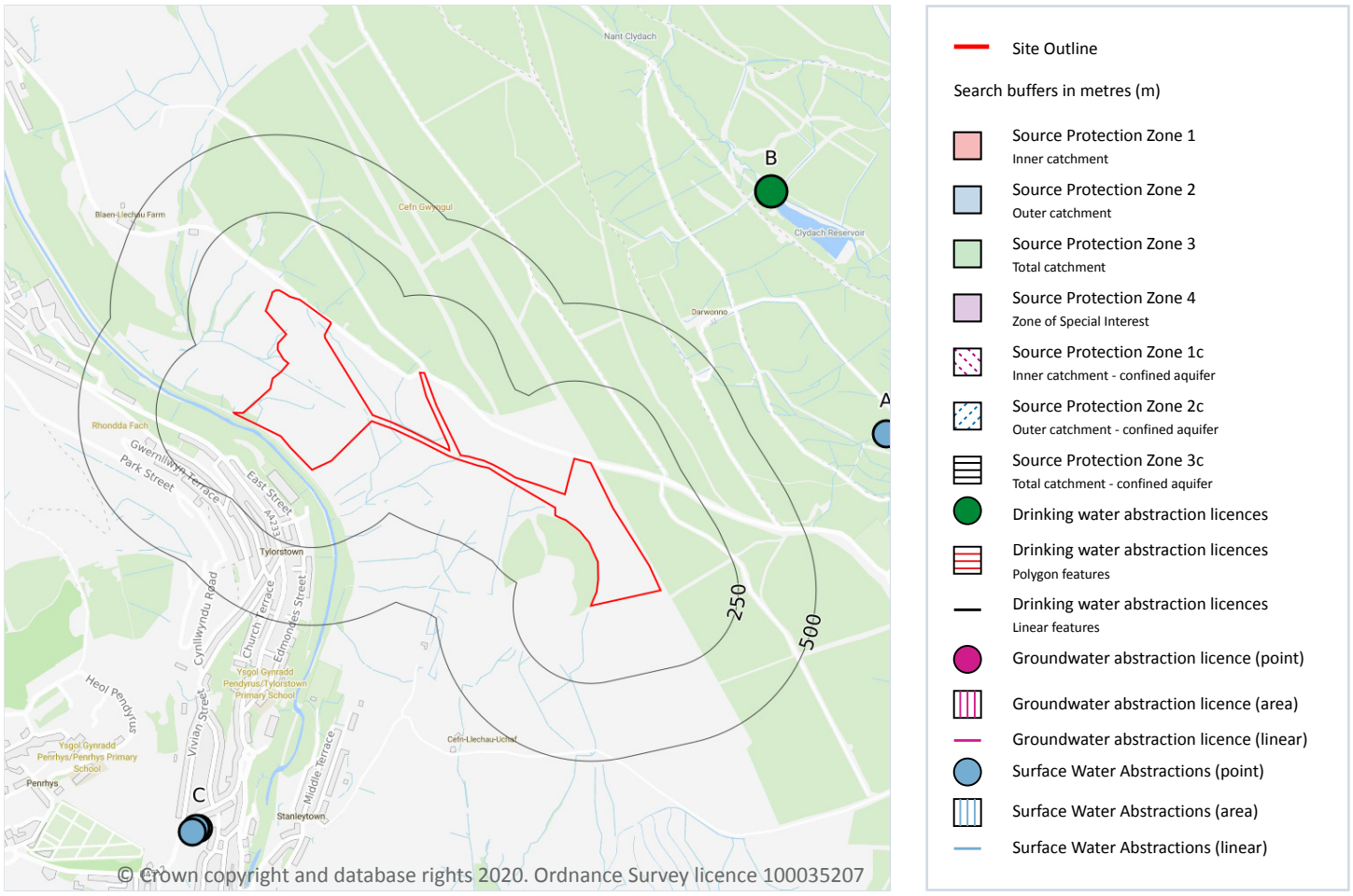
5.5 Groundwater vulnerability- local information

Records on site	0

This dataset identifies areas where additional local information affecting vulnerability is held by the Environment Agency. Further information can be obtained by contacting the Environment Agency local Area groundwater team through the Environment Agency National Customer Call Centre on 03798 506 506 or by email on enquiries@environment-agency.gov.uk.

This data is sourced from the British Geological Survey and the Environment Agency.

Abstractions and Source Protection Zones



5.6 Groundwater abstractions

Records within 2000m	0

Licensed groundwater abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, between two points (line data) or a larger area.

This data is sourced from the Environment Agency and Natural Resources Wales.

5.7 Surface water abstractions

Records within 2000m	11

Licensed surface water abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, a stretch of watercourse or a larger area.

Features are displayed on the Abstractions and Source Protection Zones map on **page 51**

ID	Location	Details	
A	871m NE	Status: Historical Licence No: 21/57/25/0001 Details: Potable Water Supply - Direct Direct Source: EAW Surface Water Point: SYCHNANT STREAM (POINT 3) Data Type: Point Name: Dwr Cymru Cyfyngedig Easting: 303030 Northing: 196020	Annual Volume (m^3): 1,725,000 Max Daily Volume (m^3): 4726.03 Original Application No: - Original Start Date: 25/03/1966 Expiry Date: - Issue No: 100 Version Start Date: 19/10/2006 Version End Date: -
B	1049m NE	Status: Historical Licence No: 21/57/25/0001 Details: Potable Water Supply - Direct Direct Source: EAW Surface Water Point: CLYDACH STREAM (POINT 1) Data Type: Point Name: Dwr Cymru Cyfyngedig Easting: 302660 Northing: 196800	Annual Volume (m^3): 1,725,000 Max Daily Volume (m^3): 4726.03 Original Application No: - Original Start Date: 25/03/1966 Expiry Date: - Issue No: 100 Version Start Date: 19/10/2006 Version End Date: -
B	1049m NE	Status: Active Licence No: 21/57/25/0001 Details: Pottable Water Supply - Direct - Medium Direct Source: - Point: - Data Type: Point Name: - Easting: 302660 Northing: 196800	Annual Volume (m^3): 1,725,000 Max Daily Volume (m^3): - Original Application No: - Original Start Date: Oct 19 2006 12:00AM Expiry Date: - Issue No: - Version Start Date: - Version End Date: -
C	1209m S	Status: Historical Licence No: 21/57/24/0054 Details: Lake & Pond Throughflow Direct Source: EAW Surface Water Point: UN-NAMED SPRING AT MAERDY AND FERNDALE ANGLING CLUB Data Type: Point Name: Maerdy and Ferndale Angling Club Easting: 300820 Northing: 194750	Annual Volume (m^3): 365000 Max Daily Volume (m^3): 1000 Original Application No: - Original Start Date: 16/03/2007 Expiry Date: 31/03/2017 Issue No: 1 Version Start Date: 16/03/2007 Version End Date: -

ID	Location	Details	
C	1212m S	Status: Historical Licence No: 21/57/24/0054 Details: Lake & Pond Throughflow Direct Source: EAW Surface Water Point: UN-NAMED SPRING AT MAERDY AND FERNDALE ANGLING CLUB Data Type: Point Name: Maerdy and Ferndale Angling Club Easting: 300810 Northing: 194750	Annual Volume (m^3): 365000 Max Daily Volume (m^3): 1000 Original Application No: - Original Start Date: 16/03/2007 Expiry Date: 31/03/2017 Issue No: 1 Version Start Date: 16/03/2007 Version End Date: -
C	1225m S	Status: Historical Licence No: 21/57/24/0054 Details: Lake & Pond Throughflow Direct Source: EAW Surface Water Point: UN-NAMED SPRING AT MAERDY AND FERNDALE ANGLING CLUB Data Type: Point Name: Maerdy and Ferndale Angling Club Easting: 300800 Northing: 194740	Annual Volume (m^3): 365000 Max Daily Volume (m^3): 1000 Original Application No: - Original Start Date: 16/03/2007 Expiry Date: 31/03/2017 Issue No: 1 Version Start Date: 16/03/2007 Version End Date: -
-	1425m NE	Status: Historical Licence No: 21/57/25/0001 Details: Potable Water Supply - Direct Direct Source: EAW Surface Water Point: CACHWNT STREAM (POINT 4) Data Type: Point Name: Dwr Cymru Cyfyngedig Easting: 303250 Northing: 196740	Annual Volume (m^3): 1,725,000 Max Daily Volume (m^3): 4726.03 Original Application No: - Original Start Date: 25/03/1966 Expiry Date: - Issue No: 100 Version Start Date: 19/10/2006 Version End Date: -
-	1823m N	Status: Historical Licence No: 21/57/23/0022 Details: Potable Water Supply - Direct Direct Source: EAW Surface Water Point: FFYRNANT STREAM Data Type: Point Name: Dwr Cymru Cyf Easting: 301200 Northing: 198300	Annual Volume (m^3): 438200 Max Daily Volume (m^3): 1200 Original Application No: - Original Start Date: 10/02/1966 Expiry Date: - Issue No: 100 Version Start Date: 21/06/1967 Version End Date: -
-	1930m N	Status: Historical Licence No: 21/57/23/0022 Details: Potable Water Supply - Direct Direct Source: EAW Surface Water Point: SPRING AT CRAIG PWLLFA Data Type: Point Name: Dwr Cymru Cyf Easting: 300850 Northing: 198400	Annual Volume (m^3): 438200 Max Daily Volume (m^3): 1200 Original Application No: - Original Start Date: 10/02/1966 Expiry Date: - Issue No: 100 Version Start Date: 21/06/1967 Version End Date: -

ID	Location	Details	
-	1932m NE	Status: Historical Licence No: 21/57/25/0001 Details: Potable Water Supply - Direct Direct Source: EAW Surface Water Point: NANT YR YSFA - LOWER REACHES (POINT 5) Data Type: Point Name: Dwr Cymru Cyfyngedig Easting: 303850 Northing: 196710	Annual Volume (m^3): 1,725,000 Max Daily Volume (m^3): 4726.03 Original Application No: - Original Start Date: 25/03/1966 Expiry Date: - Issue No: 100 Version Start Date: 19/10/2006 Version End Date: -
-	1992m N	Status: Historical Licence No: 21/57/23/0022 Details: Potable Water Supply - Direct Direct Source: EAW Surface Water Point: SPRING NEAR CRAIG PWLLFA Data Type: Point Name: Dwr Cymru Cyf Easting: 300950 Northing: 198470	Annual Volume (m^3): 438200 Max Daily Volume (m^3): 1200 Original Application No: - Original Start Date: 10/02/1966 Expiry Date: - Issue No: 100 Version Start Date: 21/06/1967 Version End Date: -

This data is sourced from the Environment Agency and Natural Resources Wales.

5.8 Potable abstractions

Records within 2000m	**8**

Licensed potable water abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, a stretch of watercourse or a larger area.

Features are displayed on the Abstractions and Source Protection Zones map on **page 51**

ID	Location	Details	
A	871m NE	Status: Historical Licence No: 21/57/25/0001 Details: Potable Water Supply - Direct Direct Source: EAW Surface Water Point: SYCHNANT STREAM (POINT 3) Data Type: Point Name: Dwr Cymru Cyfyngedig Easting: 303030 Northing: 196020	Annual Volume (m^3): 1,725,000 Max Daily Volume (m^3): 4726.03 Original Application No: - Original Start Date: 25/03/1966 Expiry Date: - Issue No: 100 Version Start Date: 19/10/2006 Version End Date: -

ID	Location	Details	
B	1049m NE	Status: Historical Licence No: 21/57/25/0001 Details: Potable Water Supply - Direct Direct Source: EAW Surface Water Point: CLYDACH STREAM (POINT 1) Data Type: Point Name: Dwr Cymru Cyfyngedig Easting: 302660 Northing: 196800	Annual Volume (m^3): 1,725,000 Max Daily Volume (m^3): 4726.03 Original Application No: - Original Start Date: 25/03/1966 Expiry Date: - Issue No: 100 Version Start Date: 19/10/2006 Version End Date: -
B	1049m NE	Status: Active Licence No: 21/57/25/0001 Details: Pottable Water Supply - Direct - Medium Direct Source: - Point: - Data Type: Point Name: - Easting: 302660 Northing: 196800	Annual Volume (m^3): 1,725,000 Max Daily Volume (m^3): - Original Application No: - Original Start Date: Oct 19 2006 12:00AM Expiry Date: - Issue No: - Version Start Date: - Version End Date: -
-	1425m NE	Status: Historical Licence No: 21/57/25/0001 Details: Potable Water Supply - Direct Direct Source: EAW Surface Water Point: CACHWNT STREAM (POINT 4) Data Type: Point Name: Dwr Cymru Cyfyngedig Easting: 303250 Northing: 196740	Annual Volume (m^3): 1,725,000 Max Daily Volume (m^3): 4726.03 Original Application No: - Original Start Date: 25/03/1966 Expiry Date: - Issue No: 100 Version Start Date: 19/10/2006 Version End Date: -
-	1823m N	Status: Historical Licence No: 21/57/23/0022 Details: Potable Water Supply - Direct Direct Source: EAW Surface Water Point: FFYRNANT STREAM Data Type: Point Name: Dwr Cymru Cyf Easting: 301200 Northing: 198300	Annual Volume (m^3): 438200 Max Daily Volume (m^3): 1200 Original Application No: - Original Start Date: 10/02/1966 Expiry Date: - Issue No: 100 Version Start Date: 21/06/1967 Version End Date: -
-	1930m N	Status: Historical Licence No: 21/57/23/0022 Details: Potable Water Supply - Direct Direct Source: EAW Surface Water Point: SPRING AT CRAIG PWLLFA Data Type: Point Name: Dwr Cymru Cyf Easting: 300850 Northing: 198400	Annual Volume (m^3): 438200 Max Daily Volume (m^3): 1200 Original Application No: - Original Start Date: 10/02/1966 Expiry Date: - Issue No: 100 Version Start Date: 21/06/1967 Version End Date: -

ID	Location	Details	
-	1932m NE	Status: Historical Licence No: 21/57/25/0001 Details: Potable Water Supply - Direct Direct Source: EAW Surface Water Point: NANT YR YSFA - LOWER REACHES (POINT 5) Data Type: Point Name: Dwr Cymru Cyfyngedig Easting: 303850 Northing: 196710	Annual Volume (m^3): 1,725,000 Max Daily Volume (m^3): 4726.03 Original Application No: - Original Start Date: 25/03/1966 Expiry Date: - Issue No: 100 Version Start Date: 19/10/2006 Version End Date: -
-	1992m N	Status: Historical Licence No: 21/57/23/0022 Details: Potable Water Supply - Direct Direct Source: EAW Surface Water Point: SPRING NEAR CRAIG PWLLFA Data Type: Point Name: Dwr Cymru Cyf Easting: 300950 Northing: 198470	Annual Volume (m^3): 438200 Max Daily Volume (m^3): 1200 Original Application No: - Original Start Date: 10/02/1966 Expiry Date: - Issue No: 100 Version Start Date: 21/06/1967 Version End Date: -

This data is sourced from the Environment Agency and Natural Resources Wales.

5.9 Source Protection Zones

Records within 500m	**0**

Source Protection Zones define the sensitivity of an area around a potable abstraction site to contamination.

This data is sourced from the Environment Agency and Natural Resources Wales.

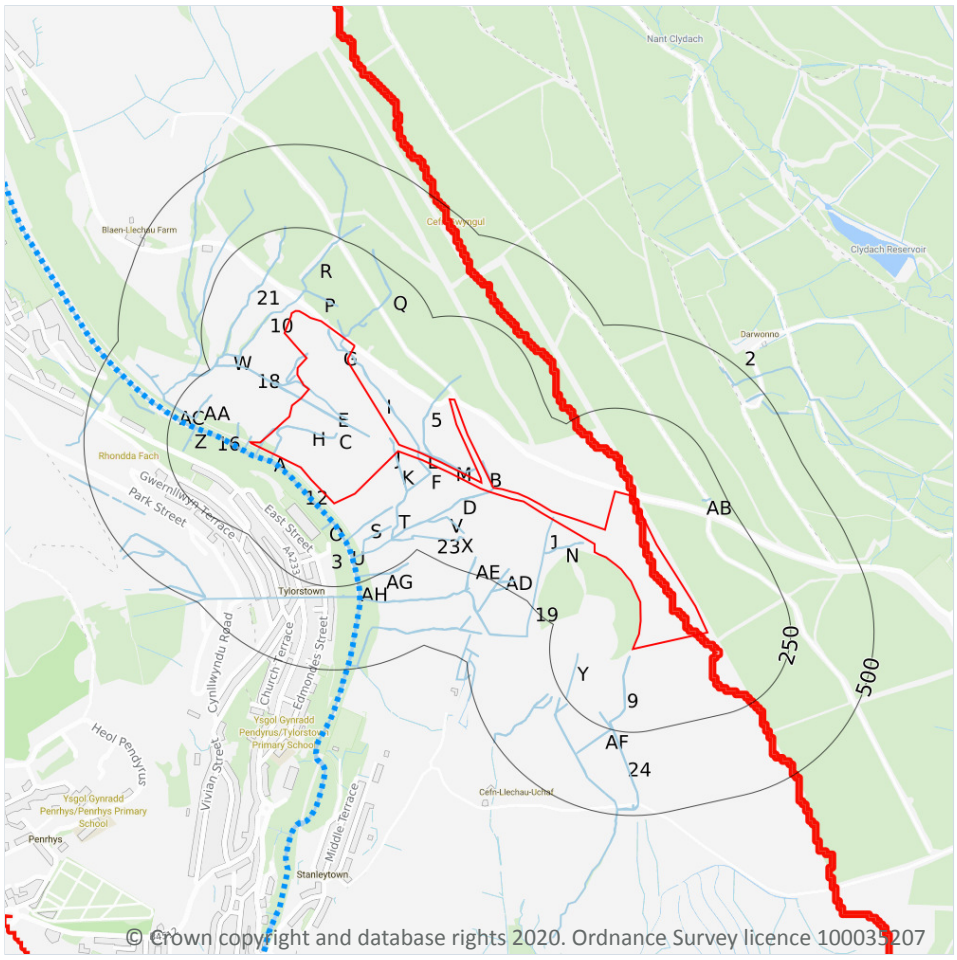
5.10 Source Protection Zones (confined aquifer)

Records within 500m	**0**

Source Protection Zones in the confined aquifer define the sensitivity around a deep groundwater abstraction to contamination. A confined aquifer would normally be protected from contamination by overlying geology and is only considered a sensitive resource if deep excavation/drilling is taking place.

This data is sourced from the Environment Agency and Natural Resources Wales.

6 Hydrology



Site Outline

Search buffers in metres (m)

Water Network (OS MasterMap)

Surface water features (wider than 5m)

Surface water features (narrower than 5m)

WFD River, canal and surface water transfer water bodies

WFD Lake water bodies

WFD Transitional and coastal water bodies

WFD Surface water body catchments boundaries

WFD Groundwater body boundaries

6.1 Water Network (OS MasterMap)

Records within 250m	101

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

Features are displayed on the Hydrology map on **page 57**

ID	Location	Type of water feature	Ground level	Permanence	Name
1	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

ID	Location	Type of water feature	Ground level	Permanence	Name
A	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
A	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
A	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
C	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
C	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
C	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
D	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
E	On site	Lake, loch or reservoir.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
E	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
E	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
E	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
E	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
E	On site	Lake, loch or reservoir.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

ID	Location	Type of water feature	Ground level	Permanence	Name
E	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
E	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
F	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
G	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
G	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
G	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
G	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
G	On site	Inland river not influenced by normal tidal action.	Underground	Watercourse contains water year round (in normal circumstances)	-
H	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
I	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
J	On site	Inland river not influenced by normal tidal action.	Underground	Watercourse contains water year round (in normal circumstances)	-
J	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
K	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

ID	Location	Type of water feature	Ground level	Permanence	Name
E	1m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
L	1m N	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
B	1m NE	Inland river not influenced by normal tidal action.	Not provided	Watercourse contains water year round (in normal circumstances)	-
M	3m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
G	4m NE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
G	5m NE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
A	5m NW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
G	6m NE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
5	6m NE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
E	6m W	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
N	14m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
9	23m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
10	23m NW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

ID	Location	Type of water feature	Ground level	Permanence	Name
12	23m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Afon Rhondda Fach
A	23m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Afon Rhondda Fach
A	30m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Afon Rhondda Fach
A	31m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Afon Rhondda Fach
E	38m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
E	42m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
A	42m NW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
16	51m W	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Afon Rhondda Fach
O	54m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
O	54m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Afon Rhondda Fach
G	58m NE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
Q	58m NE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
P	63m NE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

ID	Location	Type of water feature	Ground level	Permanence	Name
R	64m N	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
18	82m W	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
S	93m SE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
19	99m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
T	104m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
U	119m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Afon Rhondda Fach
V	122m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
21	124m NW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
S	136m SE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
W	151m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
W	151m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
X	157m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
S	159m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

ID	Location	Type of water feature	Ground level	Permanence	Name
Y	165m W	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
W	171m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
Z	172m W	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
Z	172m W	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Afon Rhondda Fach
S	173m SE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
U	173m SE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
U	174m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Afon Rhondda Fach
23	174m SW	Inland river not influenced by normal tidal action.	Not provided	Watercourse contains water year round (in normal circumstances)	-
S	174m SE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
S	175m SE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
S	176m SE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
Z	176m W	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
AA	177m NW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

ID	Location	Type of water feature	Ground level	Permanence	Name
AB	180m NE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
Z	181m NW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
AC	181m NW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
AC	183m W	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Afon Rhondda Fach
Z	183m W	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
AD	193m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
AB	193m NE	Inland river not influenced by normal tidal action.	Underground	Watercourse contains water year round (in normal circumstances)	-
W	195m W	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
AE	197m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
AB	199m NE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
Y	201m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
Y	204m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
AF	213m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

ID	Location	Type of water feature	Ground level	Permanence	Name
AD	214m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
W	231m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
24	231m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
AG	231m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
AH	231m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Afon Rhondda Fach
AD	244m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
AE	246m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
AD	247m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
Y	249m SW	Lake, loch or reservoir.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

This data is sourced from the Ordnance Survey.

6.2 Surface water features

Records within 250m	**50**

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

Features are displayed on the Hydrology map on **page 57**

This data is sourced from the Ordnance Survey.

6.3 WFD Surface water body catchments

Records on site	2

The Water Framework Directive is an EU-led framework for the protection of inland surface waters, estuaries, coastal waters and groundwater through river basin-level management planning. In terms of surface water, these basins are broken down into smaller units known as management, operational and water body catchments.

Features are displayed on the Hydrology map on **page 57**

ID	Location	Type	Water body catchment	Water body ID	Operational catchment	Management catchment
2	**On site**	**River WB catchment**	**Nant Clydach - source to conf R Taff**	**GB109057027250**	**Cynon**	**South East Valleys**
3	**On site**	**River WB catchment**	**Afon Rhondda Fach - source to conf Rhondda R**	**GB109057027210**	**Rhondda**	**South East Valleys**

This data is sourced from the Environment Agency and Natural Resources Wales.

6.4 WFD Surface water bodies

Records identified	2

Surface water bodies under the Directive may be rivers, lakes, estuary or coastal. To achieve the purpose of the Directive, environmental objectives have been set and are reported on for each water body. The progress towards delivery of the objectives is then reported on by the relevant competent authorities at the end of each six-year cycle. The river water body directly associated with the catchment listed in the previous section is detailed below, along with any lake, canal, coastal or artificial water body within 250m of the site.

Features are displayed on the Hydrology map on **page 57**

ID	Location	Type	Name	Water body ID	Overall rating	Chemical rating	Ecological rating	Year
11	24m SW	River	Afon Rhondda Fach - source to conf Rhondda R	GB109057027210	Poor	Good	Poor	2016
-	788m NE	River	Nant Clydach - source to conf R Taff	GB109057027250	Poor	Good	Poor	2016

This data is sourced from the Environment Agency and Natural Resources Wales.

6.5 WFD Groundwater bodies

Records on site	1

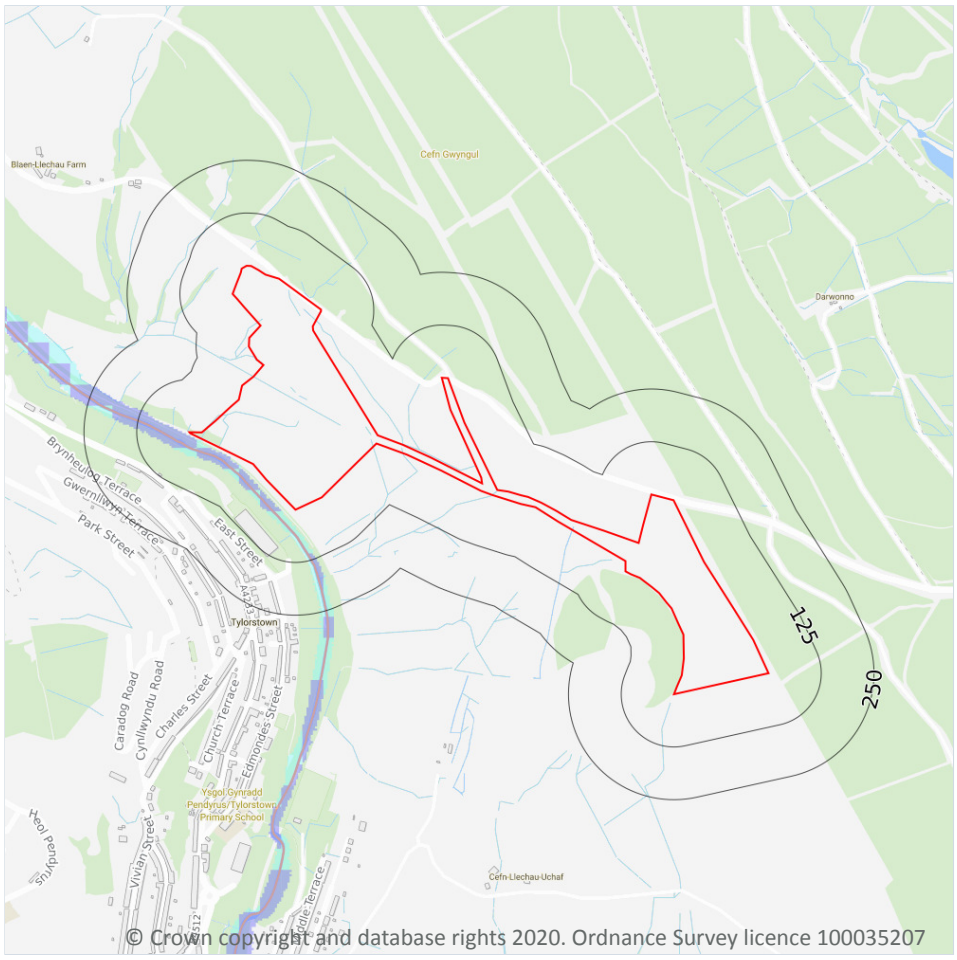
Groundwater bodies are also covered by the Directive and the same regime of objectives and reporting detailed in the previous section is in place.

Features are displayed on the Hydrology map on **page 57**

ID	Location	Name	Water body ID	Overall rating	Chemical rating	Quantitative	Year
B	**On site**	**SE Valleys Carboniferous Coal Measures**	**GB40902G201900**	**Poor**	**Poor**	**Good**	**2016**

This data is sourced from the Environment Agency and Natural Resources Wales.

7 River and coastal flooding



7.1 Risk of Flooding from Rivers and Sea (RoFRaS)

Records within 50m	22

The chance of flooding from rivers and/or the sea in any given year, based on cells of 50m. Each cell is allocated one of four flood risk categories, taking into account flood defences and their condition; Very low (less than 1 in 1000 chance in any given year), Low (less than 1 in 100 but greater than or equal to 1 in 1000 chance), Medium (less than 1 in 30 but greater than or equal to 1 in 100 chance) or High (greater than or equal to 1 in 30 chance).

Features are displayed on the River and coastal flooding map on **page 68**

Distance	RoFRaS flood risk
On site	**Low**
0 - 50m	High

This data is sourced from the Environment Agency and Natural Resources Wales.

7.2 Historical Flood Events

Records within 250m	0

Records of historic flooding from rivers, the sea, groundwater and surface water. Records began in 1946 when predecessor bodies started collecting detailed information about flooding incidents, although limited details may be included on flooding incidents prior to this date. Takes into account the presence of defences, structures, and other infrastructure where they existed at the time of flooding, and includes flood extents that may have been affected by overtopping, breaches or blockages.

This data is sourced from the Environment Agency and Natural Resources Wales.

7.3 Flood Defences

Records within 250m	0

Records of flood defences owned, managed or inspected by the Environment Agency and Natural Resources Wales. Flood defences can be structures, buildings or parts of buildings. Typically these are earth banks, stone and concrete walls, or sheet-piling that is used to prevent or control the extent of flooding.

This data is sourced from the Environment Agency and Natural Resources Wales.

7.4 Areas Benefiting from Flood Defences

Records within 250m	0

Areas that would benefit from the presence of flood defences in a 1 in 100 (1%) chance of flooding each year from rivers or 1 in 200 (0.5%) chance of flooding each year from the sea.

This data is sourced from the Environment Agency and Natural Resources Wales.

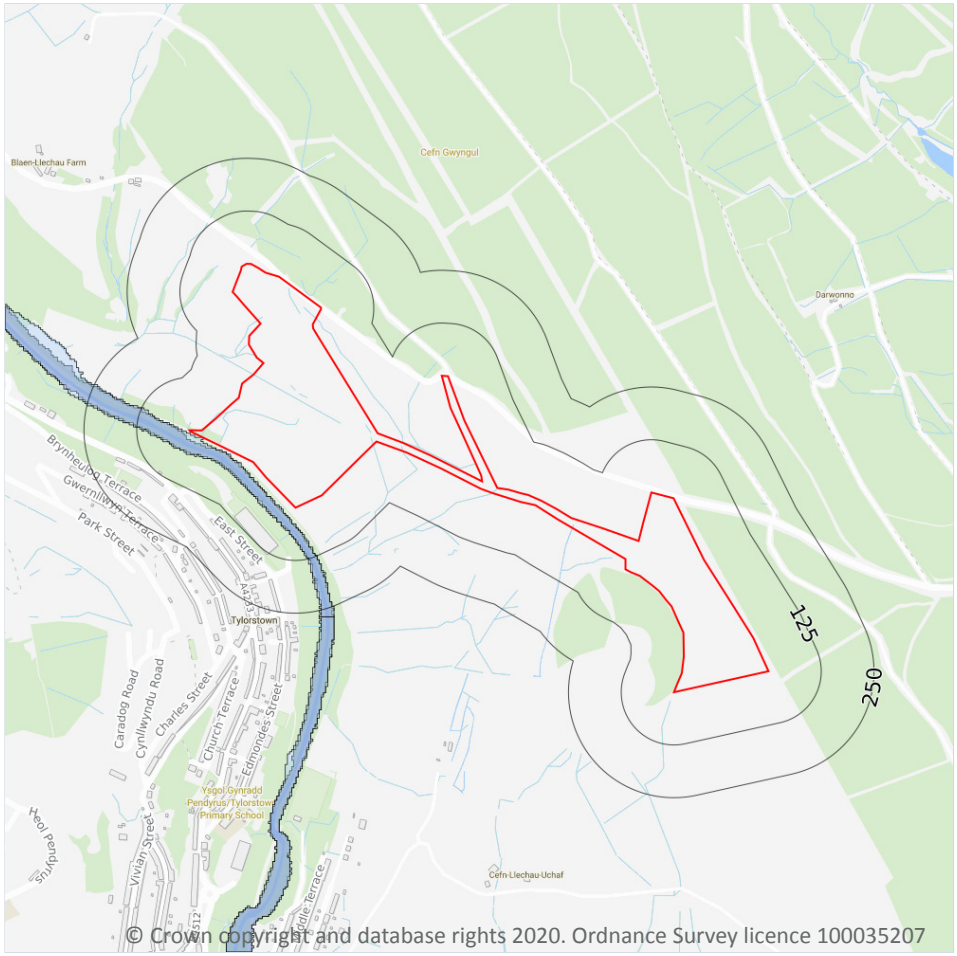
7.5 Flood Storage Areas

Records within 250m	0

Areas that act as a balancing reservoir, storage basin or balancing pond to attenuate an incoming flood peak to a flow level that can be accepted by the downstream channel or to delay the timing of a flood peak so that its volume is discharged over a longer period.

This data is sourced from the Environment Agency and Natural Resources Wales.

River and coastal flooding - Flood Zones



Site Outline

Search buffers in metres (m)

Flood zone 2

Flood zone 3

7.6 Flood Zone 2

Records within 50m	1

Areas of land at risk of flooding, when the presence of flood defences are ignored. Covering land between Flood Zone 3 (see next section) and the extent of the flooding from rivers or the sea with a 1 in 1000 (0.1%) chance of flooding each year.

Features are displayed on the River and coastal flooding map on **page 68**

Location	Type
On site	**Zone 2 - (Fluvial /Tidal Models)**

This data is sourced from the Environment Agency and Natural Resources Wales.

7.7 Flood Zone 3

Records within 50m	1

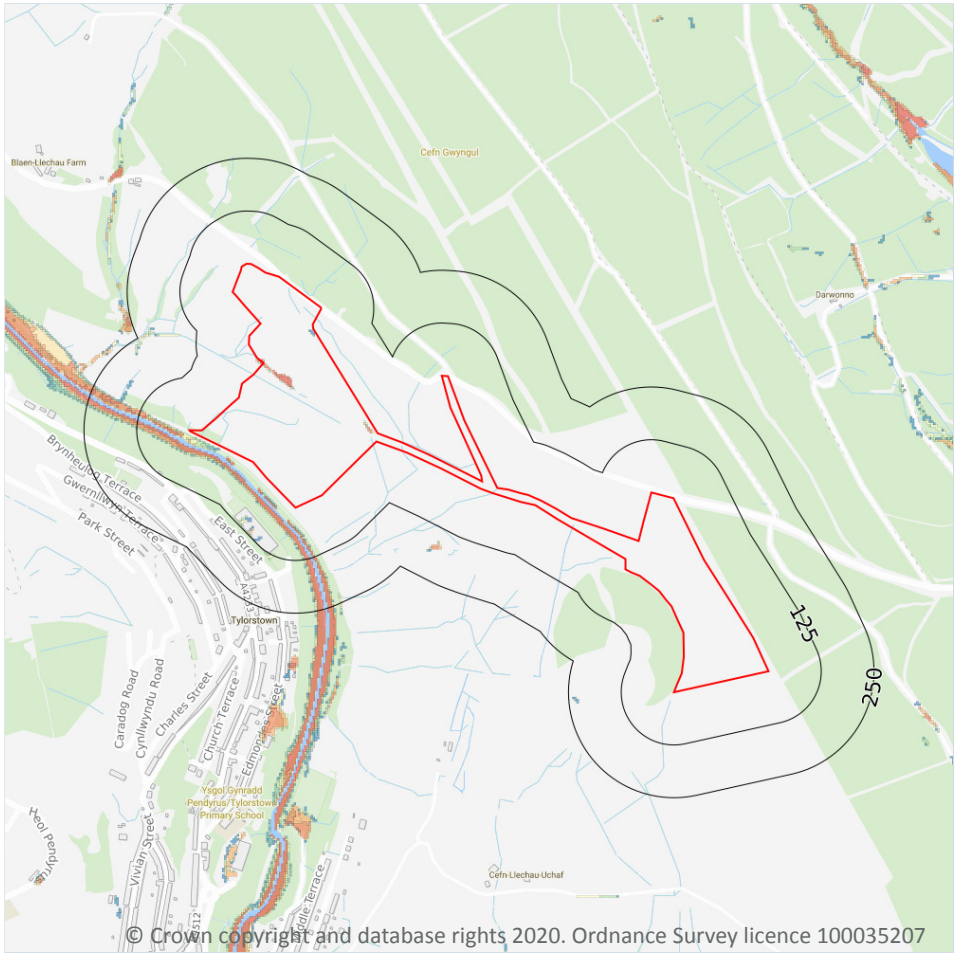
Areas of land at risk of flooding, when the presence of flood defences are ignored. Covering land with a 1 in 100 (1%) or greater chance of flooding each year from rivers or a 1 in 200 (0.5%) or greater chance of flooding each year from the sea.

Features are displayed on the River and coastal flooding map on **page 68**

Location	Type
7m SW	Zone 3 - (Fluvial Models)

This data is sourced from the Environment Agency and Natural Resources Wales.

8 Surface water flooding



Site Outline

Search buffers in metres (m)

1 in 1000 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 250 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 100 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 30 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

8.1 Surface water flooding

Highest risk on site	**1 in 30 year, Greater than 1.0m**
Highest risk within 50m	**1 in 30 year, Greater than 1.0m**

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

Features are displayed on the Surface water flooding map on **page 72**

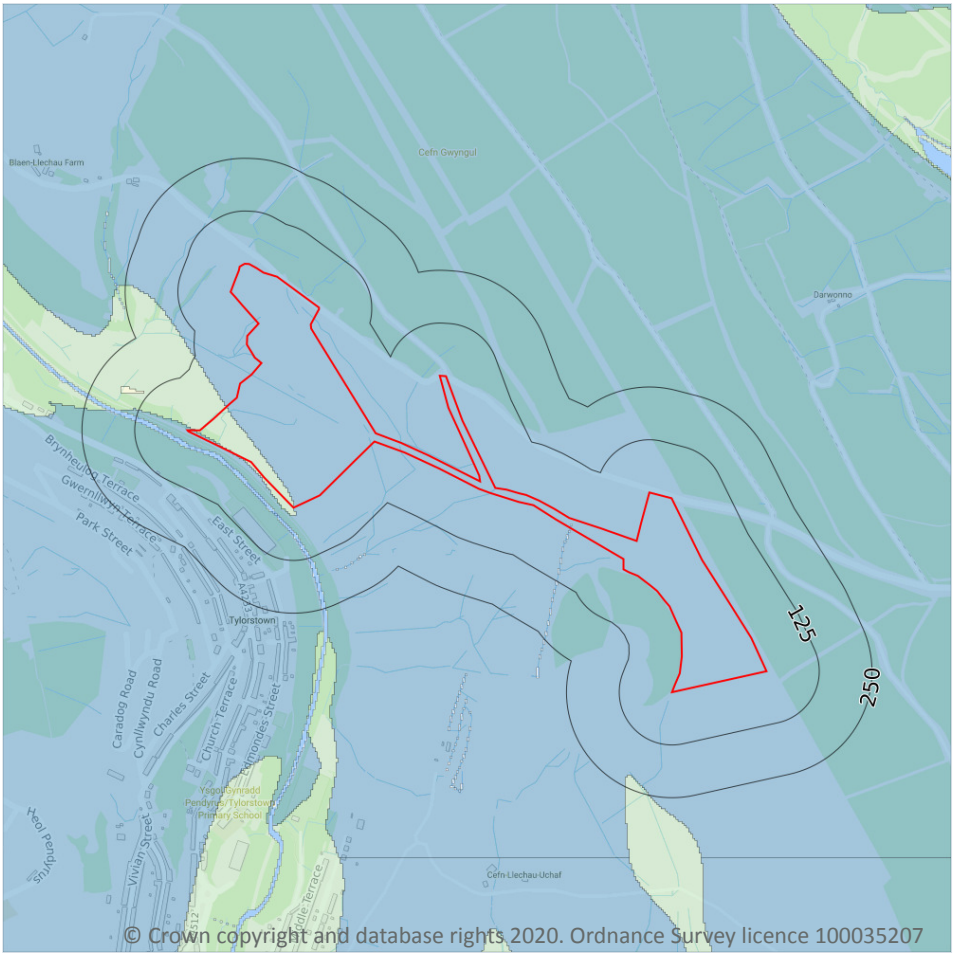
The data shown on the map and in the table above shows the highest likelihood of flood events happening at the site. Lower likelihood events may have greater flood depths and hence a greater potential impact on a site.

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

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

This data is sourced from Ambiental Risk Analytics.

9 Groundwater flooding



9.1 Groundwater flooding

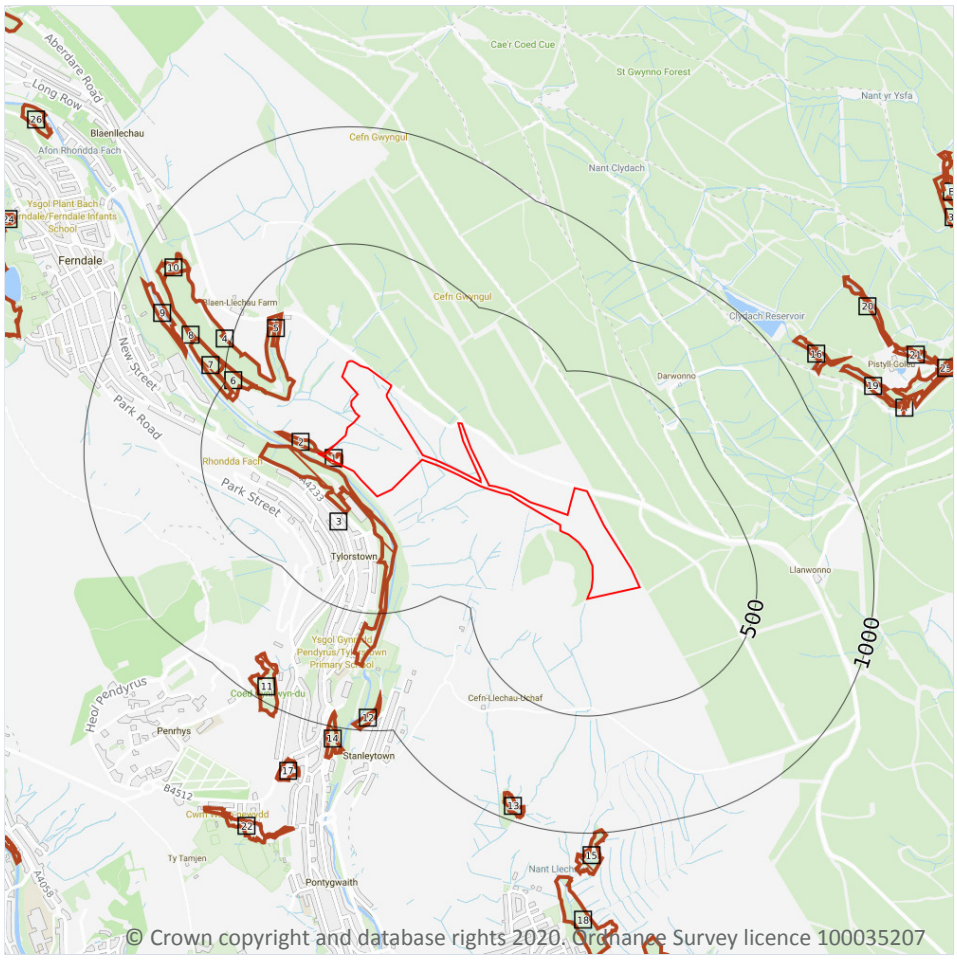
Highest risk on site	**Low**
Highest risk within 50m	**Low**

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

Features are displayed on the Groundwater flooding map on **page 74**

This data is sourced from Ambiental Risk Analytics.

10 Environmental designations



10.1 Sites of Special Scientific Interest (SSSI)

Records within 2000m	0

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

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

10.2 Conserved wetland sites (Ramsar sites)

Records within 2000m	0

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

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

10.3 Special Areas of Conservation (SAC)

Records within 2000m	0

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

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

10.4 Special Protection Areas (SPA)

Records within 2000m	0

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

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

10.5 National Nature Reserves (NNR)

Records within 2000m	0

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

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

10.6 Local Nature Reserves (LNR)

Records within 2000m	0

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

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

10.7 Designated Ancient Woodland

Records within 2000m	48

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

Features are displayed on the Environmental designations map on **page 75**

ID	Location	Name	Woodland Type
1	**On site**	**Unknown**	**Ancient Semi Natural Woodland**
2	6m N	Unknown	Ancient Semi Natural Woodland
3	29m SW	Unknown	Ancient Semi Natural Woodland
4	207m W	Unknown	Ancient Semi Natural Woodland
5	306m W	Unknown	Restored Ancient Woodland Site
6	365m W	Unknown	Ancient Semi Natural Woodland
7	453m NW	Unknown	Plantation on Ancient Woodland Site
8	645m W	Unknown	Ancient Semi Natural Woodland
9	675m W	Unknown	Ancient Semi Natural Woodland
10	783m NW	Unknown	Ancient Semi Natural Woodland
11	825m SW	Unknown	Ancient Semi Natural Woodland
12	856m S	Unknown	Ancient Semi Natural Woodland
13	894m S	Unknown	Ancient Woodland Site of Unknown Category
14	940m S	Unknown	Ancient Semi Natural Woodland
15	988m S	Unknown	Ancient Semi Natural Woodland
16	1093m NE	Unknown	Ancient Semi Natural Woodland

ID	Location	Name	Woodland Type
17	1183m S	Unknown	Ancient Semi Natural Woodland
18	1191m S	Unknown	Ancient Semi Natural Woodland
19	1203m NE	Unknown	Ancient Semi Natural Woodland
A	1352m NE	Unknown	Ancient Semi Natural Woodland
A	1352m NE	Unknown	Plantation on Ancient Woodland Site
A	1356m NE	Unknown	Ancient Semi Natural Woodland
B	1373m W	Unknown	Ancient Semi Natural Woodland
A	1401m NE	Unknown	Plantation on Ancient Woodland Site
20	1408m NE	Unknown	Plantation on Ancient Woodland Site
B	1420m W	Unknown	Ancient Semi Natural Woodland
21	1442m NE	Unknown	Ancient Semi Natural Woodland
22	1462m S	Unknown	Ancient Semi Natural Woodland
23	1470m S	Unknown	Ancient Semi Natural Woodland
C	1507m NE	Unknown	Plantation on Ancient Woodland Site
24	1543m NW	Unknown	Ancient Semi Natural Woodland
25	1553m NE	Unknown	Plantation on Ancient Woodland Site
26	1600m NW	Unknown	Ancient Semi Natural Woodland
C	1613m NE	Unknown	Plantation on Ancient Woodland Site
-	1778m NE	Unknown	Ancient Semi Natural Woodland
-	1799m NE	Unknown	Ancient Woodland Site of Unknown Category
-	1880m SW	Unknown	Ancient Semi Natural Woodland
-	1882m NE	Unknown	Plantation on Ancient Woodland Site
-	1884m NE	Unknown	Ancient Semi Natural Woodland
-	1887m NE	Unknown	Ancient Semi Natural Woodland
-	1888m NE	Unknown	Plantation on Ancient Woodland Site
-	1898m W	Unknown	Ancient Semi Natural Woodland
-	1905m W	Unknown	Ancient Semi Natural Woodland
-	1913m S	Unknown	Ancient Semi Natural Woodland

ID	Location	Name	Woodland Type
34	1922m NE	Unknown	Ancient Semi Natural Woodland
-	1951m W	Unknown	Ancient Semi Natural Woodland
E	1959m NE	Unknown	Ancient Semi Natural Woodland
E	1974m NE	Unknown	Plantation on Ancient Woodland Site

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

10.8 Biosphere Reserves

Records within 2000m	0

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

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

10.9 Forest Parks

Records within 2000m	0

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

This data is sourced from the Forestry Commission.

10.10 Marine Conservation Zones

Records within 2000m	0

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

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

10.11 Green Belt

Records within 2000m	0

Areas designated to prevent urban sprawl by keeping land permanently open.

This data is sourced from the Ministry of Housing, Communities and Local Government.

10.12 Proposed Ramsar sites

Records within 2000m	0

Ramsar sites are areas listed as a Wetland of International Importance under the Convention on Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention) 1971. The sites here supplied have a status of 'Proposed' having been identified for potential adoption under the framework.

This data is sourced from Natural England.

10.13 Possible Special Areas of Conservation (pSAC)

Records within 2000m	0

Special Areas of Conservation are areas which have been identified as best representing the range and variety within the European Union of habitats and (non-bird) species listed on Annexes I and II to the Directive. SACs are designated under the EC Habitats Directive. Those sites supplied here are those with a status of 'Possible' having been identified for potential adoption under the framework.

This data is sourced from Natural England and Natural Resources Wales.

10.14 Potential Special Protection Areas (pSPA)

Records within 2000m	0

Special Protection Areas (SPAs) are areas designated (or ‘classified’) under the European Union Wild Birds Directive for the protection of nationally and internationally important populations of wild birds. Those sites supplied here are those with a status of 'Potential' having been identified for potential adoption under the framework.

This data is sourced from Natural England.

10.15 Nitrate Sensitive Areas

Records within 2000m	0

Areas where nitrate concentrations in drinking water sources exceeded or was at risk of exceeding the limit of 50 mg/l set by the 1980 EC Drinking Water Directive. Voluntary agricultural measures as a means of reducing the levels of nitrate were introduced by DEFRA as MAFF, with payments being made to farmers who complied. The scheme was started as a pilot in 1990 in ten areas, later implemented within 32 areas. The scheme was closed to further new entrants in 1998, although existing agreements continued for their full term. All Nitrate Sensitive Areas fell within the areas designated as Nitrate Vulnerable Zones (NVZs) in 1996 under the EC Nitrate Directive (91/676/EEC).

This data is sourced from Natural England.

10.16 Nitrate Vulnerable Zones

Records within 2000m	0

Areas at risk from agricultural nitrate pollution designated under the EC Nitrate Directive (91/676/EEC). These are areas of land that drain into waters polluted by nitrates. Farmers operating within these areas have to follow mandatory rules to tackle nitrate loss from agriculture.

This data is sourced from Natural England and Natural Resources Wales.

SSSI Impact Zones and Units

10.17 SSSI Impact Risk Zones

Records on site	0

Developed to allow rapid initial assessment of the potential risks to SSSIs posed by development proposals. They define zones around each SSSI which reflect the particular sensitivities of the features for which it is notified and indicate the types of development proposal which could potentially have adverse impacts.

This data is sourced from Natural England.

10.18 SSSI Units

Records within 2000m	0

Divisions of SSSIs used to record management and condition details. Units are the smallest areas for which Natural England gives a condition assessment, however, the size of units varies greatly depending on the types of management and the conservation interest.

This data is sourced from Natural England and Natural Resources Wales.

11 Visual and cultural designations

11.1 World Heritage Sites

Records within 250m	0

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

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

11.2 Area of Outstanding Natural Beauty

Records within 250m	0

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

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

11.3 National Parks

Records within 250m	0

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

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

11.4 Listed Buildings

Records within 250m	0

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

This data is sourced from English Heritage, Cadw and Historic Environment Scotland.

11.5 Conservation Areas

Records within 250m	0

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

This data is sourced from English Heritage, Cadw and Historic Environment Scotland.

11.6 Scheduled Ancient Monuments

Records within 250m	0

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

This data is sourced from English Heritage, Cadw and Historic Environment Scotland.

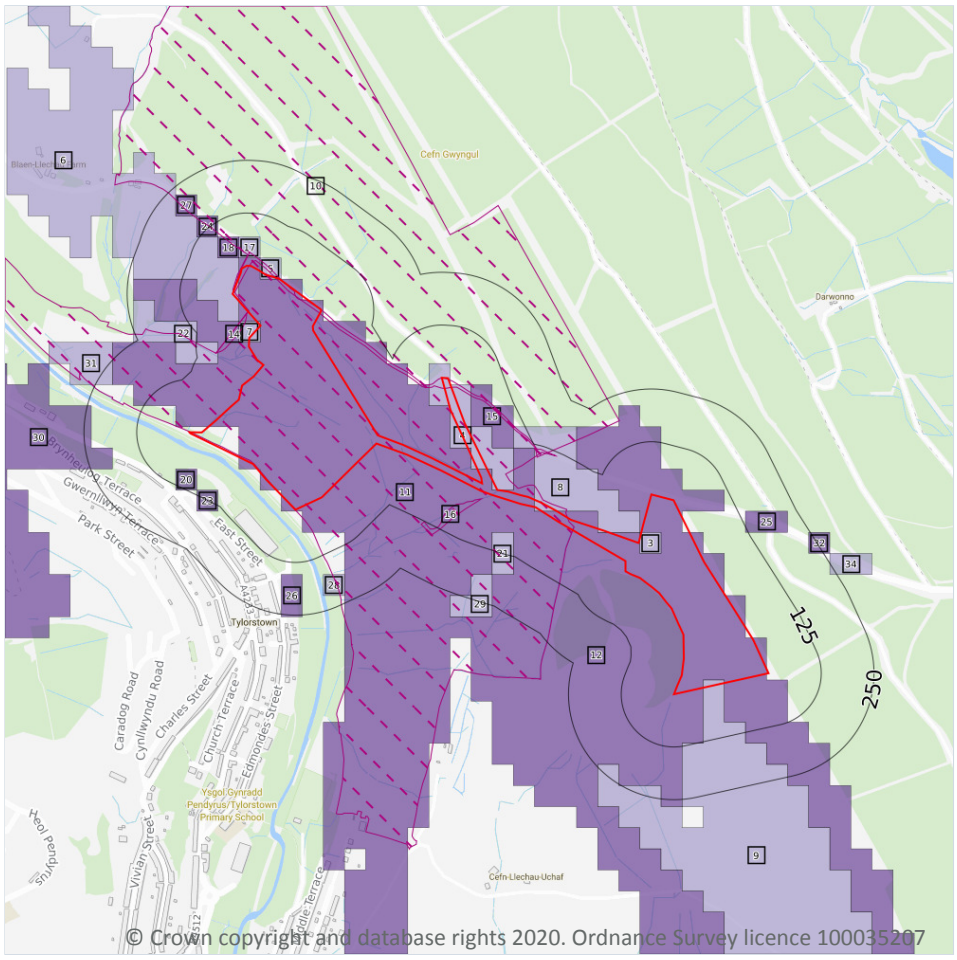
11.7 Registered Parks and Gardens

Records within 250m	0

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

This data is sourced from English Heritage, Cadw and Historic Environment Scotland.

12 Agricultural designations



Site Outline

Search buffers in metres (m)

- Grade 1 - excellent quality
- Grade 2 - very good quality
- Grade 3a - good quality
- Grade 3b - moderate quality
- Grade 4 - poor quality
- Grade 5 - very poor quality
- Timber felling licences
- Open Access land

12.1 Agricultural Land Classification

Records within 250m	25

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

Features are displayed on the Agricultural designations map on **page 85**

ID	Location	Classification	Description
3	**On site**	**Grade 4**	**Poor quality agricultural land**
4	**On site**	**Grade 4**	**Poor quality agricultural land**
5	**On site**	**Grade 4**	**Poor quality agricultural land**

ID	Location	Classification	Description
6	**On site**	**Grade 4**	**Poor quality agricultural land**
7	**On site**	**Grade 4**	**Poor quality agricultural land**
8	**On site**	**Grade 4**	**Poor quality agricultural land**
9	**On site**	**Grade 4**	**Poor quality agricultural land**
12	**On site**	**Grade 5**	**Very poor quality agricultural land**
15	10m NE	Grade 5	Very poor quality agricultural land
17	19m N	Grade 4	Poor quality agricultural land
18	25m NW	Grade 5	Very poor quality agricultural land
20	69m SW	Grade 5	Very poor quality agricultural land
21	70m S	Grade 4	Poor quality agricultural land
22	73m W	Grade 4	Poor quality agricultural land
23	92m SW	Grade 5	Very poor quality agricultural land
24	94m NW	Grade 5	Very poor quality agricultural land
25	119m NE	Grade 5	Very poor quality agricultural land
26	154m S	Grade 5	Very poor quality agricultural land
27	164m NW	Grade 5	Very poor quality agricultural land
28	167m SE	Grade 4	Poor quality agricultural land
29	180m S	Grade 4	Poor quality agricultural land
30	186m W	Grade 5	Very poor quality agricultural land
31	215m NW	Grade 4	Poor quality agricultural land
32	220m NE	Grade 5	Very poor quality agricultural land
34	236m NE	Grade 4	Poor quality agricultural land

This data is sourced from Natural Resources Wales.

12.2 Open Access Land

Records within 250m	**4**

The Countryside and Rights of Way Act 2000 (CROW Act) gives a public right of access to land without having to use paths. Access land includes mountains, moors, heaths and downs that are privately owned. It also includes common land registered with the local council and some land around the England Coast Path.

Generally permitted activities on access land are walking, running, watching wildlife and climbing.

Features are displayed on the Agricultural designations map on **page 85**

ID	Location	Name	Classification	Other relevant legislation
10	**On site**	**-**	**NRW Public Forest 2014**	**-**
11	**On site**	**-**	**Open Access Open Country**	**-**
14	4m SW	-	NRW Public Forest 2014	-
16	18m S	-	NRW Public Forest 2014	-

This data is sourced from Natural England and Natural Resources Wales.

12.3 Tree Felling Licences

Records within 250m	**0**

Felling Licence Application (FLA) areas approved by Forestry Commission England. Anyone wishing to fell trees must ensure that a licence or permission under a grant scheme has been issued by the Forestry Commission before any felling is carried out or that one of the exceptions apply.

This data is sourced from the Forestry Commission.

12.4 Environmental Stewardship Schemes

Records within 250m	**0**

Environmental Stewardship covers a range of schemes that provide financial incentives to farmers, foresters and land managers to look after and improve the environment.

This data is sourced from Natural England.

12.5 Countryside Stewardship Schemes

Records within 250m	**0**

Countryside Stewardship covers a range of schemes that provide financial incentives to farmers, foresters and land managers to look after and improve the environment. Main objectives are to improve the farmed environment for wildlife and to reduce diffuse water pollution.

This data is sourced from Natural England.

13 Habitat designations

13.1 Priority Habitat Inventory

Records within 250m	0

Habitats of principal importance as named under Natural Environment and Rural Communities Act (2006) Section 41.

This data is sourced from Natural England.

13.2 Habitat Networks

Records within 250m	0

Habitat networks for 18 priority habitat networks (based primarily, but not exclusively, on the priority habitat inventory) and areas suitable for the expansion of networks through restoration and habitat creation.

This data is sourced from Natural England.

13.3 Open Mosaic Habitat

Records within 250m	0

Sites verified as Open Mosaic Habitat. Mosaic habitats are brownfield sites that are identified under the UK Biodiversity Action Plan as a priority habitat due to the habitat variation within a single site, supporting an array of invertebrates.

This data is sourced from Natural England.

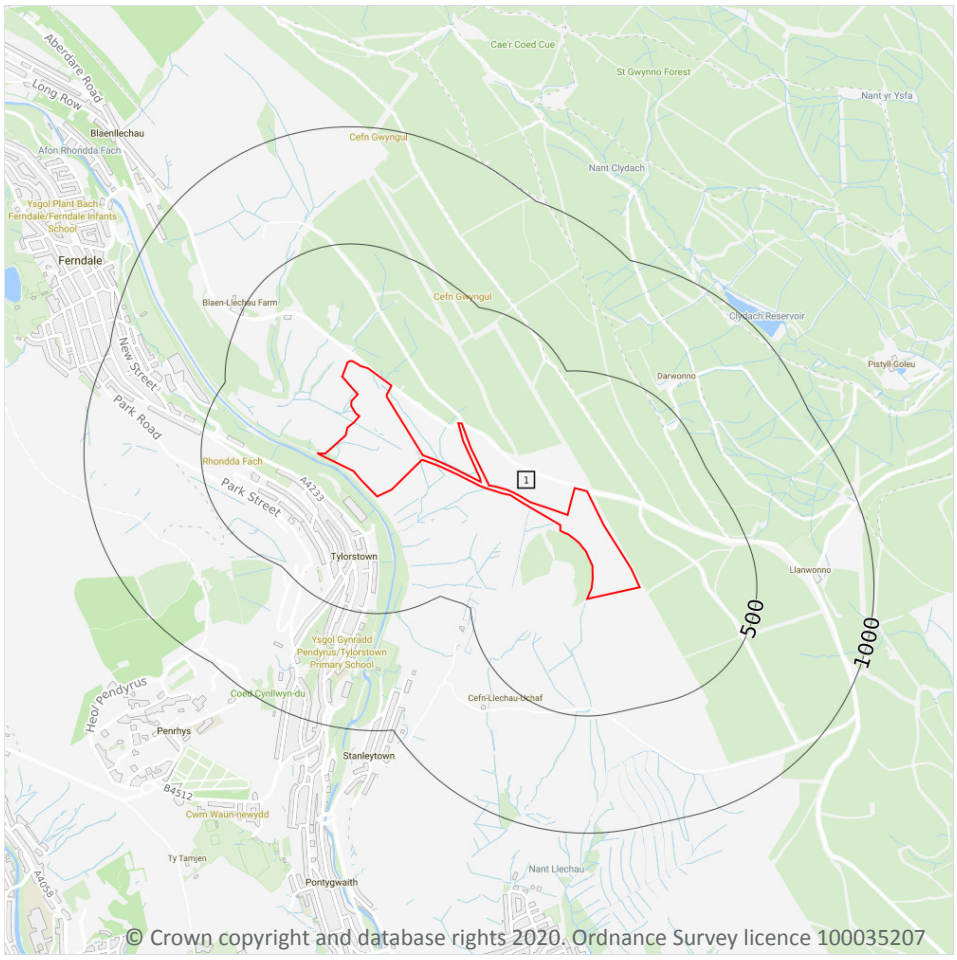
13.4 Limestone Pavement Orders

Records within 250m	0

Limestone pavements are outcrops of limestone where the surface has been worn away by natural means over millennia. These rocks have the appearance of paving blocks, hence their name. Not only do they have geological interest, they also provide valuable habitats for wildlife. These habitats are threatened due to their removal for use in gardens and water features. Many limestone pavements have been designated as SSSIs which affords them some protection. In addition, Section 34 of the Wildlife and Countryside Act 1981 gave them additional protection via the creation of Limestone Pavement Orders, which made it a criminal offence to remove any part of the outcrop. The associated Limestone Pavement Priority Habitat is part of the UK Biodiversity Action Plan priority habitat in England.

This data is sourced from Natural England.

14 Geology 1:10,000 scale - Availability



Site Outline

Search buffers in metres (m)

Full coverage

Partial coverage

No coverage

14.1 10k Availability

Records within 500m	1

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

Features are displayed on the Geology 1:10,000 scale - Availability map on **page 89**

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

This data is sourced from the British Geological Survey.

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

14.2 Artificial and made ground (10k)

Records within 500m	0

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

This data is sourced from the British Geological Survey.

Geology 1:10,000 scale - Superficial

14.3 Superficial geology (10k)

Records within 500m	0

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

This data is sourced from the British Geological Survey.

14.4 Landslip (10k)

Records within 500m	0

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

This data is sourced from the British Geological Survey.

Geology 1:10,000 scale - Bedrock

14.5 Bedrock geology (10k)

Records within 500m	0

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

This data is sourced from the British Geological Survey.

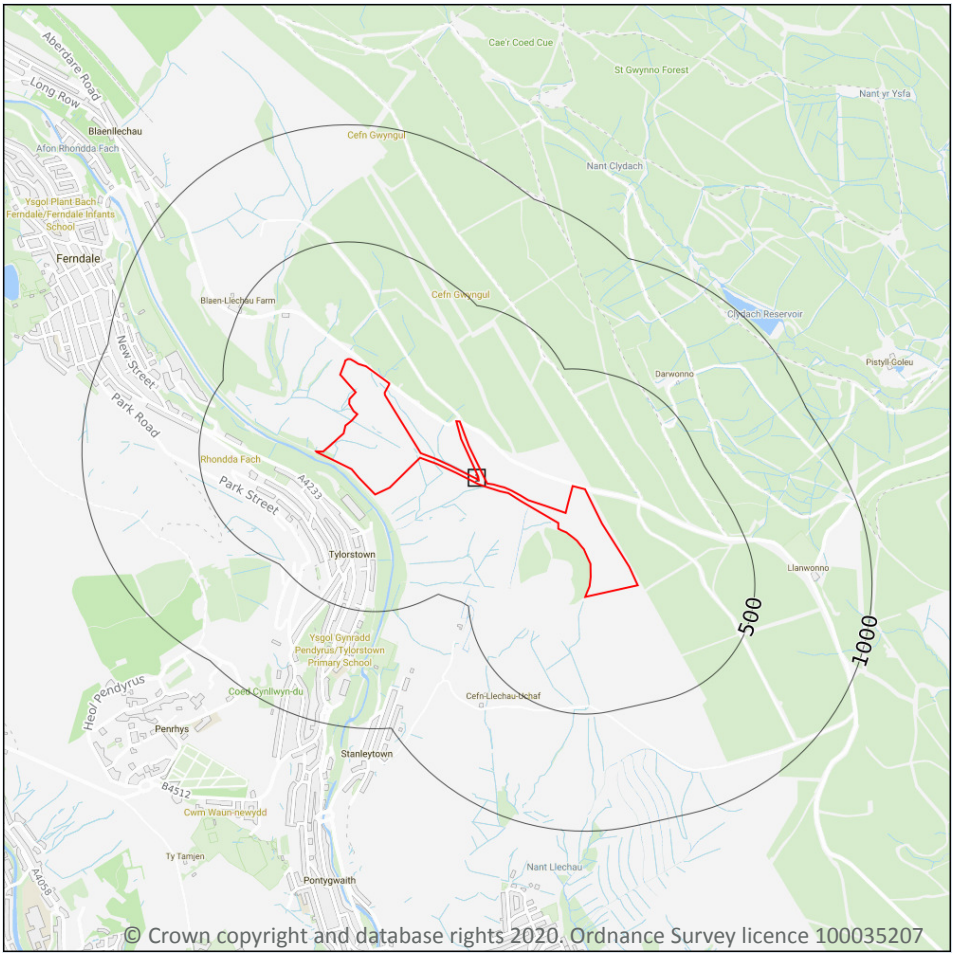
14.6 Bedrock faults and other linear features (10k)

Records within 500m	0

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

This data is sourced from the British Geological Survey.

15 Geology 1:50,000 scale - Availability



Site Outline

Search buffers in metres (m)

Geological map tile

15.1 50k Availability

Records within 500m	1

An indication on the coverage of 1:50,000 scale geology data for the site. Either 'Full' or 'No coverage' for each geological theme. Where 50k data is not available, this area has been filled in with 625k scale data.

Features are displayed on the Geology 1:50,000 scale - Availability map on **page 93**

ID	Location	Artificial	Superficial	Bedrock	Mass movement	Sheet No.
1	**On site**	**No coverage**	**Full**	**Full**	**Full**	**EW248_pontypridd_v4**

This data is sourced from the British Geological Survey.

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

15.2 Artificial and made ground (50k)

Records within 500m	0

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

This data is sourced from the British Geological Survey.

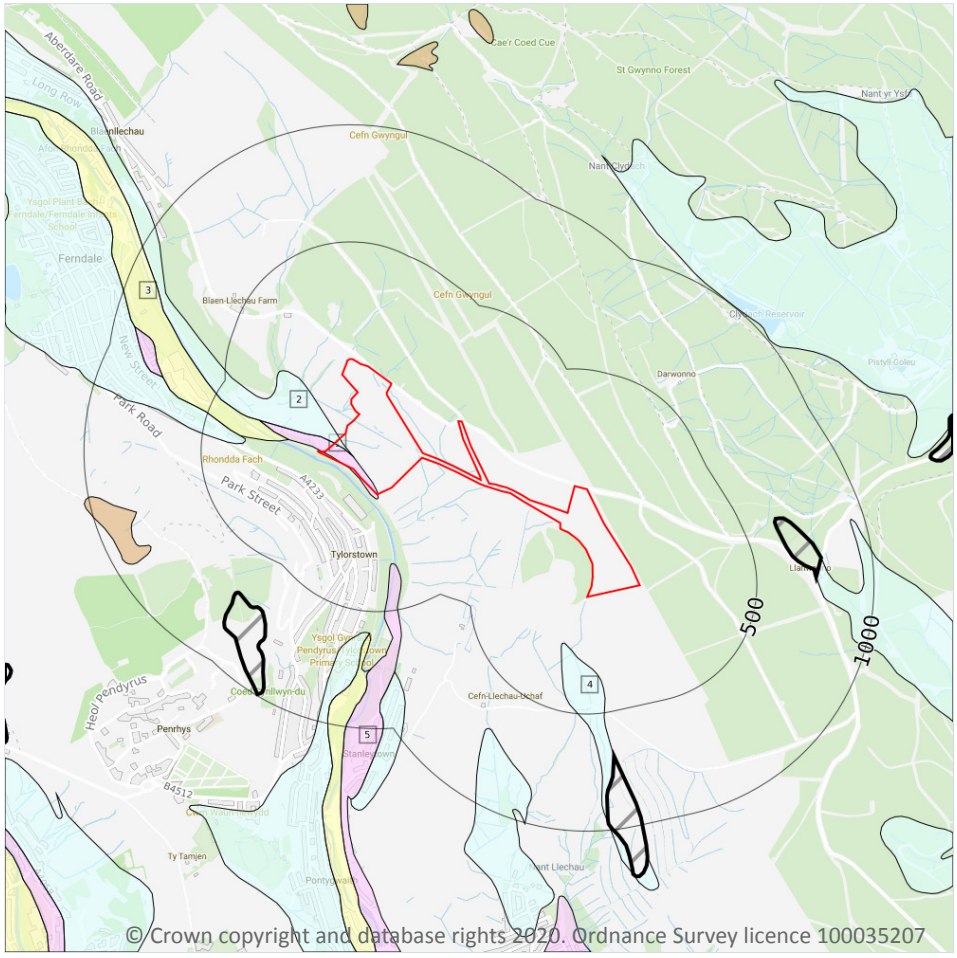
15.3 Artificial ground permeability (50k)

Records within 50m	0

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

This data is sourced from the British Geological Survey.

Geology 1:50,000 scale - Superficial



Site Outline

Search buffers in metres (m)

Landslip (50k)

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

15.4 Superficial geology (50k)

Records within 500m	5

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

Features are displayed on the Geology 1:50,000 scale - Superficial map on **page 95**

ID	Location	LEX Code	Description	Rock description
1	**On site**	**GFDUD-XSV**	**GLACIOFLUVIAL DEPOSITS, DEVENSIAN**	**SAND AND GRAVEL**
2	**On site**	**TILLD-DMTN**	**TILL, DEVENSIAN**	**DIAMICTON**
3	137m W	ALV-XCZSV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL

ID	Location	LEX Code	Description	Rock description
4	221m SW	TILLD-DMTN	TILL, DEVENSIAN	DIAMICTON
5	302m S	GFDUD-XSV	GLACIOFLUVIAL DEPOSITS, DEVENSIAN	SAND AND GRAVEL

This data is sourced from the British Geological Survey.

15.5 Superficial permeability (50k)

Records within 50m	**2**

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

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

This data is sourced from the British Geological Survey.

15.6 Landslip (50k)

Records within 500m	**0**

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

This data is sourced from the British Geological Survey.

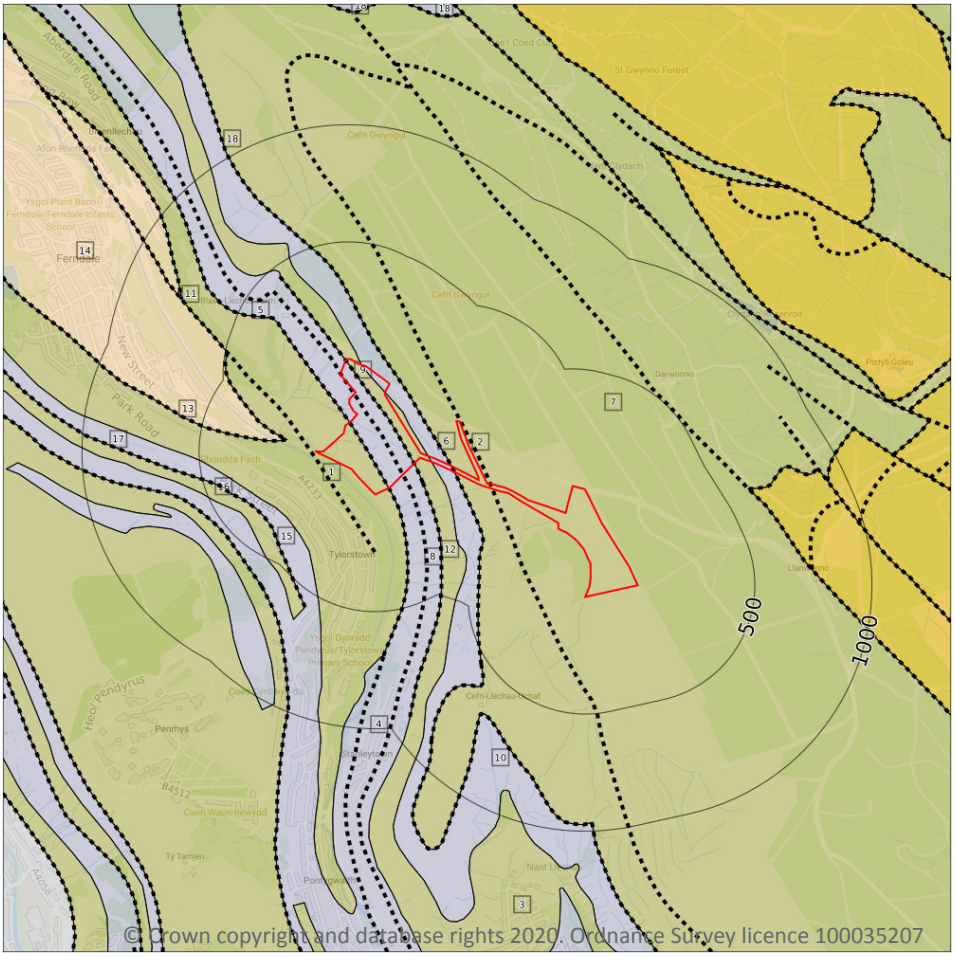
15.7 Landslip permeability (50k)

Records within 50m	**0**

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

This data is sourced from the British Geological Survey.

Geology 1:50,000 scale - Bedrock



Site Outline

Search buffers in metres (m)

Bedrock faults and other linear features (50k)

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

15.8 Bedrock geology (50k)

Records within 500m **7**

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

Features are displayed on the Geology 1:50,000 scale - Bedrock map on **page 97**

ID	Location	LEX Code	Description	Rock age
1	On site	RA-SDST	RHONDDA MEMBER - SANDSTONE	WESTPHALIAN
3	On site	RA-SDST	RHONDDA MEMBER - SANDSTONE	WESTPHALIAN
4	On site	RA-MDSS	RHONDDA MEMBER - MUDSTONE, SILTSTONE AND SANDSTONE	WESTPHALIAN

ID	Location	LEX Code	Description	Rock age
7	**On site**	**BD-SDST**	**BRITHDIR MEMBER - SANDSTONE**	**WESTPHALIAN**
10	**On site**	**RA-MDSS**	**RHONDDA MEMBER - MUDSTONE, SILTSTONE AND SANDSTONE**	**WESTPHALIAN**
14	137m W	SWUCM-MDSS	SOUTH WALES UPPER COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE	WESTPHALIAN
16	354m SW	RA-SDST	RHONDDA MEMBER - SANDSTONE	WESTPHALIAN

This data is sourced from the British Geological Survey.

15.9 Bedrock permeability (50k)

Records within 50m	**5**

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

Location	Flow type	Maximum permeability	Minimum permeability
On site	**Fracture**	**High**	**Moderate**
On site	**Fracture**	**Moderate**	**Low**
On site	**Fracture**	**High**	**Moderate**
On site	**Fracture**	**Moderate**	**Low**
On site	**Fracture**	**High**	**Moderate**

This data is sourced from the British Geological Survey.

15.10 Bedrock faults and other linear features (50k)

Records within 500m	**11**

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

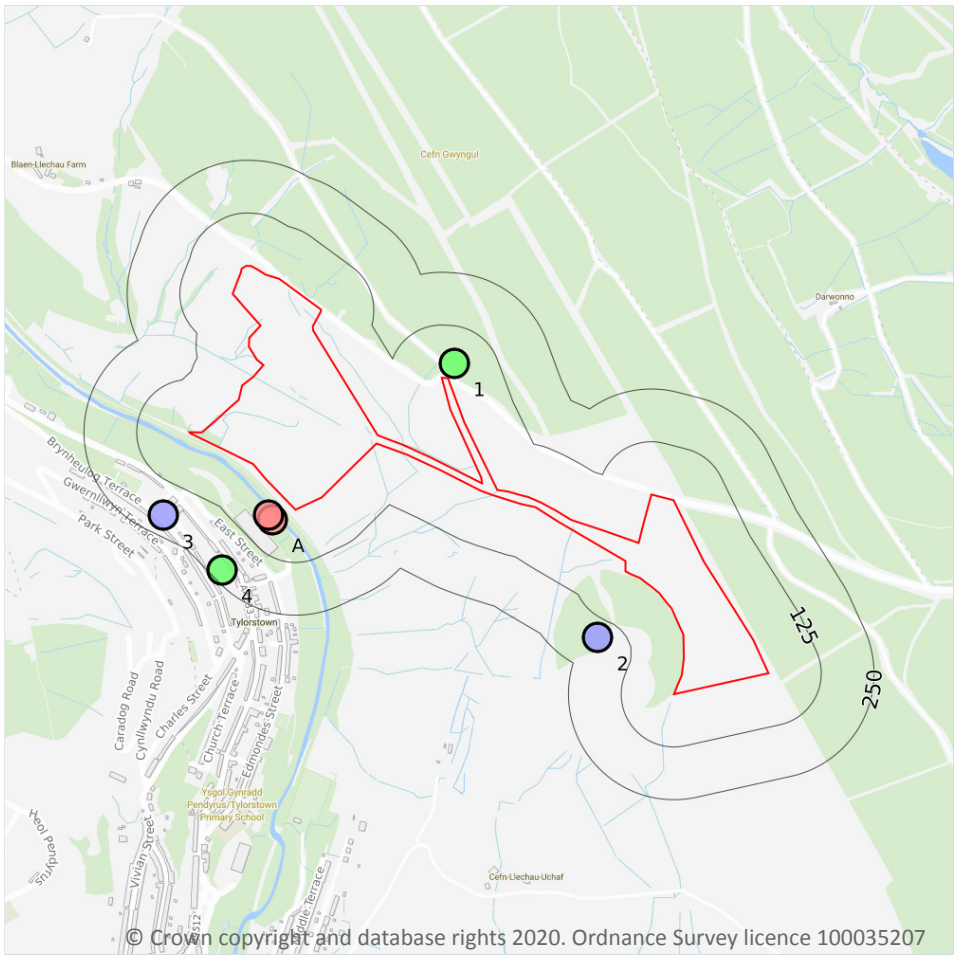
Features are displayed on the Geology 1:50,000 scale - Bedrock map on **page 97**

ID	Location	Category	Description
2	**On site**	**ROCK**	**Coal seam, inferred**
5	**On site**	**ROCK**	**Coal seam, inferred**

ID	Location	Category	Description
6	**On site**	**ROCK**	**Coal seam, observed**
8	**On site**	**ROCK**	**Coal seam, inferred**
9	**On site**	**ROCK**	**Coal seam, inferred**
11	19m SW	FAULT	Fault, inferred, displacement unknown
12	83m SE	ROCK	Coal seam, observed
13	137m W	ROCK	Coal seam, inferred
15	354m SW	ROCK	Coal seam, inferred
17	406m SW	ROCK	Coal seam, observed
18	460m N	ROCK	Coal seam, inferred

This data is sourced from the British Geological Survey.

16 Boreholes



16.1 BGS Boreholes

Records within 250m	6

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

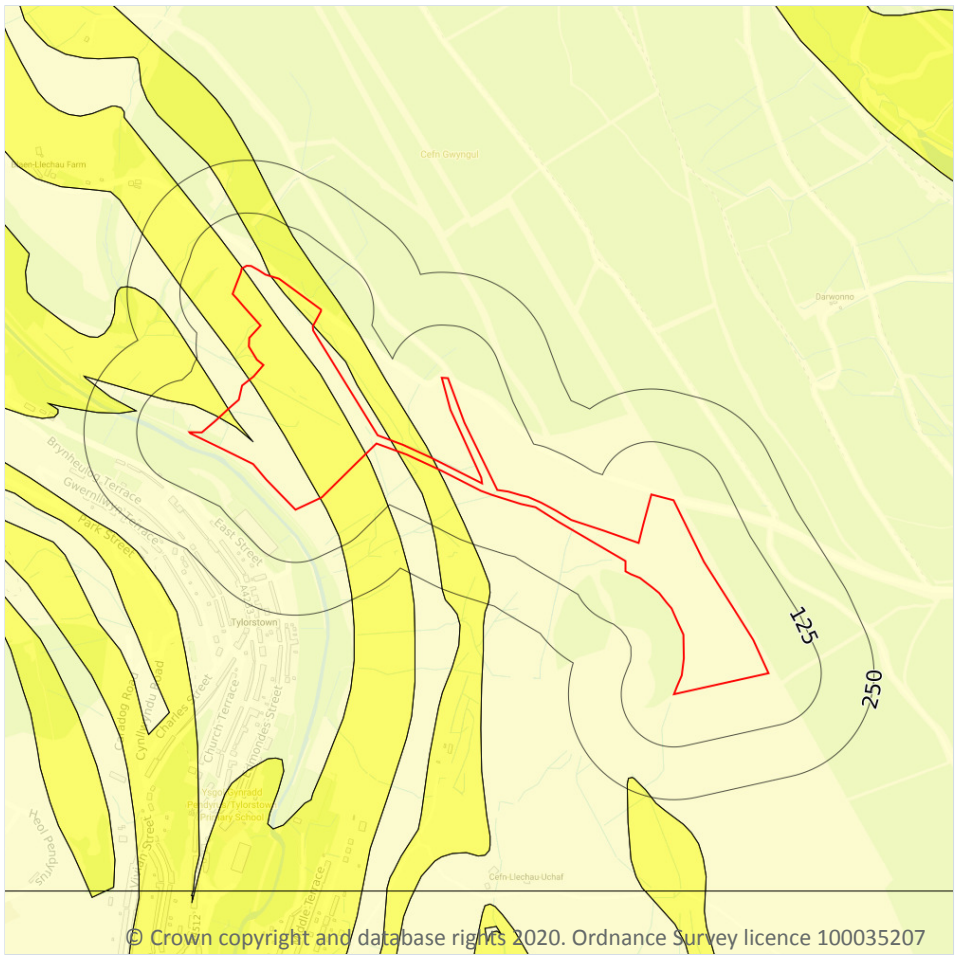
Features are displayed on the Boreholes map on **page 100**

ID	Location	Grid reference	Name	Length	Confidential	Web link
1	38m NE	301560 196250	FERNDALE NO.6 PIT EAST SIDE	21.46	N	377152
A	55m SW	301130 195880	PENDYRIS COLLIERY	335.31	N	377220
A	55m SW	301120 195890	FERNDALE COLLIERY PENDENYS NORTH NO.6 PIT	424.28	N	377144

ID	Location	Grid reference	Name	Length	Confidential	Web link
2	170m SW	301900 195600	TYLEROTOWN TIP	-2.0	N	377206
3	203m SW	300870 195890	FERNDALE NO.6 PIT 'A' CONVEYOR FACE	3.3	N	377148
4	225m SW	301010 195760	FERNDALE NO.6 PIT NO.2 DIP WEST SIDE	16.64	N	377149

This data is sourced from the British Geological Survey.

17 Natural ground subsidence - Shrink swell clays



Site Outline

Search buffers in metres (m)

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

17.1 Shrink swell clays

Records within 50m	2

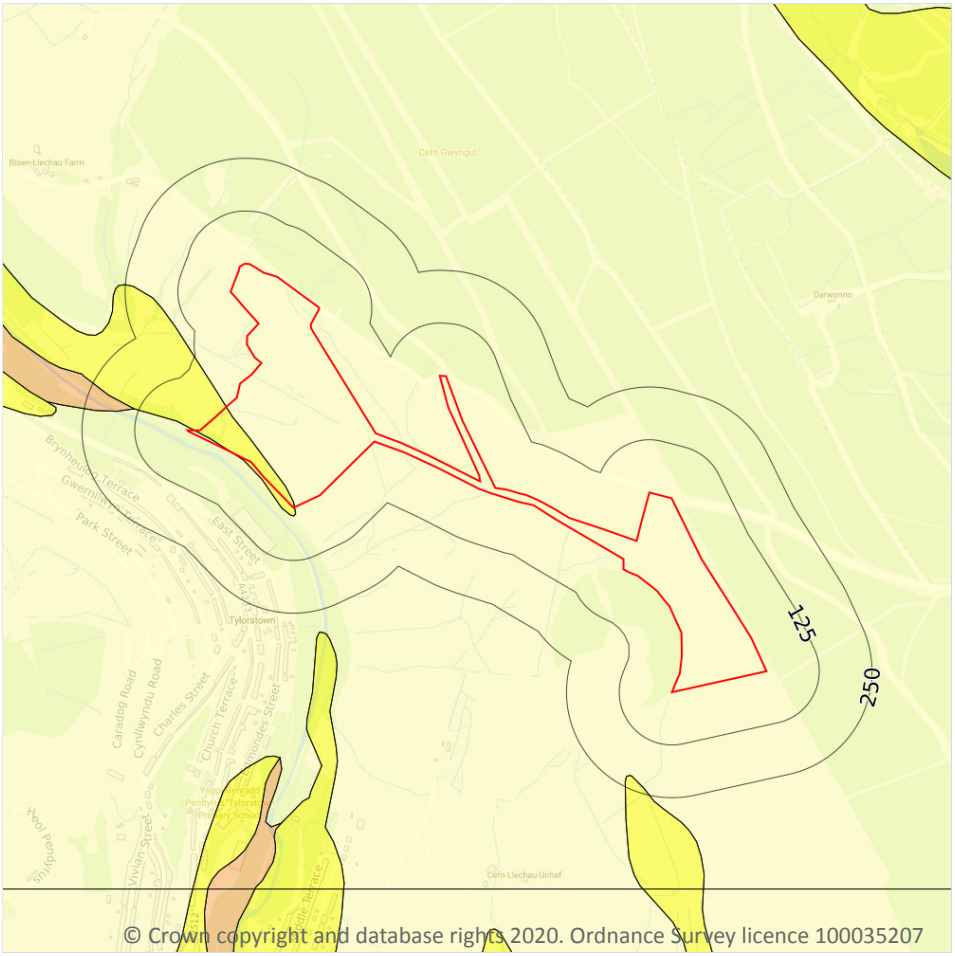
The potential hazard presented by soils that absorb water when wet (making them swell), and lose water as they dry (making them shrink). This shrink-swell behaviour is controlled by the type and amount of clay in the soil, and by seasonal changes in the soil moisture content (related to rainfall and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

Features are displayed on the Natural ground subsidence - Shrink swell clays map on **page 102**

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

This data is sourced from the British Geological Survey.

Natural ground subsidence - Running sands



Site Outline

Search buffers in metres (m)

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

17.2 Running sands

Records within 50m	2

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

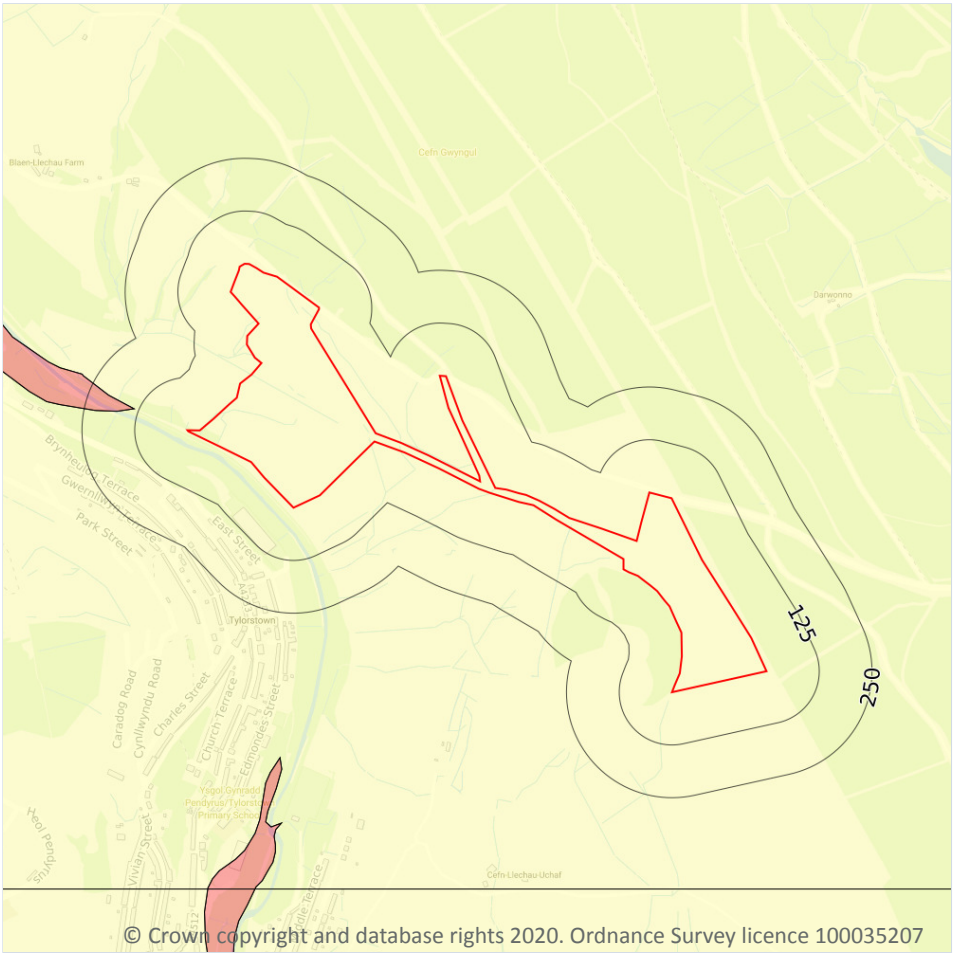
Features are displayed on the Natural ground subsidence - Running sands map on **page 103**

Location	Hazard rating	Details
On site	**Negligible**	**Running sand conditions are not thought to occur whatever the position of the water table. No identified constraints on lands use due to running conditions.**

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

This data is sourced from the British Geological Survey.

Natural ground subsidence - Compressible deposits



Site Outline

Search buffers in metres (m)

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

17.3 Compressible deposits

Records within 50m	1

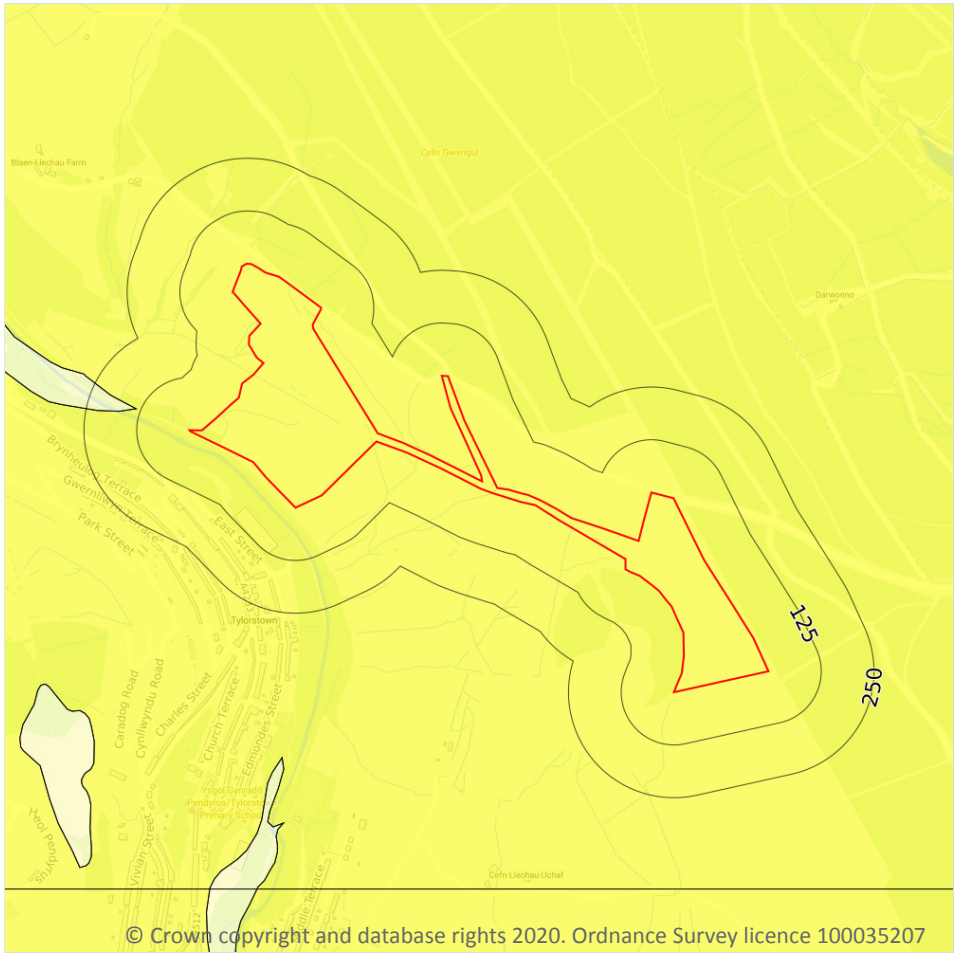
The potential hazard presented by types of ground that may contain layers of very soft materials like clay or peat and may compress if loaded by overlying structures, or if the groundwater level changes, potentially resulting in depression of the ground and disturbance of foundations.

Features are displayed on the Natural ground subsidence - Compressible deposits map on **page 105**

Location	Hazard rating	Details
On site	**Negligible**	**Compressible strata are not thought to occur.**

This data is sourced from the British Geological Survey.

Natural ground subsidence - Collapsible deposits



Site Outline

Search buffers in metres (m)

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

17.4 Collapsible deposits

Records within 50m	1

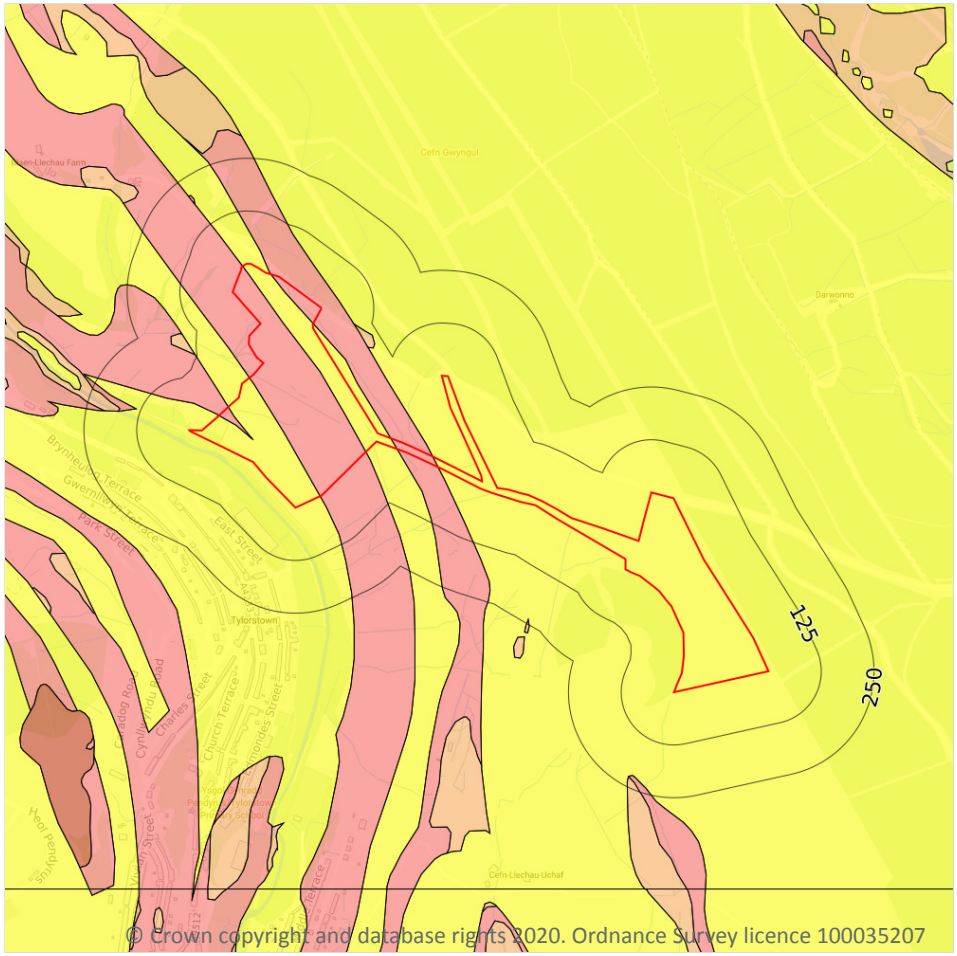
The potential hazard presented by natural deposits that could collapse when a load (such as a building) is placed on them or they become saturated with water.

Features are displayed on the Natural ground subsidence - Collapsible deposits map on **page 106**

Location	Hazard rating	Details
On site	**Very low**	**Deposits with potential to collapse when loaded and saturated are unlikely to be present.**

This data is sourced from the British Geological Survey.

Natural ground subsidence - Landslides



Site Outline

Search buffers in metres (m)

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

17.5 Landslides

Records within 50m	2

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

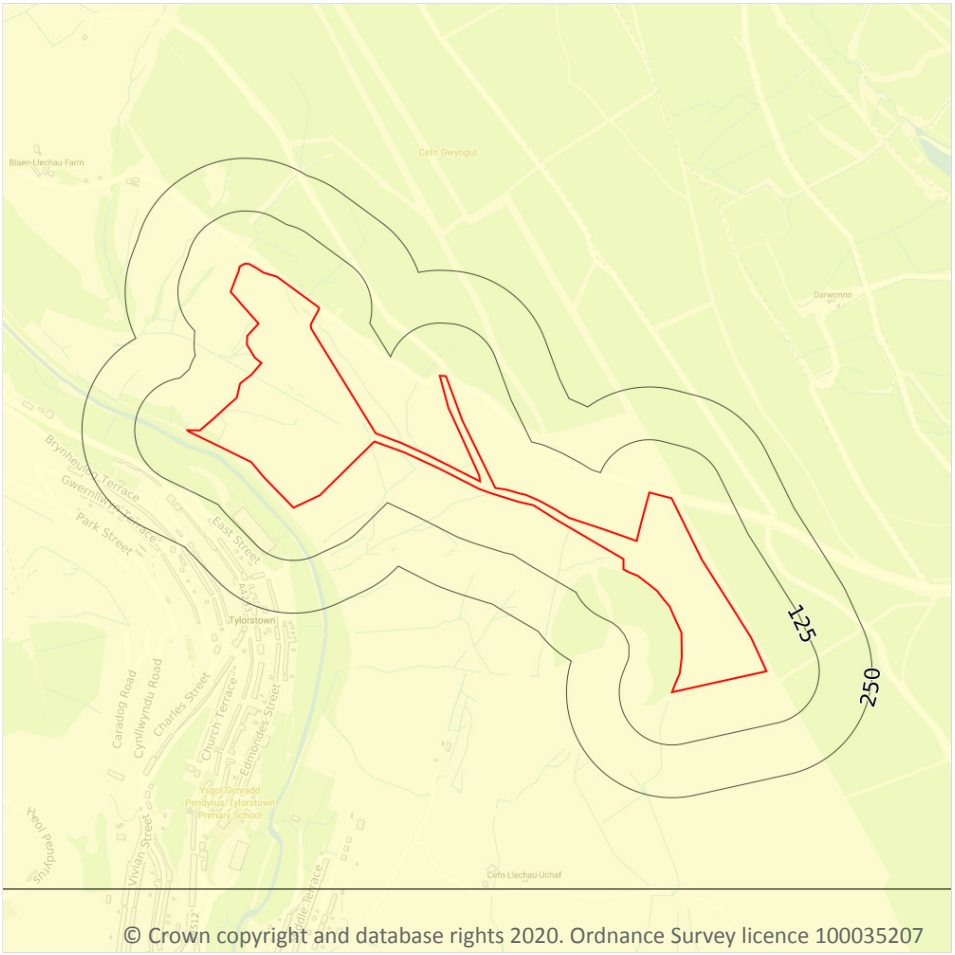
Features are displayed on the Natural ground subsidence - Landslides map on **page 107**

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

Location	Hazard rating	Details
On site	**Moderate**	**Slope instability problems are probably present or have occurred in the past. Land use should consider specifically the stability of the site.**

This data is sourced from the British Geological Survey.

Natural ground subsidence - Ground dissolution of soluble rocks



Site Outline

Search buffers in metres (m)

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

17.6 Ground dissolution of soluble rocks

Records within 50m	1

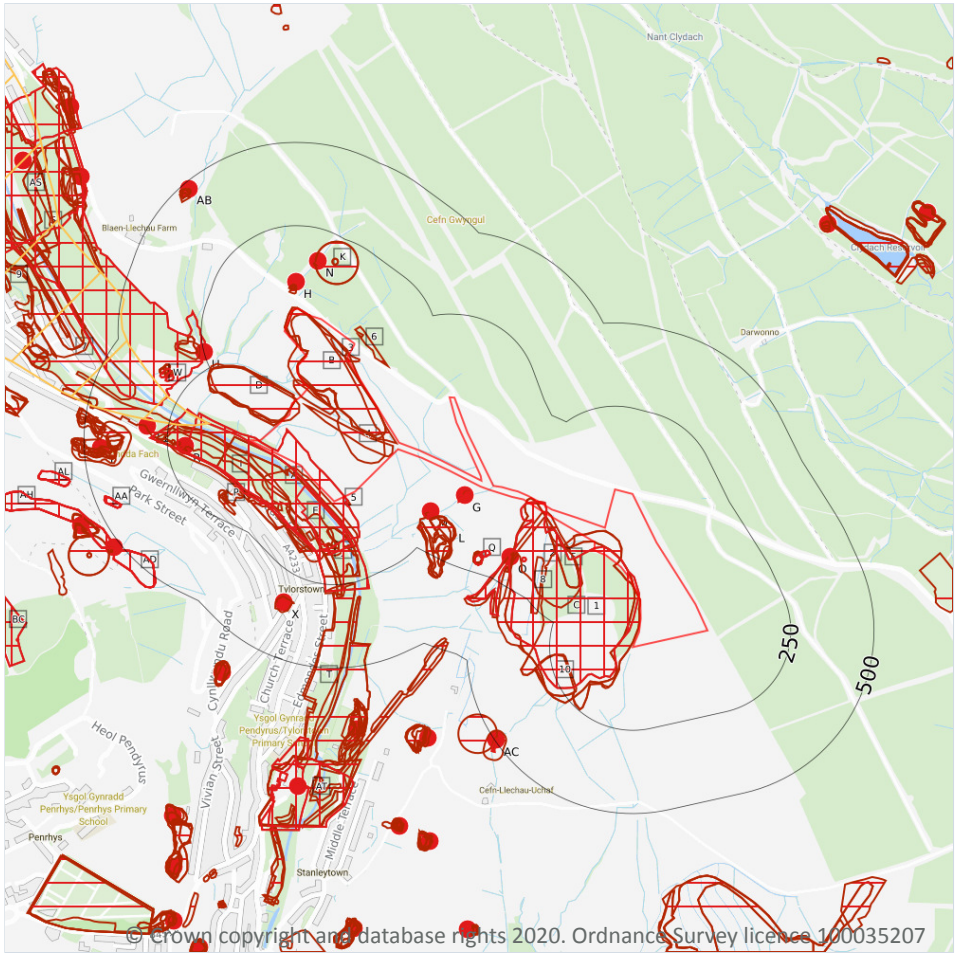
The potential hazard presented by ground dissolution, which occurs when water passing through soluble rocks produces underground cavities and cave systems. These cavities reduce support to the ground above and can cause localised collapse of the overlying rocks and deposits.

Features are displayed on the Natural ground subsidence - Ground dissolution of soluble rocks map on **page 109**

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

This data is sourced from the British Geological Survey.

18 Mining, ground workings and natural cavities



Site Outline

Search buffers in metres (m)

Natural cavities (Area)

Natural cavities (Point)

BritPits

Surface ground workings

Underground workings

Historical Mineral Planning Areas

Mining Cavities

Non Coal Mining

Sporadic underground mining of restricted extent possible

Localised small scale underground mining possible

Small scale mining possible

Underground mining known or likely within or in close proximity

Underground mining known within or in very close proximity

18.1 Natural cavities

Records within 500m	0

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

This data is sourced from Peter Brett Associates (PBA).

18.2 BritPits

Records within 500m	13

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

Features are displayed on the Mining, ground workings and natural cavities map on **page 111**

ID	Location	Details	Description
G	44m SW	Name: Pendyrys Colliery Address: Tylorstown, Ferndale, RHONDDA, Mid Glamorgan Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
H	80m N	Name: Pendyrys-isaf Address: Ferndale, RHONDDA, Mid Glamorgan Commodity: Sandstone Status: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
M	135m SW	Name: Pendyrys Colliery Address: Tylorstown, Ferndale, RHONDDA, Mid Glamorgan Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
L	146m SW	Name: Ferndale Colliery Address: Tylorstown, Ferndale, RHONDDA, Mid Glamorgan Commodity: Sandstone Status: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
N	155m N	Name: Pendyrys-isaf Address: Ferndale, RHONDDA, Mid Glamorgan Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority

ID	Location	Details	Description
O	166m SW	Name: Ferndale Colliery Address: Tylorstown, Ferndale, RHONDDA, Mid Glamorgan Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
R	196m W	Name: Preswylfa Address: Tylorstown, Ferndale, RHONDDA, Mid Glamorgan Commodity: Sandstone Status: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
U	250m W	Name: Pendyrys-isaf Address: Ferndale, RHONDDA, Mid Glamorgan Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
11	313m W	Name: Preswylfa Address: Tylorstown, Ferndale, RHONDDA, Mid Glamorgan Commodity: Sandstone Status: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
X	339m SW	Name: Coed Cynllwyn-du Address: Tylorstown, Ferndale, RHONDDA, Mid Glamorgan Commodity: Sandstone Status: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
Y	450m W	Name: Preswylfa Address: Tylorstown, Ferndale, RHONDDA, Mid Glamorgan Commodity: Sandstone Status: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
AB	480m NW	Name: Tynewydd Address: Ferndale, RHONDDA, Mid Glamorgan Commodity: Sandstone Status: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority

ID	Location	Details	Description
AC	496m SW	Name: Pen-yr-heol Address: Tylorstown, Ferndale, RHONDDA, Mid Glamorgan Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority

This data is sourced from the British Geological Survey.

18.3 Surface ground workings

Records within 250m **101**

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

Features are displayed on the Mining, ground workings and natural cavities map on **page 111**

ID	Location	Land Use	Year of mapping	Mapping scale
1	**On site**	**Refuse Heap**	**1965**	**1:10560**
2	**On site**	**Refuse Heap**	**1921**	**1:10560**
3	**On site**	**Unspecified Ground Workings**	**1948**	**1:10560**
4	**On site**	**Refuse Heap**	**1992**	**1:10000**
A	**On site**	**Colliery**	**1898**	**1:10560**
B	**On site**	**Unspecified Disused Tip**	**1992**	**1:10000**
B	**On site**	**Unspecified Heap**	**1948**	**1:10560**
B	**On site**	**Unspecified Disused Tip**	**1974**	**1:10000**
B	**On site**	**Unspecified Ground Workings**	**1965**	**1:10560**
B	**On site**	**Unspecified Heap**	**1965**	**1:10560**
B	**On site**	**Pond**	**1992**	**1:10000**
B	**On site**	**Pond**	**1974**	**1:10000**
B	**On site**	**Pond**	**1965**	**1:10560**
C	**On site**	**Old Trial Level**	**1948**	**1:10560**
C	**On site**	**Unspecified Disused Tip**	**1974**	**1:10000**

ID	Location	Land Use	Year of mapping	Mapping scale
C	**On site**	**Refuse Heap**	**1945**	**1:10560**
C	**On site**	**Refuse Heap**	**1945**	**1:10560**
D	**On site**	**Unspecified Disused Tip**	**1992**	**1:10000**
D	**On site**	**Unspecified Heap**	**1948**	**1:10560**
D	**On site**	**Unspecified Disused Tip**	**1974**	**1:10000**
D	**On site**	**Unspecified Heap**	**1965**	**1:10560**
A	4m SW	Colliery	1948	1:10560
E	7m SW	Colliery	1921	1:10560
A	8m SW	Colliery	1945	1:10560
A	8m SW	Colliery	1945	1:10560
5	15m SE	Reservoir	1898	1:10560
6	26m NE	Refuse Heap	1965	1:10560
F	28m SW	Refuse Heap	1915	1:10560
F	28m SW	Refuse Heap	1915	1:10560
A	29m SW	Colliery	1915	1:10560
A	29m SW	Colliery	1915	1:10560
G	29m SW	Old Coal Level	1915	1:10560
G	29m SW	Old Coal Level	1915	1:10560
G	30m SW	Old Coal Level	1945	1:10560
G	30m SW	Old Coal Level	1945	1:10560
G	30m SW	Old Coal Level	1948	1:10560
7	34m SW	Unspecified Disused Tip	1974	1:10000
G	40m SW	Old Coal Level	1921	1:10560
G	43m SW	Coal Level	1898	1:10560
H	46m N	Unspecified Quarry	1921	1:10560
I	54m SW	Refuse Heap	1921	1:10560
H	58m N	Unspecified Quarry	1915	1:10560
H	58m N	Unspecified Quarry	1915	1:10560

ID	Location	Land Use	Year of mapping	Mapping scale
H	58m N	Unspecified Disused Quarry	1948	1:10560
E	60m SW	Unspecified Disused Tip	1974	1:10000
H	61m N	Unspecified Quarry	1945	1:10560
I	66m SW	Refuse Heap	1948	1:10560
J	79m S	Refuse Heap	1948	1:10560
J	79m S	Refuse Heap	1921	1:10560
K	112m N	Old Coal Level	1948	1:10560
K	112m N	Old Coal Level	1921	1:10560
E	116m SW	Reservoir	1898	1:10560
8	122m SW	Unspecified Pit	1965	1:10560
L	131m SW	Unspecified Disused Quarry	1948	1:10560
L	131m SW	Unspecified Disused Quarry	1921	1:10560
L	131m SW	Unspecified Quarry	1915	1:10560
L	131m SW	Unspecified Quarry	1915	1:10560
L	137m SW	Unspecified Quarry	1945	1:10560
L	139m SW	Unspecified Quarry	1965	1:10560
N	139m N	Old Coal Level	1915	1:10560
N	139m N	Old Coal Level	1915	1:10560
M	142m SW	Trial Level	1898	1:10560
M	142m SW	Trial Level	1948	1:10560
M	143m SW	Old Trial Level	1915	1:10560
M	143m SW	Old Trial Level	1915	1:10560
L	143m SW	Unspecified Disused Quarry	1992	1:10000
L	143m SW	Unspecified Disused Quarry	1974	1:10000
M	143m SW	Old Trial Level	1945	1:10560
M	143m SW	Old Trial Level	1945	1:10560
N	147m NE	Old Coal Level	1898	1:10560
O	147m SW	Old Trial Level	1921	1:10560

ID	Location	Land Use	Year of mapping	Mapping scale
M	152m SW	Old Trial Level	1921	1:10560
P	158m SW	Cuttings	1898	1:10560
E	165m SW	Refuse Heap	1921	1:10560
K	169m NE	Old Coal Level	1945	1:10560
K	169m NE	Old Coal Level	1945	1:10560
P	169m SW	Unspecified Quarry	1948	1:10560
P	169m SW	Unspecified Quarry	1945	1:10560
L	175m SW	Unspecified Ground Workings	1965	1:10560
Q	176m S	Unspecified Disused Level	1992	1:10000
Q	176m S	Unspecified Disused Level	1974	1:10000
L	177m SW	Refuse Heap	1948	1:10560
L	177m SW	Refuse Heap	1921	1:10560
P	179m SW	Unspecified Quarry	1921	1:10560
Q	187m S	Refuse Heap	1915	1:10560
Q	187m S	Refuse Heap	1915	1:10560
Q	190m S	Old Trial Level	1945	1:10560
Q	190m S	Old Trial Level	1945	1:10560
Q	191m S	Refuse Heap	1948	1:10560
Q	191m S	Refuse Heap	1921	1:10560
R	194m W	Unspecified Quarry	1898	1:10560
Q	195m S	Unspecified Disused Level	1992	1:10000
Q	195m S	Unspecified Heap	1974	1:10000
Q	195m S	Unspecified Heap	1965	1:10560
O	196m SW	Old Trial Level	1915	1:10560
O	196m SW	Old Trial Level	1915	1:10560
10	201m W	Unspecified Disused Tip	1992	1:10000
L	202m SW	Unspecified Quarry	1945	1:10560
R	212m W	Unspecified Quarry	1898	1:10560

ID	Location	Land Use	Year of mapping	Mapping scale
S	242m W	Colliery	1898	1:10560
T	250m S	Refuse Heap	1948	1:10560

This is data is sourced from Ordnance Survey/Groundsure.

18.4 Underground workings

Records within 1000m	**44**

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

Features are displayed on the Mining, ground workings and natural cavities map on **page 111**

ID	Location	Land Use	Year of mapping	Mapping scale
A	**On site**	**Colliery**	**1898**	**1:10560**
C	**On site**	**Old Trial Level**	**1948**	**1:10560**
A	4m SW	Colliery	1948	1:10560
G	30m SW	Old Coal Level	1948	1:10560
E	30m SW	Unspecified Mine	1965	1:10560
G	40m SW	Old Coal Level	1921	1:10560
G	43m SW	Coal Level	1898	1:10560
M	142m SW	Trial Level	1898	1:10560
M	142m SW	Trial Level	1948	1:10560
N	147m NE	Old Coal Level	1898	1:10560
O	147m SW	Old Trial Level	1921	1:10560
M	152m SW	Old Trial Level	1921	1:10560
Q	176m S	Unspecified Disused Level	1992	1:10000
Q	176m S	Unspecified Disused Level	1974	1:10000
Q	195m S	Unspecified Disused Level	1992	1:10000
S	242m W	Colliery	1898	1:10560
W	296m NW	Old Trial Level	1921	1:10560
W	317m NW	Old Trial Level	1921	1:10560

ID	Location	Land Use	Year of mapping	Mapping scale
AA	434m SW	Unspecified Disused Levels	1992	1:10000
AA	434m SW	Unspecified Disused Levels	1974	1:10000
AA	434m SW	Unspecified Disused Levels	1965	1:10560
AD	468m SW	Unspecified Disused Levels	1992	1:10000
AD	468m SW	Unspecified Disused Levels	1974	1:10000
AD	468m SW	Unspecified Disused Levels	1965	1:10560
AC	493m SW	Old Coal Level	1948	1:10560
AH	516m SW	Unspecified Disused Levels	1992	1:10000
AH	516m SW	Unspecified Disused Levels	1974	1:10000
AH	516m SW	Unspecified Disused Levels	1965	1:10560
AL	556m W	Unspecified Disused Levels	1992	1:10000
AL	556m W	Unspecified Disused Levels	1974	1:10000
AL	556m W	Unspecified Disused Levels	1965	1:10560
AS	701m NW	Colliery	1948	1:10560
AT	715m S	Colliery	1898	1:10560
AY	786m S	Colliery	1921	1:10560
BC	868m SW	Colliery	1875	1:10560
BC	918m SW	Unspecified Shafts	1875	1:10560
-	934m W	Trial Level	1875	1:10560
-	939m W	Unspecified Disused Levels	1981	1:10000
-	939m W	Unspecified Disused Levels	1964	1:10560
BF	972m SW	Old Trial Level	1874	1:10560
BF	976m SW	Old Trial Level	1915	1:10560
BF	976m SW	Old Trial Level	1898	1:10560
BF	977m SW	Trial Level	1875	1:10560
BF	978m SW	Old Trial Level	1921	1:10560

This is data is sourced from Ordnance Survey/Groundsure.

18.5 Historical Mineral Planning Areas

Records within 500m	0

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

This data is sourced from the British Geological Survey.

18.6 Non-coal mining

Records within 1000m	1

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

Features are displayed on the Mining, ground workings and natural cavities map on **page 111**

ID	Location	Name	Commodity	Class	Likelihood
9	137m W	Not available	Iron Ore (Bedded)	B	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered

This data is sourced from the British Geological Survey.

18.7 Mining cavities

Records within 1000m	0

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

This data is sourced from Peter Brett Associates (PBA).

18.8 JPB mining areas

Records on site	1

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

Location	Details
On site	**In addition to being located inside an area where The Coal Authority have information on coal mining activities, Johnson Poole & Bloomer (JPB) have information such as mining plans and maps held within their archive of mining activities that have occurred within 1km of this property which may supplement this information. Further details and a quote for services can be obtained by emailing this report to enquiries.gs@jpb.co.uk.**

This data is sourced from Johnson Poole and Bloomer.

18.9 Coal mining

Records on site	**1**

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

Location	Details
On site	**The site is located within a coal mining area as defined by the Coal Authority. A Consultants Coal Mining Report is recommended to further assess coal mining issues at the site. This can be ordered directly through Groundsure or your preferred search provider.**

This data is sourced from the Coal Authority.

18.10 Brine areas

Records on site	**0**

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

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

18.11 Gypsum areas

Records on site	**0**

Generalised areas that may be affected by gypsum extraction.

This data is sourced from British Gypsum.

18.12 Tin mining

Records on site	0

Generalised areas that may be affected by historical tin mining.

This data is sourced from Mining Searches UK.

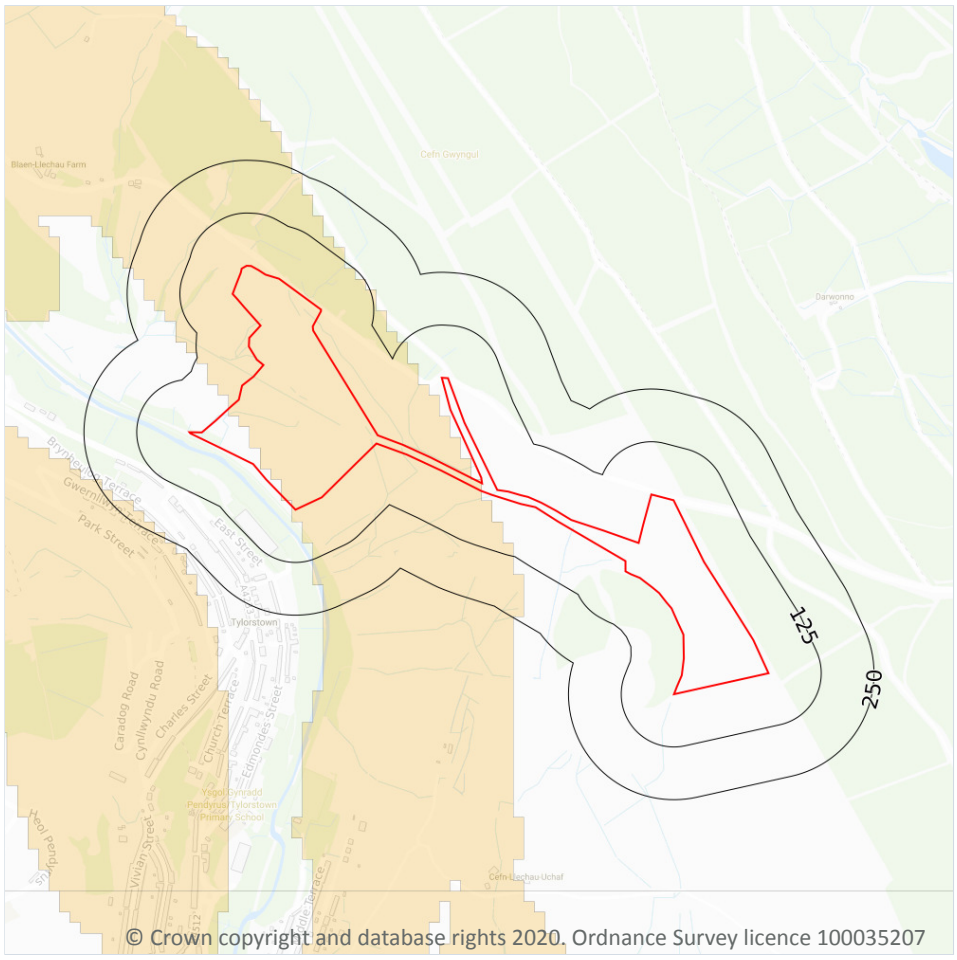
18.13 Clay mining

Records on site	0

Generalised areas that may be affected by kaolin and ball clay extraction.

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

19 Radon



Site Outline

Search buffers in metres (m)

- Greater than 30%
- Between 10% and 30%
- Between 5% and 10%
- Between 3% and 5%
- Between 1% and 3%
- Less than 1%

19.1 Radon

Records on site	2

Estimated percentage of dwellings exceeding the Radon Action Level. This data is the highest resolution radon dataset available for the UK and is produced to a 75m level of accuracy to allow for geological data accuracy and a 'residential property' buffer. The findings of this section should supersede any estimations derived from the Indicative Atlas of Radon in Great Britain. The data was derived from both geological assessments and long term measurements of radon in more than 479,000 households.

Features are displayed on the Radon map on **page 123**

Location	Estimated properties affected	Radon Protection Measures required
On site	**Between 3% and 5%**	**Basic**
On site	**Less than 1%**	**None****

This data is sourced from the British Geological Survey and Public Health England.

20 Soil chemistry

20.1 BGS Estimated Background Soil Chemistry

Records within 50m	**44**

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

Location	Arsenic	Bioaccessible Arsenic	Lead	Bioaccessible Lead	Cadmium	Chromium	Nickel
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 - 200 mg/kg**	**60 - 120 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 - 200 mg/kg**	**60 - 120 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**25 - 35 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**25 - 35 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**25 - 35 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**25 - 35 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**

Location	Arsenic	Bioaccessible Arsenic	Lead	Bioaccessible Lead	Cadmium	Chromium	Nickel
On site	**25 - 35 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**25 - 35 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**25 - 35 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**25 - 35 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**25 - 35 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**25 - 35 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
3m W	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
3m W	15 - 25 mg/kg	No data	100 - 200 mg/kg	60 - 120 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
9m W	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
9m W	15 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
9m SW	15 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg

Location	Arsenic	Bioaccessible Arsenic	Lead	Bioaccessible Lead	Cadmium	Chromium	Nickel
12m N	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
18m NW	25 - 35 mg/kg	No data	100 - 200 mg/kg	60 - 120 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
30m W	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
30m S	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
30m NW	15 mg/kg	No data	100 - 200 mg/kg	60 - 120 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
30m NW	15 mg/kg	No data	100 - 200 mg/kg	60 - 120 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
35m NW	15 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
35m NW	15 mg/kg	No data	100 - 200 mg/kg	60 - 120 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
46m NW	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
46m NW	15 - 25 mg/kg	No data	100 - 200 mg/kg	60 - 120 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
47m W	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
47m W	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
47m SW	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
47m W	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg

This data is sourced from the British Geological Survey.

20.2 BGS Estimated Urban Soil Chemistry

Records within 50m	**0**

Estimated topsoil chemistry of Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Tin and Zinc and bioaccessible Arsenic and Lead in 23 urban centres across Great Britain. These estimates are derived from interpolation of the measured urban topsoil data referred to above and provide information across each city

between the measured sample locations (4 per km^2).

This data is sourced from the British Geological Survey.

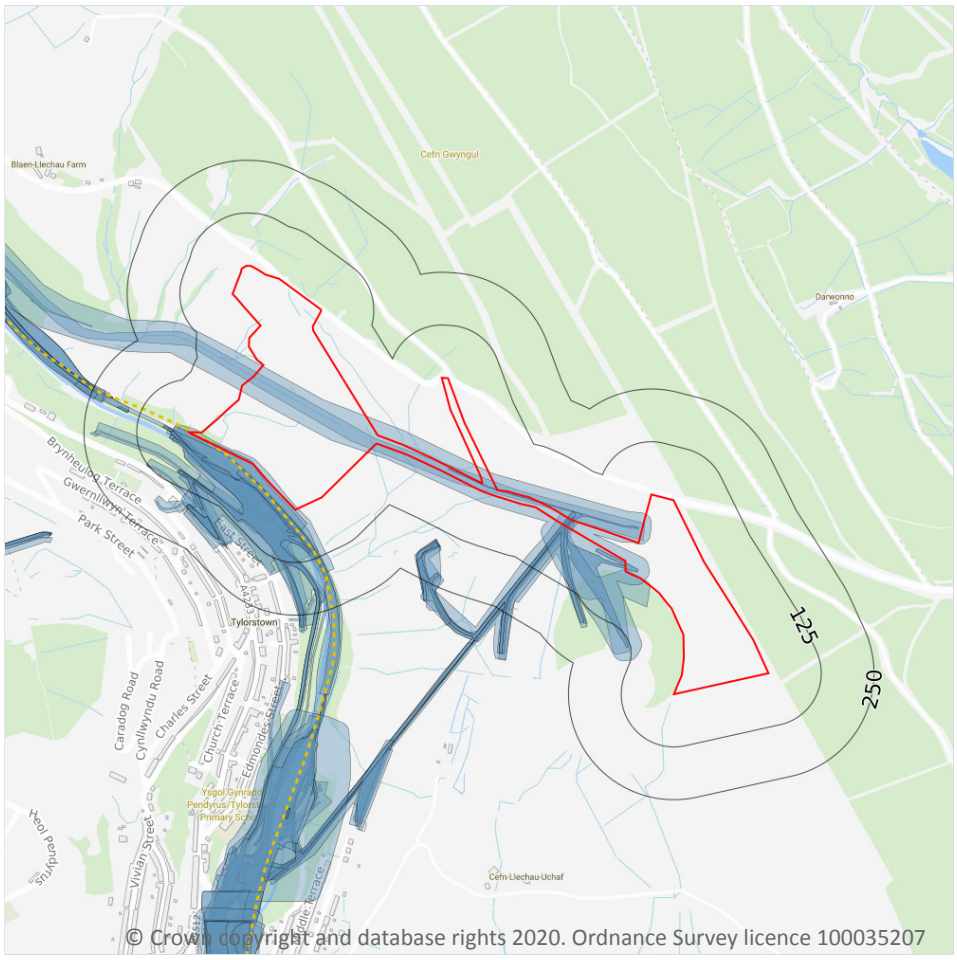
20.3 BGS Measured Urban Soil Chemistry

Records within 50m	0

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

This data is sourced from the British Geological Survey.

21 Railway infrastructure and projects



21.1 Underground railways (London)

Records within 250m	0

Details of all active London Underground lines, including approximate tunnel roof depth and operational hours.

This data is sourced from publicly available information by Groundsure.

21.2 Underground railways (Non-London)

Records within 250m	0

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

This data is sourced from publicly available information by Groundsure.

21.3 Railway tunnels

Records within 250m	0

Railway tunnels taken from contemporary Ordnance Survey mapping.

This data is sourced from the Ordnance Survey.

21.4 Historical railway and tunnel features

Records within 250m	46

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

Features are displayed on the Railway infrastructure and projects map on **page 129**

Location	Land Use	Year of mapping	Mapping scale
On site	**Railway Sidings**	**1961**	**2500**
On site	**Railway Sidings**	**1958**	**2500**
On site	**Tramway Sidings**	**1920**	**2500**
On site	**Railway Sidings**	**1898**	**10560**
On site	**Tramway Sidings**	**1948**	**10560**
On site	**Tramway Sidings**	**1945**	**10560**
On site	**Tramway Sidings**	**1915**	**10560**
On site	**Tramway Sidings**	**1921**	**10560**
On site	**Disused Tramway Sidings**	**1965**	**10560**
On site	**Railway Sidings**	**1948**	**10560**
On site	**Railway Sidings**	**1965**	**10560**
8m SW	Railway Sidings	1945	10560
17m SW	Railway Sidings	1900	2500
19m SW	Railway Sidings	1873	2500
20m SW	Railway Sidings	1961	2500
21m SW	Railway Sidings	1919	2500
21m SW	Railway Sidings	1992	10000

Location	Land Use	Year of mapping	Mapping scale
22m SW	Railway Sidings	1957	2500
25m SW	Tramway Sidings	1915	10560
26m SW	Tramway Sidings	1900	2500
29m SW	Railway Sidings	1921	10560
34m SW	Railway Sidings	1961	2500
34m SW	Railway Sidings	1958	2500
35m SW	Railway Sidings	1957	1250
40m SW	Disused Railway Sidings	1961	2500
40m SW	Disused Railway Sidings	1958	2500
40m SW	Railway Sidings	1957	1250
59m SW	Railway Sidings	1957	1250
79m SW	Tramway Sidings	1900	2500
87m SW	Railway Sidings	1919	2500
106m SW	Tramway Sidings	1900	2500
108m SW	Railway Sidings	1920	2500
112m SW	Tramway Sidings	1900	2500
150m SW	Railway Sidings	1919	2500
152m W	Railway Sidings	1961	2500
152m W	Railway Sidings	1957	2500
153m W	Railway Sidings	1957	1250
154m SW	Railway Sidings	1915	10560
156m SW	Railway Sidings	1920	2500
159m SW	Tramway Sidings	1921	10560
200m NW	Railway Sidings	1961	2500
200m NW	Railway Sidings	1957	2500
210m NW	Railway Sidings	1948	10560
220m W	Railway Sidings	1945	10560
236m NW	Railway Sidings	1921	10560

Location	Land Use	Year of mapping	Mapping scale
250m NW	Railway Sidings	1915	10560

This data is sourced from Ordnance Survey/Groundsure.

21.5 Royal Mail tunnels

Records within 250m	0

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

This data is sourced from Groundsure/the Postal Museum.

21.6 Historical railways

Records within 250m	1

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

Features are displayed on the Railway infrastructure and projects map on **page 129**

Location	Description
On site	**Abandoned**

This data is sourced from OpenStreetMap.

21.7 Railways

Records within 250m	0

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

This data is sourced from Ordnance Survey and OpenStreetMap.

21.8 Crossrail 1

Records within 500m	0

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

This data is sourced from publicly available information by Groundsure.

21.9 Crossrail 2

Records within 500m	0

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

This data is sourced from publicly available information by Groundsure.

21.10 HS2

Records within 500m	0

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

This data is sourced from HS2 ltd.

Data providers

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

Terms and conditions

Groundsure's Terms and Conditions can be accessed at this link: https://www.groundsure.com/terms-and-conditions-jan-2020/.

APPENDIX C

BGS BOREHOLE LOGS

1063 Wt. 22438/0384 10M 7/45 (51) F&S.

RECORD OF SHAFT OR BORE FOR MINERALS

(For Survey use only)
1-inch Map Registered No.
~~1 SE / 30~~
5T09NW/12

Name and Number of Shaft or Bore No 9 PIT. FERNDALE.
HARD HEADING 5-FT. TO 2FT-8.
OFF No 6 DIP. D. CONVEYOR.

For Messrs.

Town or Village

County Six-inch quarter sheet

6-inch Map Registered No.

Exact site SE. 21FT S 185E
0202 9512

Attach a tracing from a map, or a sketch-map, if possible.

Purpose for which made

Level at which shaft / bore commenced relative to O.D. State if shaft / bore is up, down, horizontal or inclined; in latter cases give angle of inclination and direction

Made by

Information from Date of Sinking

Specimens

Additional Notes in Space Overleaf

(For Survey use only) GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
	Cliff roof				
	COAL	1	4	1	4
	Stone		1	1	5
	COAL	2	8	4	1
	Clod		2	4	3
	COAL		1	4	4
	Rashes		2	4	6
	Hard fireclay	20	·	24	6
	COAL	1	10	26	4
	Fireclay	5	·	31	4
	Cliff	16	·	47	4
	COAL		4	47	8
	Cliff	28	·	75	8
	Rock	7	·	82	8
	Cliff	16	·	98	8
	5-FT.				
		98	8		

Continued Overleaf

GEOLOGICAL SURVEY AND MUSEUM, SOUTH KENSINGTON, LONDON, S.W.7.	Date received	Correspondence File No.	1" N.S. Map No.	1" O.S. Map No.	Site marked (use symbol) on 1" Map	on 6" Map

1063 Wt. 22438/0384 10m 7/45 (51) F.&S.

RECORD OF SHAFT OR BORE FOR MINERALS

(*For Survey use only*)
1-inch Map Registered No.
~~12 SE/30~~
ST09NW/13

Name and Number of Shaft or Bore No 6 Pit. FERNDALE.
EAST SIDE HARD HEADING 5-FT. TO 2FT-8.

For Messrs.

Town or Village

County Six-inch quarter sheet

6-inch Map Registered No.

Exact site on 5Ft. 1856 0156 9625

Attach a tracing from a map, or a sketch-map, if possible.

Purpose for which made

Level at which shaft / bore commenced relative to O.D. State if shaft / bore is up, down, horizontal or inclined; in latter cases give angle of inclination and direction

Made by

Information from Date of Sinking

Specimens

Additional Notes in Space Overleaf

(*For Survey use only*) GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
	COAL	3 .		3	
	F'clay	1 1		4	1
	Rock	3 9		7	10
	F'clay & shale	9		8	7
	Rock	1 1		9	8
	Cliff	10		10	6
	Rock	10		11	4
	Cliff	2 4		13	8
	COAL	1 4		15	.
	F'clay	7 6		23	6
	Cliff	20 .		43	6
	COAL	11		43	5
	F'clay	3 .		46	5
	Cliff with beds of rock	14 .		60	5
	5 FT. SEAM c.	5 .		65	5
	F'clay c.	2 .		67	5
	GELLIDEG. c.	3 .		70	5

Continued Overleaf

GEOLOGICAL SURVEY AND MUSEUM, SOUTH KENSINGTON, LONDON, S.W.7.	Date received	Correspondence File No.	1" N.S. Map No.	1" O.S. Map No.	Site marked (use symbol) on 1" Map	on 6" Map

REDSTART

APPENDIX D

CONSULTANTS COAL MINING REPORTS

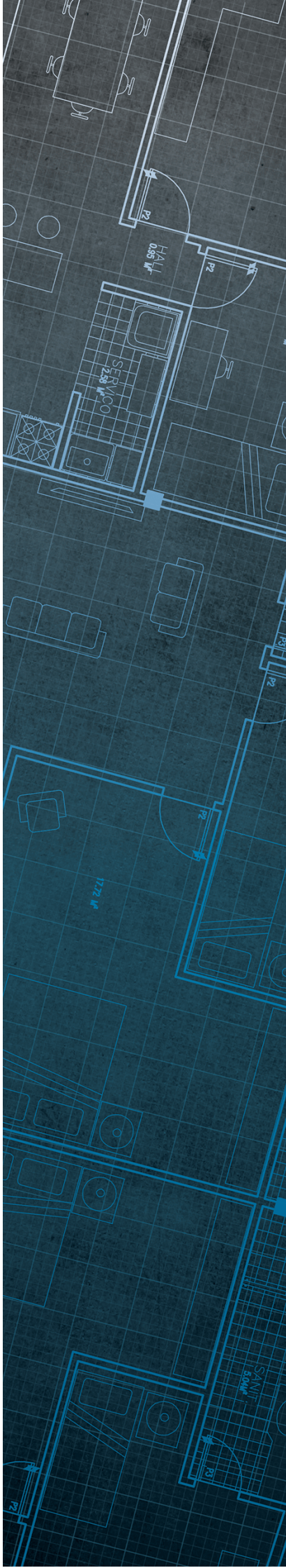
For Internal Use Only

Consultants

Coal Mining Report

Tylorstown
Rhondda Cynon Taff
South Wales

Date of enquiry:	**10 September 2020**
Date enquiry received:	**10 September 2020**
Issue date:	**10 September 2020**
Our reference:	**71006970622001**
Your reference:	



Consultants

Coal Mining Report

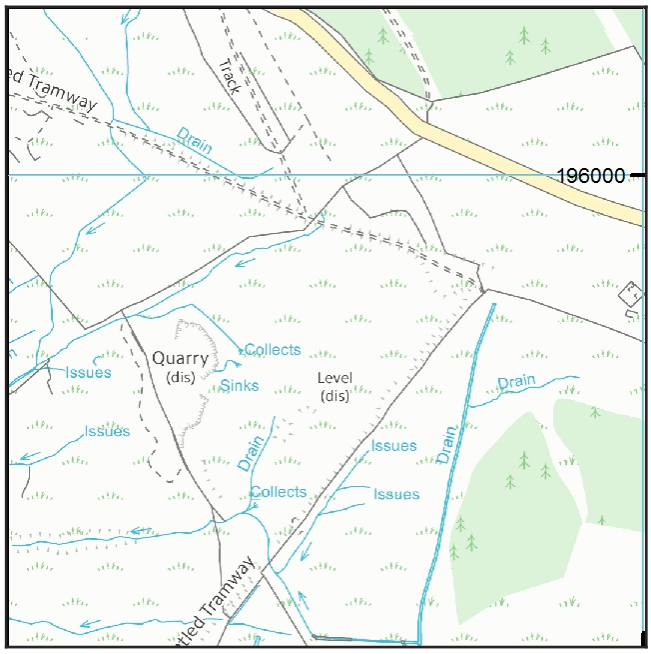
This report is based on and limited to the records held by the Coal Authority at the time the report was produced.

Client name

The Coal Authority

Enquiry address

Tylorstown
Rhondda Cynon Taff
South Wales



Approximate position of property

How to contact us

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+44 (0)1623 637 000 (International)

200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

www.groundstability.com

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

Section 1 – Mining activity and geology

Past underground mining

Colliery	Seam	Mineral	Coal Authority reference	Depth (m)	Direction to working	Dipping rate of seam worked (degrees)	Dipped direction of seam worked	Extraction thickness (cm)	Year last mined
unnamed	FOUR FOOT	Coal	44JE	278	South-West	9.1	South-East	269	1878
unnamed	UPPER SEVEN FOOT	Coal	40GB	358	West	3.2	North-West	109	1944
unnamed	TWO FOOT NINE	Coal	40NQ	390	North	4.2	East	147	1929
unnamed	TWO FOOT NINE	Coal	40NO	396	Beneath Property	3.7	South-East	147	1915
unnamed	FIVE FOOT	Coal	40F4	403	South-West	4.9	South	120	1893
unnamed	TWO FOOT NINE	Coal	44HM	405	Beneath Property	6.7	South-East	147	1904
unnamed	FOUR FOOT	Coal	40M1	408	Beneath Property	3.4	South-East	190	1907
unnamed	FIVE FOOT	Coal	412E	412	Beneath Property	45.7	South	120	1927
unnamed	TWO FOOT NINE	Coal	44HJ	417	Beneath Property	7.7	East	147	1912
FERNDALE	TWO FOOT NINE	Coal	40NO	426	Beneath Property	4.8	East	147	1915
unnamed	6FT BOTTOM LEAF	Coal	40K8	431	Beneath Property	7.4	East	196	1909
unnamed	TWO FOOT NINE	Coal	44HK	434	Beneath Property	5.4	South-East	147	1923
unnamed	6FT BOTTOM LEAF	Coal	40K8	435	Beneath Property	4.0	South	196	1909
unnamed	FOUR FOOT	Coal	44JD	442	Beneath Property	4.5	South-East	269	1936
unnamed	6FT BOTTOM LEAF	Coal	44JH	443	Beneath Property	4.6	South-East	195	1905
unnamed	BUTE	Coal	40ID	459	Beneath Property	5.4	East	93	1926
unnamed	6FT BOTTOM LEAF	Coal	44JG	466	Beneath Property	6.4	South-East	196	1907
unnamed	BUTE	Coal	40ID	467	Beneath Property	4.7	South-East	93	1926
unnamed	BUTE	Coal	44K2	477	Beneath Property	7.4	South-East	93	1916
unnamed	YARD	Coal	40H7	478	Beneath Property	6.1	East	90	1955

Colliery	Seam	Mineral	Coal Authority reference	Depth (m)	Direction to working	Dipping rate of seam worked (degrees)	Dipped direction of seam worked	Extraction thickness (cm)	Year last mined
unnamed	UPPER NINE FOOT	Coal	44JI	479	Beneath Property	8.1	South-East	198	1918
unnamed	BUTE	Coal	44K1	488	South-East	7.3	South	93	1925
unnamed	YARD	Coal	4163	498	Beneath Property	4.4	South-East	111	1952
unnamed	UPPER SEVEN FOOT	Coal	152	499	Beneath Property	7.0	South-East	152	1944
unnamed	YARD	Coal	40H9	508	North	4.1	East	110	1949
unnamed	FIVE FOOT GELLIDEG	Coal	40C1	515	Beneath Property	4.2	South-East	118	1960
unnamed	UPPER SEVEN FOOT	Coal	40GC	518	Beneath Property	5.2	East	120	1900
unnamed	FIVE FOOT	Coal	40F5	520	Beneath Property	5.9	East	120	1894
unnamed	FIVE FOOT	Coal	40F6	522	Beneath Property	6.5	East	120	1927
unnamed	FIVE FOOT GELLIDEG	Coal	44JX	524	Beneath Property	4.0	East	120	1957
unnamed	FOUR FOOT	Coal	44F5	524	South	5.1	South-East	240	1960
unnamed	FIVE FOOT	Coal	412F	528	Beneath Property	8.5	South-East	120	1912
unnamed	FIVE FOOT	Coal	412C	537	Beneath Property	7.0	North-East	120	1918
unnamed	TWO FOOT NINE	Coal	44HN	546	Beneath Property	5.7	South	155	1929
unnamed	BUTE	Coal	40IF	550	North-East	4.7	South-East	93	1937
unnamed	FOUR FOOT	Coal	44FW	555	Beneath Property	2.7	East	160	1898
unnamed	FOUR FOOT	Coal	40MM	558	North	2.6	North-East	210	1935
unnamed	UPPER SEVEN FOOT	Coal	40GD	564	East	4.7	North-East	119	1959
unnamed	YARD	Coal	415X	566	South	6.1	South-East	111	1941
unnamed	TWO FOOT NINE	Coal	44HH	568	West	4.9	South-East	147	1929
unnamed	6FT BOTTOM LEAF	Coal	44DM	569	Beneath Property	3.6	East	196	1926
unnamed	YARD	Coal	40HA	576	North-East	2.5	East	90	1946
unnamed	6FT BOTTOM LEAF	Coal	40KP	584	North	4.6	East	196	1922
unnamed	FOUR FOOT	Coal	44JC	587	West	5.8	South	269	1900

Colliery	Seam	Mineral	Coal Authority reference	Depth (m)	Direction to working	Dipping rate of seam worked (degrees)	Dipped direction of seam worked	Extraction thickness (cm)	Year last mined
unnamed	UPPER NINE FOOT	Coal	44JJ	588	West	7.1	South-East	198	1910
unnamed	FOUR FOOT	Coal	44FU	593	Beneath Property	1.2	South-East	160	1910
unnamed	FIVE FOOT GELLIDEG	Coal	44JZ	593	South-West	6.5	South-East	142	1952
FERNDALE	TWO FOOT NINE	Coal	44HO	602	North-East	2.8	East	155	1925
unnamed	FOUR FOOT	Coal	44FV	610	East	2.6	South-East	160	1934
unnamed	YARD	Coal	416L	612	South	8.1	South-East	110	1943
unnamed	6FT BOTTOM LEAF	Coal	44D6	615	South	4.8	South-East	200	1805
unnamed	UPPER NINE FOOT	Coal	41BB	616	South-West	6.5	South	240	1945
unnamed	FOUR FOOT	Coal	40MN	616	North-East	5.4	North-East	210	1922
unnamed	FOUR FOOT	Coal	44FS	618	South	0.8	South-East	240	1900
unnamed	6FT BOTTOM LEAF	Coal	44JF	619	West	4.8	South	196	1907
unnamed	UPPER SEVEN FOOT	Coal	40GE	622	North-East	4.9	East	106	1959
unnamed	6FT BOTTOM LEAF	Coal	44DI	624	South	3.4	South-East	270	1910
unnamed	YARD	Coal	40HR	636	North	2.4	East	90	1948
unnamed	BUTE	Coal	417H	636	South	3.0	South	190	1923
unnamed	UPPER NINE FOOT	Coal	41BS	641	South	5.8	North	180	1943
unnamed	LOWER NINE FOOT TOP LEAF	Coal	40JU	645	North	1.3	South-East	140	1929
unnamed	BUTE	Coal	40IQ	650	North-East	2.1	North-East	93	1937
unnamed	BUTE	Coal	417T	651	Beneath Property	3.2	South-East	93	1925
unnamed	BUTE	Coal	418M	652	South	2.5	West	200	1932
unnamed	YARD	Coal	4162	654	West	7.4	South	111	1941
unnamed	LOWER NINE FOOT	Coal	419G	656	South-West	3.0	North	110	1954
unnamed	UPPER SEVEN FOOT	Coal	414A	657	West	9.7	South-East	152	1941

Colliery	Seam	Mineral	Coal Authority reference	Depth (m)	Direction to working	Dipping rate of seam worked (degrees)	Dipped direction of seam worked	Extraction thickness (cm)	Year last mined
unnamed	BUTE	Coal	417U	658	Beneath Property	4.8	South-East	93	1932
unnamed	YARD	Coal	416M	658	South	2.6	South	110	1942
unnamed	FIVE FOOT	Coal	4130	659	Beneath Property	1.0	North-East	120	1935
unnamed	FIVE FOOT	Coal	40F7	661	North	0.0	East	120	1932
unnamed	YARD	Coal	415T	666	South	10.9	North-West	120	1947
NATIONAL	UPPER SEVEN FOOT	Coal	4143	669	South	3.9	West	140	1954
unnamed	YARD	Coal	416Q	671	Beneath Property	5.9	South-East	110	1946
unnamed	UPPER SEVEN FOOT	Coal	414S	679	Beneath Property	5.5	South	110	1940
unnamed	UPPER SEVEN FOOT	Coal	40H1	687	North-East	5.9	North-East	132	1957
unnamed	FIVE FOOT	Coal	412S	687	South	11.9	South-West	200	1938
unnamed	FIVE FOOT	Coal	412Q	689	South	0.8	South	200	1922
unnamed	FIVE FOOT	Coal	411Q	691	South-West	8.8	West	150	1926
unnamed	YARD	Coal	415W	698	West	7.2	South	111	1941
unnamed	SEVEN FOOT	Coal	4152	699	South	4.4	East	132	1951
unnamed	FIVE FOOT	Coal	411T	702	South-West	85.3	North-West	150	1927
unnamed	FIVE FOOT	Coal	411S	704	South-West	3.4	North	150	1922
unnamed	FIVE FOOT	Coal	4131	706	Beneath Property	5.6	South	120	1937
unnamed	YARD	Coal	416N	714	South-East	3.1	West	110	1952
FERNDALE	UPPER SEVEN FOOT	Coal	414R	717	South-East	5.0	South-East	132	1955
unnamed	FIVE FOOT	Coal	412D	750	West	11.6	South-East	120	1930
unnamed	FIVE FOOT	Coal	4132	752	South-East	0.0	East	180	1953

Probable unrecorded shallow workings

None.

Spine roadways at shallow depth

No spine roadway recorded at shallow depth.

Mine entries

Entry type	Reference	Grid reference	Treatment description	Mineral	Conveyancing details
Shaft	301195-069	301126 195900	Filled in 1961 with weathered shale and plugged with clay	Coal	Rhondda Borough Council 04/12/1980
Shaft	301195-070	301146 195877	Filled in 1961 with weathered shale and plugged with clay	Coal	Rhondda Borough Council 04/12/1980
Adit	301195-072	301583 195917		Coal	
Adit	301196-008	301276 196434		Coal	
Adit	301196-009	301284 196414		Coal	
Adit	301196-010	301294 196391		Coal	
Adit	301196-011	301313 196374		Coal	
Adit	301196-012	301318 196365		Coal	
Adit	301196-013	301324 196351		Coal	
Adit	301196-014	301325 196345		Coal	
Adit	301196-015	301329 196337		Coal	
Adit	301196-016	301334 196333		Coal	
Adit	301196-017	301346 196314		Coal	
Adit	301196-018	301358 196293	The entrance to this adit was excavated and secured with a concrete block wall prior to surface restoration 1n 2000 by Wardell Armstrong acting on behalf of the Coal Authority	Coal	

Abandoned mine plan catalogue numbers

The following abandoned mine plan catalogue numbers intersect with some, or all, of the enquiry boundary:

SWR832	SWR1263	SWR1085
SWR829	SWR1261	SWR1264
SWR3871	SWA818	SWR1256

Our records show we have more plans than those shown above which could affect the enquiry boundary.

Please contact us on 0345 762 6848 to determine the exact abandoned mine plans you require based on your needs.

Outcrops

Seam name	Mineral	Seam workable	Distance to outcrop (m)	Direction to outcrop	Bearing of outcrop
BRITHDIR RIDER	Coal	Yes	20.8	West	158
BRITHDIR RIDER	Coal	Yes	Within	N/A	166
NO.1 RHONDDA	Coal	Yes	Within	N/A	142
NO.1 RHONDDA	Coal	Yes	Within	N/A	324
TILLERY BRITHDIR	Coal	Yes	Within	N/A	140
TILLERY BRITHDIR	Coal	Yes	Within	N/A	318
TILLERY RIDER NO.1	Coal	Yes	Within	N/A	329
TILLERY RIDER NO.2	Coal	Yes	Within	N/A	158
TILLERY RIDER NO.2	Coal	Yes	Within	N/A	337

Geological faults, fissures and breaklines

No faults, fissures or breaklines recorded.

Opencast mines

None recorded within 500 metres of the enquiry boundary.

Coal Authority managed tips

None recorded within 500 metres of the enquiry boundary.

Section 2 – Investigative or remedial activity

Please refer to the 'Summary of findings' map (on separate sheet) for details of any activity within the area of the site boundary.

Site investigations

None recorded within 50 metres of the enquiry boundary.

Remediated sites

Distance to site remediation (m)	Direction
Within	N/A

See Section 4 for further information.

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 31 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.

Mine gas

None recorded within 500 metres of the enquiry boundary.

Mine water treatment schemes

None recorded within 500 metres of the enquiry boundary.

Section 3 – Licensing and future mining activity

Future underground mining
None recorded.

Coal mining licensing
None recorded within 200 metres of the enquiry boundary.

Court orders
None recorded.

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

Withdrawal of support notices
The property is not in an area where a notice to withdraw support has been given.

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.

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.

Section 4 – Further information

The following potential risks have been identified and as part of your risk assessment should be investigated further.

Development advice

The site is within an area of historical coal mining activity. Should you require advice and/or support on understanding the mining legacy, its risks to your development or what next steps you need to take, please contact us.

Remediated sites

The site is within an area of previous interest. It is close to where the Coal Authority has investigated and where necessary remediated mine entries and/or shallow coal mine workings following specific reported hazards.

The site requires further investigation and may influence your risk assessment. We recommend that you order the Coal Authority **Surface Hazards Incident Report**, which will include more information about the hazard.

For further information on specific site or ground investigations in relation to any issues raised in Section 4, please call us on 0345 762 6848 or email us at groundstability@coal.gov.uk.

Section 5 – Data definitions

The datasets used in this report have limitations and assumptions within their results. For more guidance on the data and the results specific to the enquiry boundary, please **call us on 0345 762 6848** or **email us at groundstability@coal.gov.uk.**

Past underground coal mining

Details of all recorded underground mining relative to the enquiry boundary. Only past underground workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination, will be included.

Probable unrecorded shallow workings

Areas where the Coal Authority believes there to be unrecorded coal workings that exist at or close to the surface (less than 30 metres deep).

Spine roadways at shallow depth

Connecting roadways either, working to working, or, surface to working, both in-seam and cross measures that exist at or close to the surface (less than 30 metres deep), either within or within 10 metres of the enquiry boundary.

Mine entries

Details of any shaft or adit either within, or within 100 metres of the enquiry boundary including approximate location, brief treatment details where known, the mineral worked from the mine entry and conveyance details where the mine entry has previously been sold by the Authority or its predecessors British Coal or the National Coal Board.

Abandoned mine plan catalogue numbers

Plan numbers extracted from the abandoned mines catalogue containing details of coal and other mineral abandonment plans deposited via the Mines Inspectorate in accordance with the Coal Mines Regulation Act and Metalliferous Mines Regulation Act 1872. A maximum of 9 plan extents that intersect with the enquiry boundary will be included. This does not infer that the workings and/or mine entries shown on the abandonment plan will be relevant to the site/property boundary.

Outcrops

Details of seam outcrops will be included where the enquiry boundary intersects with a conjectured or actual seam outcrop location (derived by either the British Geological Survey or the Coal Authority) or intersects with a defined 50 metres buffer on the coal (dip) side of the outcrop. An indication of whether the Coal Authority believes the seam to be of sufficient thickness and/or quality to have been worked will also be included.

Geological faults, fissures and breaklines

Geological disturbances or fractures in the bedrock. Surface fault lines (British Geological Survey derived data) and fissures and breaklines (Coal Authority derived data) intersecting with the enquiry boundary will be included. In some circumstances faults, fissures or breaklines have been known to contribute to surface subsidence damage as a consequence of underground coal mining.

Opencast mines
Opencast coal sites from which coal has been removed in the past by opencast (surface) methods and where the enquiry boundary is within 500 metres of either the licence area, site boundary, excavation area (high wall) or coaling area.

Coal Authority managed tips
Locations of disused colliery tip sites owned and managed by the Coal Authority, located within 500 metres of the enquiry boundary.

Site investigations
Details of site investigations within 50 metres of the enquiry boundary where the Coal Authority has received information relating to coal mining risk investigation and/or remediation by third parties.

Remediated sites
Sites where the Coal Authority has undertaken remedial works either within or within 50 metres of the enquiry boundary following report of a hazard relating to coal mining under the Coal Authority's Emergency Surface Hazard Call Out procedures.

Coal mining subsidence
Details of alleged coal mining subsidence claims made since 31 October 1994 either within or within 50 metres of the enquiry boundary. Where the claim relates to the enquiry boundary confirmation of whether the claim was accepted, rejected or whether liability is still being determined will be given. Where the claim has been discharged, whether this was by repair, payment of compensation or a combination of both, the value of the claim, where known, will also be given.

Details of any current 'Stop Notice' deferring remedial works or repairs affecting the property/site, and if so the date of the notice.

Details of any request made to execute preventative works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991. If yes, whether any person withheld consent or failed to comply with any request to execute preventative works.

Mine gas
Reports of alleged mine gas emissions received by the Coal Authority, either within or within 500 metres of the enquiry boundary that subsequently required investigation and action by the Coal Authority to mitigate the effects of the mine gas emission.

Mine water treatment schemes
Locations where the Coal Authority has constructed or operates assets that remove pollutants from mine water prior to the treated mine water being discharged into the receiving water body.

These schemes are part of the UK's strategy to meet the requirements of the Water Framework Directive. Schemes fall into 2 basic categories: Remedial – mitigating the impact of existing pollution or Preventative – preventing a future pollution incident.

Mine water treatment schemes generally consist of one or more primary settlement lagoons and one or more reed beds for secondary treatment. A small number are more specialised process treatment plants.

Future underground mining
Details of all planned underground mining relative to the enquiry boundary. Only those future workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination will be included.

Coal mining licensing
Details of all licenses issued by the Coal Authority either within or within 200 metres of the enquiry boundary in relation to the under taking of surface coal mining, underground coal mining or underground coal gasification.

Court orders
Orders in respect of the working of coal under the Mines (Working Facilities and Support) Acts of 1923 and 1966 or any statutory modification or amendment thereof.

Section 46 notices
Notice of proposals relating to underground coal mining operations that have been given under section 46 of the Coal Mining Subsidence Act 1991.

Withdrawal of support notices
Published notices of entitlement to withdraw support and the date of the notice. Details of any revocation notice withdrawing the entitlement to withdraw support given under Section 41 of the Coal Industry Act 1994.

Payment to owners of former copyhold land
Relevant notices which may affect the property and any subsequent notice of retained interests in coal and coal mines, acceptance or rejection notices and whether any compensation has been paid to a claimant.

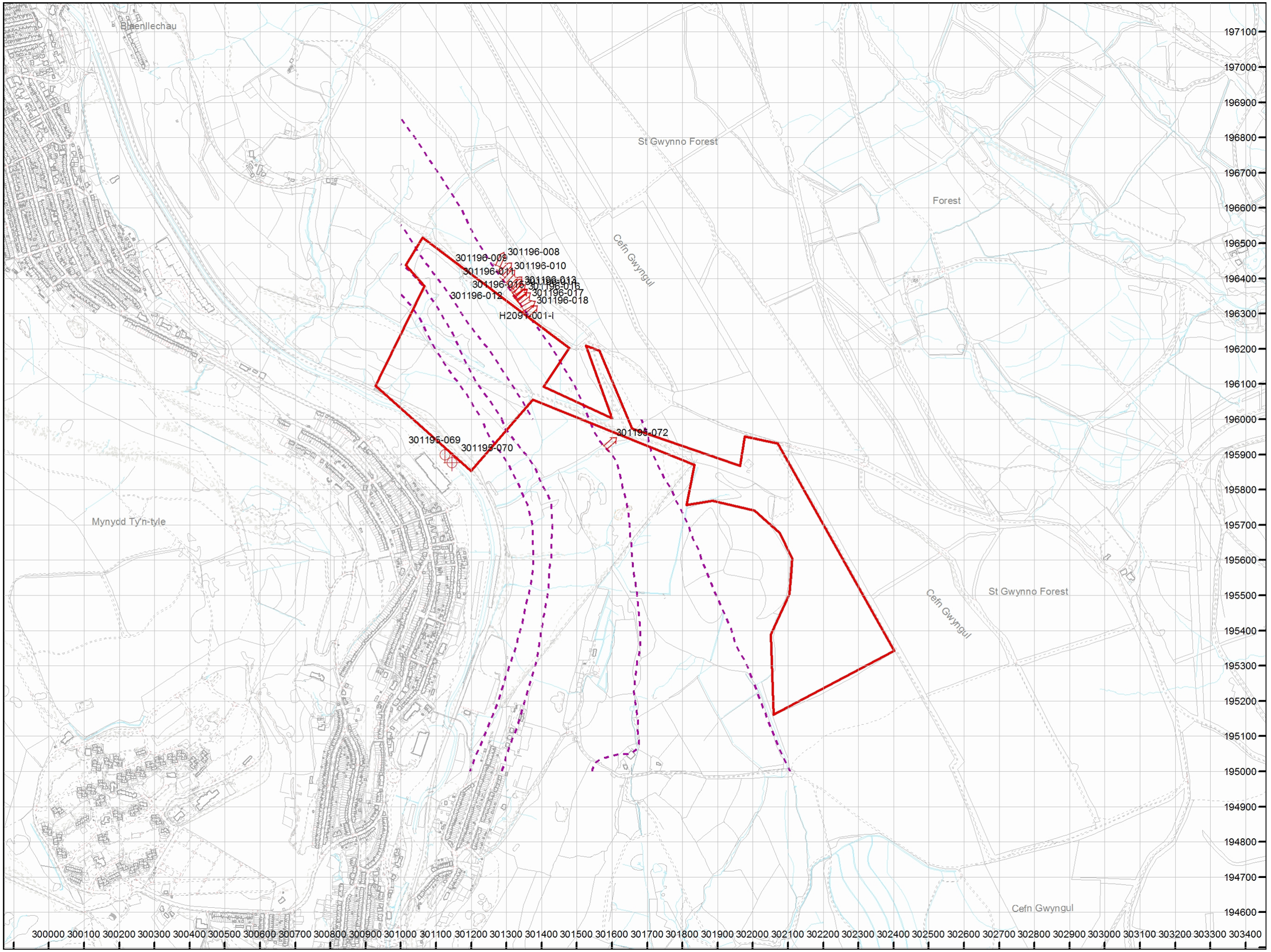
The Coal Authority

Summary of findings

The map highlights any specific surface or subsurface features within or near to the boundary of the site.

Key

- Approximate position of the enquiry boundary shown
- Disused mine shaft
- Disused adit
- Outcrop (Conjectured)
- Remediated sites



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REDSTART

Tylorstown Landslip Phase 4

Llanwonno Upper Tip Remediation

Preliminary Sources Study Report

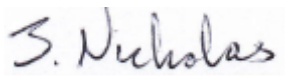
April 2021

Project No: GC/3613 Doc Ref: GC3613-RED-75-ZZ-RP-L-0001 Rev: P02

CLIENT: Rhondda Cynon Taf County Borough Council
ISSUE DATE: April 2021

Scheme Title: Tylorstown Landslip Phase 4

Preliminary Sources Study Report

	NAME	SIGNATURE	DATE
AUTHOR	James Nicholas		25/02/2021
CHECKER	Neil Greenwood		25/02/2021
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Contents

Drawings

Appendices

1. Introduction

1.1 Background

On Sunday 16th February 2020, Storm Dennis caused a flood surge which instigated the failure of Llanwonno Upper Tip (RH01) above the village of Tylorstown.

Due to approximately 60,000 m^3 of slipped debris filling the valley bottom from the toe of slope outwards in an extremely low angled and widely distributed debris envelope, the river channel was filled, and its course diverted to the western side of the valley bottom. Emergency Works are currently underway (Summer/Autumn 2020) to remove the slipped material (this is Phases 2 & 3 of the works).

This report assesses the Phase 4 of the landslide repair work, making safe Llanwonno Upper Tip (RH01). Redstart have been commissioned to provide this Preliminary Sources Study on a proposed haul road and potential receptor site around the eastern side of Tylorstown Tip (RH02), which will permit the landslide debris to be removed, stockpiled, treated and land formed. Refer Drawing GC3613-RED-61-RSC-DR-C-0002 and -0003 for locations of these land features.

Drawing No. GC3613-RED-61-RSC-DR-C-0001: Phase 4 Location Plan provides a redline boundary for the Phase 4 area, which amounts to 310 Ha of hillside and near hilltop land.

1.2 Exclusions

This report is for the private and confidential use of RCT for whom the report is undertaken and should not be reproduced in whole or in part or relied upon by third parties for use whatsoever without the express authority of Redstart.

Any recommendations made, or opinions presented are based upon a professional review of available information. However, there may be special conditions pertinent to the site which may not have been revealed by these works and have not, therefore, been taken into account in this report.

2. The Site

2.1 Site Location

The colliery spoil tips comprising the Phase 4 works are located on the eastern side of the Rhondda Fach valley, close to the centre of the South-East Wales Coal Field. The nearest village in the valley bottom is Tylorstown, with Ferndale lying a little way to its north. The only vehicle access to the tips is via Llanwonno Road, which links to the valley bottom in the village of Blaenllechau, to the north.

The Llanwonno Tips comprise two areas in which colliery spoil was deposited from the former Ferndale Colliery tramway. Llanwonno Upper Tip is the higher of the two adjacent tips and was the source of the 2020 landslip. The Upper Tip is to be reprofiled during the Phase 4 works. The Llanwonno Lower Tip site is located on the lower valley slopes, immediately north-west of the Upper Tip and separated from it by the former tramway.

Llanwonno Upper Tip is centred at NGR (ST) 301250, 196200.

The most immediately obvious colliery spoil tip in the area is Tylorstown Tip, also known as 'Old Smokey'. It's top forms a large conical feature rising over 30 m above the surrounding land and is situated at the valley crest. It lies uphill, approximately 700 m south-east, of the lower lying Llanwonno Tips. The shared former tramway terminates at this tip. The proposed receptor site (Receptor Site C), for the surplus colliery spoil generated by the Llanwonno Upper Tip reprofiling works, is located immediately to the east of 'Old Smokey' on a relatively level plateau edge.

Receptor Site C, to the east of Tylorstown Tip, is centred at NGR (ST) 302150, 195660.

2.2 Site Description and Inspection

Topography and Geomorphology

The Rhondda Fach is a steeply incised valley within the large upland plateau of the South-Wales Coalfield. The eastern valley side is stepped due to the alternating geology of hard sandstone, forming the steeper slopes, and weak mudstones, forming broad lower angled steps, known locally as 'slacks'.

Quarries are present at the level of Llanwonno Upper Tip, both up and down valley, and there is a likelihood that a buried quarry lies beneath the southern end of Llanwonno Upper Tip.

Spring lines and boggy ground are present along the slacks, this is due to groundwater in the fractured sandstones being prevented from percolating downwards by the impermeable mudstones and coal seat earths. During and immediately after periods of high/prolonged precipitation the spring lines discharge strongly but dry up during periods of drier weather.

Substantial deep mining across the area has led to past subsidence and mining related fissures, which may have altered natural groundwater flows in the area. Coal crop workings and adits are present on the hillside and potentially beneath the tips, which issue water during periods of high precipitation.

Llanwonno Upper Tip

Llanwonno Upper Tip is a linear tram tip, which is oversteepened and poorly vegetated. There was a pond in the centre of the tip, which was lost within the recent landslide.

The tip has been placed across a concave area of the hillside formed by the intersection of a steep section and a slack below.

The northern end of the tip is volumetrically smaller than the central and southern parts and is at a slightly higher level. Llanwonno Road is at the same level as the northern end of the tip but rises to the south beyond this point. The crest of the tip falls to the south.

Photograph showing Llanwonno Upper Tip and Lower Tip in central area. The terrain incorporates subdued terracing. Leisure centre at bottom of photo.

It is suggested that an ancient landslide is present within the natural hillside beneath the northern end of Llanwonno Upper Tip, hummocky ground between the Upper and Lower Tips support this landslide concept.

Within the mid-slope area of the northern part of Llanwonno Upper Tip is a tension crack. There are multiple tension cracks in the southern section of the tip, radiating from the landslide back scar as shown in Photograph below.

Within the central portion of the tip, the recent landslide has left a bowl-shaped depression with a steep back scar. In the upper half of the back scar, a wedge of colliery spoil remains (the crest of the tip), whereas in the lower half of the back scar, natural ground (a stiff orange till) is visible. In front of the back scar is a back-tiled block, traversed by a multitude of transverse cracks. In front of the landslide block, the surface is scoured to natural ground with ribbons of colliery spoil remaining from the downhill flow slide.

Photograph showing back scar with a high slope of glacial till exposed in lower third of scar face

There are several water courses and issues above the tip that have been captured by temporary drainage measures, installed during Phase 1 of the remediation works, which immediately followed the landslide event. These drainage measures form a series of 6-inch plastic pipes that collect water from culverts at Llanwonno Road, pipe them along the valley feature on the uphill

side of the tip and subsequently discharge at the southern end of the tip, where it meets the former tramway.

The base of the tip lies on a slack, which has water issues along its entire length and inevitably beneath the tip itself. Since the landslide has occurred, water issues have formed deep erosive gullies down to the valley bottom. It is considered that prior to the slip, a longitudinal drain, beneath the tramway, captured these issues and took the water away to the north, and then down to the valley bottom, via a channel that is still partially present, immediately south of Llanwonno Lower Tip.

Further still downhill of the tramway, the landslide has damaged a section of Western Power Distribution (WPD) 33 kV overhead line. This line was removed in October 2020.

Photograph of central parts of the slip, viewed from the north-west, with leisure centre visible in the valley bottom

Tramway

The former Ferndale Colliery tramway is constructed transversely across the valley side, rising from north to south. Within the Phase 4 area, the tramway embankment has been constructed using colliery spoil.

Although the tramway has been destroyed in the landslip area, it remains at the toe of the southern section of Llanwonno Upper Tip. Where the tip meets the tramway, there has been some relatively recent repair work to the toe of the tip, and a masonry wall is present.

At the very southern end of Llanwonno Tip is a tramway turning circle. A culvert is present immediately south of this, passing beneath the tramway. This culvert discharges water flowing from the small valley formed between the natural hillside and crest of the tip into an unlined drain. The culvert has been reformed recently as part of the Phase 1 remediation works so that a series of 6-inch plastic water pipes pass through it.

The tramway rises a further 700 m before reaching Receptor Site C. Over this distance it cuts across slacks and steepenings, consequently, various amounts of fill have been placed to maintain its alignment.

At a point 300 m beyond Llanwonno Upper Tip, the tramway intersects the lower edge of a slack. At this point, the tramway meets a narrow track, leading northwards, up towards Llanwonno Road. Within the slack, the local area uphill is boggy and forms a small drainage basin, which discharges at the intersection of the track and tramway. The water at this intersection regularly flows down the tramway and results in deep erosive gullies which have required both historic and recent repairs.

A further 100 m past the track/tramway intersection, the tramway rises to the plateau area and is constructed upon a small colliery spoil tip with a flat berm extending outwards into the valley. Beyond this, the tramway becomes indistinct due to the lower relief of the plateau.

Receptor Site C

Receptor Site C (RS-C) lies to the east/north-east of Tylorstown Tip (Old Smokey) and south/south-east of Llanwonno Road (vehicular access point to RS-C). The eastern edge of RS-C is bounded by conifer plantations, owned by Natural Resources Wales (NRW). In October 2020, WPD erected a new 33 kV overhead line diversion immediately to the south of RS-C, which met the NRW plantation and follows its external boundary northwards, in underground cabling, to the lay-by and vehicle access point off Llanwonno Road, in the northern corner of RS-C.

The ground levels are relatively flat over RS-C with a gentle fall from the north-west to the south-east behind Old Smokey. South-east of Old Smokey the ground levels become more naturally undulating. Old Smokey is perched on the crest of the plateau and deposited mostly upon the steep valley side below, so ground levels on the south-western edge of RS-C fall rapidly in that direction.

Immediately to the rear of Old Smokey (east) is a large area of bare ground, comprising a surface of burnt colliery shale, and east of this is a shallow depression or man-made ephemeral pond, which lies in the centre of RS-C.

Draining the bare ground area, is an informal eroded channel running to the north-west and discharging into a formal drain which runs from the former tramway in the north down the northern side of Old Smokey. A wide and shallow concrete drain is present on the southern edge of Old Smokey.

The area is generally well drained and no standing water or running water was present over several site visits in dry weather. There is a dry runnel located 30m to the north west of the RS-C site which is marked as an ‘issues’ label on OS plans.

3. Historical Land Uses

3.1 Sources of Information

Information relating to the historical development of the site has been obtained from historical maps including Ordnance Survey Maps at three different scales (1:10,000 / 1:10,560, 1:2,500 and 1:1,250) copies of which are presented in Appendix A.

The historical maps have been reviewed and relevant features are described in Table 3.1 below.

A summary description of land uses associated with the site and its immediate surroundings based on the review of the historical Ordnance Survey map extracts is provided.

3.2 Description of Historical Map Extracts

Table 3.1 – Description of Historical Map Extracts

Map Date and Scale	On site Features	Surrounding Area Features
1873-1877 1:2,500 1875 1:10,560	Unoccupied with four footpaths crossing the site orientated east-west. Two stream flows northeast to southwest centrally and on the western side of the site.	Pendyrys Colliery is located approx. 50m south, comprising about six buildings. The Taff Vale Railway runs adjacent south to the site boundary at the bottom of the valley. Five further streams spring and run from the top of the valley to the bottom. A track runs along the north of the site boundary in the same location as the current Llanwonno Road. Ferndale Colliery is located 1300m north west of the site. This comprises an old shaft, engine house, a working shaft and a smithy.
1898 1:10,560 1900 1:2,500	No significant change.	Pendyrys Colliery has expanded, comprising at least 14 buildings with a dedicated tramway. The Afon Rhondda Fach has been culverted beneath the colliery. Tylorstown is now marked on the map as the first residential properties have appeared, with at least 100 houses within 500m of the site. Three quarries are also present within 500m.

Map Date and Scale	On site Features	Surrounding Area Features
1915 1:10,560	Primarily unchanged, though a tramline originating from Cynllwyn-du Colliery 800m south bisects the site centrally running to the top of the valley.	A large amount of spoil is present at the base of the valley. The tramway network has grown with a branch connected to a new quarry located 140m south of the site halfway up the slope. Tylorstown continues to expand and a school is now present. A sawmill is located close to Ferndale Colliery.
1919-1920 1:2,500 1921 1:10,560	No significant change.	No significant change.
1945 1:10,560	The northern slopes of Tylorstown Tip begin to fall within the site boundary.	A tramway line up the slope of the valley has facilitated the deposition of Tylorstown Tip.
1948 1:10,560	The Llanwonno Upper Tip which caused the 2020 slip has now been deposited in the western part of the site. A new tramline has been built along the top of the valley, connecting the portion of the site around Tylorstown Tip to the part of the site which housed the slipped spoil. The stream which crossed the site towards the western end no longer appears, with the new spoil heap built atop its former route.	A new spoil heap has been laid adjacent west of the site halfway up the valley. Tylorstown Tip now shows two levels of deposited spoil. Quarries in the surrounding area are now marked as disused.
1957-1961 1:2,500 1965 1:10,560	Both spoil heaps have grown, but the tramway which connects the two onsite heaps is now marked as disused. The Llanwonno Tip has clearly been deposited from the tram track on the more detailed mapping.	No significant changes other than by 1959 the Ferndale Colliery is labelled as closed.
1974 1:10,000	Both onsite tips are now marked as disused and the connecting tramway appears to have been removed.	Pendyrys Colliery is no longer operational, with the majority of buildings removed and replaced with a tip. The Cynllwyn-du Colliery is also no longer operational and the tramway up the valley to Tylorstown Tip has been dismantled. The tip adjacent west is also labelled as disused. Ferndale Colliery has gone, being replaced by open land.

Map Date and Scale	On site Features	Surrounding Area Features
1992 1:10,000	Tylorstown Tip is no longer labelled as a tip and appears as a large hill with a summit at 440m AOD.	The railway line at the base of the valley is labelled disused.
1999-2003 1:2500	No significant change	8 no adits are shown 30m to 100m north of the local road. In addition there is a further adit in the central section of the site, 50m to the north of the dismantled tramway (proposed haul road) and another one 80m to the west of the same trackway (described as a level) but this is located further south lying just to the NW of Old Smokey. In practice these features are also shown on late Victorian mapping.
2001 1:10,000	No significant change.	A leisure centre has been built in Tylorstown 80m from the site boundary.
2010 1:10,000	No significant change.	No significant change.
2020 1:10,000	No significant change.	No significant change.

4. Environmental Setting

4.1 Sources of Information

The following sources have been referenced for identification of the geology, soils, hydrology, hydrogeology and general environmental setting of the site:

Table 4.1 – Sources of Information

Category	Data Source	Reference
Geology	Groundsure Insight Report	See Appendix B
	BGS Geological Maps	Sheet 248, Pontypridd
	BGS Lexicon	http://www.bgs.ac.uk/lexicon/
	BGS Borehole Scan Viewer	http://www.bgs.ac.uk/data/boreholescans/home.html
Hydrology	Environment Agency Catchment Maps	http://environment.data.gov.uk/catchment-planning/
Environment	Groundsure Insight Report	See Appendix B
	Magic Website	https://magic.defra.gov.uk/MagicMap.aspx
UXO	Zetica Risk Maps	https://zeticauxo.com/downloads-and-resources/risk-maps/
References	1. Tylorstown and Llanwonno Tips Interpretative Report and Feasibility Study, Parkman Environment, 1993 2. Llanwonno Tips Reclamation Scheme Stability Report, Halcrow Group Ltd., 2004 3. Tylorstown Landslip – Factual Report on Ground Conditions, Intégral Géotechnique, 2020	

4.2 Published Geology and Encountered Ground Conditions

Made Ground

There is no made ground shown on the geology mapping. However, large quantities of colliery spoil are known to be onsite in the Llanwonno upper tip and tramway corridor and in the surrounding areas. Additionally, exposed ground at the RS-C includes significant proportion of burnt shale.

Superficial (Drift) Geology

Geological mapping shows the site to be largely devoid of superficial deposits. A band of Glaciofluvial Deposits are predicted in the south of the site at the base of the valley, described by

the BGS as sand and gravel, locally with lenses of silt, clay or organic material. Lying just to the north of this band, and only predicted to encroach on a very small area of the site, is an area of Till which extends westwards. This typically consists of a heterogenous mixture of clay, sand, gravel, and boulders varying widely in size and shape.

Solid (Bedrock) Geology

4.2.1.1 RS-C

RS-C is underlain fully by the Brithdir Member of the Pennant Sandstone Formation. This is described by the BGS as having green-grey, lithic arenites with conglomerate lenses at bases of units; thin mudstone/siltstone and seatearth interbeds and mainly thin coals.

4.2.1.2 Tramway and Llanwonno Upper Tip

The tramway and Llanwonno Upper Tip are shown to be underlain by juxtaposed bands of Brithdir Member and Rhondda Member, both belonging to the Pennant Sandstone Formation. The Rhondda Member is described as green-grey, lithic arenites with thin mudstone/siltstone and seatearth interbeds and mainly thin coals.

Photograph of quarry located west of the proposed haul road showing Rhondda member of the Pennant Sandstone Formation

Structural Geology

Bedding is shown on the 1:50,000 scale map as dipping between 6 and 7 degrees, to the SSE.

The site lies between two faults: the Llanwonno fault present along the valley top trending NNW-SSE and downthrown to the east, and an unnamed fault along the valley bottom also trending NNW-SSE and downthrown to the east. Neither directly underlie the Phase 4 site area. Refer cross section Figure 4.1 and geology map extract in Figure 4.2 for illustration of the structure.

Five coal seams are shown on mapping to cross the site as explained in more detail in the mining section of this report.

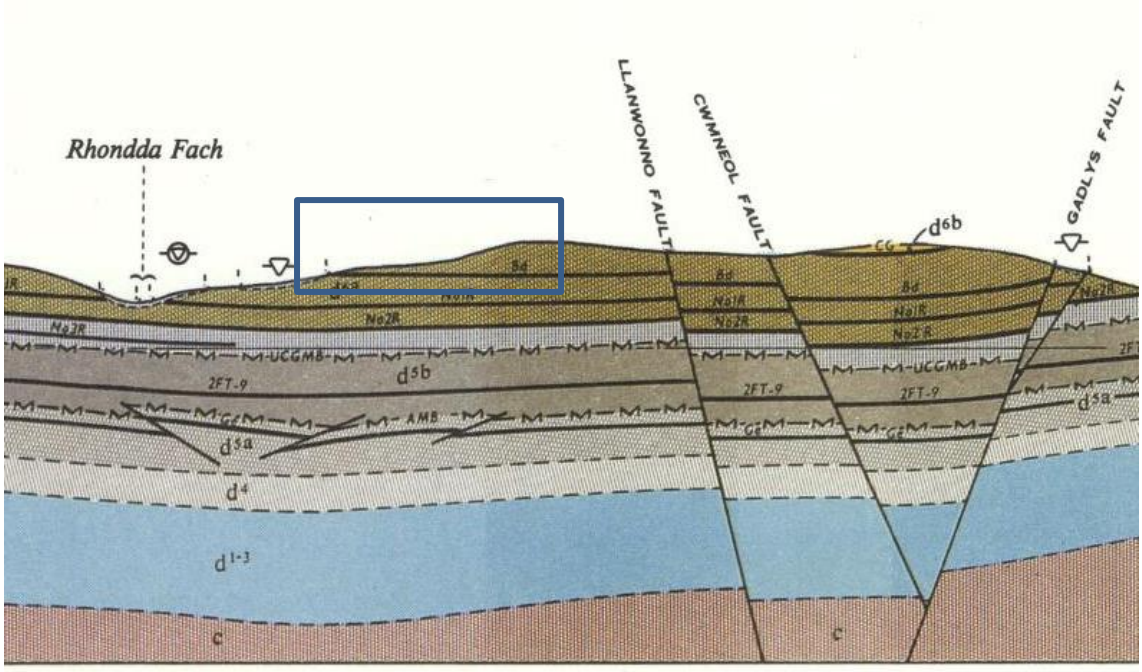

Figure 4.1 – BGS geological cross section, approximate location of Phase 4 site indicated by blue box

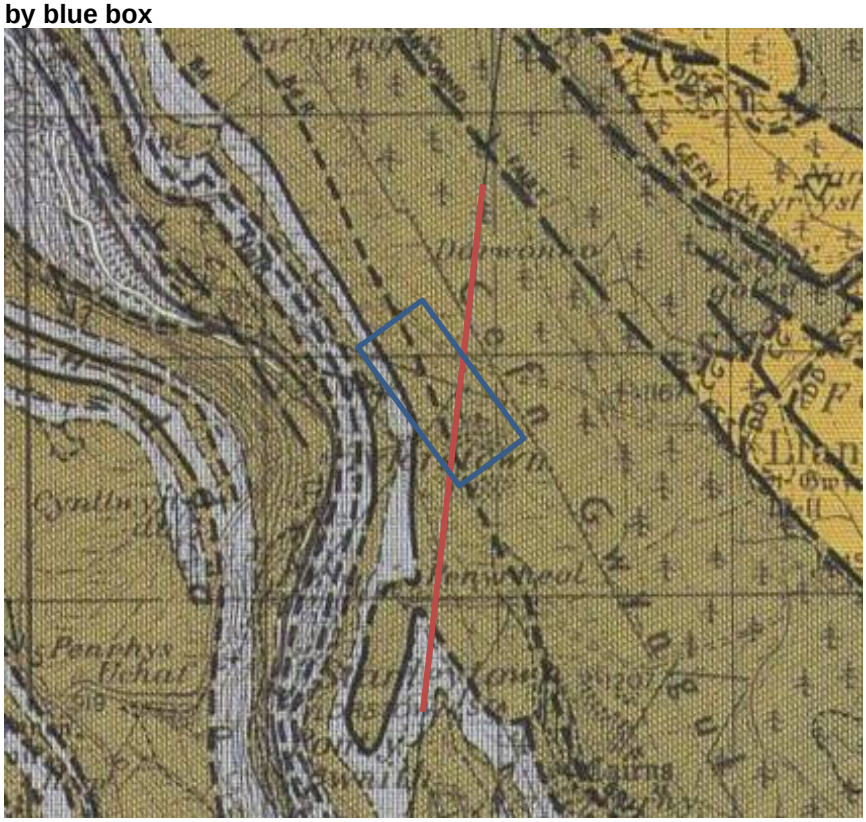

Figure 4.2 – Location of geological cross section highlighted red, with the approximate location of the Phase 4 area indicated in blue

Historical Boreholes

British Geological Survey (BGS) records of historical boreholes were reviewed for the site. The locations of the boreholes are shown on page 100 of the Groundsure Report and are presented in Appendix C. They are summarised below.

It should be noted that the depths to identified coal seams from these logs do not tally with the understood geology of the area from geological mapping. It may be that these exploratory holes were sunk from within the subterranean coal workings.

Table 4.2 – Summary of Historical Boreholes

BGS Borehole ID	Coordinates	Depth (m BGL)	Starting Level (mAOD)	Summary of Log / Ground Conditions
ST09NW12 No. 9 Pit Ferndale	302020,195120 Approx. 500m south of Tylorstown Tip summit	30.07	Not provided.	Alternating bands of clay, stone and coal down to the top of the 5ft coal seam at the base of the borehole.
ST09NW13 No. 6 Pit Ferndale	301560,196250 Approx. 60m north of un-named road at top of valley	21.46	Not provided.	Alternating bands of coal, clay and shale. The 5ft seam is hit at 19.94m and the top of the Gellideg seam is found at the base of the borehole.

Radon

Radon is a carcinogenic, radioactive gas which is naturally produced by certain geological units. The area underlying RS-C and half of the haul road is shown to be at a negligible risk of Radon, where less than 1% of properties would exceed the Radon Action Level. A band that corresponds to the Rhondda Member in the valley slope is shown to have a low risk of Radon, where 3 to 5% of properties would be expected to exceed the Radon Action Level.

Natural Ground Subsidence

According to the BGS data presented within the Insight Report Section 17, risks posed by ground stability hazards in the subject site are classified as follows:

Table 4.3 – Natural Ground Subsidence

Stability Hazard	Negligible	Very Low	Low	Moderate	High
Potential for Collapsible Ground		✔			
Potential for Compressible Ground	✔				
Potential for Ground Dissolution	✔				
Potential for Landslide Ground		✔ (Brithdir Member)		✔ (Rhondda Member)	

Potential for Running Sand Ground	✔	✔			
Potential for Shrinking or Swelling Clay Ground	✔	✔			

Soil Vulnerability

According to the Groundsure Report Section 5, onsite deposits are indicated to be Secondary A Aquifers, with the exception of the small area of Till which is Secondary Undifferentiated. Mapping shows the site to be mainly underlain by deposits with a low leaching potential, although areas beneath the haul road and to the south have a high leaching potential. The classification on which these vulnerability ratings are based is provided in Table 4.4 below.

Table 4.4 – Soil Vulnerability Class

Soil Vulnerability Class	Classification	Description
H1	High Leaching Potential Soils of high leaching potential with little ability to attenuate diffuse source pollutants and in which non-adsorbed diffuse source pollutants and liquid discharges have the potential to move rapidly to underlying strata or groundwater.	Soils that readily transmit liquid discharges because they are either shallow, or susceptible to rapid flow;
H2		Deep, permeable, coarse textured soils which can readily transmit a wide range of pollutants because of their rapid drainage and low attenuation potential.
H3		Coarse textured or moderately shallow soils which can readily transmit non-adsorbed pollutants and liquid discharges but have some ability to attenuate adsorbed pollutants because of their clay or organic matter content.
HU		Soil information for urban areas and restored mineral workings. These soils are therefore assumed to be highly permeable in the absence of site-specific information.
L	Low	Soils in which pollutants are unlikely to penetrate the soil layer because either water movement is largely horizontal, or they have a significant ability to attenuate diffuse source pollutants.

- *Definitions sourced from Environment Agency report SC040016/R (Section 5.4)*

Background Soil Geochemistry

Information on background soil geochemistry relating to concentrations of arsenic, cadmium, chromium, lead and nickel at the site and within the local area has been provided within the Groundsure Report page 125. The background concentrations have been compared with their respective Suitable for Use Level (S4UL) and / or Generic Assessment Criteria (GAC) values, for a "Public Open Space: Park" land-use scenario. On this basis, none of the indicated background concentrations of the above determinants exceed their respective S4UL or GAC concentrations for the land-use.

4.3 Mining and Mineral Extraction

4.3.1 Coal Authority Records

The Groundsure report indicates that the site is "in an area which may be affected by coal mining activity". Therefore, a site-specific Consultants Coal Mining Report has been obtained and is enclosed in Appendix D. A summary of the findings of the report is presented in the table below.

Table 4.5 – Natural Ground Subsidence

Coal Mining Aspect	Comment
Past Underground Coal Mining	Approx. 15 seams were historically worked beneath the site at depths between 278m and 752m bgl.
Probable unrecorded shallow workings	None.
Mine Entries	Two shafts are reported adjacent south of the site, both have been filled and plugged with clay by the local authority. 12 disused adits are reported, 11 of which lie to the north of the site and one below the former tramway.
Open Cast Coal Mining	None recorded within 500m of the site boundary.
Coal Mining Subsidence	The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres since 31st October 1994.
Mine Gas	None recorded within 500m of the site boundary.

In general, the Coal Authority report does not indicate the presence of any known issues relating to coal mining associated with the site on the logic that mining is deep lying and historical (circa 1915) so that any extracted seam voids will have closed some time ago and associated ground movement ceased. There are however a wealth of adits lying uphill of Llanwonno Upper Tip, within a NRW owned plantation, that are known to discharge water. This water flows down Llanwonno road onto the land directly above Llanownno Upper Tip, where the discharge is

currently managed using a network of pipes installed as Phase 1 emergency works. An extract from the Consultants Coal Mining Report is presented in Table 4.6 below, detailing outcropping seams in the area.

Table 4.6 – Coal Outcrops from Consultants Coal Mining Report

Seam name	Mineral	Seam workable	Distance to outcrop (m)	Direction to outcrop	Bearing of outcrop
BRITHDIR RIDER	Coal	Yes	20.8	West	158
BRITHDIR RIDER	Coal	Yes	Within	N/A	166
NO.1 RHONDDA	Coal	Yes	Within	N/A	142
NO.1 RHONDDA	Coal	Yes	Within	N/A	324
TILLERY BRITHDIR	Coal	Yes	Within	N/A	140
TILLERY BRITHDIR	Coal	Yes	Within	N/A	318
TILLERY RIDER NO.1	Coal	Yes	Within	N/A	329
TILLERY RIDER NO.2	Coal	Yes	Within	N/A	158
TILLERY RIDER NO.2	Coal	Yes	Within	N/A	337

4.4 Water Environment

4.4.1 Hydrogeology

Due to the complex hydrogeological conditions at the site this topic has been afforded its own section. Please see Chapter 5 for a further information.

There are no Groundwater Source Protection Zones or abstractions within 1,000m of the site.

4.4.2 Hydrology

A network of small drains run from the top of the hill to the base, with approximately eight crossing one part or other of the site. The main watercourse in the area is the Afon Rhondda Fach, located 30m south of the site at its nearest point. This river is covered by the Water Framework Directive and achieved a chemical rating of good, an ecological rating of poor and an overall rating of poor at the last monitoring round in 2016.

There are no active surface water abstractions within 1,000m of site.

4.4.3 Surface Water Discharge Consents

The Groundsure Report page 39 identifies three operators with active discharge consents at, or within 500m of the site, as listed in the Table 4.7 overleaf.

Table 4.7 – Discharge Consents

Operator	Status	Discharge Type	Receiving Water	Location
-	Effective	Sewage Discharges – Sewer Storm Overflow	Rhondda Fach	Two permits at the same location, located 288m south
-	Effective	Trade Discharges – Site Drainage	Rhondda Fach	Ferndale – Banana Colliery Tip 313m west

4.4.4 Flooding

Flood Zone definitions are set out in the UK National Planning Policy Guidance, as shown in Table 4.8.

Table 4.8 – Flood Zones

Flood Zone	Definition	%
1	Land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding	<0.1%
2	Land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding or	1% – 0.1%
	Between a 1 in 200 and 1 in 1,000 annual probability of sea flooding in any year	0.5% – 0.1%
3	Land assessed as having a 1 in 100 or greater annual probability of river flooding or	>1%
	a 1 in 200 or greater annual probability of flooding from the sea in any year	>0.5%

Note: These flood zones refer to the probability of river and sea flooding, ignoring the presence of defences.

The site is located in a Flood Zone 1. A Flood Zone 2 is located adjacent south, becoming a Flood Zone 3 closer to the Rhondda Fach.

The risk from groundwater flooding for the vast majority of the site is categorised as negligible, with a thin strip of moderate associated with glaciofluvial deposits in the very valley bottom section of the site. The latter area is included for planning access reasons and the new waste deposition area (RS-C) is located well away from groundwater flooding risk areas.

4.5 Waste

4.5.1 Historical and Active Landfills

The Groundsure Report does not report any active or historical landfills within 500m of the site.

4.5.2 Waste Sites

The Groundsure Report does not report any active or historical waste sites within 500m of the site.

4.6 Environmental Setting

4.6.1 Pollution Incidents

According to the Groundsure Report page 41, 4no. Pollution Incidents have been identified within a 500m radius of the site. All were Category 3 – Minor incidents.

The most recent dates from 2013 and all are therefore considered historical. They are unlikely to have any impact upon the site and proposed development, although this cannot be ruled out entirely.

4.6.2 Industrial Sites

According to the Groundsure Report page 36 there are no current industrial sites located on or within 50m of the site.

4.6.3 Hazardous Sites

According to the Groundsure Report there are no sites within 500m which fall within the following categories:

- determined as Contaminated Land under Part 2A of the Environmental Protection Act 1990;
- Control of Major Accident Hazards Sites (COMAH);
- Notification of Installations Handling Hazardous Substances (NIHHS) sites;
- Planning Hazardous Substance Consent sites
- Historical Integrated Pollutions Control Authorisations;
- Part A (1) and Integrated Pollution Prevention Control Authorisations;
- Red List discharge consents;
- List 1 Dangerous Substances Inventory Sites;
- List 2 Dangerous Substances Inventory Sites;
- Part A (2) and Part B Activities;
- Category 3 or 4 Radioactive substance authorisations; and
- Planning Hazardous Substance Consents and Enforcements
- Water Industry Referrals (potentially harmful substances to the public sewer).

4.6.4 Unexploded Ordnance (UXO)

The site is located within an area that is at low risk with regard to UXO according to risk maps provided by Zetica UXO Ltd and this health and safety matter is not considered further.

4.6.5 Environmentally Sensitive Sites

According to the Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance (2012), Section 4.3 (Table 1) land can be determined as “Contaminated Land” if it has

the significant possibility of significant harm (SPOSH) to one or more of the following ecological systems:

- Local Nature Reserves (LNR),
- Marine Nature Reserves (MNR),
- National Nature Reserves (NNR),
- National Parks,
- Ramsar Sites,
- Sites of Special Scientific Interest (SSSI),
- Special Areas of Conservation (SAC) (including candidates) or
- Special Protection Areas (SPA) (including candidates).

According to Groundsure Report, none of the above designations are present within 500m of the site.

4.6.6 Heritage / Archaeology

Heritage/archaeology is being assessed through a site specific appraisal, as part of the sites Environmental Assessment report.

5. Hydrogeology

5.1 Introduction

Information regarding the hydrogeology of the Phase 4 site has been obtained from:

- Llanwonno Tips Reclamation Scheme Stability Report 2004 (Ref. 2);
- Hydrogeological Map of South Wales (BGS, 1986);
- The physical properties of minor aquifers in England and Wales (Jones et al., 2000); and
- Hydrogeology of Wales: Carboniferous aquifers - the Coal Measures facies (Robins and Davies, 2016)

5.2 Hydrogeological Units

5.2.1 Regional Hydrogeology

The Pennant Sandstone Formation forms the largest aquifer within Rhondda Cynon Taf, and is classified by NRW as a Secondary A aquifer, which means that these rocks are capable of supporting water supplies at a local rather than strategic scale. The Hydrogeological Map of South Wales (1986) is reproduced below showing that the site is located on the formerly named Upper Coal Measures and specifically the Brithdir Beds (now the Brithdir and Rhondda Members of the Pennant Sandstone Formation).

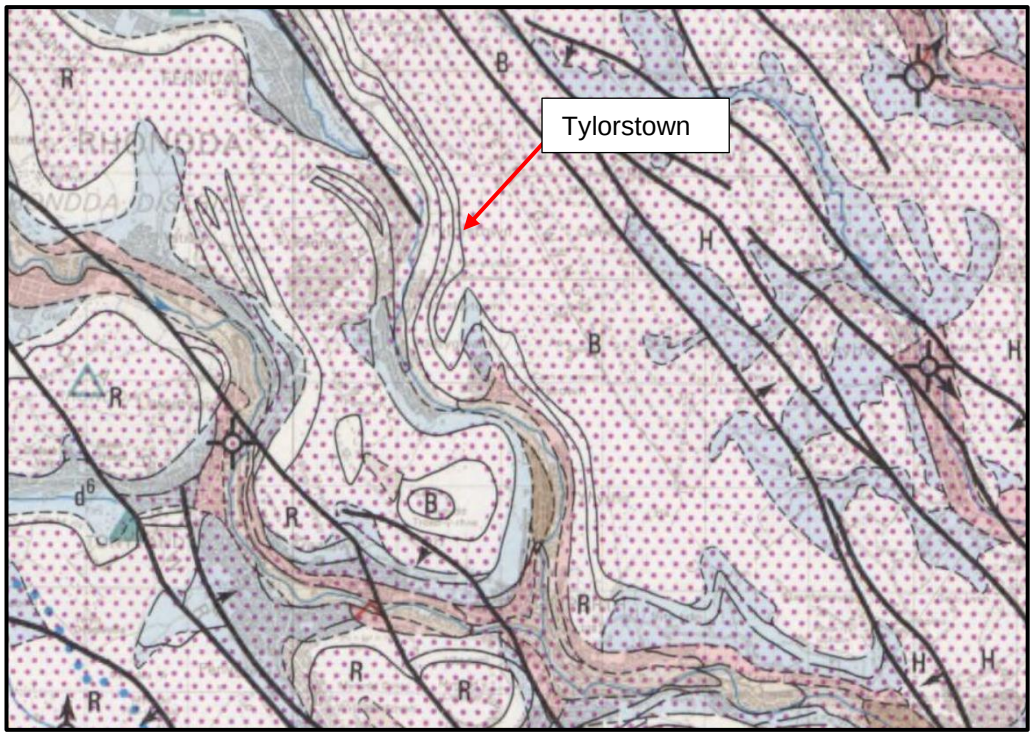

Figure 5.1 - Extract from hydrogeological map of South Wales showing site location

The Pennant Sandstone Formation is recognised as having large quantities of groundwater within a multi-layered aquifer system, with the sandstone units forming distinct and separate aquifer units between the lower permeability argillaceous layers of coal and mudstone which form aquitards. However, where mining has occurred then hydraulic continuity between these sandstone layers has been created in many places. Near the surface, groundwater within these sandstone units will be unconfined, but with increasing depth groundwater bodies in each sandstone unit will tend to become confined beneath argillaceous layers.

The sandstones are very well cemented, extremely hard and dense and as a result possess very little intergranular permeability and porosity. The sandstone permeability is directly related to the distribution and size of fractures present in the sandstone horizons. Mining has induced tension and compression fractures within these sandstones increasing the hydraulic conductivity of the sandstones. Fractures can be up to several centimetres in aperture near the surface.

Transmissivities of the Pennant Sandstone Formation are highly variable and range between 0.15 and 225 m^2/day. Specific yield data are not available for the sandstones but given the lack of primary porosity it is expected to be in the region of 0.005 to 0.05. Storage coefficients are likely to be around 0.002.

Infiltration of rainwater is diverted from further vertical migration by the argillaceous bands which then emerges as streams (labelled as issues on mapping) or provides baseflow to rivers. It is noted in Robins and Davies (2016) that adits were frequently used as mine drainage to a valley side.

5.2.2 Site Hydrogeology

Site-specific data was only available for the Llanwonno Upper Tip area of the Phase 4 works; this has been reviewed below. No information for Receptor Site C was available at the time of writing and therefore hydrogeological conditions have been inferred.

Data from the Halcrow (2004) stability report cross sections support the regional view that in places there are separate aquifer units within the sandstone layers. Whilst it has not been possible within the remit of this PSSR report to view and assess individual borehole strikes or the Halcrow groundwater monitoring dataset, Sections LWT R2 2 and LWT R2 3 with LWT1 and LWT6 indicate two separate aquifers in an upper and lower sandstone unit, with very different groundwater levels obtained within the spoil/superficial deposits and the sandstone layers.

The relevant argillaceous layers at Llanwonno Upper Tip, from the surface downwards, are the Brithdir Rider, Brithdir, 1st Rhondda Rider and 1st Rhondda[1]. Were the argillaceous material and sandstones not covered by superficial deposits and colliery spoil, then very distinct, separate unconfined aquifers would be present near the surface in each sandstone layer, with streams emerging where the groundwater met the surface near the boundary with the coal/mudstones. The presence of the superficial deposits and colliery spoil makes this simplistic model less likely, however there are distinct spring line across the slacks which appear to generally coincide with argillaceous layers. The sandstones layers above and immediately below the Brithdir are also unconfined and appear to be separate. Vertical groundwater gradients appear to be downwards

[1] Capita take the location of the coal seams from the BGS mapping and this does not concur with labelling on cross sections in the Halcrow report which we consider are erroneous

in all locations where two strikes or groundwater levels have been monitored. Vertical groundwater gradients may reverse to be upwards near the base of the valley where the river may receive groundwater as part of its base flow.

The presence of the adits at the boundary of the Brithdir coal seam is likely to be linked to draining the sandstone immediately above it in order to gain access to this coal seam from the surface (Robins and Davies, 2016). These adits are known to issue water during times of high rainfall, supporting this hypothesis of a drainage mechanism.

5.2.3 Summary

The hydrogeological units on Llanwonno Upper Tip site as found outcropping from north-east to south-west (the outcrop formed where the hillslope exposes the geology) are presented in Figure 5.2, overleaf and described below, using a surface downwards order:

- Colliery spoil and superficial deposits – intergranular flow with a continuous groundwater body which is in continuity with the underlying sandstone. Unconfined;
- Sandstone 2 – unconfined with fracture flow dominant in continuity with groundwater within overlying colliery spoil and superficial deposits;
- Brithdir argillaceous layer – an aquitard but close to the surface is overlain by colliery spoil and superficial deposits so does not provide a barrier to flow near the surface;
- Sandstone 3 – unconfined fracture flow dominant in continuity with groundwater within overlying colliery spoil and superficial deposits
- 1st Rhondda Rider argillaceous layer – an aquitard but close to the surface is overlain by colliery spoil and superficial deposits so does not provide a barrier to flow;
- Sandstone 4 – confined in the northern part of the site under two argillaceous layers, but unconfined in southern part of the site as it outcrops at or close to the surface;
- 1st Rhondda argillaceous layer – an aquitard but close to the surface is overlain by colliery spoil and superficial deposits so does not provide a barrier to flow. Confines deeper sandstone layers in the north of the site;
- Sandstone 5 – confined in the northern part of the site under two argillaceous layers, but unconfined in southern part of the site as it outcrops at or close to the surface;
- Daren Rhestyn – an aquitard but close to the surface is overlain by colliery spoil and superficial deposits so does not provide a barrier to flow;
- Sandstone 6 – confined in the northern part of the site under two argillaceous layers, but unconfined in southern part of the site as it outcrops at or close to the surface.

Data from the Halcrow (Ref. 2) stability report indicates that groundwater is present[2] within the colliery spoil in the basal 1-2 m of the Llanwonno Upper Tip. Halcrow state that there is generally between 0.3 and 2.4 m of groundwater above the base of the Upper Tip. Groundwater is also

[2] It is noted that the Halcrow report is dated 2004 and water height and surfaces can change annually and due to climate change and this data is pre-slip

present within the superficial deposits as well as the sandstone units. Groundwater flow directions mimic the surface topography with flow down towards the base of the valley.

The sandstone layer beneath the argillaceous 1st Rhondda at 275 m AOD in LWT1 appears to be confined, as would be expected as depths increase.

The underlying superficial deposits are generally of high hydraulic conductivity and high porosity, although they have lower hydraulic conductivity in localised areas. Specifically Halcrow note that construction of the lowest tier of the Upper tip created a pond at that location which was likely due to surface water runoff and the unconfined groundwater in the superficial deposits and colliery spoil meeting the lower hydraulic conductivity argillaceous layer of the 1st Rhondda and lower conductivity superficial material. Seepages were present at the toe of the incline which is coincident with deeper argillaceous layers.

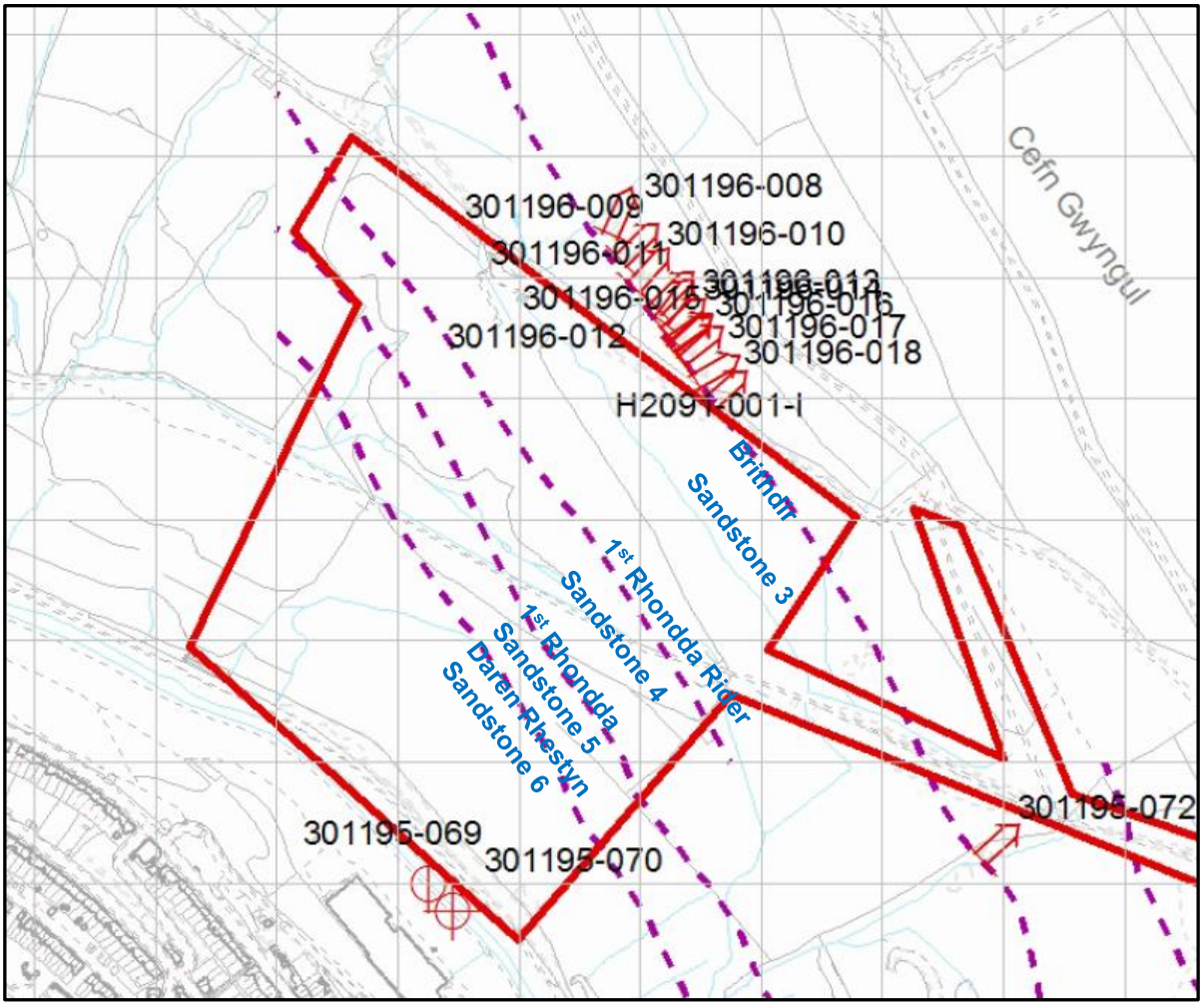

Figure 5.2 - Inferred hydrogeological units at the upper tip site

In the RS-C area of the Phase 4 site the hydrogeological units are inferred to be as follows from the surface downwards:

- Sandstone 1 at the surface of the site - unconfined fracture flow dominant;

- Brithdir Rider - does not outcrop at the surface of the site RS-C Phase 4 main part of the site but is likely to outcrop at the tramway. This aquitard should provide a barrier to flow as no known colliery spoil or superficial deposits in this part of the site;
- Sandstone 2 – likely to be confined beneath the Brithdir Rider with fracture flow dominant; and
- Brithdir argillaceous layer – an aquitard likely to confine groundwater in the underlying sandstone layers.

The sequence of sandstone and argillaceous layers will then follow the same geological sequence as described for the Llanwonno Upper Tip. Some caution is required as no borehole information is available for RS-C and local minor faults can cause changes to that shown on geological mapping.

5.3 Groundwater Levels

Data for groundwater levels have only been recorded for the Llanwonno Upper Tip area. No data have been available to review for RS-C, but it is envisaged that broadly similar trends would be observed.

Those piezometers installed in the colliery spoil and superficial deposits recorded groundwater level variations of the order of 1.0 m, whereas within the sandstone and siltstone this was much more variable between approximately 0.5 and 4.0 m over the monitoring period. The small variation in groundwater level in the spoil indicates a high porosity material, whereas the generally higher variation in level in the sandstone and siltstone indicates a lower porosity material. This is supported by the regional data which states that the effective porosity of the siltstone and sandstone is low and is principally due to fractures rather than inaccessible intergranular porosity.

Ten piezometers were installed in Llanwonno Upper Tip at various points between 1995 and 2004, with a recorded head of water varying between 0.73 m and 2.43 m above the base of the tip. Three locations were noted to frequently seep at the toe of the Upper Tip. Six piezometers, located in superficial deposits beneath the Upper Tip, reported a head of water between 0.00 m and 6.87 m above the base of the deposit.

Six piezometers were installed in bedrock below the Upper Tip. Readings from four piezometers installed in siltstone and sandstone generally indicated piezometric heads between 3.82 and 1.59 m above rockhead. Halcrow (2004) state that the piezometric levels in rockhead are comparable to levels obtained in overlying piezometers installed within colliery spoil. From the cross sections, this does not appear to be entirely the case at depth, as stated earlier.

5.4 Interactions with Surface Water

In 1875 the Llanwonno Tip site comprised open hillside and was wooded on the lower slopes, with at least five streams descending the hillside in the vicinity of the current tips flowing generally towards the south west. Creation of the tips resulted in streams being diverted around and, in some cases, beneath the tips and a more complex pattern to this surface water drainage developing. The central incline acts as an unlined channel, conveying the majority of run-off from the Upper Tip and adjacent hillside behind and past the Lower Tip. Construction of the lowest tier of the Upper Tip created a series of ponds, fed by surface run-off and seepage through the tip.

At least one watercourse is culverted beneath the Lower Tip, with an outfall below the tip. Downhill of the tips, the stream courses cross natural ground and pass through short culverts beneath the former railway to discharge into the Afon Rhondda Fach.

The emergence of the streams is due to the presence of the low angle, low hydraulic conductivity argillaceous layers intersecting the surface causing groundwater to egress; this can be seen in existing emergence of streams. A series of spring lines are now emerging from the slack at the approximate location of the former tramway/ponds. Care should be taken that the remedial design still allows for these streams to flow or where the streams are blocked by Storm Dennis slide material that there is an alternative method of surface water drainage in place.

There are no watercourses crossing the RS-C Phase 4 area. There are however two watercourses that border the site area on the western side at easting 301850 to 301950.

Flows within the majority of these watercourses are known to be variable and ephemeral and will depend on groundwater level in comparison to the argillaceous layers.

6. Available Information

The following section gives a précis of the relevant information obtained concerning the site and other phases of work relating to the removal of slipped colliery spoil.

6.1 Tylorstown and Llanwonno Tips Interpretative Report and Feasibility Study, Parkman Environment, 1993

Parkman Environment undertook a feasibility study into the reclamation of Tylorstown and Llanwonno Tips. They reported previous stabilisation works on Tylorstown Tip after a series of slips in the 1970s which included the removal of the tips conical top, benching of the sides and the placement of counterbalancing fill. Works also involved surface water concrete drainage channels, mine adit drainage measures, tunnel drive adit drainage measures and gabion channels to direct water from or in the colliery spoil heap. The calculated volume of the tip was 4.25 million m^3.

A ground investigation was undertaken at both tips. The geology is discussed in the Halcrow report detailed in Section 6.2, which built upon these 1993 findings. 13 locations were analysed for coal content on both tips with an average value of 8.5%, although a maximum value of 30.8% was found in one location. Tylorstown Tip was also reported to have pockets of spoil undergoing combustion, with elevated temperatures and compounds indicative of burning found in the waters from some boreholes.

6.2 LLanwonno Tips Reclamation Scheme Stability Report, Halcrow Group Ltd., 2004

Halcrow undertook a stability assessment Llanwonno Upper and Lower Tips. Llanwonno Upper Tip lies within the Phase 4 site boundary and is the source of the 2020 landslip, while the Lower Tip is the spoil heap described in Chapter 3 as lying adjacent, west of the site boundary.

Instability in Llanwonno Upper Tip was noted in aerial photography dating from 1947, indicating early failure of the structure. Further events include the appearance of a 190 m long arcuate backscar in 1993 and a 20 m tension crack in 2000. They report that a number of streams were diverted around or beneath the tips to facilitate their deposition, and a central incline which separates the upper and lower sites acts as an unlined channel, conveying the majority of the run-off from Llanwonno Upper Tip.

6.2.1 Geology

A 2001 ground investigation sought to characterise conditions at the site. Upper Coal Measures (Pennant Measures) were found to underlie the tips with three boreholes encountering three coal seams. Contrary to geological maps, they identified superficial deposits to lie beneath the tips, with a maximum thickness of 7.90m beneath Llanwonno Upper Tip.

Colliery spoil material predominantly comprised sand, gravel and cobble-sized fragments of mudstone and coal with lesser quantities of siltstone, sandstone and ironstone. The material comprised sand and gravel with some cobbles and less than 20% fines, which was classified as coarse soil in accordance with BS5930:1999. The maximum thickness of deposits in Llanwonno

Upper Tip were 24.00m in the south-east, though this tapers to 5.00m at locations in the north-west. Halcrow surmise that, while not present on records, a historical quarry exploiting the Rhondda Sandstone is located beneath the deepest portions of Llanwonno Upper Tip and is perhaps the reason that the tip was sited where it is. This prediction is, according to Halcrow, supported by geophysical surveys.

6.2.2 Hydrology

Key points include:

- Flows from above Llanwonno Road emerge from two pipes beneath the road and are conveyed in an unlined channel obliquely across the hillside above Llanwonno Upper Tip. Inspections have shown that, even in wet periods, these flows sink into the hillside upslope of Llanwonno Upper Tip.
- Llanwonno Upper Tip was placed over two streams whose flows were diverted southwards in an unlined channel. Site inspections showed flows to be ephemeral.
- The construction of the lowest tier of Llanwonno Upper Tip resulted in the formation of ponds. The ponds are perennial and are fed by surface run-off from Llanwonno Upper Tip and groundwater issues. The ponds have no permanent surface outlet and water overspills westwards in very wet conditions. A pipe emerges from the lowest tier of Llanwonno Upper Tip and discharges flows into the incline ditch. It is believed that this pipe provides a drainage outlet for the ponds.
- A ferruginous seep was identified emerging from the base of the Upper Tip.

6.2.3 Conclusions

It was concluded that Llanwonno Upper Tip would not meet generally accepted stability criteria under either existing or reasonably foreseeable conditions. Halcrow stated that, based on the observed behaviour, the consequence of this instability would be gradual encroachment of the tip onto the natural ground adjacent to the toe of the tip. However, should the displacements become significant, the existing ponds and surface drainage would be disrupted and possibly breached, resulting in rapid and uncontrolled water and debris flows.

6.3 Tylorstown Landslip – Factual Report on Ground Conditions, Intégral Géotechnique, 2020

Intégral Géotechnique attended the site in 2020 to characterise the material which made up the debris toe of the landslip, in the valley bottom. Six trial pits were excavated on the eastern side of the river, to depths of between 1.5m and 3.0m. The deposits were found to typically comprise a thin crust of desiccated material consisting of loose grey silty sandy gravel (between approx. 0.1 and 0.2m thick. This lay over (very loose) dark grey or grey brown variably silty variably sandy fine to coarse gravel with variable cobble and boulder content, or locally soft grey brown sandy gravelly clay/silt with variable cobble and boulder content. The coarse constituents (i.e. gravel, cobbles and boulders) comprised variable amounts of mudstone, coal and sandstone.

Seven samples were sent for laboratory analysis of a range of contaminants. Waste Classification Reports prepared using HazWasteOnline showed that all samples would be classed as non-hazardous waste.

6.4 Utility Information

Details of the existing services on, or in the vicinity of, the sites were obtained from RCT and are summarised below:

6.4.1 Western Power Distribution

A 33kV overhead power line runs lies immediately south of RS-C and is diverted to underground cabling along the eastern edge of the site boundary.

7. Geotechnical Design Approach

7.1 Introduction and Development Proposals.

This chapter provides an outline of the geotechnical design approach and is split into the three development areas of the site namely LLanwonno Upper Tip, the haul road and the RS-C site. The development proposals are as follows:

- The desired landscape to be created at the slip sites is one of flattened hillslope better matching the surrounding terrain. A sketch of the earthworks is provided below. 3D terrain modelling shows this to require removal of in the region of 200,000 m^3 of spoil and 60,000 m^3 of fill to infill such features as the slip scar. This will result in a net export of 150,000 m^3. In association with these works the temporary Phase 1 drainage works will require upgrading into a permanent system and this is envisaged to require elements of the temporary system plus additional drainage around the toe of the tip and some elements of drainage linking down to the lower, western edges of the site where there are well developed streams and runnles. Selected Design drawings for the re-profiling are provided in drawings GC3613-RED-61-RSC-DR-C-0004 to GC3613-RED-61-RSC-DR-C-0008.
- The tramway will require passing points and strengthening and widening to accept the anticipated size and volume of construction traffic require for moving the materials. Given that the type machinery used to move the spoil is of multi-wheeled off-road type then it is not envisaged that the former tram track will require paving or long stretches of aggregate capping. The drainage of the track is however poor and local improvement will be required.
- The 150,000 m^3 of fill material is planned to be placed in an irregular landform within RS-C, lying to rear of Tylorstown Tip. Preliminary designs show this landform to be 540 m long and between 75 and 120 m wide, with a maximum hight of 7m and a 2.5 % cross fall. The side batters are 1 in 3 maximum. It is possible that the topsoil strip will be replaced as a cap pending landscape designs being completed. A material deposit drawing is provided as GC3613-RED-61-RSC-DR-C-0009 to GC3613-RED-61-RSC-DR-C-00013.

7.1.1 Llanwonno Upper Tip

This PSSR, along with the factual information contained in the Halcrow reports will inform a next stage of stability checks on the designed landform. The stability analyses will conform to Eurocode standards and will use SLOPE software to explore the factors of safety the new landform will present. The model will be developed using a number of geological cross sections developed from a combination of Halcrow borehole logs and also in field observations of the glacial till stratum exposed in the back scar and inserting the curvate feature of the existing slip surface.

The strength parameters for the fill are provided in the Halcrow report and have been based on particle size distribution and shear box testing. The peak angle of shearing resistance = 33.5 degrees and the residual angle of shearing resistance = 26.5 degrees. The water level data input

to the model will need to reflect the Halcrow measurement that the piezometeric head lies within the porous spoil at typically between 0.73 m and 2.43 m above the base of the tip, but it will be prudent to plot piezometric contours of the Halcrow data in order to select which head will apply in any given cross section.

In addition, a permanent drainage design is programmed to follow the issue of this PSSR. The key features to drain, or where drainage is not possible due to slip coverage to intercept at a higher level up the slope, as described in section 5.4

In terms of mining stability, the risk is considered low (refer section 4.3 for rationale) and a formal coal authority mining risk assessment will be prepared, submitted and approval sought prior to any fill removal works commencing in Phase 4.

The stability assessment will include a section on any short- or medium-term monitoring, though it is possible that the factor of safety delivered by the emergency works is such that no monitoring is necessary at this site.

7.1.2 *Haul Road*

The haul road will be subject to a condition assessment to assess its suitability to carry the intended earth moving vehicles and this will include the condition of embanked sections raised on spoil or other Made Ground. The drainage of the route will be a material consideration and local improvements will need to be designed as appropriate. A degree of rutting may be inevitable, and it is envisaged that a programme of on-going repair during haulage operations will be necessary using capping type aggregates and perhaps laid over geogrid laid as a strengthening layer, particularly where a disused mine adit passes beneath the haul road.

7.1.3 RS-C

Geological mapping does not show any superficial deposits. It is observed that there is a cover, perhaps less than 2 m thick, of burnt colliery shale but other Made Ground materials may be present. Sandstone of the Rhondda Member lie at, or close to, the ground surface. containing an unconfined water body. The Brithdir Rider coal seam is indicated to underlie the site at moderate depth, but records indicate this has not been worked. Beneath this lies further sandstones, likely forming a confined deep aquifer due to the presence of argillaceous material associated with the Brithdir Rider.

This geology is thought to provide a reasonably competent formation for the support of the new landform. Post construction settlements are likely to be small and well within the tolerable limits of an earth landform, though a site investigation is planned to fully categorise the ground conditions including its compressibility. The designs for new landform include a separation zone between it and the toe slopes of Tylorstown Tip, so that there is no risk of the landform having a destabilising influence. Again, the site investigation will include a number of holes installed in this ‘peripheral‘ zone to Tylorstown Tip.

The fill material is granular and as such it is not thought that the rainwater infiltration/run off pattern will be significantly affected, though a small amount of extra storage will be afforded where the fill is thickest. The site investigation will establish piezometric heads in any Made Ground layers and in the shallow rock head to allow the hydrogeological model to be confirmed /amended.

The donor fill material is thought to contain on average 8.5 % coal and to have Calorific Values of values 2.09 to 4.51 MJ/kg with an average of 3.05 MJ/. The BRE information paper 'Fire and explosion hazards associated with the redevelopment of contaminated land' (Crowhurst and Beever, 1976) indicates that materials with a calorific value (CV) greater than 10 MJ/kg are considered highly combustible, while those with less than 2 MJ/kg are deemed highly unlikely to be so. On this basis, as long as hotspots of any coal material are screened, then the risk of smouldering in the finished heap is small.

Stability of the slope from slippage is very low as side batters of 1 in 3 have been selected and such slopes have a track record of providing embankments of good stability.

The design of the upper surface of the landform will need to consider whether it can resist erosion from walkers, though local erosion from off road motorcycle use may be difficult to achieve.

In terms of mining stability, the risk is initially considered low (refer section 4.3 for rationale). Receptor Site C is not within a Coal Authority high risk zone. However, as the haul road and donor site (Llanwonno Upper Tip) are within a high risk zone, a formal Coal Authority mining risk assessment is required for planning.

8. Contaminated Land Assessment

8.1 Introduction

The information presented in the previous sections of this report has been collated and evaluated to establish a preliminary qualitative risk assessment for the site. A preliminary conceptual site model has been generated based on information derived from this assessment.

The site has been considered with regard to current UK legislation and guidance, namely 'Land Contamination: Risk Management 2019', Part 2A of the Environmental Protection Act 1990 and the Contaminated Land (England) Regulations 2000 and in accordance with current UK good practice guidelines.

For a risk of pollution or environmental harm to occur as a result of ground contamination, all of the following elements must be present in order for a pollutant linkage to be formed:

- Source, i.e. a substance that is capable of causing pollution or harm;
- Pathway, i.e. a route by which the contaminant can reach a target; and
- Receptor (target), i.e. something which could be adversely affected by the contaminant.

If one of these elements is absent there can be no significant risk. If all are present then the magnitude of the risk is a function of the magnitude and mobility of the source, the sensitivity of the receptor and the nature of the migration pathway.

The contaminated land 'Preliminary Risk Assessment' provides a qualitative evaluation of potentially active "pollutant linkages" at the site; these being plausible scenarios whereby a contamination source is connected to a possible receptor by one more potential migration pathways:

i. Potential sources of contamination: these include any actual or potential contaminative materials and activities, located either on, or in the vicinity of the site;

ii. Potential pathways for contamination migration: these comprise the routes or mechanism by which in-ground contaminants may connect the source to a receptor, including environmental migration pathways and human health exposure pathways; and

iii. Potential receptors at risk from contamination or pollution: these include present and / or future land users, ecological systems, water resources and property.

Potential sources, pathways and receptors have been identified and the risks associated with possible pollutant linkages assessed in Table 8.1.

8.2 Conceptual Site Model

From the information reviewed in this report the following on-site and off-site sources of potential contamination, receptors and potential pathways have been identified for the site. Sources, pathways and receptors are numbered on the drawing and correspond to the features in Table 8.2 below.

Table 8.2 – Conceptual Site Model

Potential Sources of Contamination		Number
On-Site		
Llanwonno Upper Tip and the northern foot of Tylorstown Tip – colliery spoil which is within the site boundary. Risk of leachate high in pH, iron, manganese, aluminium, sulphate with low to trace PAH's and ground gas generation		**S1**
Historic tramways – potential for contaminants including PAHs, herbicides, creosote or asbestos		**S2**
Burnt shale fill at RS-C may include arsenic and PAH's		**S3**
Off-Site		
Llanwonno Lower Tip and Tylorstown Tip – leachate high in pH, iron, manganese, aluminium and sulphate with low to trace PAH's and ground gas generation.		**S4**
Mine adits – potential for acid mine drainage and ground gas generation. An example being a seepage of ferruginous mine water from Llanwonno Lower Tip		**S5**
Former quarries, some potentially infilled – generation of ground gas		**S6**
Identified Pathways		
Human Health – Airborne Migration Pathways / Inhalation	As the majority of the site is not currently surfaced with hardstanding, there are potential **particulate / dust / fibre** inhalation pathways. This pathway includes windblown contaminants from offsite sources.	**P1**
	Vapour inhalation pathways.	**P2**
Human Health – Direct Contact Exposure Pathways	Direct **dermal contact** with soils and waters.	**P3**
Human Health – Ingestion	**Ingestion** via hand to mouth action from contaminated soils and waters.	**P4**
Controlled Waters – Aqueous Migration Pathways	On-site surface / near-surface mobile contaminants have the potential to enter the shallow groundwater regime via **leaching** and migration and impact the underlying aquifers and via seepage outflows impact watercourses within the local area.	**P5**
	The bedrock geology is indicated to be a Secondary A aquifer, in which **groundwater migration** pathways may be active.	**P6**

Table 8.2 – Conceptual Site Model (cont.)

Potential Receptors		Number
Human Health	**Current site users** including members of the public such as walkers.	**R1**
	Construction workers / contractors who may undergo exposure during construction work (particularly ground works) undertaken at the site.	**R2**
	Future end-users including members of the public such as walkers.	**R3**
Controlled Waters	The **Afon Rhondda Fach** and tributaries	**R4**
	Groundwater within the **Secondary A Aquifer** superficial and bedrock deposits	**R5**

8.3 Discounted Sources

Former Pendyrys and Ferndale Colliery – while the former collieries are a likely source of contamination on the valley floor, it is considered unlikely that any contamination would impact the Phase 4 site as it would be reasonably localised to the sources areas and there is sufficient separation (often uphill) from the site as to rule out any pathway. Historically there were smithies associated with the colliery buildings but again these are quite distant from the Phase 4 site. Of all sources then mine gas is likely to travel the furthest but the old colliery shafts are now filled and or capped and the Pendyrys Colliery is redeveloped as the Rhonda Fach Leisure Centre.

There is a former railway – now dismantled running along the valley side a little higher than river level. This has remnant sleepers and a ballast layer. Whilst asbestos and creosote type sources are possible the features lie a little way from Phase 4 and the Phase 4 land is higher.

8.4 General

Based on the Conceptual Site Model outlined in the preceding sections, a qualitative ground contamination Preliminary Risk Assessment has been undertaken in-line with the methodology outlined in CIRIA 552 (CIRIA, 2001).

The assessment of risk is considered as a combination of the severity of the potential risk and likelihood of its occurrence in line with the definitions presented in the following tables.

Table 8.3 – Classification of Consequence

Category	Definition – Human Health	Definition – Environment	Definition – Buildings	Definition – Ecology
Severe	Short term (acute) risk to human health likely to result in "significant harm" as defined by the Environment Protection Act 1990, Part IIa. e.g. high concentrations of cyanide on the surface of an informal recreation area.	Short term risk of pollution of sensitive water resource. e.g. major spillage of contaminants from site into controlled water.	Catastrophic damage to buildings / property. e.g. explosion, causing building collapse.	A short-term risk to a particular eco-system or organism forming part of such ecosystem.
Medium	Chronic damage to Human Health.	Pollution of sensitive water resources. e.g. leach of contaminants from a site to a Principal or Secondary Aquifer.	Severe damage to building fabric	A significant change in a particular ecosystem. e.g. death of a species within a designated nature reserve.
Mild	Heath deterioration that last several months	Pollution of non-sensitive water resources. Pollution of non-classified groundwater.	Significant damage to buildings, structures and services. Damage to sensitive buildings / structures / services. e.g. foundation damage resulting in instability.	Significant damage to crops. Damage to sensitive parts of the environment.
Minor	Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc.).	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve.	Easily repairable effects of damage to buildings, structures and services. Discoloration of concrete.	The loss of plants in a landscaping scheme.

The likelihood of an event (probability) takes into account both the presence of the hazard and target and the integrity of the pathway and has been assessed based on the categories given below.

Table 8.4 – Categorisation of Probability

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

The potential severity of the risk and the probability of the risk occurring have been combined in accordance with the following matrix in order to give a level of risk for each potential hazard.

Table 8.5 – Risk Matrix Categories

		Potential Severity			
		Severe	Medium	Minor	Negligible
Probability of Risk	High Likelihood	Very High	High	Moderate	Low / Moderate*
	Likely	High	Moderate	Low / Moderate	Low
	Low Likelihood	Moderate	Low / Moderate	Low	Very Low
	Unlikely	Low / Moderate	Low	Very Low	Very Low

N.B. – High Likelihood with Minor Severity has been modified from CIRIA C552 from Low / Moderate to Low Risk in NHBC RandD66.

A qualitative risk assessment has been undertaken for the contaminant linkages to identify any potentially unacceptable risks in relation to the existing site setting and the proposed development. Table 8.6 below details the risk categorisation for each identified potentially significant pollutant linkage.

Table 8.6 – Qualitative Risk Assessment

Potential Sources of Contamination	Potential Receptor	Potential Pathway	Consequence of risk being realised	Probability of risk being realised	Risk	Justification / Comments
S1: Llanwonno Upper Tip and the northern foot of Tylorstown Tip	R1: Current Site Users	P1: Particulate / dust / fibre inhalation P2: Vapour inhalation P3: Direct dermal contact P4: Ingestion	Unlikely	Minor	Very Low	Public access to the site is limited and likely constrained to members of the public out walking around Tylorstown Tip.
	R2: Construction workers / contractors		Low likelihood	Medium	Low	Testing of slipped material in 2020 GI showed low levels of contamination. Combustion within Tylorstown Tip may be producing carbon dioxide.
	R3: Future end-users		Unlikely	Minor	Very Low	Similar situation to current site users.
	R4: Afon Rhondda Fach	P5: Leaching P6: Groundwater Migration	Likely	Minor	Low / Moderate	A ferruginous seep was noted from Llanwonno Tip by Halcrow in their 2004 report. Surface water flows towards the river.
	R5: Secondary A Aquifer		Low likelihood	Medium	Low	Leaching was visibly noted by Halcrow in 2004 which indicates the potential for groundwater contamination, but argillaceous bands will protect deeper groundwater
S2: Historic tramways and S3 burnt shale spread	R1: Current Site Users	P1: Particulate / dust / fibre inhalation P2: Vapour inhalation	Unlikely	Negligible	Very Low	Levels of contamination unlikely to be high enough to trigger human health toxicity.
	R2: Construction workers / contractors		Low likelihood	Minor	Low	Construction workers may encounter some contamination when undertaking groundworks.

	R3: Future end-users	P3: Direct dermal contact P4: Ingestion	Unlikely	Negligible	Very Low	Similar situation to current site users.
	R4: Afon Rhondda Fach	P5: Leaching P6: Groundwater Migration	Unlikely	Minor	Very Low	The distance these sources lie they lie from the river makes any potential impacts unlikely due to dilution and dispersal.
	R5: Secondary A Aquifer		Low likelihood	Minor	Low	There is the potential for contaminants to leach into unconfined aquifers. However, there is no abstraction in the area
S4: Lower Llanwonno Tip and Tylorstown Tip	R1: Current Site Users	P1: Particulate / dust / fibre inhalation P2: Vapour inhalation P4: Ingestion	Unlikely	Minor	Very Low	The off-site tips are all well vegetated, decreasing the potential for contaminant particulate migration.
	R2: Construction workers / contractors		Low	Medium	Low	There is the potential for ground gas generated by emission from seams to accumulate in drainage culverts and manholes, potentially harming construction workers.
	R3: Future end-users		Unlikely	Minor	Very Low	Similar situation to current site users.
S5: Mine adits/levels	R1: Current Site Users	P2: Vapour inhalation	Unlikely	Minor	Very Low	The principle risk comes from mine gas, which is unlikely to affect
	R2: Construction workers / contractors		Low likelihood	Medium	Low / Moderate	There is the potential for explosive or asphyxiant gases to accumulate in excavations.
	R3: Future end-users		Unlikely	Minor	Very Low	Similar situation to current site users.

	R4: Afon Rhondda Fach	P5: Leaching P6: Groundwater Migration	Unlikely	Medium	Low	Placing a large amount of colliery spoil at the top of the valley in the receptor site may disrupt the hydrogeological conditions, potentially raising contaminated mine water to impact receptors.
	R5: Secondary A Aquifer		Unlikely	Medium	Low	
S5: Former quarries, some potentially infilled	R1: Current Site Users	P1: Particulate / dust / fibre inhalation P2: Vapour inhalation	Unlikely	Negligible	Very Low	Historically quarries were occasionally tipped with waste that would be capable of producing ground gas, however the most likely tipped material in the area is colliery spoil.
	R2: Construction workers / contractors		Low	Minor	Low	Material used to fill quarries may be capable of producing leachate or gases which could migrate to the site and be encountered during ground works.
	R3: Future end-users		Unlikely	Negligible	Very Low	Similar situation to current site users.

Note: It is assumed that site conditions are post-development, assuming no mitigation or remedial measures are implemented

9. Summary

9.1 Ground Model Establishment

This report collates geo-environmental, geological, mining and geotechnical information relating to the three development sub areas of the site. Geological maps, former ground investigations and records from the Coal Authority have been combined to develop a ground model for both the Llanwonno Upper Tip and Receptor Site C (RS-C).

The report includes a detailed breakdown of aquifer and non–aquifer stratigraphy beneath the Site (i.e. the different sandstone and mudstone/coal layers) and this should inform any future ground investigation and or decisions as to where potential monitoring wells should be placed and what layers they should be screened in.

9.2 Llanwonno Upper Tip

The ground model here is one of alternating sandstones and argillaceous bands associated with coal seams and in the case of Llanwonno Upper Tip there is surface deposit of diamicton. The shallow coal seams are unlikely to have been worked beneath the redevelopment area footprints. Springs emerge at various points along the valley face and five separate streams or rivulets traverse or underlie the Llanwonno tip area.

The slide at Llanwonno is interpreted to be water pressure induced and surface water build up at the head of the tip is thought to be the contributor. There is now a circular style slip surface embedded in the remnant slip mass with a substantial arcuate back scar.

This PSSR, along with the factual information contained in the Halcrow reports, will inform a next stage of stability checks on the designed landform. The stability analyses will conform to Eurocode standards and will use SLOPE software to explore the factors of safety the new landform will present. The model will be developed using a number of geological cross sections developed from a combination of Halcrow borehole logs and also in field observations of the glacial till stratum exposed in the back scar and inserting the curvate feature of the existing slip surface.

The water level data inputted in the model will need to reflect the Halcrow measurement that the piezometeric head lies within the porous spoil at typically between 0.73 m and 2.43 m above the base of the tip but it will be prudent to plot piezometric contours of the Halcrow data in order to select which head will apply in any given cross section.

In addition, a permanent drainage design is programmed to follow the issue of this PSSR and key drainage features are highlighted in this report.

In terms of mining stability risk then is considered low, none the less a formal coal authority mining risk assessment will be prepared and submitted as early stages in the emergency works design.

Risks from contamination at the site are low and one of the higher rated risks is the risk of encountered mine water with a high ferruginous content.

9.3 Haul Road

The haul road will be subject to a condition assessment to assess its suitability to carry the intended earth moving vehicles and this will include the condition of embanked sections raised on spoil or other Made Ground. The drainage of the route will be a material consideration and local improvements will need to be designed as appropriate. A degree of rutting may be inevitable, and it is envisaged that a programme of on-going repair during haulage operations will be necessary using capping type aggregates and perhaps laid over geogrid laid as a strengthening layer, particularly where a disused mine adit passes beneath the haul road.

No contamination issues are linked with the haul road operation other than a general requirement to avoid turbid run off impacting streams or runnels and maintain any culverts which may pass underneath raised embankment sections.

9.4 Receptor Site C

There is less information available on the proposed receptor site, particularly in the form of past ground investigations, so details have been inferred from other sources. Geological mapping predicts a lack of superficial deposits with sandstones of the Rhondda Formation lying at the surface. Coal seams are expected beneath the site but do not outcrop within the boundary. No shallow mining has been identified.

This geology is thought to provide a reasonably competent formation for the support of the new fill mound. Post construction settlements are likely to be small and well within the tolerable movement of an earth landform, though a site investigation is planned to fully categorise the ground conditions including its compressibility. The designs for new mound include a separation zone between it and the toe slopes of Tylorstown tip so that there is no risk of the mound having a destabilising influence. Again, the site investigation will include a number of holes installed in this ‘peripheral‘ zone to Tylorstown Tip.

The fill material is granular and as such it is not thought that the rainwater infiltration/run off pattern will be significantly affected though a small amount of extra storage will be afforded where the fill is thickest. The site investigation will establish piezometers heads in any made ground layers and that in the shallow rock head to allow the hydrogeological model to be confirmed /amended.

The donor fill material is thought to contain on average 8.5 % coal and to have Calorific Values of values 2.09 to 4.51 MJ/kg with an average of 3.05 MJ/kg as consequently smouldering of the material is low risk. However, a watching brief will be required to guard against very coal rich pockets being used to add to the source fill material.

Stability of the slope from slippage is very low as side batters of 1 in 3 have been selected and such slopes have a track record of providing embankments of good stability.

The design of the upper surface of the mound will need to consider whether it can resist erosion from walkers, though local erosion form of road motorcycle use may be difficult to achieve.

In terms of mining stability, the risk is considered low, and because the site is not within a Coal Authority high risk zone a formal Coal Authority mining risk assessment is not deemed necessary.

Contamination risk is low based on possible low-level impact with metals and PAH’s in burnt shale near surface deposits. It is envisaged that a materials management plan will be produced ahead of the earthworks and this should be provided to the civils contactor so they are informed of fill movement recording requirements and any testing that may be required by the plan.

REDSTART

Tylorstown Landslip Phase 4

Llanwonno Upper Tip Remediation

Preliminary Sources Study Report

April 2021

Project No: GC/3613 Doc Ref: GC3613-RED-75-ZZ-RP-L-0001 Rev: P02

CLIENT: Rhondda Cynon Taf County Borough Council
ISSUE DATE: April 2021

Scheme Title: Tylorstown Landslip Phase 4

Preliminary Sources Study Report

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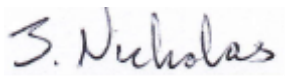
AUTHOR	James Nicholas		25/02/2021
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Contents

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1. Introduction

1.1 Background

On Sunday 16th February 2020, Storm Dennis caused a flood surge which instigated the failure of Llanwonno Upper Tip (RH01) above the village of Tylorstown.

Due to approximately 60,000 m^3 of slipped debris filling the valley bottom from the toe of slope outwards in an extremely low angled and widely distributed debris envelope, the river channel was filled, and its course diverted to the western side of the valley bottom. Emergency Works are currently underway (Summer/Autumn 2020) to remove the slipped material (this is Phases 2 & 3 of the works).

This report assesses the Phase 4 of the landslide repair work, making safe Llanwonno Upper Tip (RH01). Redstart have been commissioned to provide this Preliminary Sources Study on a proposed haul road and potential receptor site around the eastern side of Tylorstown Tip (RH02), which will permit the landslide debris to be removed, stockpiled, treated and land formed. Refer Drawing GC3613-RED-61-RSC-DR-C-0002 and -0003 for locations of these land features.

Drawing No. GC3613-RED-61-RSC-DR-C-0001: Phase 4 Location Plan provides a redline boundary for the Phase 4 area, which amounts to 310 Ha of hillside and near hilltop land.

1.2 Exclusions

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Any recommendations made, or opinions presented are based upon a professional review of available information. However, there may be special conditions pertinent to the site which may not have been revealed by these works and have not, therefore, been taken into account in this report.

2. The Site

2.1 Site Location

The colliery spoil tips comprising the Phase 4 works are located on the eastern side of the Rhondda Fach valley, close to the centre of the South-East Wales Coal Field. The nearest village in the valley bottom is Tylorstown, with Ferndale lying a little way to its north. The only vehicle access to the tips is via Llanwonno Road, which links to the valley bottom in the village of Blaenllechau, to the north.

The Llanwonno Tips comprise two areas in which colliery spoil was deposited from the former Ferndale Colliery tramway. Llanwonno Upper Tip is the higher of the two adjacent tips and was the source of the 2020 landslip. The Upper Tip is to be reprofiled during the Phase 4 works. The Llanwonno Lower Tip site is located on the lower valley slopes, immediately north-west of the Upper Tip and separated from it by the former tramway.

Llanwonno Upper Tip is centred at NGR (ST) 301250, 196200.

The most immediately obvious colliery spoil tip in the area is Tylorstown Tip, also known as 'Old Smokey'. It's top forms a large conical feature rising over 30 m above the surrounding land and is situated at the valley crest. It lies uphill, approximately 700 m south-east, of the lower lying Llanwonno Tips. The shared former tramway terminates at this tip. The proposed receptor site (Receptor Site C), for the surplus colliery spoil generated by the Llanwonno Upper Tip reprofiling works, is located immediately to the east of 'Old Smokey' on a relatively level plateau edge.

Receptor Site C, to the east of Tylorstown Tip, is centred at NGR (ST) 302150, 195660.

2.2 Site Description and Inspection

Topography and Geomorphology

The Rhondda Fach is a steeply incised valley within the large upland plateau of the South-Wales Coalfield. The eastern valley side is stepped due to the alternating geology of hard sandstone, forming the steeper slopes, and weak mudstones, forming broad lower angled steps, known locally as 'slacks'.

Quarries are present at the level of Llanwonno Upper Tip, both up and down valley, and there is a likelihood that a buried quarry lies beneath the southern end of Llanwonno Upper Tip.

Spring lines and boggy ground are present along the slacks, this is due to groundwater in the fractured sandstones being prevented from percolating downwards by the impermeable mudstones and coal seat earths. During and immediately after periods of high/prolonged precipitation the spring lines discharge strongly but dry up during periods of drier weather.

Substantial deep mining across the area has led to past subsidence and mining related fissures, which may have altered natural groundwater flows in the area. Coal crop workings and adits are present on the hillside and potentially beneath the tips, which issue water during periods of high precipitation.

Llanwonno Upper Tip

Llanwonno Upper Tip is a linear tram tip, which is oversteepened and poorly vegetated. There was a pond in the centre of the tip, which was lost within the recent landslide.

The tip has been placed across a concave area of the hillside formed by the intersection of a steep section and a slack below.

The northern end of the tip is volumetrically smaller than the central and southern parts and is at a slightly higher level. Llanwonno Road is at the same level as the northern end of the tip but rises to the south beyond this point. The crest of the tip falls to the south.

Photograph showing Llanwonno Upper Tip and Lower Tip in central area. The terrain incorporates subdued terracing. Leisure centre at bottom of photo.

It is suggested that an ancient landslide is present within the natural hillside beneath the northern end of Llanwonno Upper Tip, hummocky ground between the Upper and Lower Tips support this landslide concept.

Within the mid-slope area of the northern part of Llanwonno Upper Tip is a tension crack. There are multiple tension cracks in the southern section of the tip, radiating from the landslide back scar as shown in Photograph below.

Within the central portion of the tip, the recent landslide has left a bowl-shaped depression with a steep back scar. In the upper half of the back scar, a wedge of colliery spoil remains (the crest of the tip), whereas in the lower half of the back scar, natural ground (a stiff orange till) is visible. In front of the back scar is a back-tiled block, traversed by a multitude of transverse cracks. In front of the landslide block, the surface is scoured to natural ground with ribbons of colliery spoil remaining from the downhill flow slide.

Photograph showing back scar with a high slope of glacial till exposed in lower third of scar face

There are several water courses and issues above the tip that have been captured by temporary drainage measures, installed during Phase 1 of the remediation works, which immediately followed the landslide event. These drainage measures form a series of 6-inch plastic pipes that collect water from culverts at Llanwonno Road, pipe them along the valley feature on the uphill

side of the tip and subsequently discharge at the southern end of the tip, where it meets the former tramway.

The base of the tip lies on a slack, which has water issues along its entire length and inevitably beneath the tip itself. Since the landslide has occurred, water issues have formed deep erosive gullies down to the valley bottom. It is considered that prior to the slip, a longitudinal drain, beneath the tramway, captured these issues and took the water away to the north, and then down to the valley bottom, via a channel that is still partially present, immediately south of Llanwonno Lower Tip.

Further still downhill of the tramway, the landslide has damaged a section of Western Power Distribution (WPD) 33 kV overhead line. This line was removed in October 2020.

Photograph of central parts of the slip, viewed from the north-west, with leisure centre visible in the valley bottom

Tramway

The former Ferndale Colliery tramway is constructed transversely across the valley side, rising from north to south. Within the Phase 4 area, the tramway embankment has been constructed using colliery spoil.

Although the tramway has been destroyed in the landslip area, it remains at the toe of the southern section of Llanwonno Upper Tip. Where the tip meets the tramway, there has been some relatively recent repair work to the toe of the tip, and a masonry wall is present.

At the very southern end of Llanwonno Tip is a tramway turning circle. A culvert is present immediately south of this, passing beneath the tramway. This culvert discharges water flowing from the small valley formed between the natural hillside and crest of the tip into an unlined drain. The culvert has been reformed recently as part of the Phase 1 remediation works so that a series of 6-inch plastic water pipes pass through it.

The tramway rises a further 700 m before reaching Receptor Site C. Over this distance it cuts across slacks and steepenings, consequently, various amounts of fill have been placed to maintain its alignment.

At a point 300 m beyond Llanwonno Upper Tip, the tramway intersects the lower edge of a slack. At this point, the tramway meets a narrow track, leading northwards, up towards Llanwonno Road. Within the slack, the local area uphill is boggy and forms a small drainage basin, which discharges at the intersection of the track and tramway. The water at this intersection regularly flows down the tramway and results in deep erosive gullies which have required both historic and recent repairs.

A further 100 m past the track/tramway intersection, the tramway rises to the plateau area and is constructed upon a small colliery spoil tip with a flat berm extending outwards into the valley. Beyond this, the tramway becomes indistinct due to the lower relief of the plateau.

Receptor Site C

Receptor Site C (RS-C) lies to the east/north-east of Tylorstown Tip (Old Smokey) and south/south-east of Llanwonno Road (vehicular access point to RS-C). The eastern edge of RS-C is bounded by conifer plantations, owned by Natural Resources Wales (NRW). In October 2020, WPD erected a new 33 kV overhead line diversion immediately to the south of RS-C, which met the NRW plantation and follows its external boundary northwards, in underground cabling, to the lay-by and vehicle access point off Llanwonno Road, in the northern corner of RS-C.

The ground levels are relatively flat over RS-C with a gentle fall from the north-west to the south-east behind Old Smokey. South-east of Old Smokey the ground levels become more naturally undulating. Old Smokey is perched on the crest of the plateau and deposited mostly upon the steep valley side below, so ground levels on the south-western edge of RS-C fall rapidly in that direction.

Immediately to the rear of Old Smokey (east) is a large area of bare ground, comprising a surface of burnt colliery shale, and east of this is a shallow depression or man-made ephemeral pond, which lies in the centre of RS-C.

Draining the bare ground area, is an informal eroded channel running to the north-west and discharging into a formal drain which runs from the former tramway in the north down the northern side of Old Smokey. A wide and shallow concrete drain is present on the southern edge of Old Smokey.

The area is generally well drained and no standing water or running water was present over several site visits in dry weather. There is a dry runnel located 30m to the north west of the RS-C site which is marked as an ‘issues’ label on OS plans.

3. Historical Land Uses

3.1 Sources of Information

Information relating to the historical development of the site has been obtained from historical maps including Ordnance Survey Maps at three different scales (1:10,000 / 1:10,560, 1:2,500 and 1:1,250) copies of which are presented in Appendix A.

The historical maps have been reviewed and relevant features are described in Table 3.1 below.

A summary description of land uses associated with the site and its immediate surroundings based on the review of the historical Ordnance Survey map extracts is provided.

3.2 Description of Historical Map Extracts

Table 3.1 – Description of Historical Map Extracts

Map Date and Scale	On site Features	Surrounding Area Features
1873-1877 1:2,500 1875 1:10,560	Unoccupied with four footpaths crossing the site orientated east-west. Two stream flows northeast to southwest centrally and on the western side of the site.	Pendyrys Colliery is located approx. 50m south, comprising about six buildings. The Taff Vale Railway runs adjacent south to the site boundary at the bottom of the valley. Five further streams spring and run from the top of the valley to the bottom. A track runs along the north of the site boundary in the same location as the current Llanwonno Road. Ferndale Colliery is located 1300m north west of the site. This comprises an old shaft, engine house, a working shaft and a smithy.
1898 1:10,560 1900 1:2,500	No significant change.	Pendyrys Colliery has expanded, comprising at least 14 buildings with a dedicated tramway. The Afon Rhondda Fach has been culverted beneath the colliery. Tylorstown is now marked on the map as the first residential properties have appeared, with at least 100 houses within 500m of the site. Three quarries are also present within 500m.

Map Date and Scale	On site Features	Surrounding Area Features
1915 1:10,560	Primarily unchanged, though a tramline originating from Cynllwyn-du Colliery 800m south bisects the site centrally running to the top of the valley.	A large amount of spoil is present at the base of the valley. The tramway network has grown with a branch connected to a new quarry located 140m south of the site halfway up the slope. Tylorstown continues to expand and a school is now present. A sawmill is located close to Ferndale Colliery.
1919-1920 1:2,500 1921 1:10,560	No significant change.	No significant change.
1945 1:10,560	The northern slopes of Tylorstown Tip begin to fall within the site boundary.	A tramway line up the slope of the valley has facilitated the deposition of Tylorstown Tip.
1948 1:10,560	The Llanwonno Upper Tip which caused the 2020 slip has now been deposited in the western part of the site. A new tramline has been built along the top of the valley, connecting the portion of the site around Tylorstown Tip to the part of the site which housed the slipped spoil. The stream which crossed the site towards the western end no longer appears, with the new spoil heap built atop its former route.	A new spoil heap has been laid adjacent west of the site halfway up the valley. Tylorstown Tip now shows two levels of deposited spoil. Quarries in the surrounding area are now marked as disused.
1957-1961 1:2,500 1965 1:10,560	Both spoil heaps have grown, but the tramway which connects the two onsite heaps is now marked as disused. The Llanwonno Tip has clearly been deposited from the tram track on the more detailed mapping.	No significant changes other than by 1959 the Ferndale Colliery is labelled as closed.
1974 1:10,000	Both onsite tips are now marked as disused and the connecting tramway appears to have been removed.	Pendyrys Colliery is no longer operational, with the majority of buildings removed and replaced with a tip. The Cynllwyn-du Colliery is also no longer operational and the tramway up the valley to Tylorstown Tip has been dismantled. The tip adjacent west is also labelled as disused. Ferndale Colliery has gone, being replaced by open land.

Map Date and Scale	On site Features	Surrounding Area Features
1992 1:10,000	Tylorstown Tip is no longer labelled as a tip and appears as a large hill with a summit at 440m AOD.	The railway line at the base of the valley is labelled disused.
1999-2003 1:2500	No significant change	8 no adits are shown 30m to 100m north of the local road. In addition there is a further adit in the central section of the site, 50m to the north of the dismantled tramway (proposed haul road) and another one 80m to the west of the same trackway (described as a level) but this is located further south lying just to the NW of Old Smokey. In practice these features are also shown on late Victorian mapping.
2001 1:10,000	No significant change.	A leisure centre has been built in Tylorstown 80m from the site boundary.
2010 1:10,000	No significant change.	No significant change.
2020 1:10,000	No significant change.	No significant change.

4. Environmental Setting

4.1 Sources of Information

The following sources have been referenced for identification of the geology, soils, hydrology, hydrogeology and general environmental setting of the site:

Table 4.1 – Sources of Information

Category	Data Source	Reference
Geology	Groundsure Insight Report	See Appendix B
	BGS Geological Maps	Sheet 248, Pontypridd
	BGS Lexicon	http://www.bgs.ac.uk/lexicon/
	BGS Borehole Scan Viewer	http://www.bgs.ac.uk/data/boreholescans/home.html
Hydrology	Environment Agency Catchment Maps	http://environment.data.gov.uk/catchment-planning/
Environment	Groundsure Insight Report	See Appendix B
	Magic Website	https://magic.defra.gov.uk/MagicMap.aspx
UXO	Zetica Risk Maps	https://zeticauxo.com/downloads-and-resources/risk-maps/
References	1. Tylorstown and Llanwonno Tips Interpretative Report and Feasibility Study, Parkman Environment, 1993 2. Llanwonno Tips Reclamation Scheme Stability Report, Halcrow Group Ltd., 2004 3. Tylorstown Landslip – Factual Report on Ground Conditions, Intégral Géotechnique, 2020	

4.2 Published Geology and Encountered Ground Conditions

Made Ground

There is no made ground shown on the geology mapping. However, large quantities of colliery spoil are known to be onsite in the Llanwonno upper tip and tramway corridor and in the surrounding areas. Additionally, exposed ground at the RS-C includes significant proportion of burnt shale.

Superficial (Drift) Geology

Geological mapping shows the site to be largely devoid of superficial deposits. A band of Glaciofluvial Deposits are predicted in the south of the site at the base of the valley, described by

the BGS as sand and gravel, locally with lenses of silt, clay or organic material. Lying just to the north of this band, and only predicted to encroach on a very small area of the site, is an area of Till which extends westwards. This typically consists of a heterogenous mixture of clay, sand, gravel, and boulders varying widely in size and shape.

Solid (Bedrock) Geology

4.2.1.1 RS-C

RS-C is underlain fully by the Brithdir Member of the Pennant Sandstone Formation. This is described by the BGS as having green-grey, lithic arenites with conglomerate lenses at bases of units; thin mudstone/siltstone and seatearth interbeds and mainly thin coals.

4.2.1.2 Tramway and Llanwonno Upper Tip

The tramway and Llanwonno Upper Tip are shown to be underlain by juxtaposed bands of Brithdir Member and Rhondda Member, both belonging to the Pennant Sandstone Formation. The Rhondda Member is described as green-grey, lithic arenites with thin mudstone/siltstone and seatearth interbeds and mainly thin coals.

Photograph of quarry located west of the proposed haul road showing Rhondda member of the Pennant Sandstone Formation

Structural Geology

Bedding is shown on the 1:50,000 scale map as dipping between 6 and 7 degrees, to the SSE.

The site lies between two faults: the Llanwonno fault present along the valley top trending NNW-SSE and downthrown to the east, and an unnamed fault along the valley bottom also trending NNW-SSE and downthrown to the east. Neither directly underlie the Phase 4 site area. Refer cross section Figure 4.1 and geology map extract in Figure 4.2 for illustration of the structure.

Five coal seams are shown on mapping to cross the site as explained in more detail in the mining section of this report.

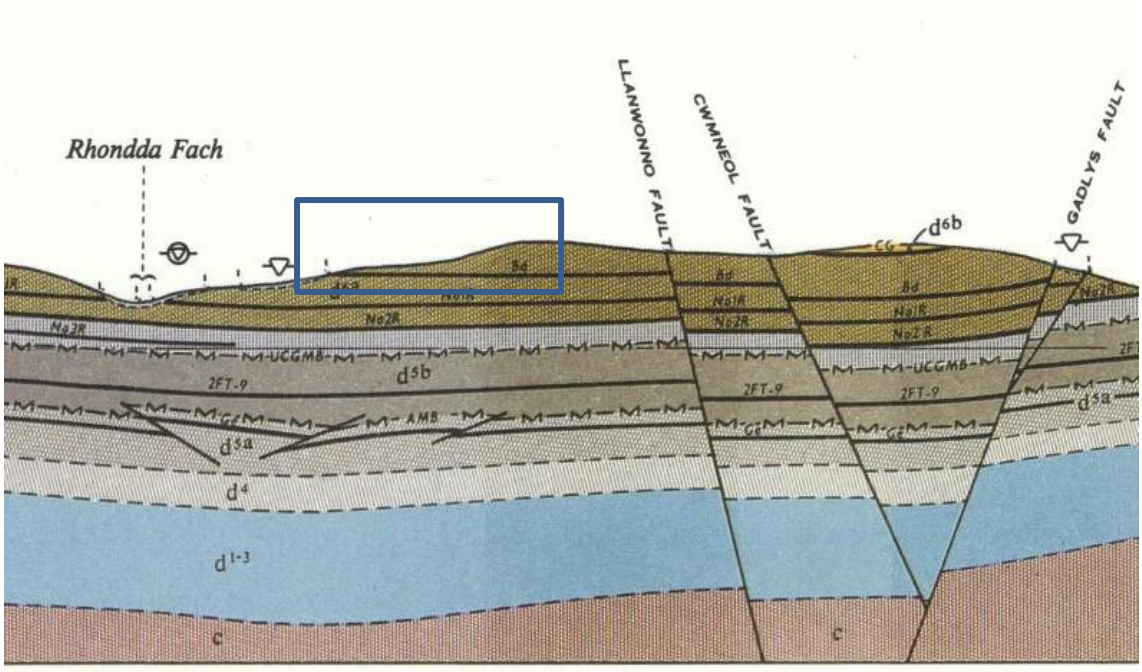

Figure 4.1 – BGS geological cross section, approximate location of Phase 4 site indicated by blue box

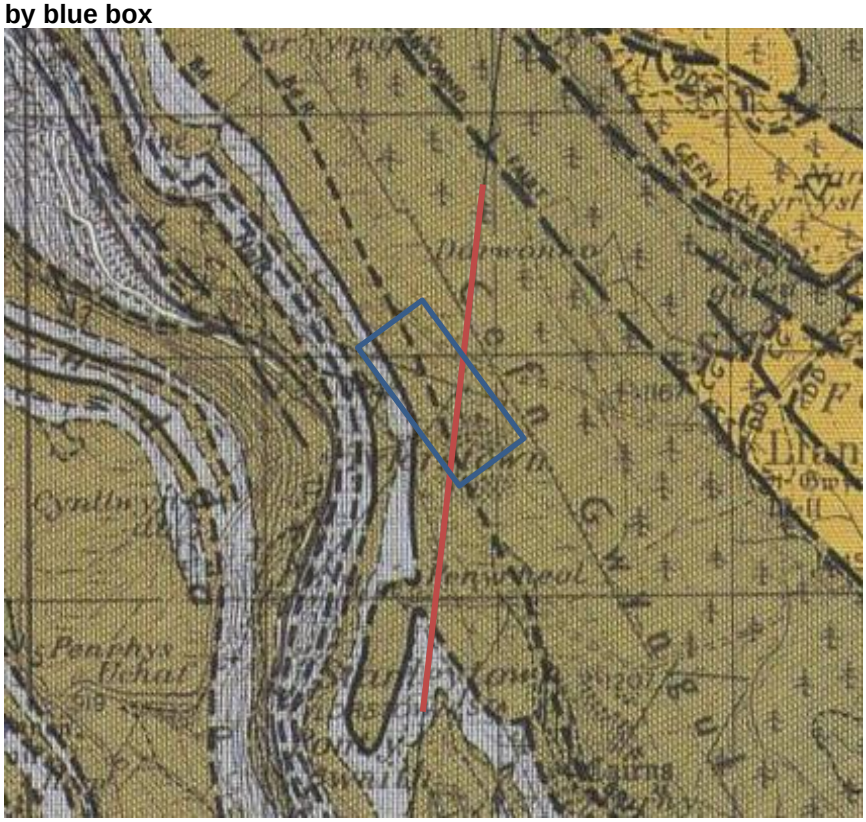

Figure 4.2 – Location of geological cross section highlighted red, with the approximate location of the Phase 4 area indicated in blue

Historical Boreholes

British Geological Survey (BGS) records of historical boreholes were reviewed for the site. The locations of the boreholes are shown on page 100 of the Groundsure Report and are presented in Appendix C. They are summarised below.

It should be noted that the depths to identified coal seams from these logs do not tally with the understood geology of the area from geological mapping. It may be that these exploratory holes were sunk from within the subterranean coal workings.

Table 4.2 – Summary of Historical Boreholes

BGS Borehole ID	Coordinates	Depth (m BGL)	Starting Level (mAOD)	Summary of Log / Ground Conditions
ST09NW12 No. 9 Pit Ferndale	302020,195120 Approx. 500m south of Tylorstown Tip summit	30.07	Not provided.	Alternating bands of clay, stone and coal down to the top of the 5ft coal seam at the base of the borehole.
ST09NW13 No. 6 Pit Ferndale	301560,196250 Approx. 60m north of un-named road at top of valley	21.46	Not provided.	Alternating bands of coal, clay and shale. The 5ft seam is hit at 19.94m and the top of the Gellideg seam is found at the base of the borehole.

Radon

Radon is a carcinogenic, radioactive gas which is naturally produced by certain geological units. The area underlying RS-C and half of the haul road is shown to be at a negligible risk of Radon, where less than 1% of properties would exceed the Radon Action Level. A band that corresponds to the Rhondda Member in the valley slope is shown to have a low risk of Radon, where 3 to 5% of properties would be expected to exceed the Radon Action Level.

Natural Ground Subsidence

According to the BGS data presented within the Insight Report Section 17, risks posed by ground stability hazards in the subject site are classified as follows:

Table 4.3 – Natural Ground Subsidence

Stability Hazard	Negligible	Very Low	Low	Moderate	High
Potential for Collapsible Ground		✔			
Potential for Compressible Ground	✔				
Potential for Ground Dissolution	✔				
Potential for Landslide Ground		✔ (Brithdir Member)		✔ (Rhondda Member)	

Potential for Running Sand Ground	✔	✔			
Potential for Shrinking or Swelling Clay Ground	✔	✔			

Soil Vulnerability

According to the Groundsure Report Section 5, onsite deposits are indicated to be Secondary A Aquifers, with the exception of the small area of Till which is Secondary Undifferentiated. Mapping shows the site to be mainly underlain by deposits with a low leaching potential, although areas beneath the haul road and to the south have a high leaching potential. The classification on which these vulnerability ratings are based is provided in Table 4.4 below.

Table 4.4 – Soil Vulnerability Class

Soil Vulnerability Class	Classification	Description
H1	High Leaching Potential Soils of high leaching potential with little ability to attenuate diffuse source pollutants and in which non-adsorbed diffuse source pollutants and liquid discharges have the potential to move rapidly to underlying strata or groundwater.	Soils that readily transmit liquid discharges because they are either shallow, or susceptible to rapid flow;
H2		Deep, permeable, coarse textured soils which can readily transmit a wide range of pollutants because of their rapid drainage and low attenuation potential.
H3		Coarse textured or moderately shallow soils which can readily transmit non-adsorbed pollutants and liquid discharges but have some ability to attenuate adsorbed pollutants because of their clay or organic matter content.
HU		Soil information for urban areas and restored mineral workings. These soils are therefore assumed to be highly permeable in the absence of site-specific information.
L	Low	Soils in which pollutants are unlikely to penetrate the soil layer because either water movement is largely horizontal, or they have a significant ability to attenuate diffuse source pollutants.

- *Definitions sourced from Environment Agency report SC040016/R (Section 5.4)*

Background Soil Geochemistry

Information on background soil geochemistry relating to concentrations of arsenic, cadmium, chromium, lead and nickel at the site and within the local area has been provided within the Groundsure Report page 125. The background concentrations have been compared with their respective Suitable for Use Level (S4UL) and / or Generic Assessment Criteria (GAC) values, for a "Public Open Space: Park" land-use scenario. On this basis, none of the indicated background concentrations of the above determinants exceed their respective S4UL or GAC concentrations for the land-use.

4.3 Mining and Mineral Extraction

4.3.1 Coal Authority Records

The Groundsure report indicates that the site is "in an area which may be affected by coal mining activity". Therefore, a site-specific Consultants Coal Mining Report has been obtained and is enclosed in Appendix D. A summary of the findings of the report is presented in the table below.

Table 4.5 – Natural Ground Subsidence

Coal Mining Aspect	Comment
Past Underground Coal Mining	Approx. 15 seams were historically worked beneath the site at depths between 278m and 752m bgl.
Probable unrecorded shallow workings	None.
Mine Entries	Two shafts are reported adjacent south of the site, both have been filled and plugged with clay by the local authority. 12 disused adits are reported, 11 of which lie to the north of the site and one below the former tramway.
Open Cast Coal Mining	None recorded within 500m of the site boundary.
Coal Mining Subsidence	The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres since 31st October 1994.
Mine Gas	None recorded within 500m of the site boundary.

In general, the Coal Authority report does not indicate the presence of any known issues relating to coal mining associated with the site on the logic that mining is deep lying and historical (circa 1915) so that any extracted seam voids will have closed some time ago and associated ground movement ceased. There are however a wealth of adits lying uphill of Llanwonno Upper Tip, within a NRW owned plantation, that are known to discharge water. This water flows down Llanwonno road onto the land directly above Llanownno Upper Tip, where the discharge is

currently managed using a network of pipes installed as Phase 1 emergency works. An extract from the Consultants Coal Mining Report is presented in Table 4.6 below, detailing outcropping seams in the area.

Table 4.6 – Coal Outcrops from Consultants Coal Mining Report

Seam name	Mineral	Seam workable	Distance to outcrop (m)	Direction to outcrop	Bearing of outcrop
BRITHDIR RIDER	Coal	Yes	20.8	West	158
BRITHDIR RIDER	Coal	Yes	Within	N/A	166
NO.1 RHONDDA	Coal	Yes	Within	N/A	142
NO.1 RHONDDA	Coal	Yes	Within	N/A	324
TILLERY BRITHDIR	Coal	Yes	Within	N/A	140
TILLERY BRITHDIR	Coal	Yes	Within	N/A	318
TILLERY RIDER NO.1	Coal	Yes	Within	N/A	329
TILLERY RIDER NO.2	Coal	Yes	Within	N/A	158
TILLERY RIDER NO.2	Coal	Yes	Within	N/A	337

4.4 Water Environment

4.4.1 Hydrogeology

Due to the complex hydrogeological conditions at the site this topic has been afforded its own section. Please see Chapter 5 for a further information.

There are no Groundwater Source Protection Zones or abstractions within 1,000m of the site.

4.4.2 Hydrology

A network of small drains run from the top of the hill to the base, with approximately eight crossing one part or other of the site. The main watercourse in the area is the Afon Rhondda Fach, located 30m south of the site at its nearest point. This river is covered by the Water Framework Directive and achieved a chemical rating of good, an ecological rating of poor and an overall rating of poor at the last monitoring round in 2016.

There are no active surface water abstractions within 1,000m of site.

4.4.3 Surface Water Discharge Consents

The Groundsure Report page 39 identifies three operators with active discharge consents at, or within 500m of the site, as listed in the Table 4.7 overleaf.

Table 4.7 – Discharge Consents

Operator	Status	Discharge Type	Receiving Water	Location
-	Effective	Sewage Discharges – Sewer Storm Overflow	Rhondda Fach	Two permits at the same location, located 288m south
-	Effective	Trade Discharges – Site Drainage	Rhondda Fach	Ferndale – Banana Colliery Tip 313m west

4.4.4 Flooding

Flood Zone definitions are set out in the UK National Planning Policy Guidance, as shown in Table 4.8.

Table 4.8 – Flood Zones

Flood Zone	Definition	%
1	Land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding	<0.1%
2	Land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding or	1% – 0.1%
	Between a 1 in 200 and 1 in 1,000 annual probability of sea flooding in any year	0.5% – 0.1%
3	Land assessed as having a 1 in 100 or greater annual probability of river flooding or	>1%
	a 1 in 200 or greater annual probability of flooding from the sea in any year	>0.5%

Note: These flood zones refer to the probability of river and sea flooding, ignoring the presence of defences.

The site is located in a Flood Zone 1. A Flood Zone 2 is located adjacent south, becoming a Flood Zone 3 closer to the Rhondda Fach.

The risk from groundwater flooding for the vast majority of the site is categorised as negligible, with a thin strip of moderate associated with glaciofluvial deposits in the very valley bottom section of the site. The latter area is included for planning access reasons and the new waste deposition area (RS-C) is located well away from groundwater flooding risk areas.

4.5 Waste

4.5.1 Historical and Active Landfills

The Groundsure Report does not report any active or historical landfills within 500m of the site.

4.5.2 Waste Sites

The Groundsure Report does not report any active or historical waste sites within 500m of the site.

4.6 Environmental Setting

4.6.1 Pollution Incidents

According to the Groundsure Report page 41, 4no. Pollution Incidents have been identified within a 500m radius of the site. All were Category 3 – Minor incidents.

The most recent dates from 2013 and all are therefore considered historical. They are unlikely to have any impact upon the site and proposed development, although this cannot be ruled out entirely.

4.6.2 Industrial Sites

According to the Groundsure Report page 36 there are no current industrial sites located on or within 50m of the site.

4.6.3 Hazardous Sites

According to the Groundsure Report there are no sites within 500m which fall within the following categories:

- determined as Contaminated Land under Part 2A of the Environmental Protection Act 1990;
- Control of Major Accident Hazards Sites (COMAH);
- Notification of Installations Handling Hazardous Substances (NIHHS) sites;
- Planning Hazardous Substance Consent sites
- Historical Integrated Pollutions Control Authorisations;
- Part A (1) and Integrated Pollution Prevention Control Authorisations;
- Red List discharge consents;
- List 1 Dangerous Substances Inventory Sites;
- List 2 Dangerous Substances Inventory Sites;
- Part A (2) and Part B Activities;
- Category 3 or 4 Radioactive substance authorisations; and
- Planning Hazardous Substance Consents and Enforcements
- Water Industry Referrals (potentially harmful substances to the public sewer).

4.6.4 Unexploded Ordnance (UXO)

The site is located within an area that is at low risk with regard to UXO according to risk maps provided by Zetica UXO Ltd and this health and safety matter is not considered further.

4.6.5 Environmentally Sensitive Sites

According to the Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance (2012), Section 4.3 (Table 1) land can be determined as “Contaminated Land” if it has

the significant possibility of significant harm (SPOSH) to one or more of the following ecological systems:

- Local Nature Reserves (LNR),
- Marine Nature Reserves (MNR),
- National Nature Reserves (NNR),
- National Parks,
- Ramsar Sites,
- Sites of Special Scientific Interest (SSSI),
- Special Areas of Conservation (SAC) (including candidates) or
- Special Protection Areas (SPA) (including candidates).

According to Groundsure Report, none of the above designations are present within 500m of the site.

4.6.6 Heritage / Archaeology

Heritage/archaeology is being assessed through a site specific appraisal, as part of the sites Environmental Assessment report.

5. Hydrogeology

5.1 Introduction

Information regarding the hydrogeology of the Phase 4 site has been obtained from:

- Llanwonno Tips Reclamation Scheme Stability Report 2004 (Ref. 2);
- Hydrogeological Map of South Wales (BGS, 1986);
- The physical properties of minor aquifers in England and Wales (Jones et al., 2000); and
- Hydrogeology of Wales: Carboniferous aquifers - the Coal Measures facies (Robins and Davies, 2016)

5.2 Hydrogeological Units

5.2.1 Regional Hydrogeology

The Pennant Sandstone Formation forms the largest aquifer within Rhondda Cynon Taf, and is classified by NRW as a Secondary A aquifer, which means that these rocks are capable of supporting water supplies at a local rather than strategic scale. The Hydrogeological Map of South Wales (1986) is reproduced below showing that the site is located on the formerly named Upper Coal Measures and specifically the Brithdir Beds (now the Brithdir and Rhondda Members of the Pennant Sandstone Formation).

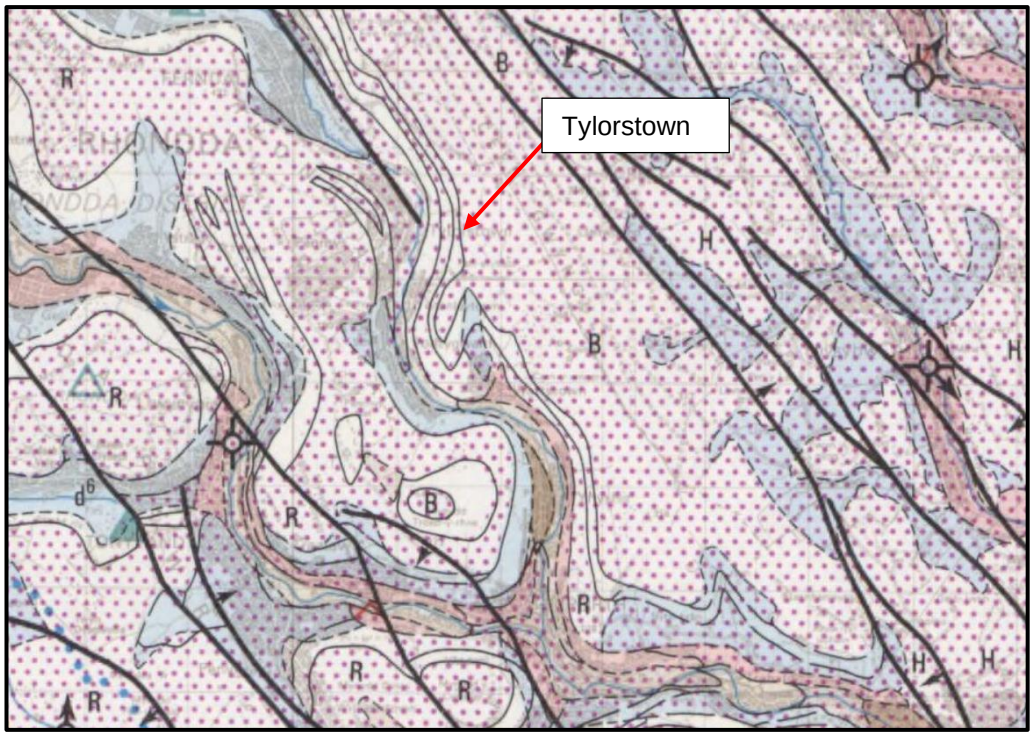

Figure 5.1 - Extract from hydrogeological map of South Wales showing site location

The Pennant Sandstone Formation is recognised as having large quantities of groundwater within a multi-layered aquifer system, with the sandstone units forming distinct and separate aquifer units between the lower permeability argillaceous layers of coal and mudstone which form aquitards. However, where mining has occurred then hydraulic continuity between these sandstone layers has been created in many places. Near the surface, groundwater within these sandstone units will be unconfined, but with increasing depth groundwater bodies in each sandstone unit will tend to become confined beneath argillaceous layers.

The sandstones are very well cemented, extremely hard and dense and as a result possess very little intergranular permeability and porosity. The sandstone permeability is directly related to the distribution and size of fractures present in the sandstone horizons. Mining has induced tension and compression fractures within these sandstones increasing the hydraulic conductivity of the sandstones. Fractures can be up to several centimetres in aperture near the surface.

Transmissivities of the Pennant Sandstone Formation are highly variable and range between 0.15 and 225 m^2/day. Specific yield data are not available for the sandstones but given the lack of primary porosity it is expected to be in the region of 0.005 to 0.05. Storage coefficients are likely to be around 0.002.

Infiltration of rainwater is diverted from further vertical migration by the argillaceous bands which then emerges as streams (labelled as issues on mapping) or provides baseflow to rivers. It is noted in Robins and Davies (2016) that adits were frequently used as mine drainage to a valley side.

5.2.2 Site Hydrogeology

Site-specific data was only available for the Llanwonno Upper Tip area of the Phase 4 works; this has been reviewed below. No information for Receptor Site C was available at the time of writing and therefore hydrogeological conditions have been inferred.

Data from the Halcrow (2004) stability report cross sections support the regional view that in places there are separate aquifer units within the sandstone layers. Whilst it has not been possible within the remit of this PSSR report to view and assess individual borehole strikes or the Halcrow groundwater monitoring dataset, Sections LWT R2 2 and LWT R2 3 with LWT1 and LWT6 indicate two separate aquifers in an upper and lower sandstone unit, with very different groundwater levels obtained within the spoil/superficial deposits and the sandstone layers.

The relevant argillaceous layers at Llanwonno Upper Tip, from the surface downwards, are the Brithdir Rider, Brithdir, 1st Rhondda Rider and 1st Rhondda[1]. Were the argillaceous material and sandstones not covered by superficial deposits and colliery spoil, then very distinct, separate unconfined aquifers would be present near the surface in each sandstone layer, with streams emerging where the groundwater met the surface near the boundary with the coal/mudstones. The presence of the superficial deposits and colliery spoil makes this simplistic model less likely, however there are distinct spring line across the slacks which appear to generally coincide with argillaceous layers. The sandstones layers above and immediately below the Brithdir are also unconfined and appear to be separate. Vertical groundwater gradients appear to be downwards

[1] Capita take the location of the coal seams from the BGS mapping and this does not concur with labelling on cross sections in the Halcrow report which we consider are erroneous

in all locations where two strikes or groundwater levels have been monitored. Vertical groundwater gradients may reverse to be upwards near the base of the valley where the river may receive groundwater as part of its base flow.

The presence of the adits at the boundary of the Brithdir coal seam is likely to be linked to draining the sandstone immediately above it in order to gain access to this coal seam from the surface (Robins and Davies, 2016). These adits are known to issue water during times of high rainfall, supporting this hypothesis of a drainage mechanism.

5.2.3 Summary

The hydrogeological units on Llanwonno Upper Tip site as found outcropping from north-east to south-west (the outcrop formed where the hillslope exposes the geology) are presented in Figure 5.2, overleaf and described below, using a surface downwards order:

- Colliery spoil and superficial deposits – intergranular flow with a continuous groundwater body which is in continuity with the underlying sandstone. Unconfined;
- Sandstone 2 – unconfined with fracture flow dominant in continuity with groundwater within overlying colliery spoil and superficial deposits;
- Brithdir argillaceous layer – an aquitard but close to the surface is overlain by colliery spoil and superficial deposits so does not provide a barrier to flow near the surface;
- Sandstone 3 – unconfined fracture flow dominant in continuity with groundwater within overlying colliery spoil and superficial deposits
- 1st Rhondda Rider argillaceous layer – an aquitard but close to the surface is overlain by colliery spoil and superficial deposits so does not provide a barrier to flow;
- Sandstone 4 – confined in the northern part of the site under two argillaceous layers, but unconfined in southern part of the site as it outcrops at or close to the surface;
- 1st Rhondda argillaceous layer – an aquitard but close to the surface is overlain by colliery spoil and superficial deposits so does not provide a barrier to flow. Confines deeper sandstone layers in the north of the site;
- Sandstone 5 – confined in the northern part of the site under two argillaceous layers, but unconfined in southern part of the site as it outcrops at or close to the surface;
- Daren Rhestyn – an aquitard but close to the surface is overlain by colliery spoil and superficial deposits so does not provide a barrier to flow;
- Sandstone 6 – confined in the northern part of the site under two argillaceous layers, but unconfined in southern part of the site as it outcrops at or close to the surface.

Data from the Halcrow (Ref. 2) stability report indicates that groundwater is present[2] within the colliery spoil in the basal 1-2 m of the Llanwonno Upper Tip. Halcrow state that there is generally between 0.3 and 2.4 m of groundwater above the base of the Upper Tip. Groundwater is also

[2] It is noted that the Halcrow report is dated 2004 and water height and surfaces can change annually and due to climate change and this data is pre-slip

present within the superficial deposits as well as the sandstone units. Groundwater flow directions mimic the surface topography with flow down towards the base of the valley.

The sandstone layer beneath the argillaceous 1st Rhondda at 275 m AOD in LWT1 appears to be confined, as would be expected as depths increase.

The underlying superficial deposits are generally of high hydraulic conductivity and high porosity, although they have lower hydraulic conductivity in localised areas. Specifically Halcrow note that construction of the lowest tier of the Upper tip created a pond at that location which was likely due to surface water runoff and the unconfined groundwater in the superficial deposits and colliery spoil meeting the lower hydraulic conductivity argillaceous layer of the 1st Rhondda and lower conductivity superficial material. Seepages were present at the toe of the incline which is coincident with deeper argillaceous layers.

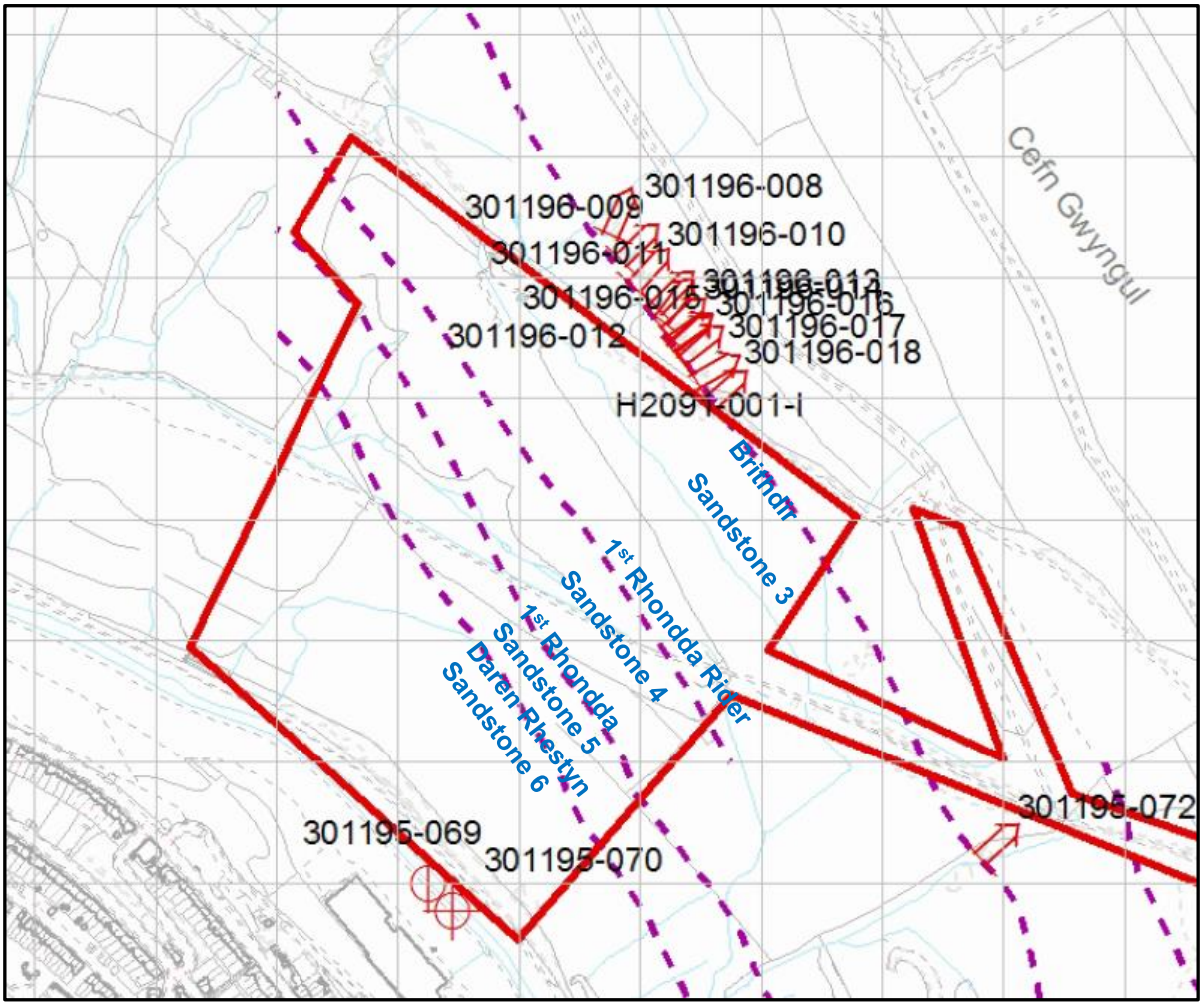

Figure 5.2 - Inferred hydrogeological units at the upper tip site

In the RS-C area of the Phase 4 site the hydrogeological units are inferred to be as follows from the surface downwards:

- Sandstone 1 at the surface of the site - unconfined fracture flow dominant;

- Brithdir Rider - does not outcrop at the surface of the site RS-C Phase 4 main part of the site but is likely to outcrop at the tramway. This aquitard should provide a barrier to flow as no known colliery spoil or superficial deposits in this part of the site;
- Sandstone 2 – likely to be confined beneath the Brithdir Rider with fracture flow dominant; and
- Brithdir argillaceous layer – an aquitard likely to confine groundwater in the underlying sandstone layers.

The sequence of sandstone and argillaceous layers will then follow the same geological sequence as described for the Llanwonno Upper Tip. Some caution is required as no borehole information is available for RS-C and local minor faults can cause changes to that shown on geological mapping.

5.3 Groundwater Levels

Data for groundwater levels have only been recorded for the Llanwonno Upper Tip area. No data have been available to review for RS-C, but it is envisaged that broadly similar trends would be observed.

Those piezometers installed in the colliery spoil and superficial deposits recorded groundwater level variations of the order of 1.0 m, whereas within the sandstone and siltstone this was much more variable between approximately 0.5 and 4.0 m over the monitoring period. The small variation in groundwater level in the spoil indicates a high porosity material, whereas the generally higher variation in level in the sandstone and siltstone indicates a lower porosity material. This is supported by the regional data which states that the effective porosity of the siltstone and sandstone is low and is principally due to fractures rather than inaccessible intergranular porosity.

Ten piezometers were installed in Llanwonno Upper Tip at various points between 1995 and 2004, with a recorded head of water varying between 0.73 m and 2.43 m above the base of the tip. Three locations were noted to frequently seep at the toe of the Upper Tip. Six piezometers, located in superficial deposits beneath the Upper Tip, reported a head of water between 0.00 m and 6.87 m above the base of the deposit.

Six piezometers were installed in bedrock below the Upper Tip. Readings from four piezometers installed in siltstone and sandstone generally indicated piezometric heads between 3.82 and 1.59 m above rockhead. Halcrow (2004) state that the piezometric levels in rockhead are comparable to levels obtained in overlying piezometers installed within colliery spoil. From the cross sections, this does not appear to be entirely the case at depth, as stated earlier.

5.4 Interactions with Surface Water

In 1875 the Llanwonno Tip site comprised open hillside and was wooded on the lower slopes, with at least five streams descending the hillside in the vicinity of the current tips flowing generally towards the south west. Creation of the tips resulted in streams being diverted around and, in some cases, beneath the tips and a more complex pattern to this surface water drainage developing. The central incline acts as an unlined channel, conveying the majority of run-off from the Upper Tip and adjacent hillside behind and past the Lower Tip. Construction of the lowest tier of the Upper Tip created a series of ponds, fed by surface run-off and seepage through the tip.

At least one watercourse is culverted beneath the Lower Tip, with an outfall below the tip. Downhill of the tips, the stream courses cross natural ground and pass through short culverts beneath the former railway to discharge into the Afon Rhondda Fach.

The emergence of the streams is due to the presence of the low angle, low hydraulic conductivity argillaceous layers intersecting the surface causing groundwater to egress; this can be seen in existing emergence of streams. A series of spring lines are now emerging from the slack at the approximate location of the former tramway/ponds. Care should be taken that the remedial design still allows for these streams to flow or where the streams are blocked by Storm Dennis slide material that there is an alternative method of surface water drainage in place.

There are no watercourses crossing the RS-C Phase 4 area. There are however two watercourses that border the site area on the western side at easting 301850 to 301950.

Flows within the majority of these watercourses are known to be variable and ephemeral and will depend on groundwater level in comparison to the argillaceous layers.

6. Available Information

The following section gives a précis of the relevant information obtained concerning the site and other phases of work relating to the removal of slipped colliery spoil.

6.1 Tylorstown and Llanwonno Tips Interpretative Report and Feasibility Study, Parkman Environment, 1993

Parkman Environment undertook a feasibility study into the reclamation of Tylorstown and Llanwonno Tips. They reported previous stabilisation works on Tylorstown Tip after a series of slips in the 1970s which included the removal of the tips conical top, benching of the sides and the placement of counterbalancing fill. Works also involved surface water concrete drainage channels, mine adit drainage measures, tunnel drive adit drainage measures and gabion channels to direct water from or in the colliery spoil heap. The calculated volume of the tip was 4.25 million m^3.

A ground investigation was undertaken at both tips. The geology is discussed in the Halcrow report detailed in Section 6.2, which built upon these 1993 findings. 13 locations were analysed for coal content on both tips with an average value of 8.5%, although a maximum value of 30.8% was found in one location. Tylorstown Tip was also reported to have pockets of spoil undergoing combustion, with elevated temperatures and compounds indicative of burning found in the waters from some boreholes.

6.2 LLanwonno Tips Reclamation Scheme Stability Report, Halcrow Group Ltd., 2004

Halcrow undertook a stability assessment Llanwonno Upper and Lower Tips. Llanwonno Upper Tip lies within the Phase 4 site boundary and is the source of the 2020 landslip, while the Lower Tip is the spoil heap described in Chapter 3 as lying adjacent, west of the site boundary.

Instability in Llanwonno Upper Tip was noted in aerial photography dating from 1947, indicating early failure of the structure. Further events include the appearance of a 190 m long arcuate backscar in 1993 and a 20 m tension crack in 2000. They report that a number of streams were diverted around or beneath the tips to facilitate their deposition, and a central incline which separates the upper and lower sites acts as an unlined channel, conveying the majority of the run-off from Llanwonno Upper Tip.

6.2.1 Geology

A 2001 ground investigation sought to characterise conditions at the site. Upper Coal Measures (Pennant Measures) were found to underlie the tips with three boreholes encountering three coal seams. Contrary to geological maps, they identified superficial deposits to lie beneath the tips, with a maximum thickness of 7.90m beneath Llanwonno Upper Tip.

Colliery spoil material predominantly comprised sand, gravel and cobble-sized fragments of mudstone and coal with lesser quantities of siltstone, sandstone and ironstone. The material comprised sand and gravel with some cobbles and less than 20% fines, which was classified as coarse soil in accordance with BS5930:1999. The maximum thickness of deposits in Llanwonno

Upper Tip were 24.00m in the south-east, though this tapers to 5.00m at locations in the north-west. Halcrow surmise that, while not present on records, a historical quarry exploiting the Rhondda Sandstone is located beneath the deepest portions of Llanwonno Upper Tip and is perhaps the reason that the tip was sited where it is. This prediction is, according to Halcrow, supported by geophysical surveys.

6.2.2 Hydrology

Key points include:

- Flows from above Llanwonno Road emerge from two pipes beneath the road and are conveyed in an unlined channel obliquely across the hillside above Llanwonno Upper Tip. Inspections have shown that, even in wet periods, these flows sink into the hillside upslope of Llanwonno Upper Tip.
- Llanwonno Upper Tip was placed over two streams whose flows were diverted southwards in an unlined channel. Site inspections showed flows to be ephemeral.
- The construction of the lowest tier of Llanwonno Upper Tip resulted in the formation of ponds. The ponds are perennial and are fed by surface run-off from Llanwonno Upper Tip and groundwater issues. The ponds have no permanent surface outlet and water overspills westwards in very wet conditions. A pipe emerges from the lowest tier of Llanwonno Upper Tip and discharges flows into the incline ditch. It is believed that this pipe provides a drainage outlet for the ponds.
- A ferruginous seep was identified emerging from the base of the Upper Tip.

6.2.3 Conclusions

It was concluded that Llanwonno Upper Tip would not meet generally accepted stability criteria under either existing or reasonably foreseeable conditions. Halcrow stated that, based on the observed behaviour, the consequence of this instability would be gradual encroachment of the tip onto the natural ground adjacent to the toe of the tip. However, should the displacements become significant, the existing ponds and surface drainage would be disrupted and possibly breached, resulting in rapid and uncontrolled water and debris flows.

6.3 Tylorstown Landslip – Factual Report on Ground Conditions, Intégral Géotechnique, 2020

Intégral Géotechnique attended the site in 2020 to characterise the material which made up the debris toe of the landslip, in the valley bottom. Six trial pits were excavated on the eastern side of the river, to depths of between 1.5m and 3.0m. The deposits were found to typically comprise a thin crust of desiccated material consisting of loose grey silty sandy gravel (between approx. 0.1 and 0.2m thick. This lay over (very loose) dark grey or grey brown variably silty variably sandy fine to coarse gravel with variable cobble and boulder content, or locally soft grey brown sandy gravelly clay/silt with variable cobble and boulder content. The coarse constituents (i.e. gravel, cobbles and boulders) comprised variable amounts of mudstone, coal and sandstone.

Seven samples were sent for laboratory analysis of a range of contaminants. Waste Classification Reports prepared using HazWasteOnline showed that all samples would be classed as non-hazardous waste.

6.4 Utility Information

Details of the existing services on, or in the vicinity of, the sites were obtained from RCT and are summarised below:

6.4.1 Western Power Distribution

A 33kV overhead power line runs lies immediately south of RS-C and is diverted to underground cabling along the eastern edge of the site boundary.

7. Geotechnical Design Approach

7.1 Introduction and Development Proposals.

This chapter provides an outline of the geotechnical design approach and is split into the three development areas of the site namely LLanwonno Upper Tip, the haul road and the RS-C site. The development proposals are as follows:

- The desired landscape to be created at the slip sites is one of flattened hillslope better matching the surrounding terrain. A sketch of the earthworks is provided below. 3D terrain modelling shows this to require removal of in the region of 200,000 m^3 of spoil and 60,000 m^3 of fill to infill such features as the slip scar. This will result in a net export of 150,000 m^3. In association with these works the temporary Phase 1 drainage works will require upgrading into a permanent system and this is envisaged to require elements of the temporary system plus additional drainage around the toe of the tip and some elements of drainage linking down to the lower, western edges of the site where there are well developed streams and runnles. Selected Design drawings for the re-profiling are provided in drawings GC3613-RED-61-RSC-DR-C-0004 to GC3613-RED-61-RSC-DR-C-0008.
- The tramway will require passing points and strengthening and widening to accept the anticipated size and volume of construction traffic require for moving the materials. Given that the type machinery used to move the spoil is of multi-wheeled off-road type then it is not envisaged that the former tram track will require paving or long stretches of aggregate capping. The drainage of the track is however poor and local improvement will be required.
- The 150,000 m^3 of fill material is planned to be placed in an irregular landform within RS-C, lying to rear of Tylorstown Tip. Preliminary designs show this landform to be 540 m long and between 75 and 120 m wide, with a maximum hight of 7m and a 2.5 % cross fall. The side batters are 1 in 3 maximum. It is possible that the topsoil strip will be replaced as a cap pending landscape designs being completed. A material deposit drawing is provided as GC3613-RED-61-RSC-DR-C-0009 to GC3613-RED-61-RSC-DR-C-00013.

7.1.1 Llanwonno Upper Tip

This PSSR, along with the factual information contained in the Halcrow reports will inform a next stage of stability checks on the designed landform. The stability analyses will conform to Eurocode standards and will use SLOPE software to explore the factors of safety the new landform will present. The model will be developed using a number of geological cross sections developed from a combination of Halcrow borehole logs and also in field observations of the glacial till stratum exposed in the back scar and inserting the curvate feature of the existing slip surface.

The strength parameters for the fill are provided in the Halcrow report and have been based on particle size distribution and shear box testing. The peak angle of shearing resistance = 33.5 degrees and the residual angle of shearing resistance = 26.5 degrees. The water level data input

to the model will need to reflect the Halcrow measurement that the piezometeric head lies within the porous spoil at typically between 0.73 m and 2.43 m above the base of the tip, but it will be prudent to plot piezometric contours of the Halcrow data in order to select which head will apply in any given cross section.

In addition, a permanent drainage design is programmed to follow the issue of this PSSR. The key features to drain, or where drainage is not possible due to slip coverage to intercept at a higher level up the slope, as described in section 5.4

In terms of mining stability, the risk is considered low (refer section 4.3 for rationale) and a formal coal authority mining risk assessment will be prepared, submitted and approval sought prior to any fill removal works commencing in Phase 4.

The stability assessment will include a section on any short- or medium-term monitoring, though it is possible that the factor of safety delivered by the emergency works is such that no monitoring is necessary at this site.

7.1.2 *Haul Road*

The haul road will be subject to a condition assessment to assess its suitability to carry the intended earth moving vehicles and this will include the condition of embanked sections raised on spoil or other Made Ground. The drainage of the route will be a material consideration and local improvements will need to be designed as appropriate. A degree of rutting may be inevitable, and it is envisaged that a programme of on-going repair during haulage operations will be necessary using capping type aggregates and perhaps laid over geogrid laid as a strengthening layer, particularly where a disused mine adit passes beneath the haul road.

7.1.3 RS-C

Geological mapping does not show any superficial deposits. It is observed that there is a cover, perhaps less than 2 m thick, of burnt colliery shale but other Made Ground materials may be present. Sandstone of the Rhondda Member lie at, or close to, the ground surface. containing an unconfined water body. The Brithdir Rider coal seam is indicated to underlie the site at moderate depth, but records indicate this has not been worked. Beneath this lies further sandstones, likely forming a confined deep aquifer due to the presence of argillaceous material associated with the Brithdir Rider.

This geology is thought to provide a reasonably competent formation for the support of the new landform. Post construction settlements are likely to be small and well within the tolerable limits of an earth landform, though a site investigation is planned to fully categorise the ground conditions including its compressibility. The designs for new landform include a separation zone between it and the toe slopes of Tylorstown Tip, so that there is no risk of the landform having a destabilising influence. Again, the site investigation will include a number of holes installed in this ‘peripheral‘ zone to Tylorstown Tip.

The fill material is granular and as such it is not thought that the rainwater infiltration/run off pattern will be significantly affected, though a small amount of extra storage will be afforded where the fill is thickest. The site investigation will establish piezometric heads in any Made Ground layers and in the shallow rock head to allow the hydrogeological model to be confirmed /amended.

The donor fill material is thought to contain on average 8.5 % coal and to have Calorific Values of values 2.09 to 4.51 MJ/kg with an average of 3.05 MJ/. The BRE information paper 'Fire and explosion hazards associated with the redevelopment of contaminated land' (Crowhurst and Beever, 1976) indicates that materials with a calorific value (CV) greater than 10 MJ/kg are considered highly combustible, while those with less than 2 MJ/kg are deemed highly unlikely to be so. On this basis, as long as hotspots of any coal material are screened, then the risk of smouldering in the finished heap is small.

Stability of the slope from slippage is very low as side batters of 1 in 3 have been selected and such slopes have a track record of providing embankments of good stability.

The design of the upper surface of the landform will need to consider whether it can resist erosion from walkers, though local erosion from off road motorcycle use may be difficult to achieve.

In terms of mining stability, the risk is initially considered low (refer section 4.3 for rationale). Receptor Site C is not within a Coal Authority high risk zone. However, as the haul road and donor site (Llanwonno Upper Tip) are within a high risk zone, a formal Coal Authority mining risk assessment is required for planning.

8. Contaminated Land Assessment

8.1 Introduction

The information presented in the previous sections of this report has been collated and evaluated to establish a preliminary qualitative risk assessment for the site. A preliminary conceptual site model has been generated based on information derived from this assessment.

The site has been considered with regard to current UK legislation and guidance, namely 'Land Contamination: Risk Management 2019', Part 2A of the Environmental Protection Act 1990 and the Contaminated Land (England) Regulations 2000 and in accordance with current UK good practice guidelines.

For a risk of pollution or environmental harm to occur as a result of ground contamination, all of the following elements must be present in order for a pollutant linkage to be formed:

- Source, i.e. a substance that is capable of causing pollution or harm;
- Pathway, i.e. a route by which the contaminant can reach a target; and
- Receptor (target), i.e. something which could be adversely affected by the contaminant.

If one of these elements is absent there can be no significant risk. If all are present then the magnitude of the risk is a function of the magnitude and mobility of the source, the sensitivity of the receptor and the nature of the migration pathway.

The contaminated land 'Preliminary Risk Assessment' provides a qualitative evaluation of potentially active "pollutant linkages" at the site; these being plausible scenarios whereby a contamination source is connected to a possible receptor by one more potential migration pathways:

i. Potential sources of contamination: these include any actual or potential contaminative materials and activities, located either on, or in the vicinity of the site;

ii. Potential pathways for contamination migration: these comprise the routes or mechanism by which in-ground contaminants may connect the source to a receptor, including environmental migration pathways and human health exposure pathways; and

iii. Potential receptors at risk from contamination or pollution: these include present and / or future land users, ecological systems, water resources and property.

Potential sources, pathways and receptors have been identified and the risks associated with possible pollutant linkages assessed in Table 8.1.

8.2 Conceptual Site Model

From the information reviewed in this report the following on-site and off-site sources of potential contamination, receptors and potential pathways have been identified for the site. Sources, pathways and receptors are numbered on the drawing and correspond to the features in Table 8.2 below.

Table 8.2 – Conceptual Site Model

Potential Sources of Contamination		Number
On-Site		
Llanwonno Upper Tip and the northern foot of Tylorstown Tip – colliery spoil which is within the site boundary. Risk of leachate high in pH, iron, manganese, aluminium, sulphate with low to trace PAH's and ground gas generation		**S1**
Historic tramways – potential for contaminants including PAHs, herbicides, creosote or asbestos		**S2**
Burnt shale fill at RS-C may include arsenic and PAH's		**S3**
Off-Site		
Llanwonno Lower Tip and Tylorstown Tip – leachate high in pH, iron, manganese, aluminium and sulphate with low to trace PAH's and ground gas generation.		**S4**
Mine adits – potential for acid mine drainage and ground gas generation. An example being a seepage of ferruginous mine water from Llanwonno Lower Tip		**S5**
Former quarries, some potentially infilled – generation of ground gas		**S6**
Identified Pathways		
Human Health – Airborne Migration Pathways / Inhalation	As the majority of the site is not currently surfaced with hardstanding, there are potential **particulate / dust / fibre** inhalation pathways. This pathway includes windblown contaminants from offsite sources.	**P1**
	Vapour inhalation pathways.	**P2**
Human Health – Direct Contact Exposure Pathways	Direct **dermal contact** with soils and waters.	**P3**
Human Health – Ingestion	**Ingestion** via hand to mouth action from contaminated soils and waters.	**P4**
Controlled Waters – Aqueous Migration Pathways	On-site surface / near-surface mobile contaminants have the potential to enter the shallow groundwater regime via **leaching** and migration and impact the underlying aquifers and via seepage outflows impact watercourses within the local area.	**P5**
	The bedrock geology is indicated to be a Secondary A aquifer, in which **groundwater migration** pathways may be active.	**P6**

Table 8.2 – Conceptual Site Model (cont.)

Potential Receptors		Number
Human Health	**Current site users** including members of the public such as walkers.	**R1**
	Construction workers / contractors who may undergo exposure during construction work (particularly ground works) undertaken at the site.	**R2**
	Future end-users including members of the public such as walkers.	**R3**
Controlled Waters	The **Afon Rhondda Fach** and tributaries	**R4**
	Groundwater within the **Secondary A Aquifer** superficial and bedrock deposits	**R5**

8.3 Discounted Sources

Former Pendyrys and Ferndale Colliery – while the former collieries are a likely source of contamination on the valley floor, it is considered unlikely that any contamination would impact the Phase 4 site as it would be reasonably localised to the sources areas and there is sufficient separation (often uphill) from the site as to rule out any pathway. Historically there were smithies associated with the colliery buildings but again these are quite distant from the Phase 4 site. Of all sources then mine gas is likely to travel the furthest but the old colliery shafts are now filled and or capped and the Pendyrys Colliery is redeveloped as the Rhonda Fach Leisure Centre.

There is a former railway – now dismantled running along the valley side a little higher than river level. This has remnant sleepers and a ballast layer. Whilst asbestos and creosote type sources are possible the features lie a little way from Phase 4 and the Phase 4 land is higher.

8.4 General

Based on the Conceptual Site Model outlined in the preceding sections, a qualitative ground contamination Preliminary Risk Assessment has been undertaken in-line with the methodology outlined in CIRIA 552 (CIRIA, 2001).

The assessment of risk is considered as a combination of the severity of the potential risk and likelihood of its occurrence in line with the definitions presented in the following tables.

Table 8.3 – Classification of Consequence

Category	Definition – Human Health	Definition – Environment	Definition – Buildings	Definition – Ecology
Severe	Short term (acute) risk to human health likely to result in "significant harm" as defined by the Environment Protection Act 1990, Part IIa. e.g. high concentrations of cyanide on the surface of an informal recreation area.	Short term risk of pollution of sensitive water resource. e.g. major spillage of contaminants from site into controlled water.	Catastrophic damage to buildings / property. e.g. explosion, causing building collapse.	A short-term risk to a particular eco-system or organism forming part of such ecosystem.
Medium	Chronic damage to Human Health.	Pollution of sensitive water resources. e.g. leach of contaminants from a site to a Principal or Secondary Aquifer.	Severe damage to building fabric	A significant change in a particular ecosystem. e.g. death of a species within a designated nature reserve.
Mild	Heath deterioration that last several months	Pollution of non-sensitive water resources. Pollution of non-classified groundwater.	Significant damage to buildings, structures and services. Damage to sensitive buildings / structures / services. e.g. foundation damage resulting in instability.	Significant damage to crops. Damage to sensitive parts of the environment.
Minor	Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc.).	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve.	Easily repairable effects of damage to buildings, structures and services. Discoloration of concrete.	The loss of plants in a landscaping scheme.

The likelihood of an event (probability) takes into account both the presence of the hazard and target and the integrity of the pathway and has been assessed based on the categories given below.

Table 8.4 – Categorisation of Probability

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

The potential severity of the risk and the probability of the risk occurring have been combined in accordance with the following matrix in order to give a level of risk for each potential hazard.

Table 8.5 – Risk Matrix Categories

		Potential Severity			
		Severe	Medium	Minor	Negligible
Probability of Risk	High Likelihood	Very High	High	Moderate	Low / Moderate*
	Likely	High	Moderate	Low / Moderate	Low
	Low Likelihood	Moderate	Low / Moderate	Low	Very Low
	Unlikely	Low / Moderate	Low	Very Low	Very Low

N.B. – High Likelihood with Minor Severity has been modified from CIRIA C552 from Low / Moderate to Low Risk in NHBC RandD66.

A qualitative risk assessment has been undertaken for the contaminant linkages to identify any potentially unacceptable risks in relation to the existing site setting and the proposed development. Table 8.6 below details the risk categorisation for each identified potentially significant pollutant linkage.

Table 8.6 – Qualitative Risk Assessment

Potential Sources of Contamination	Potential Receptor	Potential Pathway	Consequence of risk being realised	Probability of risk being realised	Risk	Justification / Comments
S1: Llanwonno Upper Tip and the northern foot of Tylorstown Tip	R1: Current Site Users	P1: Particulate / dust / fibre inhalation P2: Vapour inhalation P3: Direct dermal contact P4: Ingestion	Unlikely	Minor	Very Low	Public access to the site is limited and likely constrained to members of the public out walking around Tylorstown Tip.
	R2: Construction workers / contractors		Low likelihood	Medium	Low	Testing of slipped material in 2020 GI showed low levels of contamination. Combustion within Tylorstown Tip may be producing carbon dioxide.
	R3: Future end-users		Unlikely	Minor	Very Low	Similar situation to current site users.
	R4: Afon Rhondda Fach	P5: Leaching P6: Groundwater Migration	Likely	Minor	Low / Moderate	A ferruginous seep was noted from Llanwonno Tip by Halcrow in their 2004 report. Surface water flows towards the river.
	R5: Secondary A Aquifer		Low likelihood	Medium	Low	Leaching was visibly noted by Halcrow in 2004 which indicates the potential for groundwater contamination, but argillaceous bands will protect deeper groundwater
S2: Historic tramways and S3 burnt shale spread	R1: Current Site Users	P1: Particulate / dust / fibre inhalation P2: Vapour inhalation	Unlikely	Negligible	Very Low	Levels of contamination unlikely to be high enough to trigger human health toxicity.
	R2: Construction workers / contractors		Low likelihood	Minor	Low	Construction workers may encounter some contamination when undertaking groundworks.

	R3: Future end-users	P3: Direct dermal contact P4: Ingestion	Unlikely	Negligible	Very Low	Similar situation to current site users.
	R4: Afon Rhondda Fach	P5: Leaching P6: Groundwater Migration	Unlikely	Minor	Very Low	The distance these sources lie they lie from the river makes any potential impacts unlikely due to dilution and dispersal.
	R5: Secondary A Aquifer		Low likelihood	Minor	Low	There is the potential for contaminants to leach into unconfined aquifers. However, there is no abstraction in the area
S4: Lower Llanwonno Tip and Tylorstown Tip	R1: Current Site Users	P1: Particulate / dust / fibre inhalation P2: Vapour inhalation P4: Ingestion	Unlikely	Minor	Very Low	The off-site tips are all well vegetated, decreasing the potential for contaminant particulate migration.
	R2: Construction workers / contractors		Low	Medium	Low	There is the potential for ground gas generated by emission from seams to accumulate in drainage culverts and manholes, potentially harming construction workers.
	R3: Future end-users		Unlikely	Minor	Very Low	Similar situation to current site users.
S5: Mine adits/levels	R1: Current Site Users	P2: Vapour inhalation	Unlikely	Minor	Very Low	The principle risk comes from mine gas, which is unlikely to affect
	R2: Construction workers / contractors		Low likelihood	Medium	Low / Moderate	There is the potential for explosive or asphyxiant gases to accumulate in excavations.
	R3: Future end-users		Unlikely	Minor	Very Low	Similar situation to current site users.

	R4: Afon Rhondda Fach	P5: Leaching P6: Groundwater Migration	Unlikely	Medium	Low	Placing a large amount of colliery spoil at the top of the valley in the receptor site may disrupt the hydrogeological conditions, potentially raising contaminated mine water to impact receptors.
	R5: Secondary A Aquifer		Unlikely	Medium	Low	
S5: Former quarries, some potentially infilled	R1: Current Site Users	P1: Particulate / dust / fibre inhalation P2: Vapour inhalation	Unlikely	Negligible	Very Low	Historically quarries were occasionally tipped with waste that would be capable of producing ground gas, however the most likely tipped material in the area is colliery spoil.
	R2: Construction workers / contractors		Low	Minor	Low	Material used to fill quarries may be capable of producing leachate or gases which could migrate to the site and be encountered during ground works.
	R3: Future end-users		Unlikely	Negligible	Very Low	Similar situation to current site users.

Note: It is assumed that site conditions are post-development, assuming no mitigation or remedial measures are implemented

9. Summary

9.1 Ground Model Establishment

This report collates geo-environmental, geological, mining and geotechnical information relating to the three development sub areas of the site. Geological maps, former ground investigations and records from the Coal Authority have been combined to develop a ground model for both the Llanwonno Upper Tip and Receptor Site C (RS-C).

The report includes a detailed breakdown of aquifer and non–aquifer stratigraphy beneath the Site (i.e. the different sandstone and mudstone/coal layers) and this should inform any future ground investigation and or decisions as to where potential monitoring wells should be placed and what layers they should be screened in.

9.2 Llanwonno Upper Tip

The ground model here is one of alternating sandstones and argillaceous bands associated with coal seams and in the case of Llanwonno Upper Tip there is surface deposit of diamicton. The shallow coal seams are unlikely to have been worked beneath the redevelopment area footprints. Springs emerge at various points along the valley face and five separate streams or rivulets traverse or underlie the Llanwonno tip area.

The slide at Llanwonno is interpreted to be water pressure induced and surface water build up at the head of the tip is thought to be the contributor. There is now a circular style slip surface embedded in the remnant slip mass with a substantial arcuate back scar.

This PSSR, along with the factual information contained in the Halcrow reports, will inform a next stage of stability checks on the designed landform. The stability analyses will conform to Eurocode standards and will use SLOPE software to explore the factors of safety the new landform will present. The model will be developed using a number of geological cross sections developed from a combination of Halcrow borehole logs and also in field observations of the glacial till stratum exposed in the back scar and inserting the curvate feature of the existing slip surface.

The water level data inputted in the model will need to reflect the Halcrow measurement that the piezometeric head lies within the porous spoil at typically between 0.73 m and 2.43 m above the base of the tip but it will be prudent to plot piezometric contours of the Halcrow data in order to select which head will apply in any given cross section.

In addition, a permanent drainage design is programmed to follow the issue of this PSSR and key drainage features are highlighted in this report.

In terms of mining stability risk then is considered low, none the less a formal coal authority mining risk assessment will be prepared and submitted as early stages in the emergency works design.

Risks from contamination at the site are low and one of the higher rated risks is the risk of encountered mine water with a high ferruginous content.

9.3 Haul Road

The haul road will be subject to a condition assessment to assess its suitability to carry the intended earth moving vehicles and this will include the condition of embanked sections raised on spoil or other Made Ground. The drainage of the route will be a material consideration and local improvements will need to be designed as appropriate. A degree of rutting may be inevitable, and it is envisaged that a programme of on-going repair during haulage operations will be necessary using capping type aggregates and perhaps laid over geogrid laid as a strengthening layer, particularly where a disused mine adit passes beneath the haul road.

No contamination issues are linked with the haul road operation other than a general requirement to avoid turbid run off impacting streams or runnels and maintain any culverts which may pass underneath raised embankment sections.

9.4 Receptor Site C

There is less information available on the proposed receptor site, particularly in the form of past ground investigations, so details have been inferred from other sources. Geological mapping predicts a lack of superficial deposits with sandstones of the Rhondda Formation lying at the surface. Coal seams are expected beneath the site but do not outcrop within the boundary. No shallow mining has been identified.

This geology is thought to provide a reasonably competent formation for the support of the new fill mound. Post construction settlements are likely to be small and well within the tolerable movement of an earth landform, though a site investigation is planned to fully categorise the ground conditions including its compressibility. The designs for new mound include a separation zone between it and the toe slopes of Tylorstown tip so that there is no risk of the mound having a destabilising influence. Again, the site investigation will include a number of holes installed in this ‘peripheral‘ zone to Tylorstown Tip.

The fill material is granular and as such it is not thought that the rainwater infiltration/run off pattern will be significantly affected though a small amount of extra storage will be afforded where the fill is thickest. The site investigation will establish piezometers heads in any made ground layers and that in the shallow rock head to allow the hydrogeological model to be confirmed /amended.

The donor fill material is thought to contain on average 8.5 % coal and to have Calorific Values of values 2.09 to 4.51 MJ/kg with an average of 3.05 MJ/kg as consequently smouldering of the material is low risk. However, a watching brief will be required to guard against very coal rich pockets being used to add to the source fill material.

Stability of the slope from slippage is very low as side batters of 1 in 3 have been selected and such slopes have a track record of providing embankments of good stability.

The design of the upper surface of the mound will need to consider whether it can resist erosion from walkers, though local erosion form of road motorcycle use may be difficult to achieve.

In terms of mining stability, the risk is considered low, and because the site is not within a Coal Authority high risk zone a formal Coal Authority mining risk assessment is not deemed necessary.

Contamination risk is low based on possible low-level impact with metals and PAH’s in burnt shale near surface deposits. It is envisaged that a materials management plan will be produced ahead of the earthworks and this should be provided to the civils contactor so they are informed of fill movement recording requirements and any testing that may be required by the plan.

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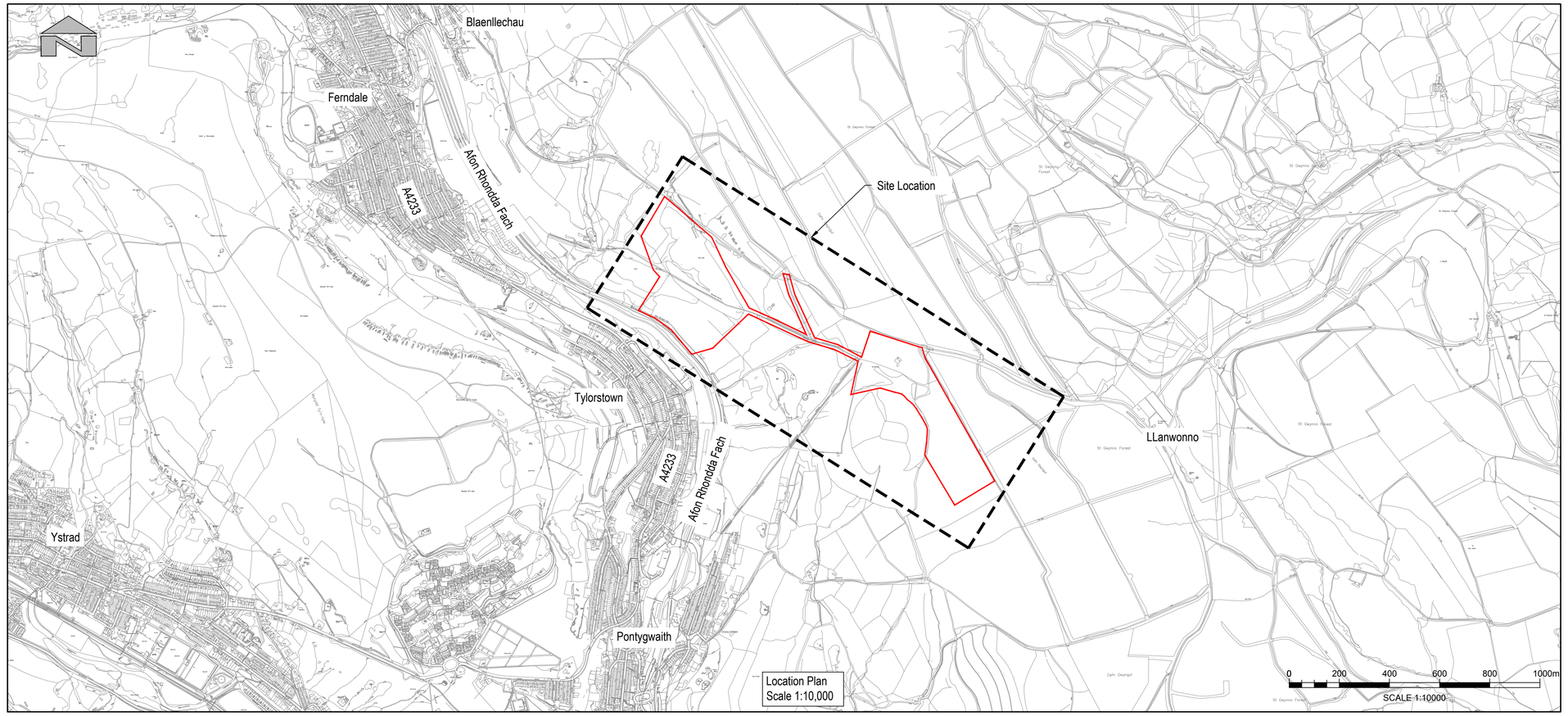
DRAWINGS

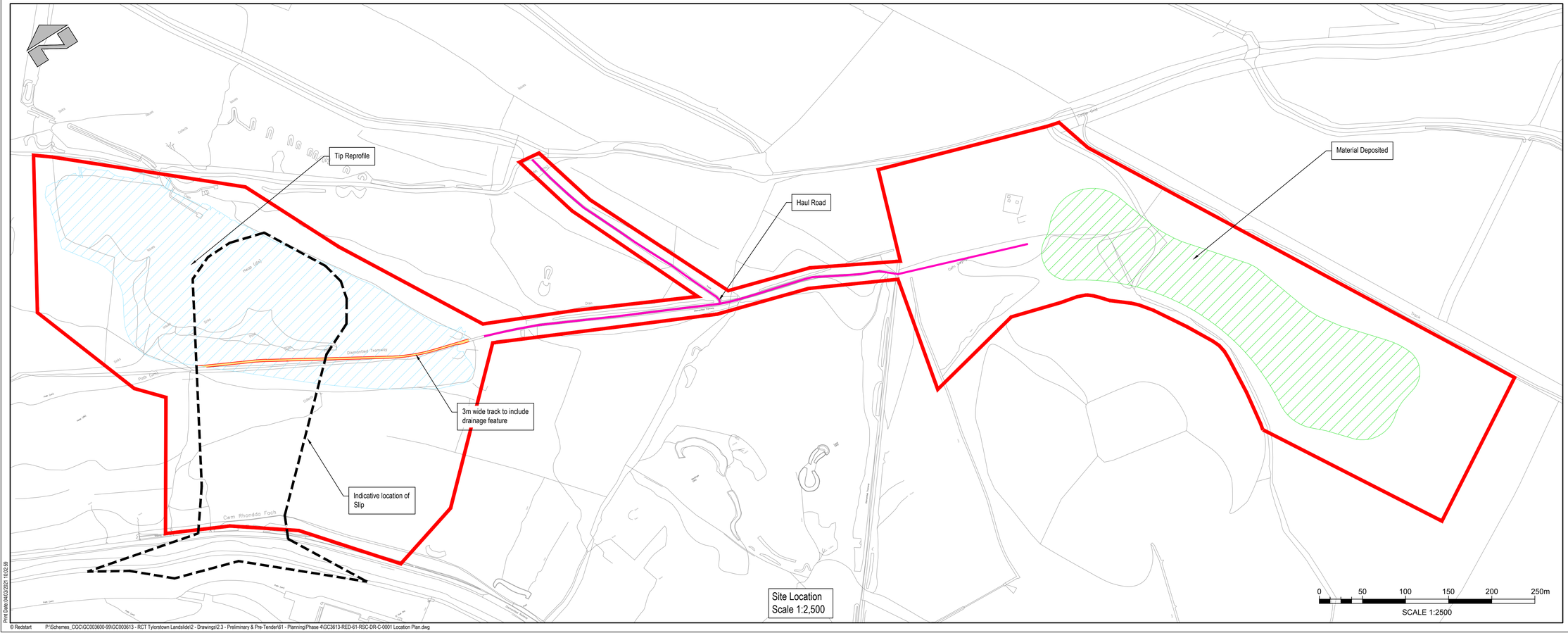


Key:

- Planning Boundary
- Proposed Tip Reprofile (including Tramway)
- Proposed Material deposit
- Proposed Haul Route
- Proposed 3m wide track to include drainage feature
- Indicative location of Slip

Notes:

1. For Tip Reprofile General Arrangement refer to drawing : GC3613-RED-61-RSC-DR-C-0002
2. For Receptor Site C General Arrangement refer to drawing : GC3613-RED-61-RSC-DR-C-0003
3. For cross sections of Tip Reprofile refer to drawings: GC3613-RED-61-RSC-DR-C-0004-0008
4. For cross sections of Receptor Site C refer to drawings: GC3613-RED-61-RSC-DR-C-0009-0013



Rev	Drwn	Chkd	Apprd	Description	Date

Purpose of Issue
D5 - Suitable for Planning

Classification
Public

Client
Rhondda Cynon Taf
County Borough Council

Project
Tylorstown Landslide

Drawing
Phase 4
Location Plan

Scale @ A1	Drawn	Checked	Approved
As Shown	MH	NG	PH

Project No.: GC/3613
Date: March 2021

Drawing Identifier (Project - Originator - Zone - Level - File Type - Role - Number): GC3613-RED-61-RSC-DR-C-0001
BS1192 Compliant revision: P01

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Print Date: 04/03/2021 10:02:59

Typical Section
Scale 1:50

Key:

- Proposed Tip Reprofile (including Tramway)
- Proposed 2m wide track and 1m wide drainage feature
- Existing Drainage Ditch

Notes:

1. For Location Plan refer to drawing : GC3613-RED-61-RSC-DR-C-0001
2. For Receptor Site C General Arrangement refer to drawing : GC3613-RED-61-RSC-DR-C-0003
3. For cross sections of Tip Reprofile refer to drawings: GC3613-RED-61-RSC-DR-C-0004-0010
4. For Receptor Site C Cross Sections refer to drawings: GC3613-RED-61-RSC-DR-C-0009-0013

Rev	Drwn	Chk'd	Appd	Description	Date

Purpose of Issue
D5 - Suitable for Planning

Classification
Public

Client
Rhondda Cynon Taf
County Borough Council

Project
Tylorstown Landslide

Drawing
Phase 4
General Arrangement
Tip Reprofile

Scale @ A1	Drawn	Checked	Approved
As Shown	MH	NG	PH

Project No.: GC/3613
Date: March 2021

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number
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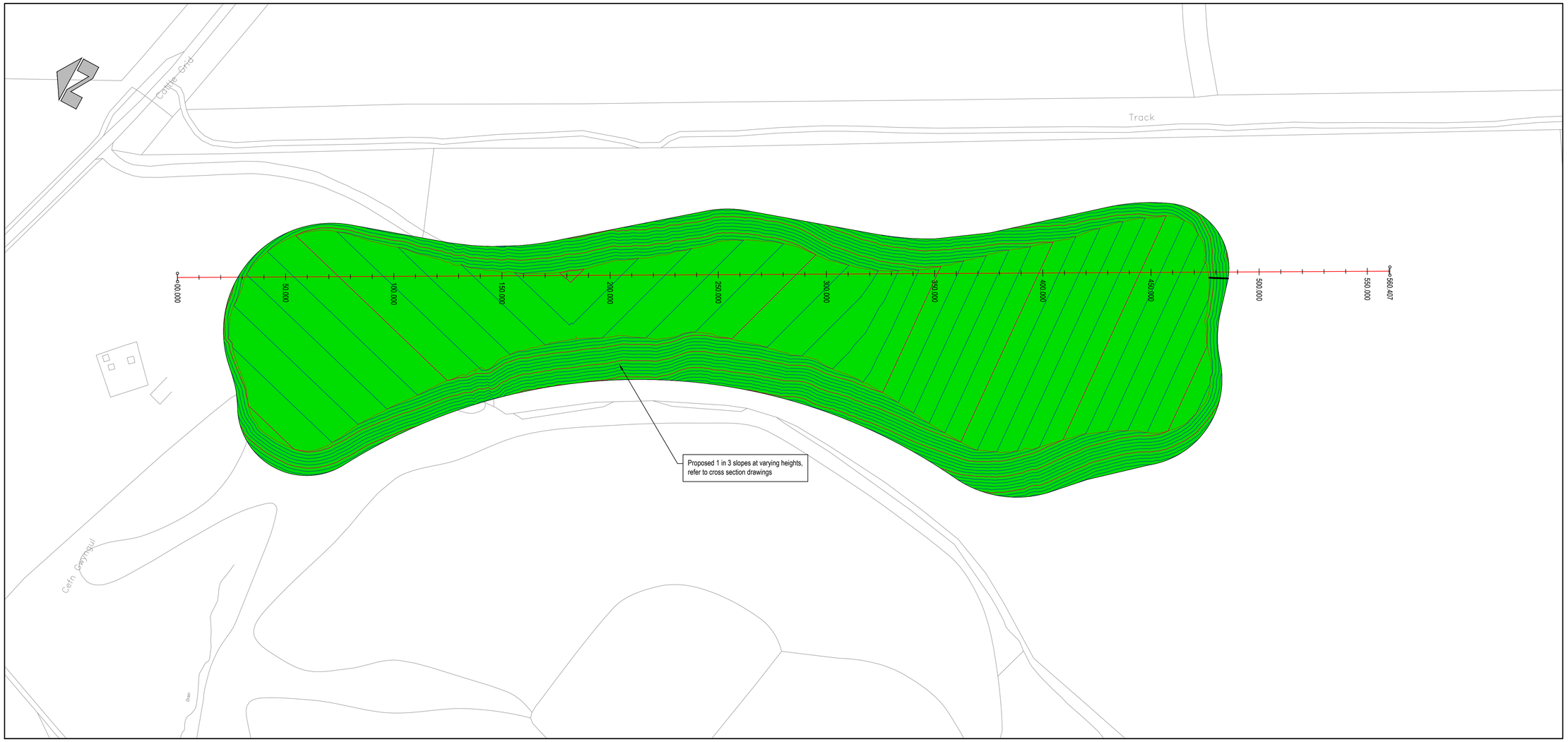

Key:

- Proposed Deposited Material
- Proposed Contour Major (2.5m intervals)
- Proposed Contour Minor (0.5m intervals)

Notes:

1. For Location Plan refer to drawing : GC3613-RED-61-RSC-DR-C-0001
2. For Tip Reprofile General Arrangement refer to drawing : GC3613-RED-61-RSC-DR-C-0002
3. For cross sections of Tip Reprofile refer to drawings: GC3613-RED-61-RSC-DR-C-0004-0008
4. For cross sections of Receptor Site C refer to drawings: GC3613-RED-61-RSC-DR-C-0009-0013

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Public

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Project
Tylorstown Landslide

Drawing
Phase 4
General Arrangement
Receptor Site C

Scale @ A1	Drawn	Checked	Approved
As Shown	MH	NG	PH

Project No.
GC/3613

Date
March 2021

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number
GC3613-RED-61-RSC-DR-C-0003

BS1192 Compliant
revision
P01

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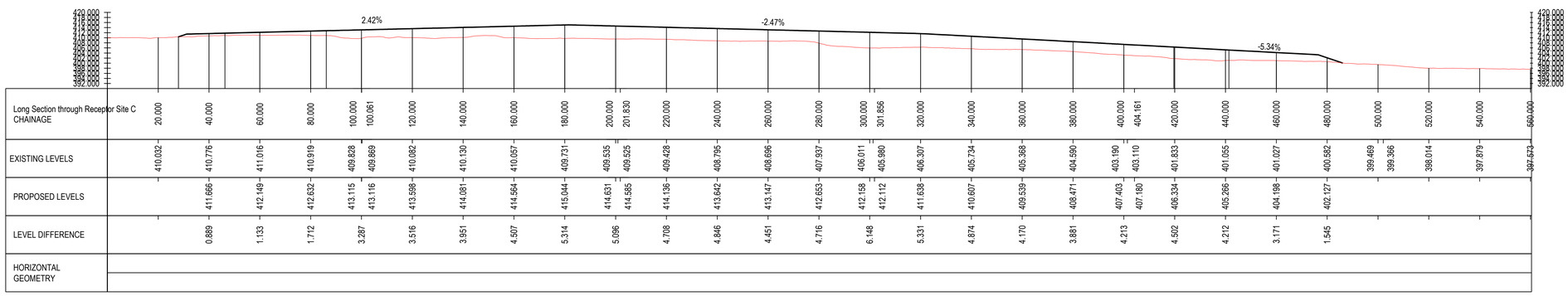
Key:

- Existing Ground Lidar
- Proposed Ground



Long Section through Receptor Site C
SCALE: H 1:1000, V 1:1000

0 20 40 60 80 100m
SCALE 1:1000

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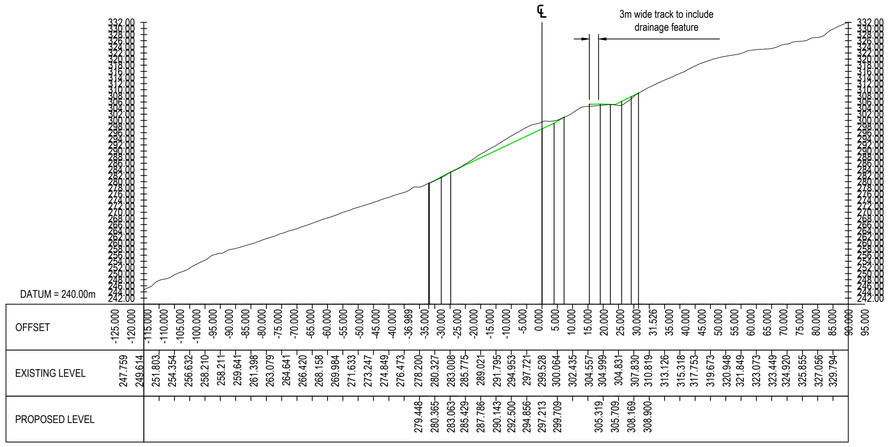

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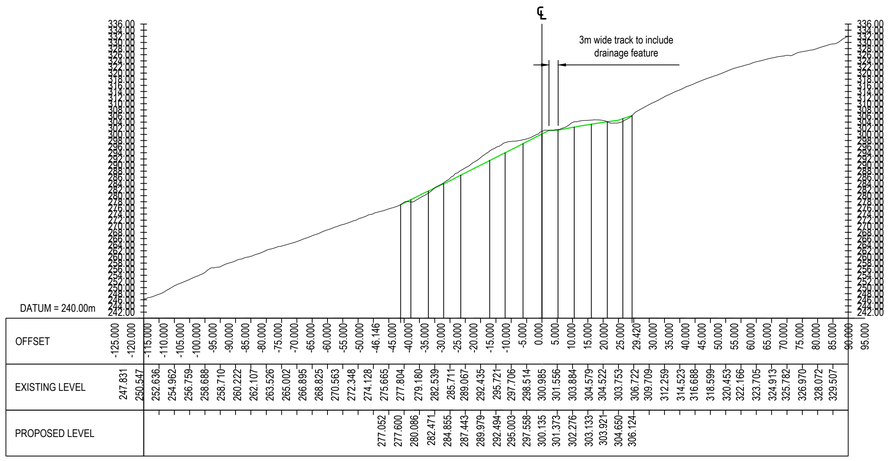

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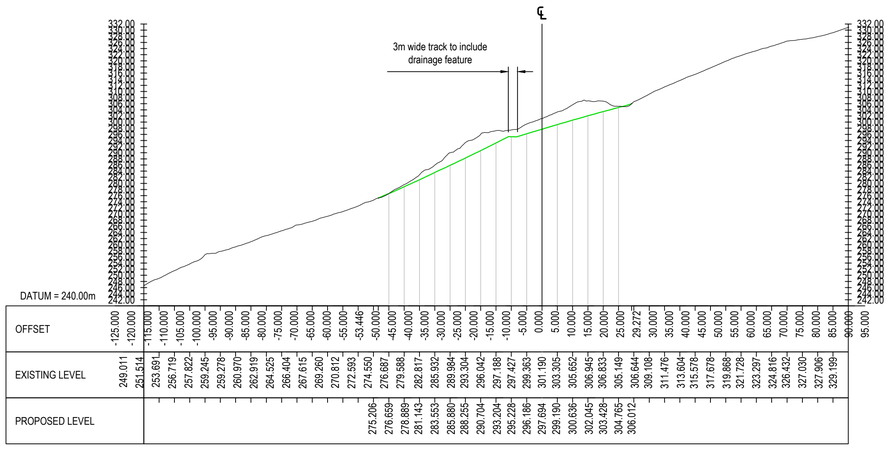

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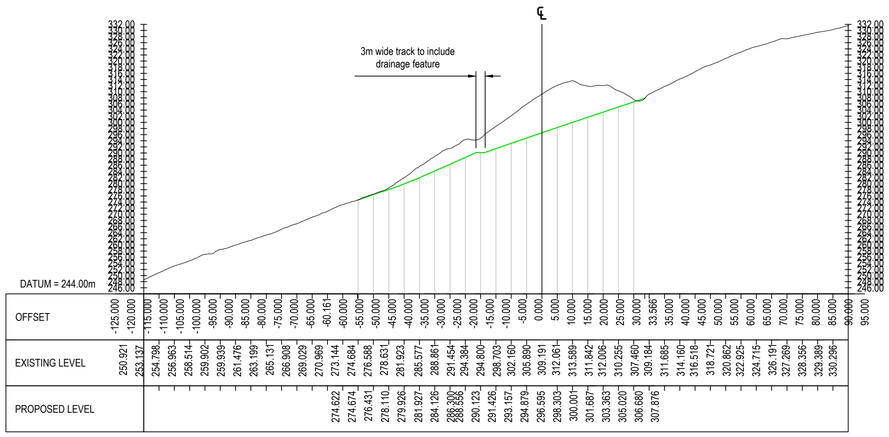

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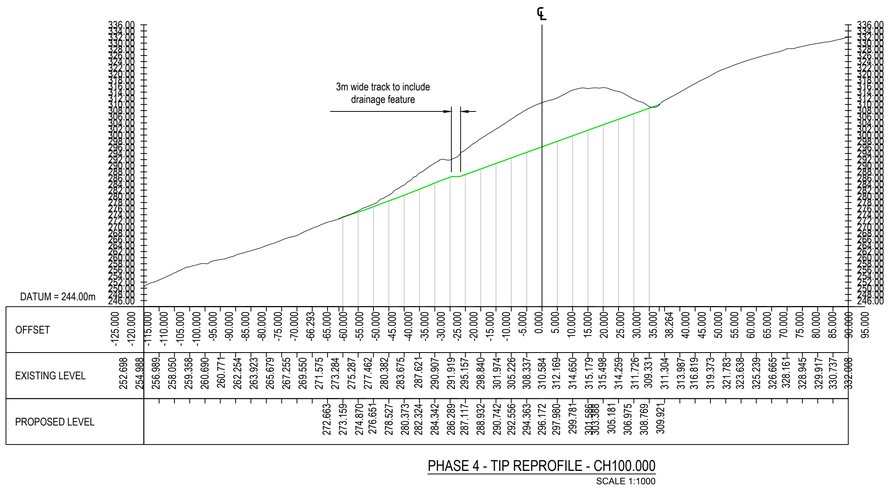

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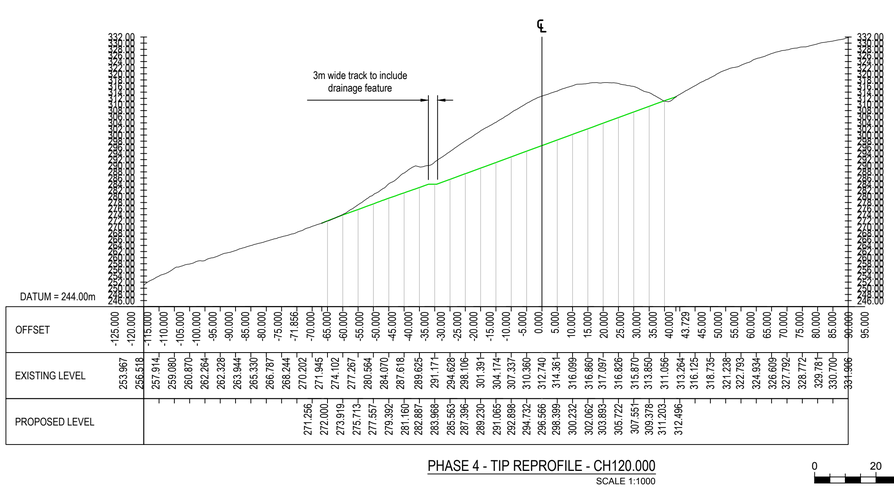

PHASE 4 - TIP REPROFILE - CH120.000
SCALE 1:1000

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SCALE 1:1000

Key:

Proposed Levels

Existing Levels

Notes:

1. For cross sections markers refer to drawing: GC3613-RED-61-RSC-DR-C-0002
2. For Location Plan refer to drawing: GC3613-RED-61-RSC-DR-C-0001
3. For General Arrangement Plan of Receptor Site C refer to drawing: GC3613-RED-61-RSC-DR-C-0003
4. For Cross Sections of Receptor Site C refer to drawing: GC3613-RED-61-RSC-DR-C-0009-0013

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Purpose of Issue
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Project
Tylorstown Landslide

Drawing
Phase 4
Cross Sections - Tip Reprofile
Sheet 1 of 5

Scale @ A1	Drawn	Checked	Approved
1:1000	MH	NG	PH

Project No.: GC/3613
Date: March 2021

Drawing Identifier: GC3613-RED-61-RSC-DR-C-0004
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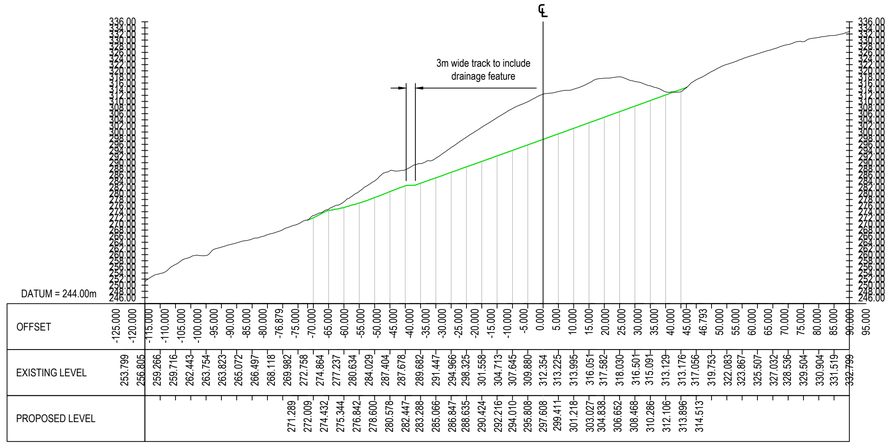
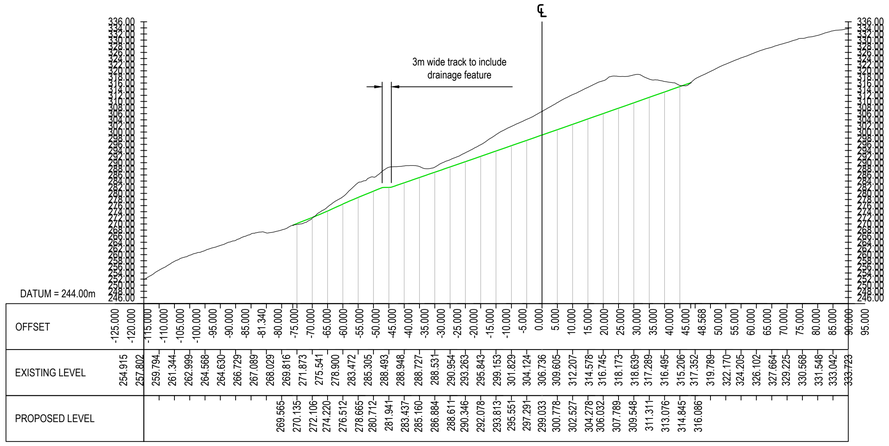


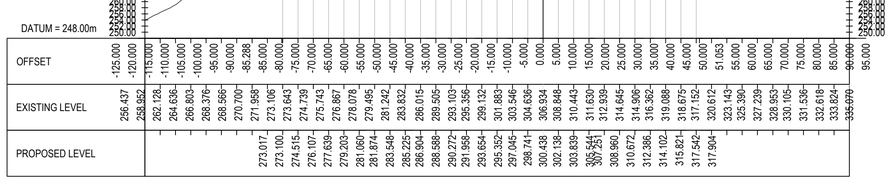
PHASE 4 - TIP REPROFILE - CH140.000

SCALE 1:1000



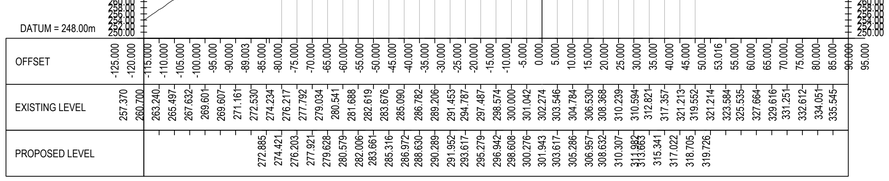
PHASE 4 - TIP REPROFILE - CH160.000

SCALE 1:1000



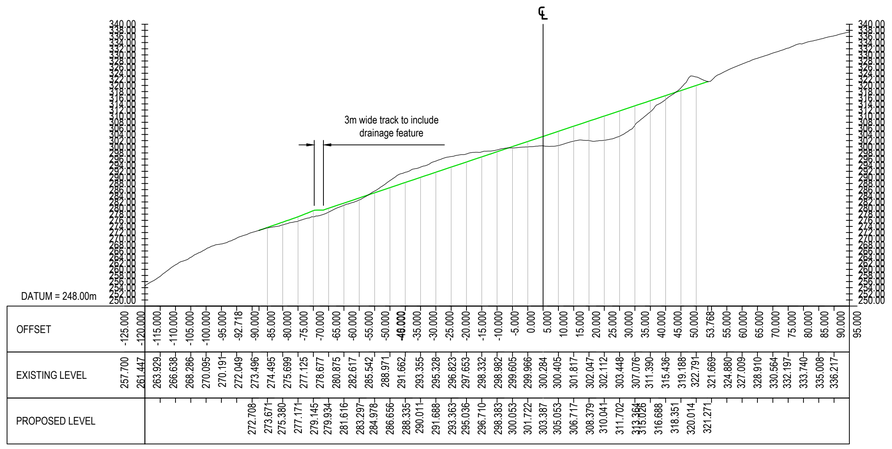
PHASE 4 - TIP REPROFILE - CH180.000

SCALE 1:1000



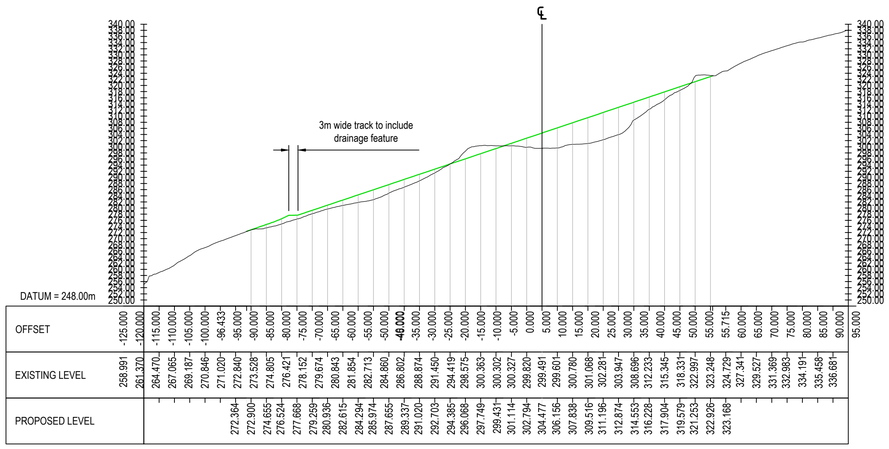
PHASE 4 - TIP REPROFILE - CH200.000

SCALE 1:1000



PHASE 4 - TIP REPROFILE - CH220.000

SCALE 1:1000



PHASE 4 - TIP REPROFILE - CH240.000

SCALE 1:1000

Key:

- Proposed Levels
- Existing Levels

Notes:

1. For cross sections markers refer to drawing: GC3613-RED-61-RSC-DR-C-0002
2. For Location Plan refer to drawing: GC3613-RED-61-RSC-DR-C-0001
3. For General Arrangement Plan of Receptor Site C refer to drawing: GC3613-RED-61-RSC-DR-C-0003
4. For Cross Sections of Receptor Site C refer to drawing: GC3613-RED-61-RSC-DR-C-0009-0013

0 20 40 60 80 100m

SCALE 1:1000

Rev	Drwn	Chk'd	App'd	Description	Date

Purpose of Issue

D5 - Suitable for Planning

Classification

Public

Client

Rhondda Cynon Taf
County Borough Council

Project

Tylorstown Landslide

Drawing

Phase 4
Cross Sections - Tip Reprofile
Sheet 2 of 5

Scale @ A1	Drawn	Checked	Approved
1:1000	MH	NG	PH

Project No.: GC/3613

Date: March 2021

Drawing Identifier (Project - Originator - Zone - Level - File Type - Role - Number): GC3613-RED-61-RSC-DR-C-0005

BS1192 Compliant revision: P01

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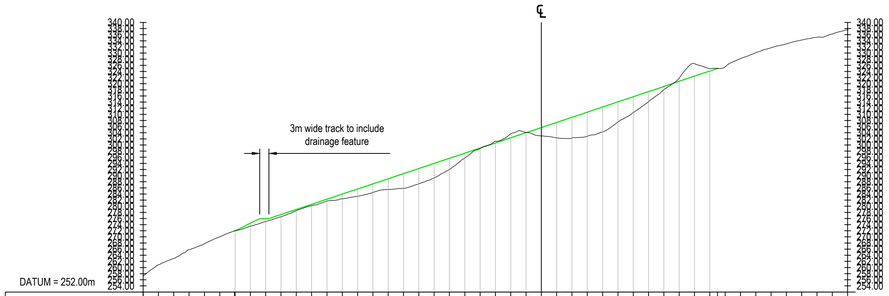

DATUM = 252.00m

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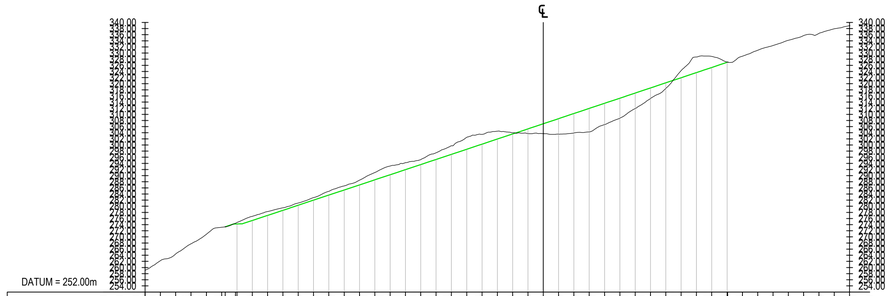
EXISTING LEVEL	260.849	262.954	265.820	267.742	270.020	271.869	271.923	273.483	274.994	276.582	278.574	280.146	281.683	282.426	283.240	284.498	285.456	285.845	287.334	289.249	291.983	295.718	298.832	301.176	303.641	304.066	302.962	302.325	302.260	302.842	304.284	307.520	310.597	314.176	318.034	321.837	325.617	324.947	325.504	328.200	330.123	331.736	332.991	334.259	335.185	336.247
PROPOSED LEVEL							271.906	271.974	274.472	275.945	277.302	278.966	280.632	282.297	283.964	285.631	287.299	288.967	290.635	292.306	293.976	295.646	297.317	298.990	300.662	302.335	304.009	305.683	307.359	309.035	310.710	312.388	314.065	315.744	317.424	319.103	320.785	322.466	324.146	324.995								

PHASE 4 - TIP REPROFILE - CH260.000

SCALE 1:1000



DATUM = 252.00m

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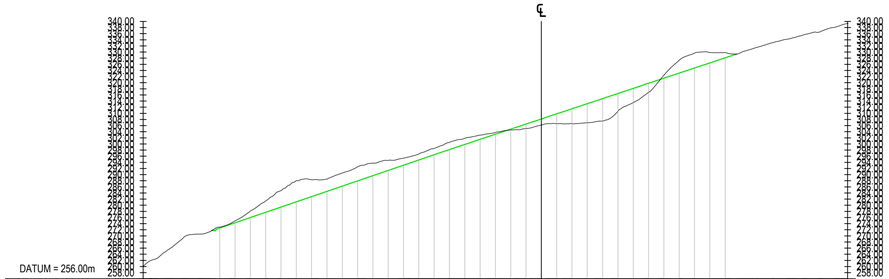
EXISTING LEVEL	262.242	264.438	267.751	270.846	273.142	274.438	274.438	274.694	276.729	278.280	279.500	281.054	282.828	284.883	286.629	288.519	291.015	293.145	294.233	295.226	297.446	299.730	302.490	303.472	304.481	303.981	303.734	303.704	303.528	303.910	304.265	306.951	308.749	311.888	315.164	318.471	321.958	324.289	328.724	328.912	327.091	328.989	330.910	332.460	334.152	335.732	336.434	337.913	338.950
PROPOSED LEVEL					273.262	274.220	274.227	275.353	277.010	278.668	280.327	281.985	283.645	285.305	286.965	288.627	290.287	291.951	293.610	295.276	296.936	298.603	300.266	301.930	303.597	305.264	306.931	308.598	310.266	311.934	313.604	315.273	316.943	318.614	320.286	321.958	323.630	325.304	326.979	327.040								

PHASE 4 - TIP REPROFILE - CH280.000

SCALE 1:1000



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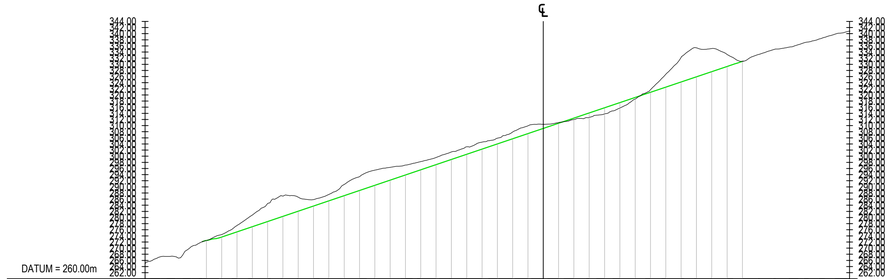
EXISTING LEVEL	263.012	266.771	270.355	270.733	272.859	274.651	274.894	278.107	281.371	284.775	288.034	288.320	288.506	290.530	292.570	293.756	294.640	295.355	293.085	294.794	296.748	298.505	300.548	301.836	302.886	303.751	304.557	305.053	306.192	306.610	306.613	306.936	307.499	309.025	310.701	313.494	316.828	322.431	327.317	329.669	329.860	329.809	329.751	331.437	332.925	334.152	335.405	336.412	337.983
PROPOSED LEVEL				271.724	272.196	272.582	274.291	276.000	277.708	279.417	281.125	282.834	284.542	286.251	287.959	289.668	291.377	293.085	294.794	296.500	298.173	299.846	301.514	303.180	304.846	306.509	308.171	309.833	311.494	313.155	314.818	316.481	318.144	319.807	321.471	323.136	324.802	326.467	328.133	329.346								

PHASE 4 - TIP REPROFILE - CH300.000

SCALE 1:1000



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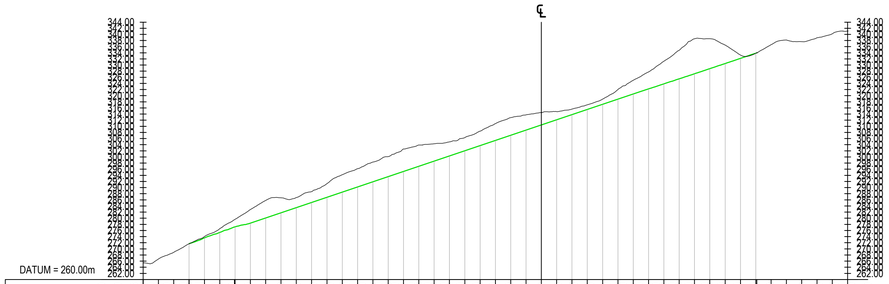
OFFSET	-125.000	-120.000	-115.000	-111.293	-110.000	-105.799	-105.000	-100.000	-95.000	-90.000	-85.000	-80.000	-75.000	-70.000	-65.000	-60.000	-55.000	-50.000	-45.000	-40.000	-35.000	-30.000	-25.000	-20.000	-15.000	-10.000	-5.000	0.000	5.000	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000	55.000	60.000	65.137	70.000	75.000	80.000	85.000	90.000	95.000
EXISTING LEVEL	267.195	267.202	270.417	272.483	274.443	277.341	277.383	280.787	284.547	286.981	286.661	285.826	287.521	290.771	293.335	295.457	296.370	297.114	298.248	299.565	301.380	303.073	304.587	305.872	307.889	309.950	310.416	310.999	311.994	312.685	313.792	315.726	318.658	321.686	324.243	325.930	327.617	329.305	330.992	333.119	334.741	335.576	336.993	338.249	339.764	340.827	
PROPOSED LEVEL			272.130	272.502	273.352	273.622	275.309	276.996	278.684	280.371	282.059	283.746	285.433	287.121	288.808	290.495	292.183	293.870	295.557	297.245	298.932	300.619	302.307	303.994	305.682	307.369	309.056	310.744	312.431	314.118	315.806	317.493	319.180	320.868	322.555	324.243	325.930	327.617	329.305	330.957	331.004								

PHASE 4 - TIP REPROFILE - CH320.000

SCALE 1:1000



DATUM = 260.00m

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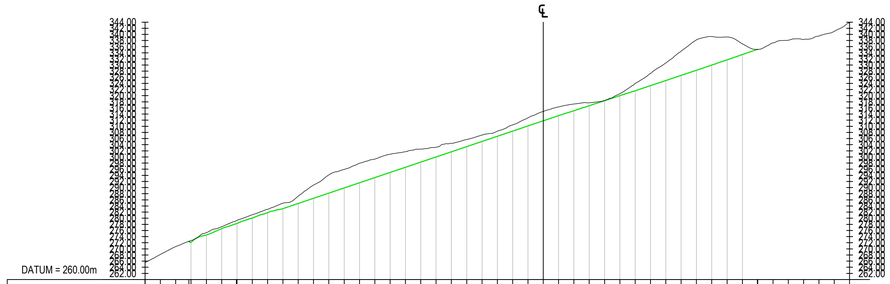
EXISTING LEVEL	266.701	268.883	271.673	274.010	276.556	279.432	279.656	282.833	285.800	286.676	286.755	286.684	288.498	294.194	296.182	298.342	300.122	302.576	303.881	304.323	304.931	306.332	307.873	308.427	310.873	312.842	313.756	314.800	315.618	317.008	318.881	322.024	325.044	327.766	331.256	334.838	338.560	338.609	336.534	333.273	333.839	336.624	338.168	337.645	338.889	340.212
PROPOSED LEVEL	271.669	271.673	273.583	275.369	277.144	277.208	278.374	280.062	281.749	283.436	285.124	286.811	288.498	290.186	291.873	293.561	295.248	296.935	298.623	300.310	301.997	303.685	305.372	307.059	308.747	310.434	312.122	313.809	315.496	317.184	318.871	320.558	322.229	323.857	325.488	327.154	328.824	330.496	332.182	333.884	333.999					

PHASE 4 - TIP REPROFILE - CH340.000

SCALE 1:1000



DATUM = 260.00m

OFFSET	-125.000	-120.000	-115.698	-110.000	-105.000	-100.194	-100.000	-95.000	-90.000	-85.000	-80.000	-75.000	-70.000	-65.000	-60.000	-55.000	-50.000	-45.000	-40.000	-35.000	-30.000	-25.000	-20.000	-15.000	-10.000	-5.000	0.000	5.000	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000	55.000	60.000	65.000	69.868	75.000	80.000	85.000	90.000	95.000
EXISTING LEVEL	268.182	270.755	272.729	275.258	277.219	279.128	279.289	281.163	282.893	284.918	287.209	290.821	294.166	295.963	297.952	299.297	300.890	301.722	302.548	303.187	304.459	305.693	307.181	308.411	310.457	312.757	314.875	316.329	317.279	317.681	318.424	320.007	320.657	323.994	327.232	330.674	334.553	338.199	339.303	339.143	336.914	335.107	337.235	338.079	338.332	339.460	341.020	343.994
PROPOSED LEVEL	272.458	272.694	274.561	276.590	278.236	279.285	279.289	280.061	281.842	283.127	284.814	286.502	288.189	289.876	291.564	293.251	294.938	296.626	298.313	300.000	301.688	303.375	305.063	306.750	308.437	310.125	311.812	313.499	315.097	316.731	318.363	320.007	321.613	323.272	324.940	326.627	328.307	329.991	331.705	333.423	335.103							

PHASE 4 - TIP REPROFILE - CH360.000

SCALE 1:1000

0 20 40 60 80 100m

SCALE 1:1000

Key:

Proposed Levels

Existing Levels

Notes:

1. For cross sections markers refer to drawing: GC3613-RED-61-RSC-DR-C-0002
2. For Location Plan refer to drawing: GC3613-RED-61-RSC-DR-C-0001
3. For General Arrangement Plan of Receptor Site C refer to drawing: GC3613-RED-61-RSC-DR-C-0003
4. For Cross Sections of Receptor Site C refer to drawing: GC3613-RED-61-RSC-DR-C-0009-0013

Rev	Drwn	Chkd	Appd	Description	Date

Purpose of Issue

D5 - Suitable for Planning

Classification

Public

Client

Rhondda Cynon Taf
County Borough Council

Project

Tylorstown Landslide

Drawing

Phase 4
Cross Sections - Tip Reprofile
Sheet 3 of 5

Scale @ A1	Drawn	Checked	Approved
1:1000	MH	NG	PH

Project No.

GC/3613

Date

March 2021

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number

GC3613-RED-61-RSC-DR-C-0006

BS1192 Compliant revision

P01

REDSTART

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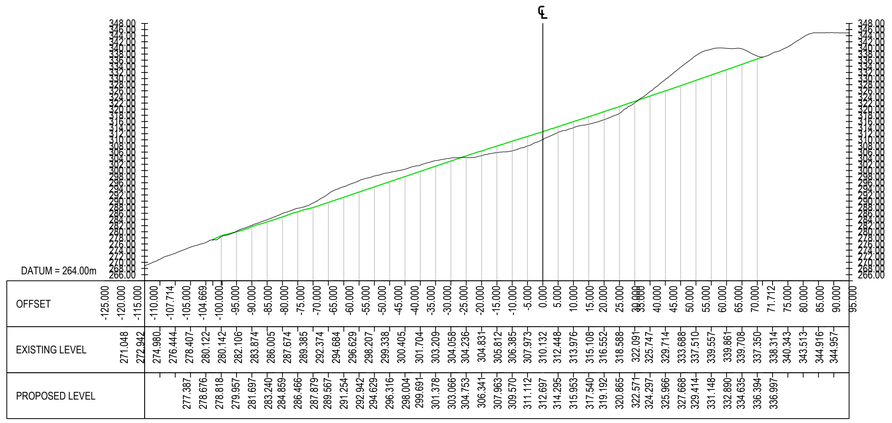
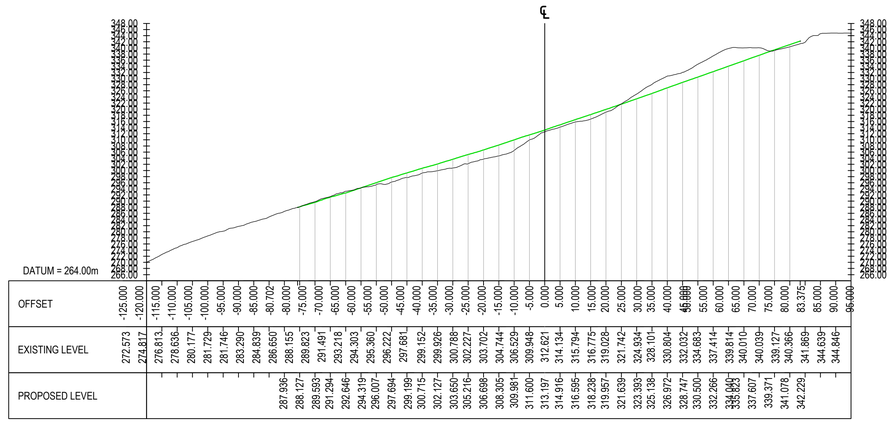


PHASE 4 - TIP REPROFILE - CH380.000
SCALE 1:1000



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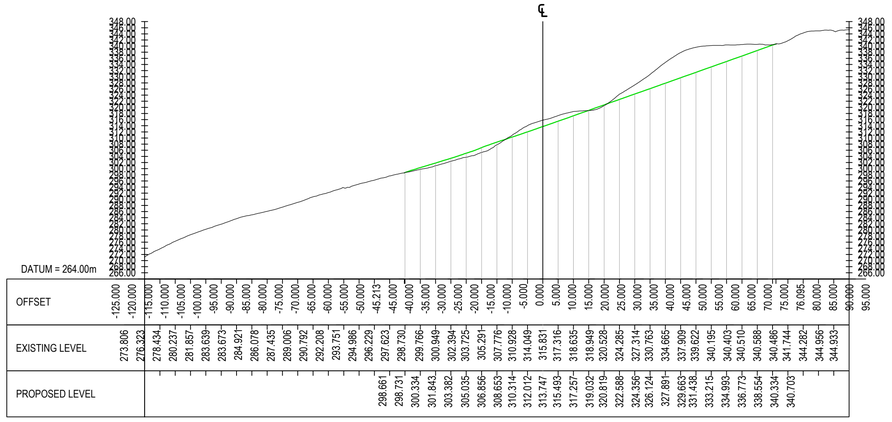
SCALE 1:1000



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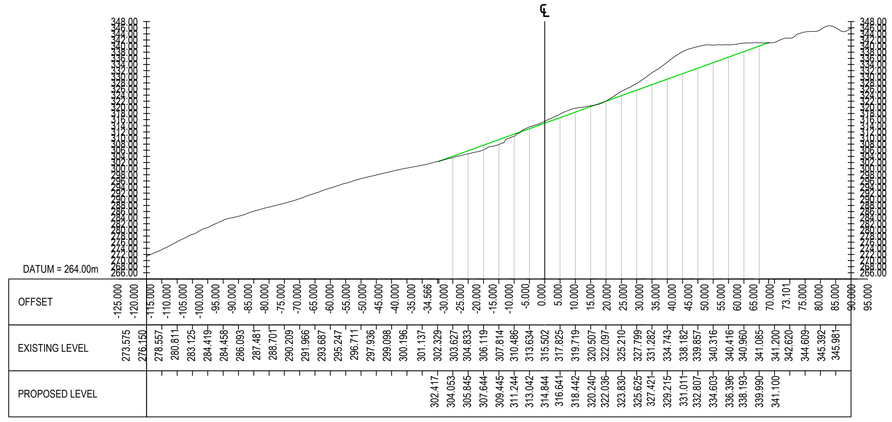
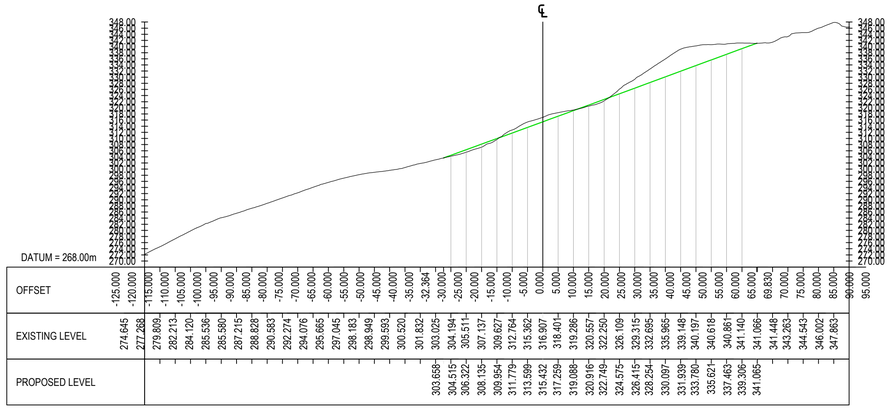


PHASE 4 - TIP REPROFILE - CH440.000
SCALE 1:1000



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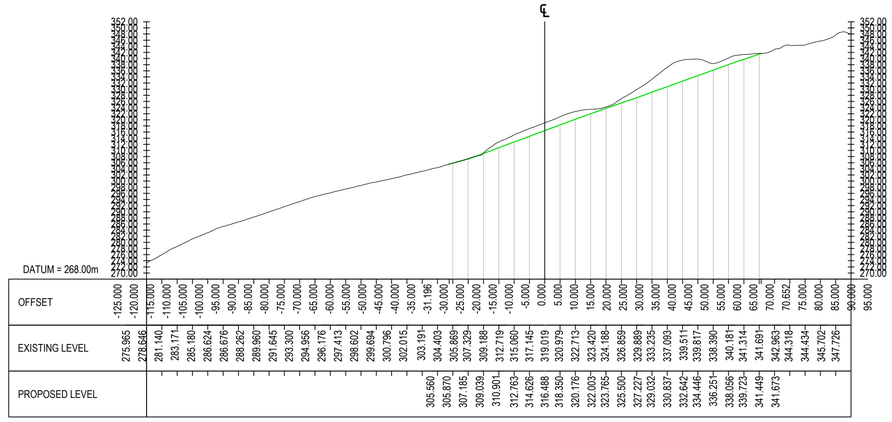
SCALE 1:1000



PHASE 4 - TIP REPROFILE - CH480.000
SCALE 1:1000

0 20 40 60 80 100m

SCALE 1:1000

Key:

Proposed Levels

Existing Levels

Notes:

1. For cross sections markers refer to drawing: GC3613-RED-61-RSC-DR-C-0002
2. For Location Plan refer to drawing: GC3613-RED-61-RSC-DR-C-0001
3. For General Arrangement Plan of Receptor Site C refer to drawing: GC3613-RED-61-RSC-DR-C-0003
4. For Cross Sections of Receptor Site C refer to drawing: GC3613-RED-61-RSC-DR-C-0009-0013

Rev	Drwn	Chk'd	App'd	Description	Date

Purpose of Issue

D5 - Suitable for Planning

Classification

Public

Client

Rhondda Cynon Taf
County Borough Council

Project

Tylorstown Landslide

Drawing

Phase 4
Cross Sections - Tip Reprofile
Sheet 4 of 5

Scale @ A1	Drawn	Checked	Approved
1:1000	MH	NG	PH

Project No.: GC/3613

Date: March 2021

Drawing Identifier (Project - Originator - Zone - Level - File Type - Role - Number): GC3613-RED-61-RSC-DR-C-0007

BS1192 Compliant revision: P01

REDSTART
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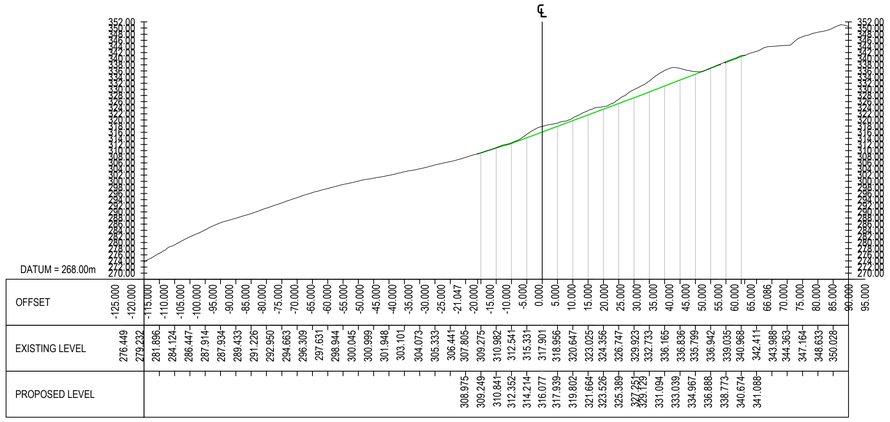
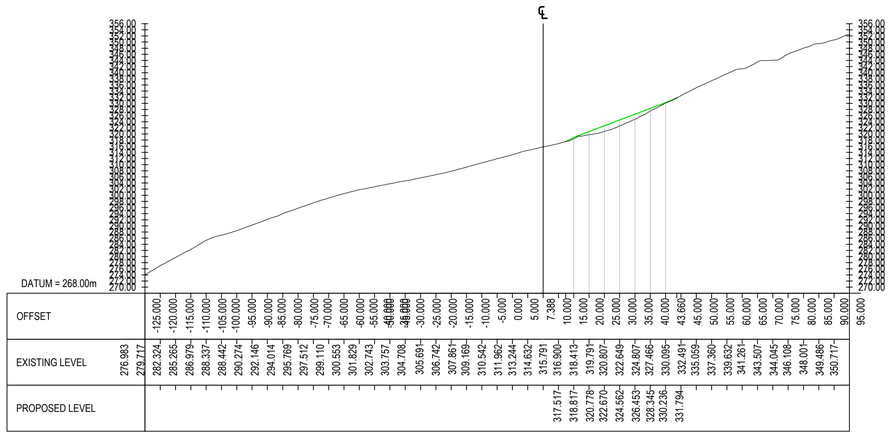


PHASE 4 - TIP REPROFILE - CH500.000

SCALE 1:1000



PHASE 4 - TIP REPROFILE - CH520.000

SCALE 1:1000

0 20 40 60 80 100m

SCALE 1:1000

Key:

Proposed Levels

Existing Levels

Notes:

1. For cross sections markers refer to drawing: GC3613-RED-61-RSC-DR-C-0002
2. For Location Plan refer to drawing: GC3613-RED-61-RSC-DR-C-0001
3. For General Arrangement Plan of Receptor Site C refer to drawing: GC3613-RED-61-RSC-DR-C-0003
4. For Cross Sections of Receptor Site C refer to drawing: GC3613-RED-61-RSC-DR-C-0009-0013

Rev	Drwn	Chk'd	App'd	Description	Date

Purpose of Issue

D5 - Suitable for Planning

Classification

Public

Client

Rhondda Cynon Taf
County Borough Council

Project

Tylorstown Landslide

Drawing

Phase 4
Cross Sections - Tip Reprofile
Sheet 5 of 5

Scale @ A1	Drawn	Checked	Approved
1:1000	MH	NG	PH

Project No.: GC/3613

Date: March 2021

Drawing Identifier (Project - Originator - Zone - Level - File Type - Role - Number): GC3613-RED-61-RSC-DR-C-0008

BS1192 Compliant revision: P01

REDSTART

St David's House, Pascal Close, St Mellons, Cardiff, CF3 0LW
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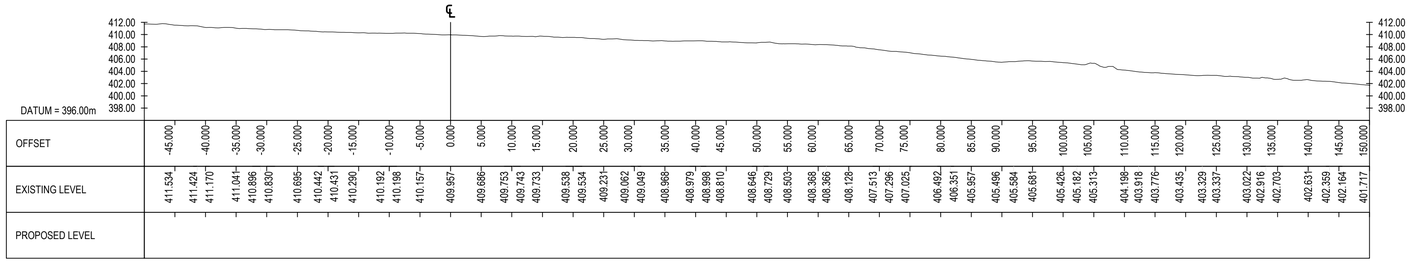
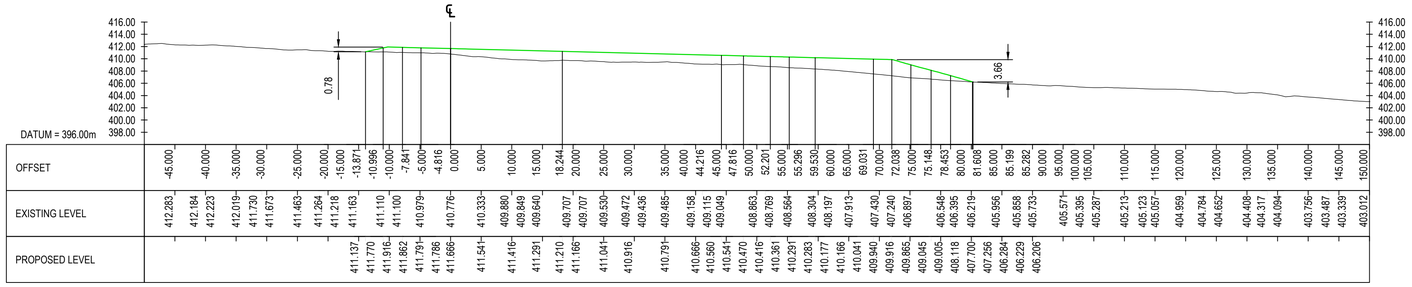
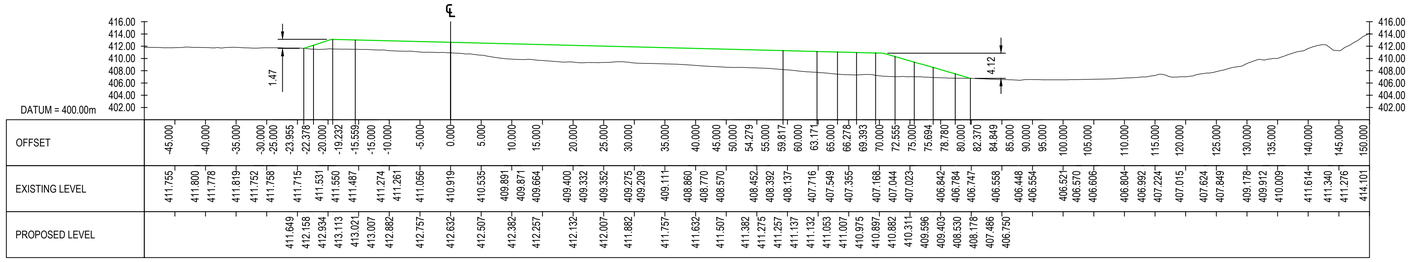
 P:\Schemes_CGC\GC003600-99\GC003613 - RCT Tylorstown Landslide\2 - Drawings\2.3 - Preliminary & Pre-Tender\61 - Planning\Phase 4\GC3613-RED-61-RSC-DR-C-0004 - 0008 Cross Sections Tip Reprofile.dwg



PHASE 4 - MATERIAL DEPOSIT - CH0.000
SCALE 1:500



PHASE 4 - MATERIAL DEPOSIT - CH40.000
SCALE 1:500



PHASE 4 - MATERIAL DEPOSIT - CH80.000
SCALE 1:500

Key:

Proposed Levels

Existing Levels

Notes:

1. For cross section markers refer to the Receptor Site C General Arrangement drawing : GC3613-RED-61-RSC-DR-C-0003
2. For Location Plan refer to drawing: GC3613-RED-61-RSC-DR-C-0001
3. For Tip Reprofile General Arrangement refer to drawing : GC3613-RED-61-RSC-DR-C-0002
4. For cross sections of Tip Reprofile refer to drawings: GC3613-RED-61-RSC-DR-C-0004-0008

0 20 40 60 80 100m

SCALE 1:1000

Rev	Drwn	Chkd	Appd	Description	Date

Purpose of Issue

D5 - Suitable for Planning

Classification

Public

Client

Rhondda Cynon Taf
County Borough Council

Project

Tylorstown Landslide

Drawing

Phase 4
Receptor Site C - Cross Sections
Sheet 1 of 5

Scale @ A1	Drawn	Checked	Approved
1:500	MH	NG	PH

Project No.: GC/3613

Date: March 2021

Drawing Identifier (BS1192 Compliant)
Project - Originator - Zone - Level - File Type - Role - Number
GC3613-RED-61-RSC-DR-C-0009

revision: P01

REDSTART
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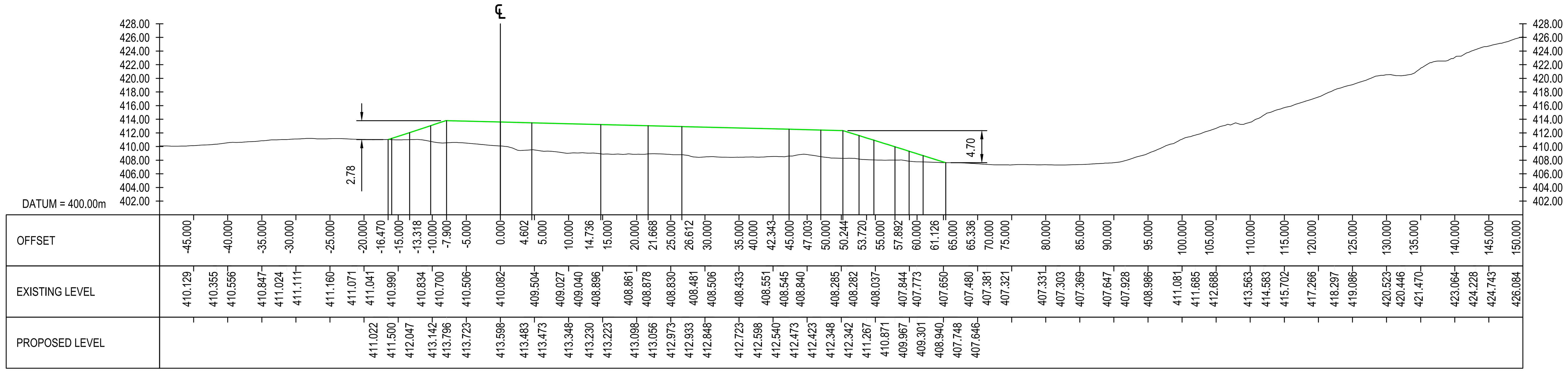
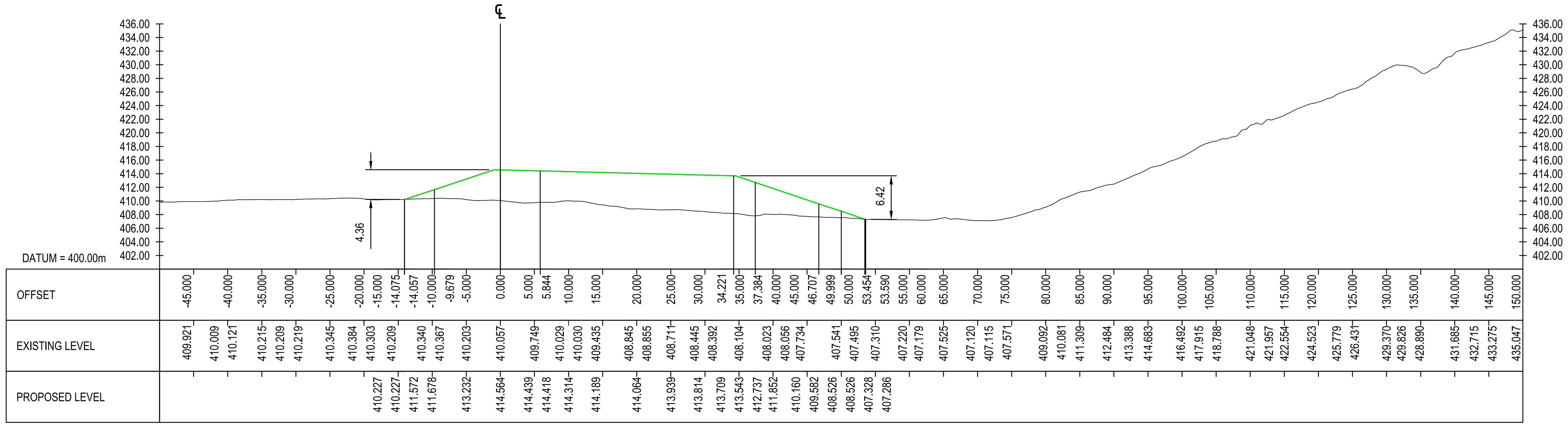
P:\Schemes_CGC\GC003600-99\GC003613 - RCT Tylorstown Landslide\2 - Drawings\2.3 - Preliminary & Pre-Tender\61 - Planning\Phase 4\GC3613-RED-61-RSC-DR-C-0009 - 0013 Receptor Site C Cross Sections.dwg



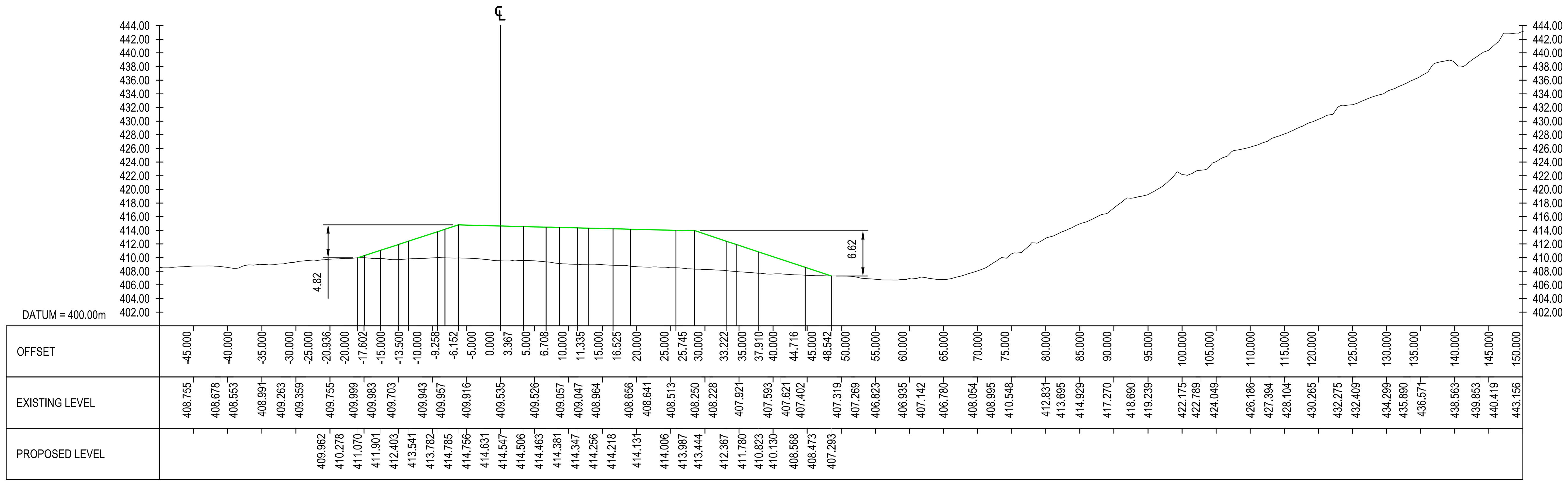
PHASE 4 - MATERIAL DEPOSIT - CH120.000

SCALE 1:500



PHASE 4 - MATERIAL DEPOSIT - CH160.000

SCALE 1:500



PHASE 4 - MATERIAL DEPOSIT - CH200.000

SCALE 1:500

0 20 40 60 80 100m

SCALE 1:1000

Key:

Proposed Levels

Existing Levels

Notes:

1. For cross section markers refer to the Receptor Site C General Arrangement drawing : GC3613-RED-61-RSC-DR-C-0003
2. For Location Plan refer to drawing: GC3613-RED-61-RSC-DR-C-0001
3. For Tip Reprofile General Arrangement refer to drawing : GC3613-RED-61-RSC-DR-C-0002
4. For cross sections of Tip Reprofile refer to drawings: GC3613-RED-61-RSC-DR-C-0004-0008

Rev	Drwn	Chk'd	App'd	Description	Date

Purpose of Issue
D5 - Suitable for Planning

Classification
Public

Client
Rhondda Cynon Taf
County Borough Council

Project
Tylorstown Landslide

Drawing
Phase 4
Receptor Site C - Cross Sections
Sheet 2 of 5

Scale @ A1	Drawn	Checked	Approved
1:500	MH	NG	PH

Project No.	Date
GC/3613	March 2021

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number
BS1192 Compliant
revision
GC3613-RED-61-RSC-DR-C-0010 P01

REDSTART

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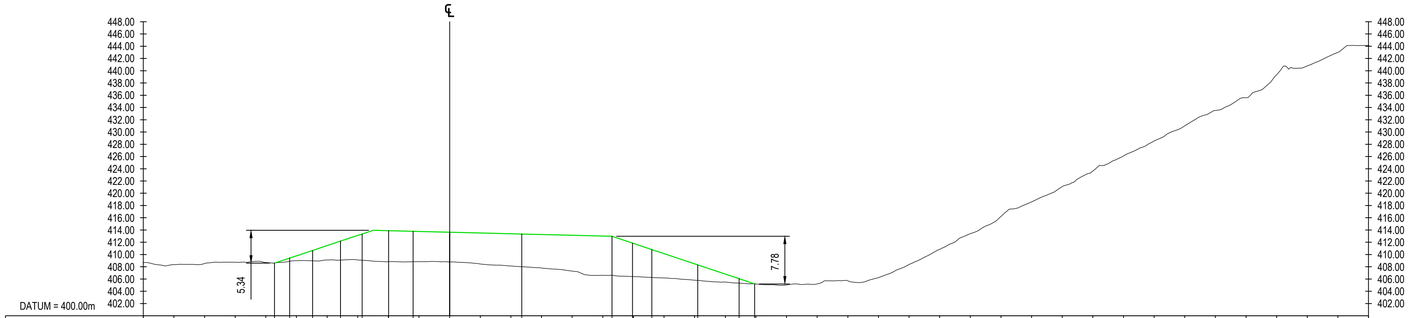

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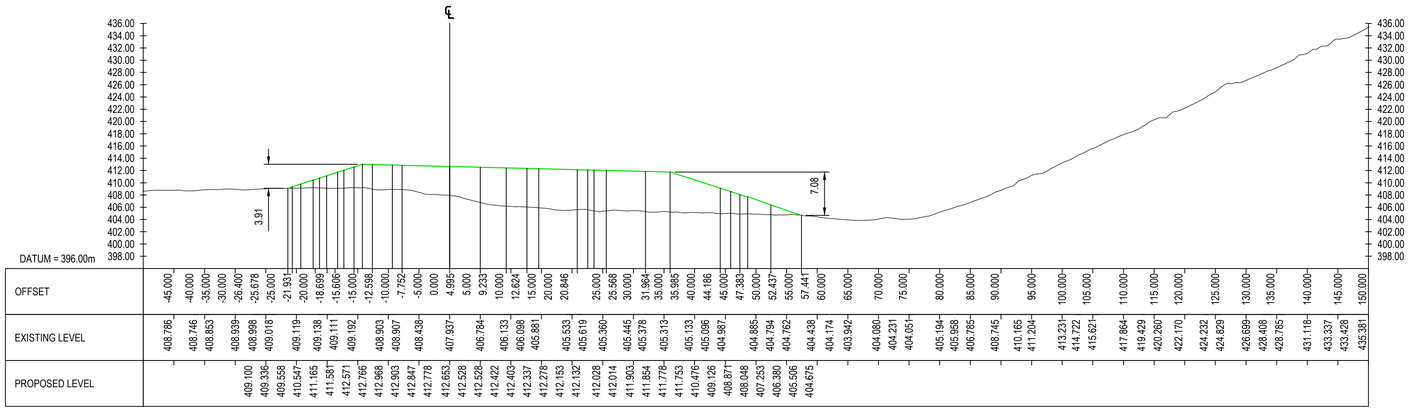
EXISTING LEVEL	408.356	408.348	408.527	408.749	408.898	408.689	409.005	409.069	409.109	409.124	408.822	408.637	408.834	408.795	408.458	408.127	408.106	407.807	407.293	407.229	406.605	406.408	406.372	406.182	405.820	405.739	405.498	405.194	405.076	405.029	405.202	405.715	405.721	406.224	407.015	408.363	410.861	412.039	413.401	416.223	417.606	418.565	421.093	422.626	423.618	426.083	427.561	428.529	431.018	432.842	433.510	435.602	437.977	439.338	440.777	442.622	443.000	444.128
PROPOSED LEVEL	408.610	409.420	409.781	410.665	411.458	412.191	413.115	413.352	413.892	413.891	413.791	413.767	413.642	413.517	413.392	413.347	413.267	413.142	413.017	412.979	411.864	411.815	410.808	410.142	408.474	408.309	406.812	406.065	405.200																																		

PHASE 4 - MATERIAL DEPOSIT - CH240.000

SCALE 1:500



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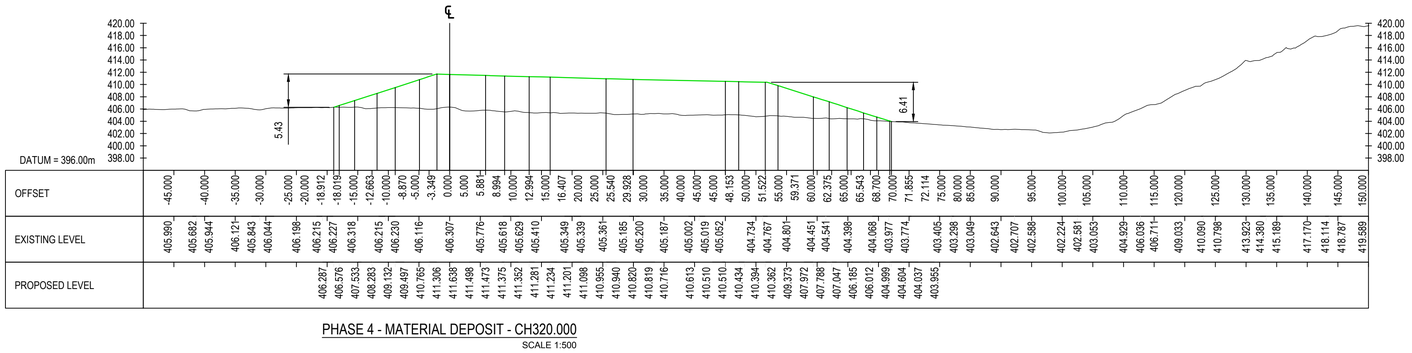
EXISTING LEVEL	408.786	408.746	408.853	408.939	408.998	409.018	409.119	409.138	409.111	409.192	408.903	408.907	408.438	407.937	406.784	406.133	406.098	405.881	405.533	405.619	405.360	405.445	405.378	405.313	405.133	405.096	404.987	404.885	404.794	404.762	404.438	404.174	403.942	404.080	404.231	404.051	405.194	405.558	406.785	408.745	410.165	411.204	413.231	414.722	415.624	417.864	419.429	420.260	422.170	424.232	424.823	426.699	428.408	428.765	431.118	433.337	433.428	435.381
PROPOSED LEVEL	409.100	409.336	409.558	410.547	411.165	411.581	412.571	412.766	412.968	412.903	412.847	412.778	412.653	412.528	412.528	412.422	412.403	412.337	412.278	412.153	412.132	412.028	412.014	411.903	411.854	411.778	411.753	410.476	409.126	408.871	408.048	407.253	406.380	405.506	404.675																														

PHASE 4 - MATERIAL DEPOSIT - CH280.000

SCALE 1:500



DATUM = 396.00m

OFFSET	-45.000	-40.000	-35.000	-30.000	-25.000	-20.000	-18.912	-18.019	-15.000	-12.662	-10.000	-8.870	-5.000	-3.349	0.000	5.000	5.881	8.994	10.000	12.994	15.000	16.407	20.000	25.000	25.540	29.928	30.000	35.000	40.000	45.000	48.153	50.000	51.522	55.000	59.371	60.000	62.375	65.000	65.543	68.700	70.000	71.855	72.114	75.000	80.000	85.000	90.000	95.000	100.000	105.000	110.000	115.000	120.000	125.000	130.000	135.000	140.000	145.000	150.000
EXISTING LEVEL	405.990	405.682	405.944	406.121	405.843	406.044	406.198	406.215	406.227	406.318	406.215	406.230	406.116	406.307	405.776	405.618	405.629	405.410	405.349	405.339	405.361	405.185	405.200	405.187	405.002	405.019	405.052	404.734	404.767	404.801	404.451	404.541	404.398	404.068	403.977	403.774	403.405	403.298	403.045	402.643	402.707	402.588	402.224	402.581	403.053	404.929	406.036	406.711	409.033	410.090	410.798	413.923	414.380	415.189	417.170	418.114	418.787	419.589
PROPOSED LEVEL	406.287	406.576	407.533	408.283	409.132	409.497	410.765	411.306	411.638	411.498	411.473	411.375	411.352	411.281	411.234	411.201	411.098	410.955	410.940	410.820	410.819	410.716	410.613	410.510	410.510	410.434	410.394	410.362	409.373	407.972	407.788	407.047	406.185	406.012	404.999	404.604	404.037	403.955																														

PHASE 4 - MATERIAL DEPOSIT - CH320.000

SCALE 1:500

0 20 40 60 80 100m

SCALE 1:1000

Key:

Proposed Levels

Existing Levels

Notes:

1. For cross section markers refer to the Receptor Site C General Arrangement drawing : GC3613-RED-61-RSC-DR-C-0003
2. For Location Plan refer to drawing: GC3613-RED-61-RSC-DR-C-0001
3. For Tip Reprofile General Arrangement refer to drawing : GC3613-RED-61-RSC-DR-C-0002
4. For cross sections of Tip Reprofile refer to drawings: GC3613-RED-61-RSC-DR-C-0004-0008

Rev	Drwn	Chk'd	App'd	Description	Date

Purpose of Issue

D5 - Suitable for Planning

Classification

Public

Client

Rhondda Cynon Taf
County Borough Council

Project

Tylorstown Landslide

Drawing

Phase 4
Receptor Site C - Cross Sections
Sheet 3 of 5

Scale @ A1	Drawn	Checked	Approved
1:500	MH	NG	PH

Project No.: GC/3613

Date: March 2021

Drawing Identifier (Project - Originator - Zone - Level - File Type - Role - Number): GC3613-RED-61-RSC-DR-C-0011

BS1192 Compliant revision: P01

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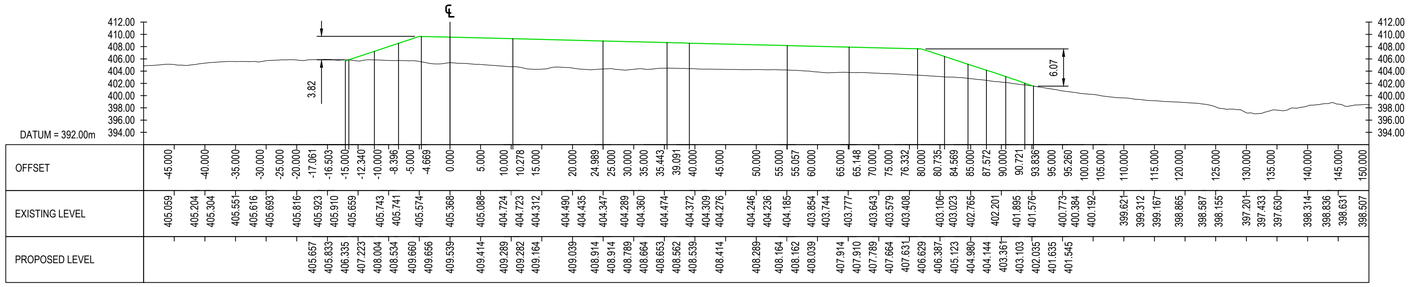
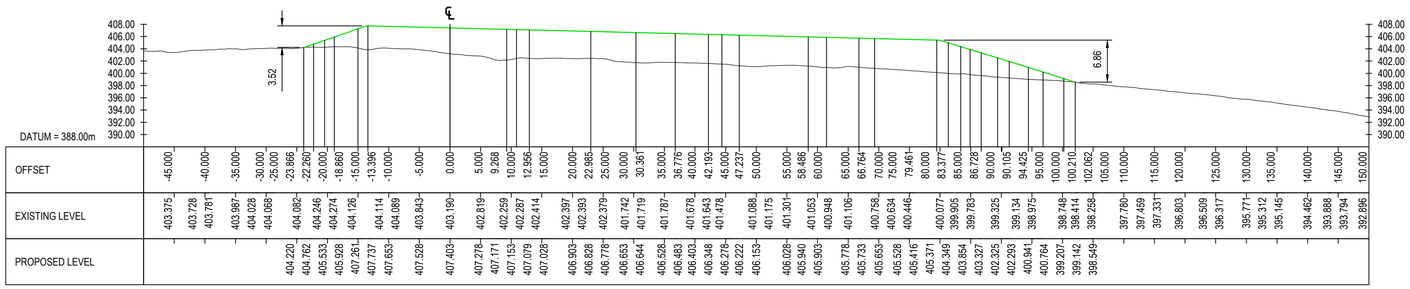


OFFSET	-45.000	-40.000	-35.000	-30.000	-25.000	-20.000	-17.061	-16.503	-15.000	-12.340	-10.000	-8.396	-5.000	-4.669	0.000	5.000	10.000	10.278	15.000	20.000	24.989	25.000	30.000	35.000	35.443	39.091	40.000	45.000	50.000	55.000	55.057	60.000	65.000	65.148	70.000	75.000	76.332	80.000	80.735	84.569	85.000	87.572	90.000	90.721	93.838	95.000	95.260	100.000	105.000	110.000	115.000	120.000	125.000	130.000	135.000	140.000	145.000	150.000
EXISTING LEVEL	405.059	405.204	405.304	405.551	405.616	405.693	405.816	405.923	405.910	405.659	405.743	405.741	405.574	405.368	405.088	404.724	404.723	404.312	404.490	404.435	404.347	404.289	404.360	404.474	404.372	404.309	404.276	404.246	404.236	404.185	403.854	403.744	403.777	403.643	403.579	403.408	403.106	403.023	402.765	402.201	401.895	401.576	400.773	400.384	400.192	399.621	399.312	399.167	398.865	398.587	398.155	397.201	397.433	397.630	398.314	398.836	398.631	398.597
PROPOSED LEVEL							405.657	405.833	406.335	407.223	408.004	408.534	409.660	409.656	409.539	409.414	409.289	409.282	409.164	409.039	408.914	408.914	408.789	408.664	408.653	408.562	408.539	408.414	408.289	408.164	408.162	408.039	407.914	407.910	407.789	407.664	407.631	406.629	406.387	405.123	404.980	404.144	403.361	403.103	402.035	401.635	401.545													

PHASE 4 - MATERIAL DEPOSIT - CH360.000

SCALE 1:500



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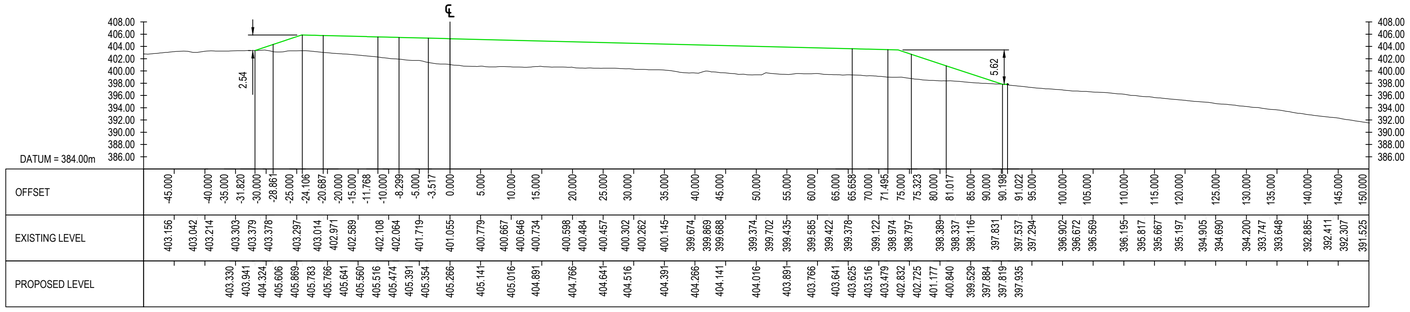
EXISTING LEVEL	403.375	403.728	403.781	403.987	404.028	404.068	404.082	404.246	404.274	404.126	404.114	404.089	403.843	403.190	402.819	402.259	402.287	402.414	402.397	402.393	402.379	401.742	401.719	401.787	401.678	401.643	401.478	401.088	401.175	401.301	401.053	400.948	401.106	400.758	400.634	400.446	400.077	399.905	399.783	399.325	399.134	398.975	398.748	398.414	398.258	397.780	397.459	397.331	396.803	396.509	396.317	395.771	395.312	395.145	394.462	393.888	393.794	392.896
PROPOSED LEVEL							404.220	404.762	405.533	405.928	407.261	407.737	407.653	407.528	407.403	407.278	407.171	407.153	407.079	407.028	406.903	406.828	406.778	406.653	406.644	406.528	406.483	406.403	406.348	406.278	406.222	406.153	406.028	405.940	405.903	405.778	405.733	405.653	405.528	405.416	405.371	404.349	403.854	403.327	402.325	402.293	400.941	400.764	399.207	399.142	398.549											

PHASE 4 - MATERIAL DEPOSIT - CH400.000

SCALE 1:500



OFFSET	-45.000	-40.000	-35.000	-31.820	-30.000	-28.861	-25.000	-24.106	-20.687	-20.000	-15.000	-11.768	-10.000	-8.299	-5.000	-3.517	0.000	5.000	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000	55.000	60.000	65.000	65.658	70.000	71.495	75.000	75.323	80.000	81.017	85.000	90.000	90.198	91.022	95.000	100.000	105.000	110.000	115.000	120.000	125.000	130.000	135.000	140.000	145.000	150.000
EXISTING LEVEL	403.156	403.042	403.214	403.303	403.379	403.378	403.297	403.014	402.971	402.589	402.108	402.064	401.719	401.055	400.779	400.667	400.646	400.734	400.598	400.484	400.457	400.302	400.262	400.145	399.674	399.869	399.688	399.374	399.702	399.435	399.585	399.422	399.378	399.122	398.974	398.797	398.389	398.337	398.116	397.831	397.537	397.294	396.902	396.672	396.569	396.195	395.817	395.667	395.197	394.905	394.690	394.200	393.747	393.648	392.885	392.411	392.307	391.525
PROPOSED LEVEL				403.330	403.941	404.324	405.606	405.869	405.783	405.766	405.641	405.560	405.516	405.474	405.391	405.354	405.266	405.141	405.016	404.891	404.766	404.641	404.516	404.391	404.266	404.141	404.016	403.891	403.766	403.641	403.625	403.516	403.479	402.832	402.725	401.177	400.840	399.529	397.884	397.819	397.935																	

PHASE 4 - MATERIAL DEPOSIT - CH440.000

SCALE 1:500

Key:

Proposed Levels

Existing Levels

Notes:

1. For cross section markers refer to the Receptor Site C General Arrangement drawing : GC3613-RED-61-RSC-DR-C-0003
2. For Location Plan refer to drawing: GC3613-RED-61-RSC-DR-C-0001
3. For Tip Reprofile General Arrangement refer to drawing : GC3613-RED-61-RSC-DR-C-0002
4. For cross sections of Tip Reprofile refer to drawings: GC3613-RED-61-RSC-DR-C-0004-0008

0 20 40 60 80 100m

SCALE 1:1000

Rev	Drwn	Chk'd	App'd	Description	Date

Purpose of Issue

D5 - Suitable for Planning

Classification

Public

Client

Rhondda Cynon Taf
County Borough Council

Project

Tylorstown Landslide

Drawing

Phase 4
Receptor Site C - Cross Sections
Sheet 4 of 5

Scale @ A1	Drawn	Checked	Approved
1:500	MH	NG	PH

Project No. GC/3613

Date March 2021

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number

BS1192 Compliant

GC3613-RED-61-RSC-DR-C-0012

revision P01

REDSTART
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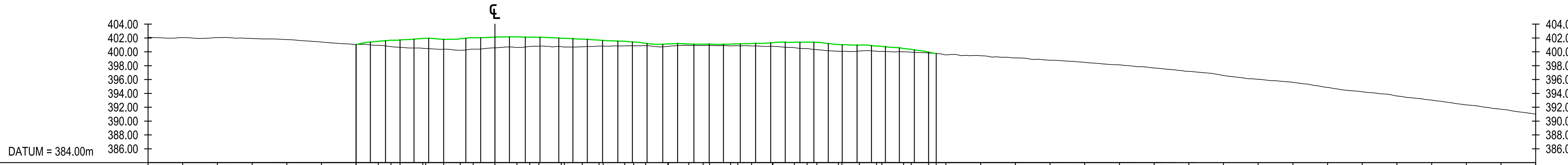
P:\Schemes_CGC\GC003600-99\GC003613 - RCT Tylorstown Landslide\2 - Drawings\2.3 - Preliminary & Pre-Tender\61 - Planning\Phase 4\GC3613-RED-61-RSC-DR-C-0009 - 0013 Receptor Site C Cross Sections.dwg

Key:

Proposed Levels

Existing Levels



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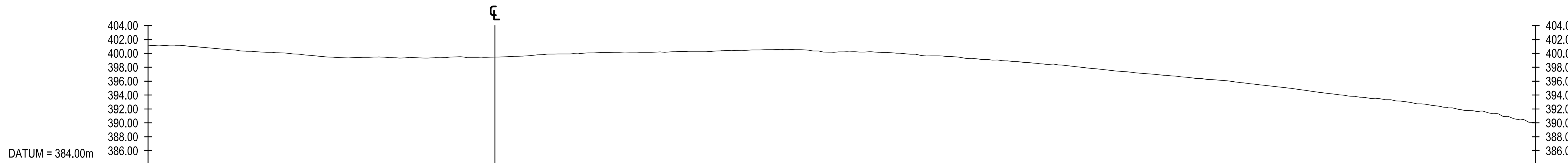
EXISTING LEVEL	402.058, 402.019, 402.065, 401.931, 401.812, 401.759, 401.413, 401.089, 401.069, 400.746, 400.502, 400.493, 400.222, 400.582, 400.767, 400.700, 400.692, 400.825, 400.875, 400.877, 400.804, 400.919, 400.930, 400.883, 400.811, 400.764, 400.470, 400.081, 400.059, 400.090, 399.959, 399.911, 399.559, 399.440, 399.292, 399.118, 398.794, 398.721, 398.484, 398.122, 397.902, 397.666, 397.177, 396.957, 396.590, 396.044, 395.806, 395.599, 394.856, 394.426, 394.241, 393.625, 393.229, 393.041, 392.342, 391.878, 391.725, 391.019
PROPOSED LEVEL	401.070, 401.071, 401.073, 401.532, 401.677, 401.718, 401.942, 401.951, 401.812, 401.908, 402.040, 402.127, 402.163, 402.126, 402.108, 401.961, 401.962, 401.833, 401.690, 401.645, 401.524, 401.419, 401.237, 401.145, 401.149, 401.132, 401.098, 401.123, 401.106, 401.159, 401.208, 401.319, 401.323, 401.379, 401.406, 401.380, 401.056, 401.021, 400.989, 400.841, 400.795, 400.483, 400.359, 399.971, 399.753

PHASE 4 - MATERIAL DEPOSIT - CH480.000
SCALE 1:500



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EXISTING LEVEL	401.115, 400.834, 400.672, 400.278, 400.076, 400.023, 399.551, 399.383, 399.406, 399.378, 399.323, 399.324, 399.507, 399.469, 399.676, 399.907, 399.908, 400.113, 400.165, 400.163, 400.195, 400.291, 400.288, 400.433, 400.519, 400.551, 400.477, 400.218, 400.224, 400.181, 399.864, 399.794, 399.566, 399.125, 399.085, 398.806, 398.434, 398.319, 397.946, 397.419, 397.274, 396.994, 396.533, 396.372, 396.096, 395.505, 395.260, 394.939, 394.248, 393.981, 393.683, 393.164, 392.802, 392.537, 391.785, 391.517, 391.103, 389.972
PROPOSED LEVEL	

PHASE 4 - MATERIAL DEPOSIT - CH500.000
SCALE 1:500

Notes:

1. For cross section markers refer to the Receptor Site C General Arrangement drawing : GC3613-RED-61-RSC-DR-C-0003
2. For Location Plan refer to drawing: GC3613-RED-61-RSC-DR-C-0001
3. For Tip Reprofile General Arrangement refer to drawing : GC3613-RED-61-RSC-DR-C-0002
4. For cross sections of Tip Reprofile refer to drawings: GC3613-RED-61-RSC-DR-C-0004-0008

Rev	Drwn	Chk'd	App'd	Description	Date

Purpose of Issue
D5 - Suitable for Planning

Classification
Public

Client
Rhondda Cynon Taf
County Borough Council

Project
Tylorstown Landslide

Drawing
Phase 4
Receptor Site C - Cross Sections
Sheet 5 of 5

Scale @ A1	Drawn	Checked	Approved
1:500	MH	NG	PH

Project No. GC/3613
Date March 2021

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number
BS1192 Compliant
GC3613-RED-61-RSC-DR-C-0013
revision P01

0 20 40 60 80 100m
SCALE 1:1000

REDSTART
St David's House, Pascal Close, St Mellons, Cardiff, CF3 0LW
www.redstartwales.com

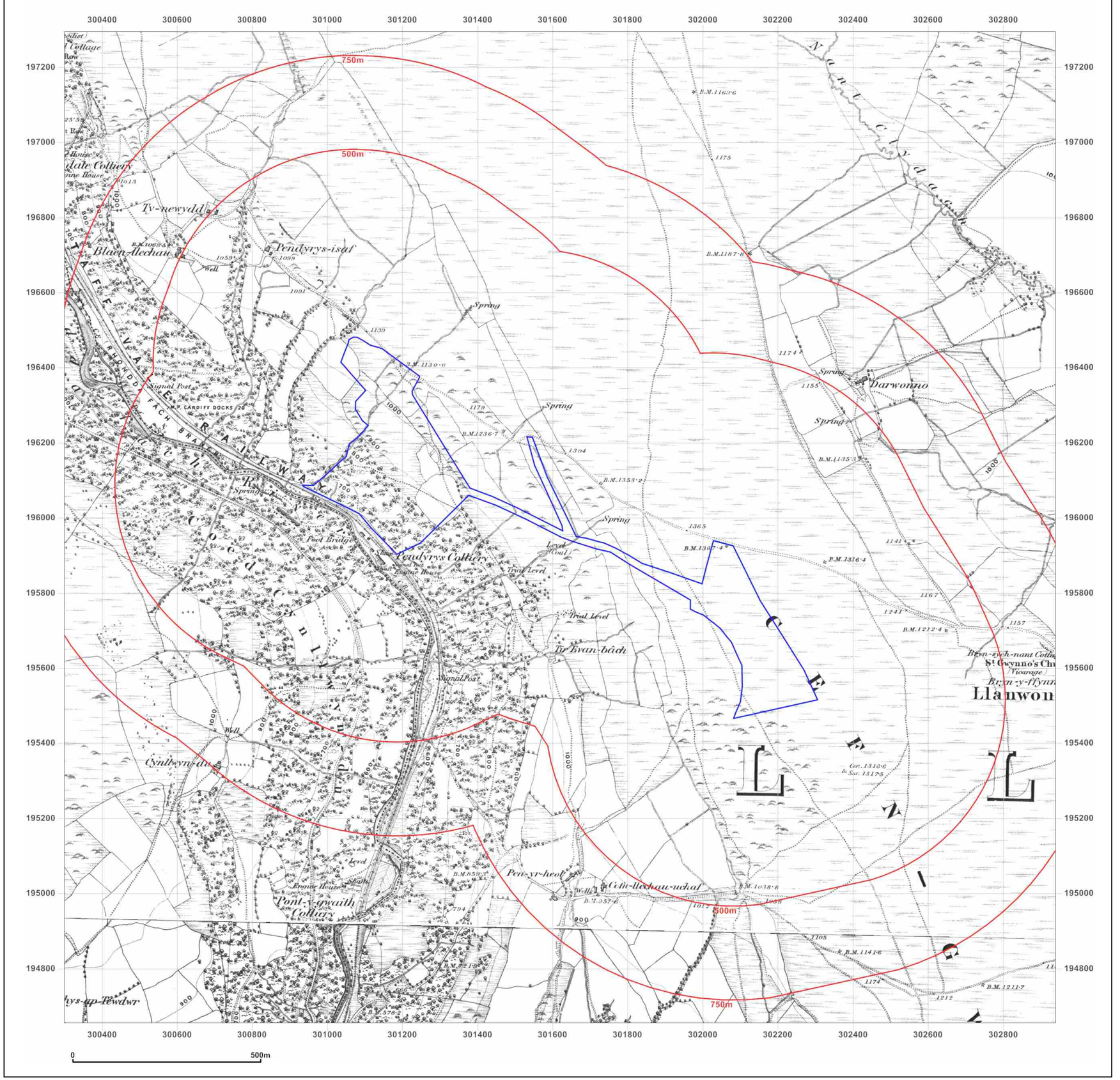
Print Date:04/03/2021 10:31:25

 P:\Schemes_CGC\GC003600-99\GC003613 - RCT Tylorstown Landslide\2 - Drawings\2.3 - Preliminary & Pre-Tender\61 - Planning\Phase 4\GC3613-RED-61-RSC-DR-C-0009 - 0013 Receptor Site C Cross Sections.dwg

REDSTART

APPENDIX A

HISTORICAL MAPPING



Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728
Grid Ref: 301619, 195974

Map Name: County Series

Map date: **1875**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed 1875
Revised 1875
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1875
Revised 1875
Edition N/A
Copyright N/A
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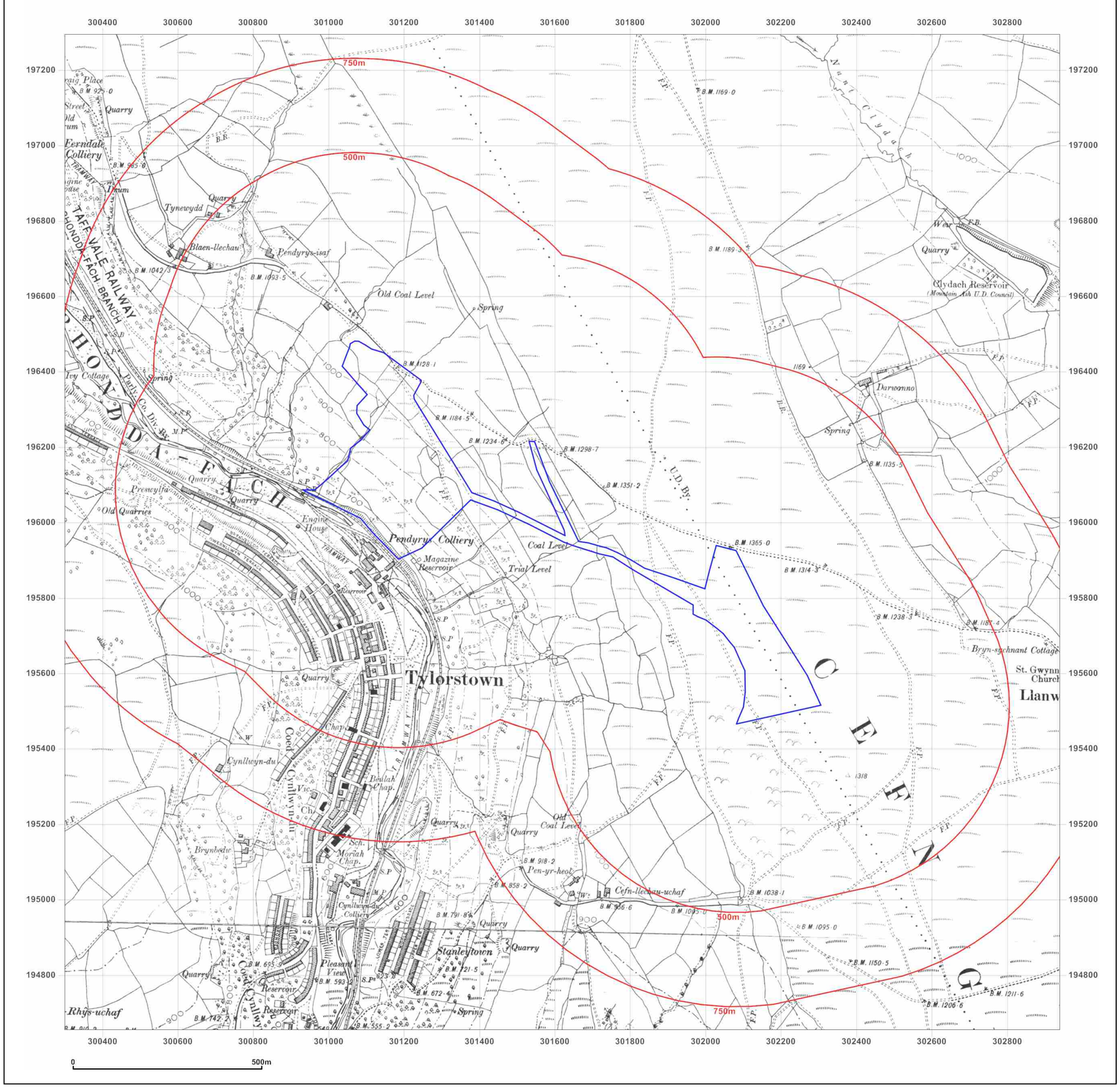

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728
Grid Ref: 301619, 195974

Map Name: County Series

Map date: **1898**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed 1876
Revised 1898
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1874
~~Revised 1898~~
Edition N/A
Copyright N/A
Levelled N/A

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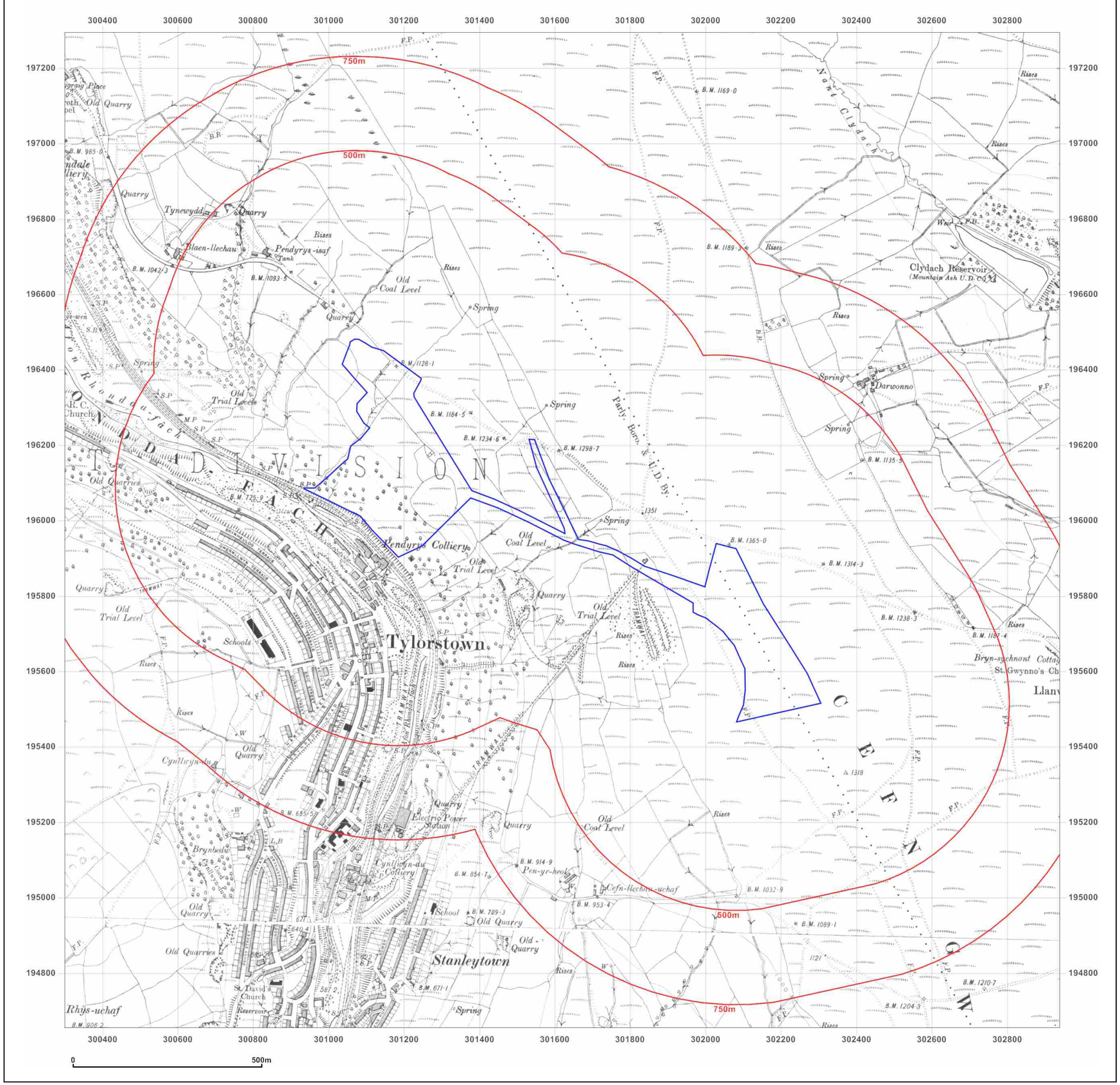

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728
Grid Ref: 301619, 195974

Map Name: County Series

Map date: **1915**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed 1874
Revised 1915
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1874
~~Revised 1915~~
Edition N/A
Copyright N/A
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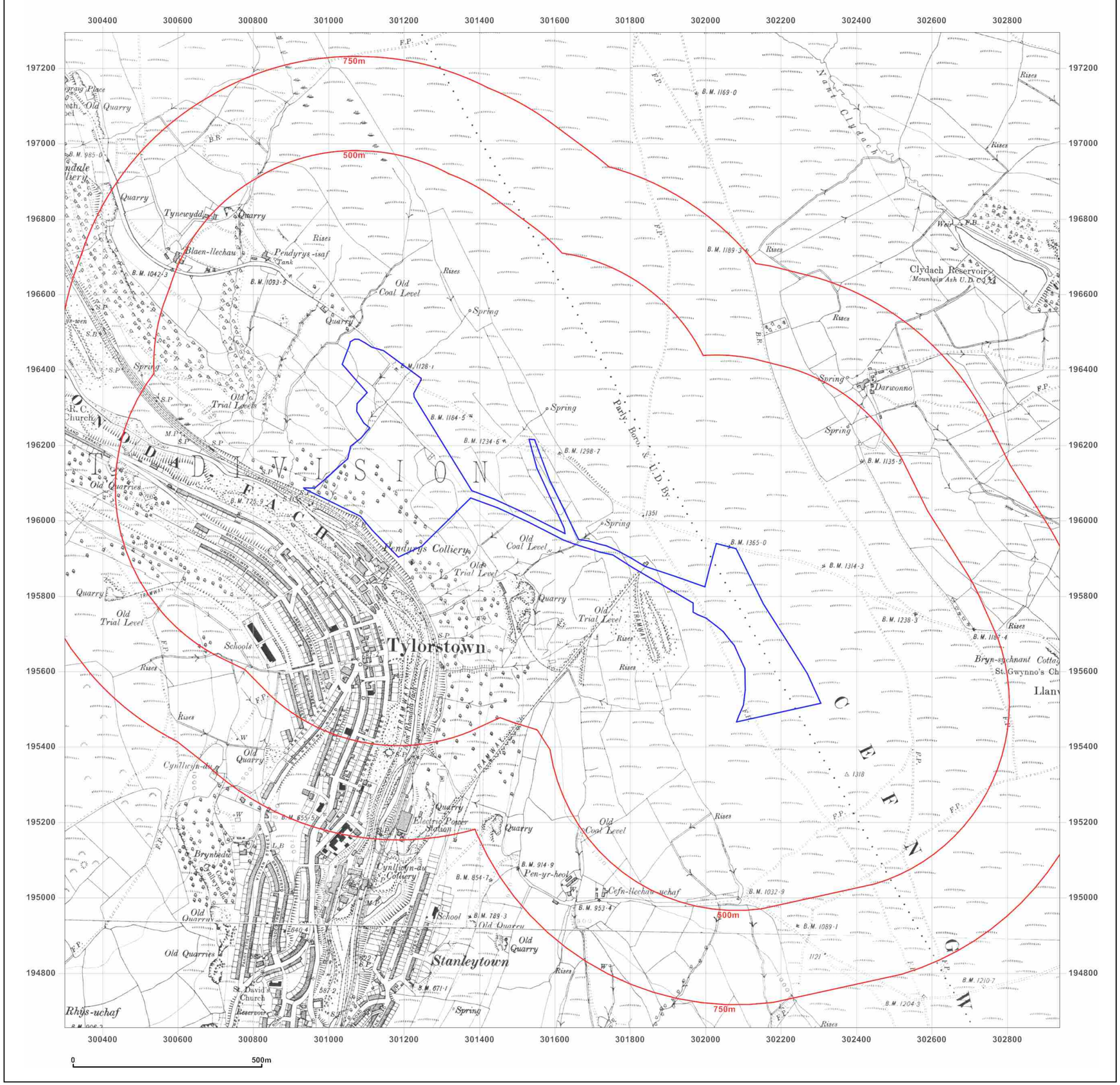

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728
Grid Ref: 301619, 195974

Map Name: County Series

Map date: **1921**

Scale: 1:10,560

Printed at: 1:10,560

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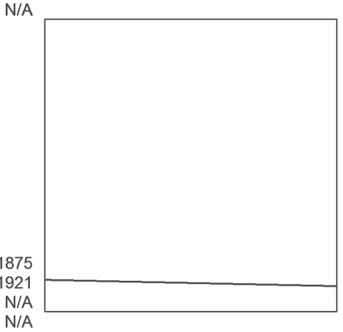
Surveyed 1875
Revised 1921
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1875
Revised 1921
Edition N/A
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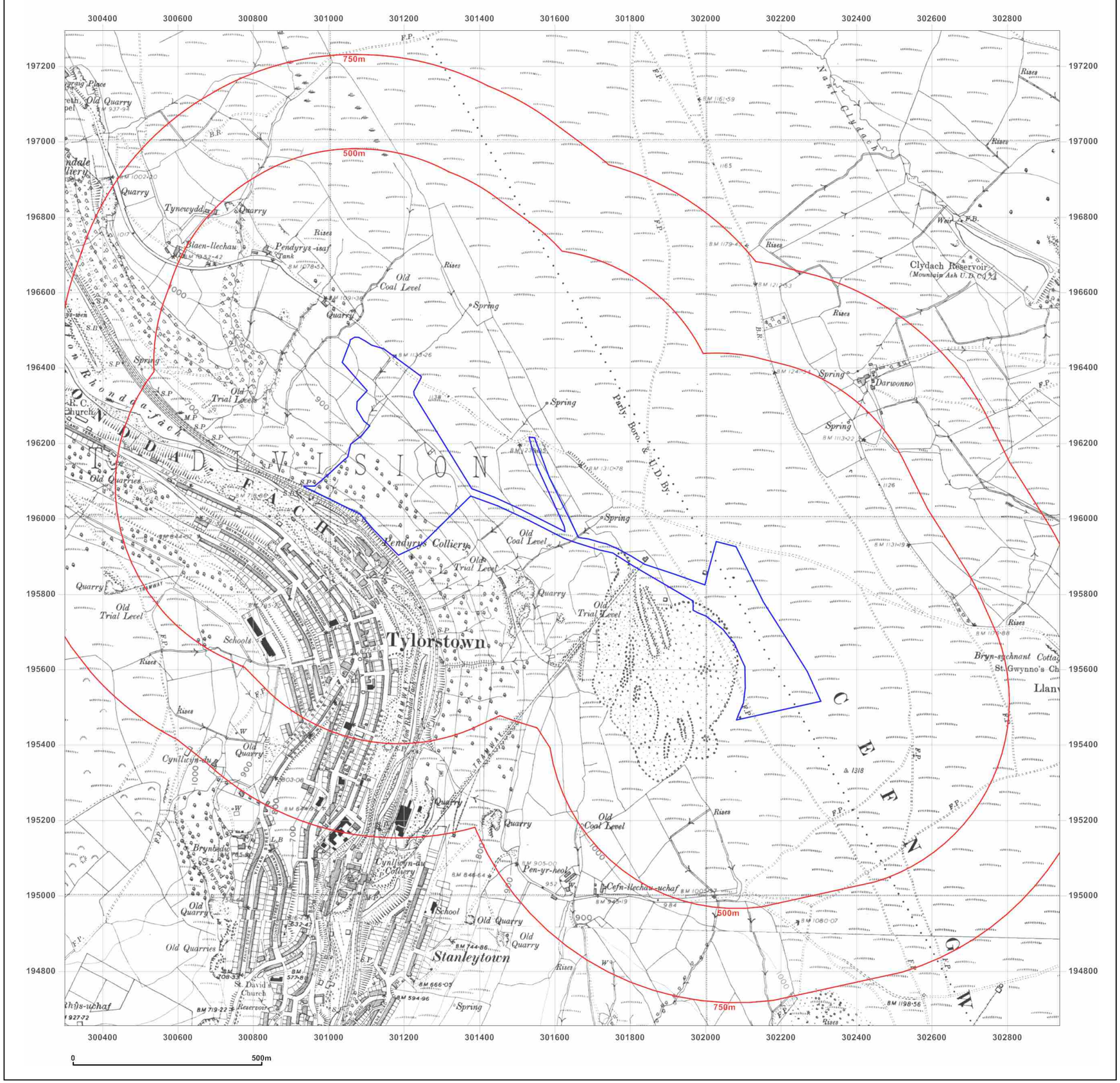

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728
Grid Ref: 301619, 195974

Map Name: County Series

Map date: **1945-1948**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed 1874
Revised 1945
Edition 1945
Copyright N/A
Levelled N/A

Surveyed 1874
~~Revised 1948~~
Edition 1947
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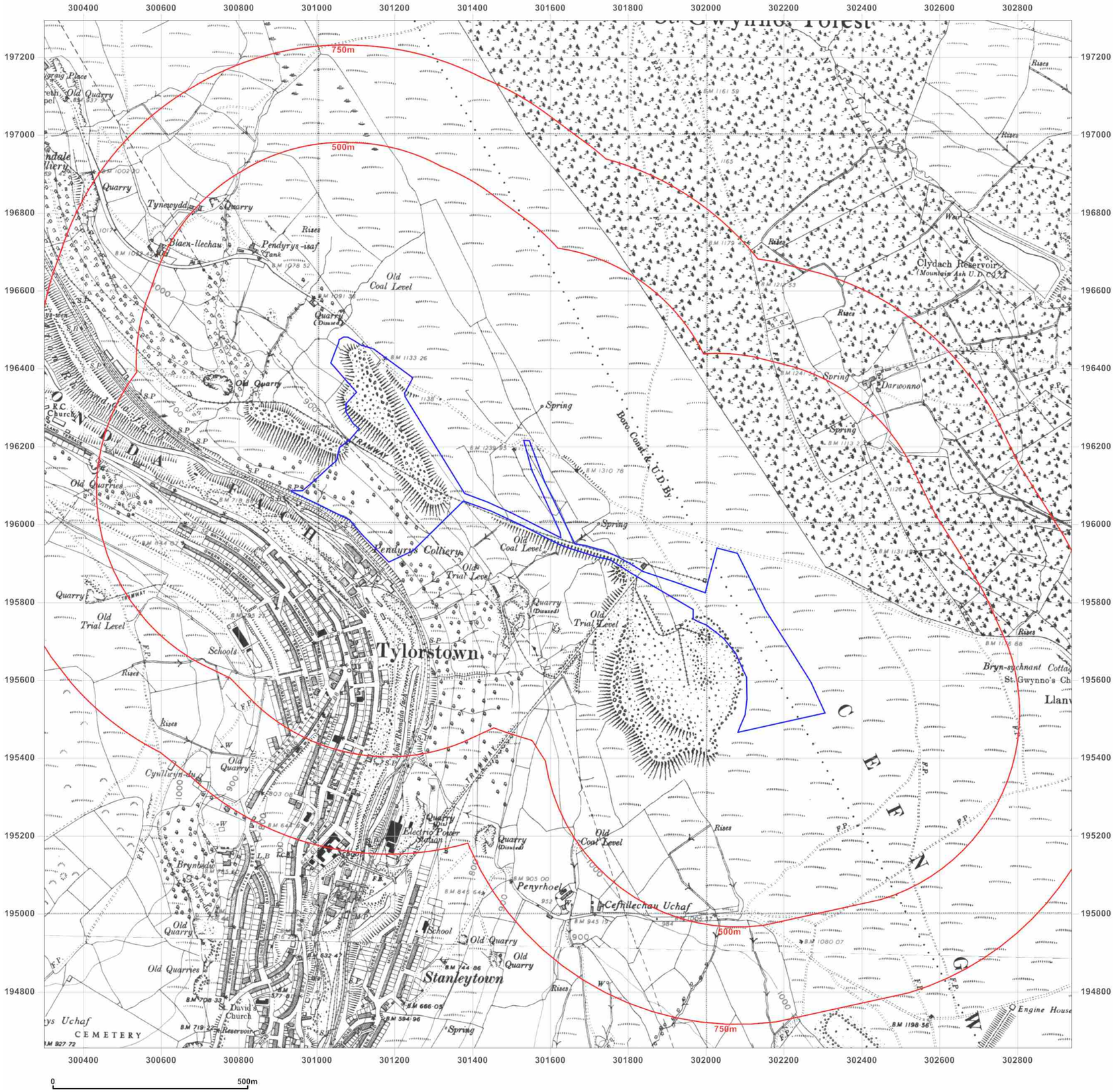

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728
Grid Ref: 301619, 195974

Map Name: County Series

Map date: **1948**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed 1874
Revised 1948
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1874
~~Revised 1948~~
Edition 1948
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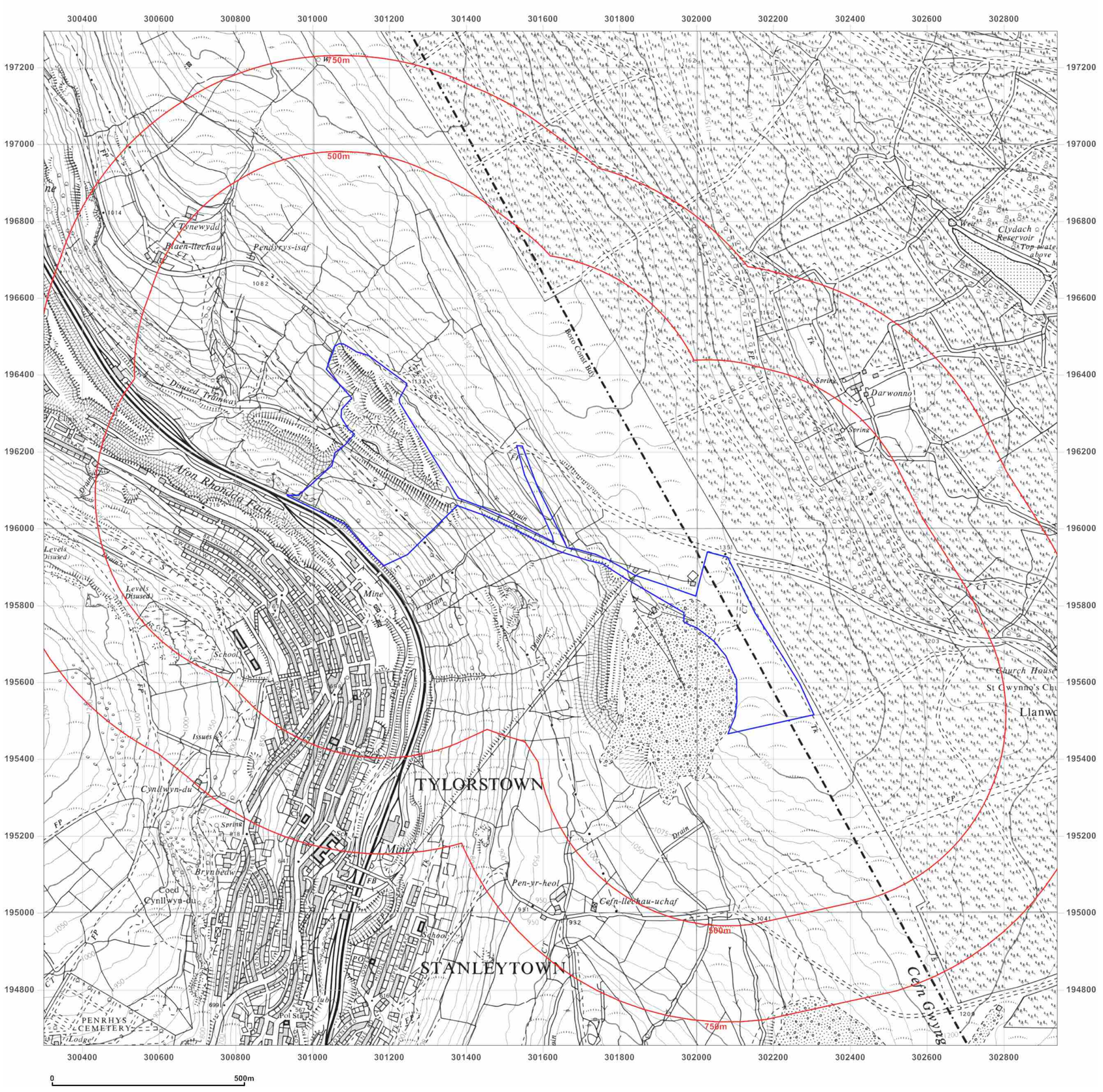

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728
Grid Ref: 301619, 195974

Map Name: Provisional

Map date: **1965**

Scale: 1:10,560

Printed at: 1:10,560

N
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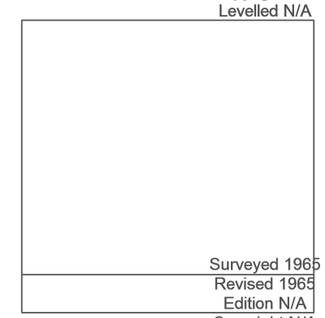
Surveyed 1965
Revised 1965
Edition N/A
Copyright N/A
Levelled N/A



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Revised 1965
Edition N/A
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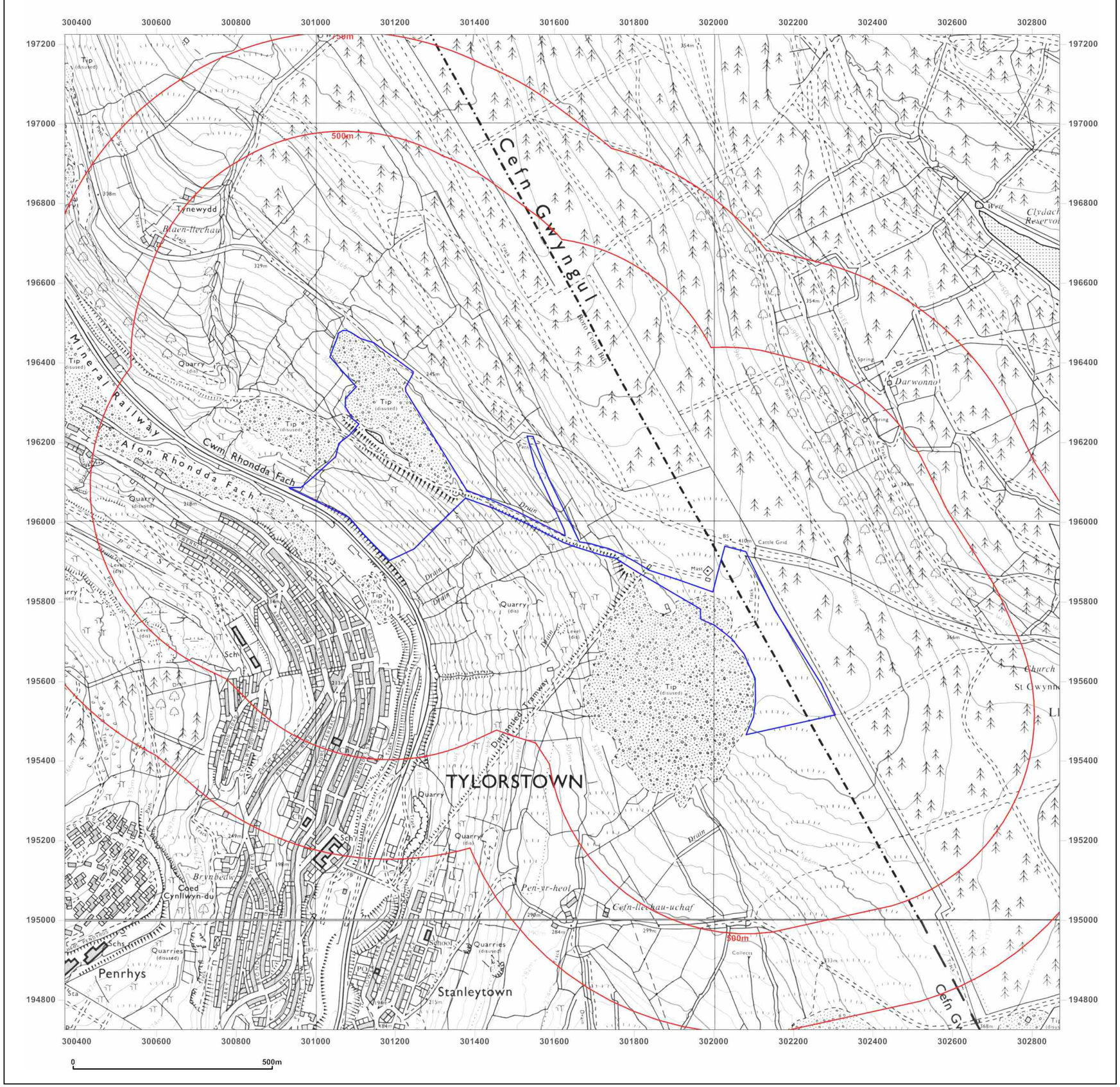

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728
Grid Ref: 301619, 195974

Map Name: National Grid

Map date: **1974**

Scale: 1:10,000

Printed at: 1:10,000

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

Surveyed 1973
Revised 1974
Edition N/A
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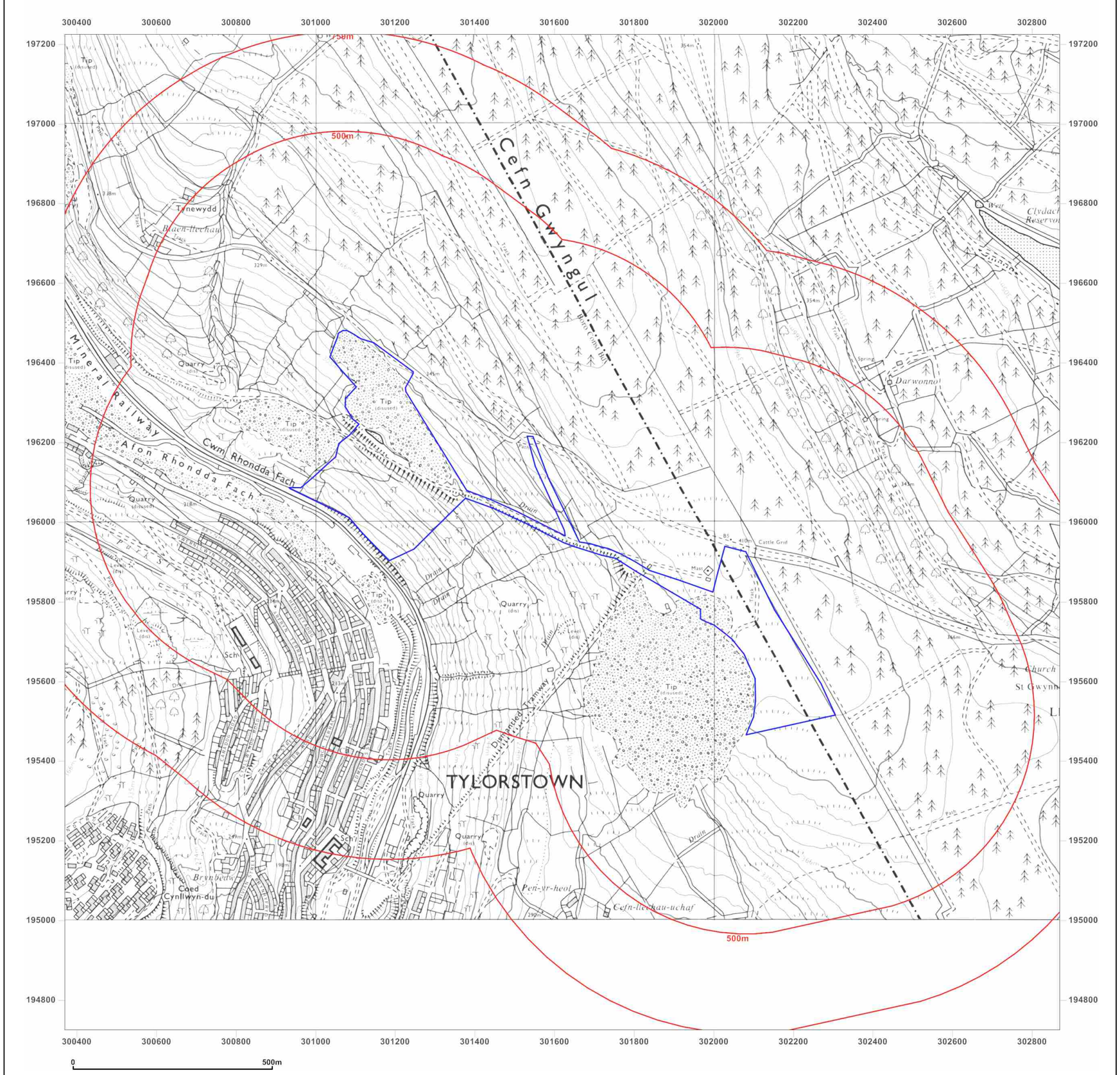

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728
Grid Ref: 301619, 195974

Map Name: National Grid

Map date: **1974**

Scale: 1:10,000

Printed at: 1:10,000

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

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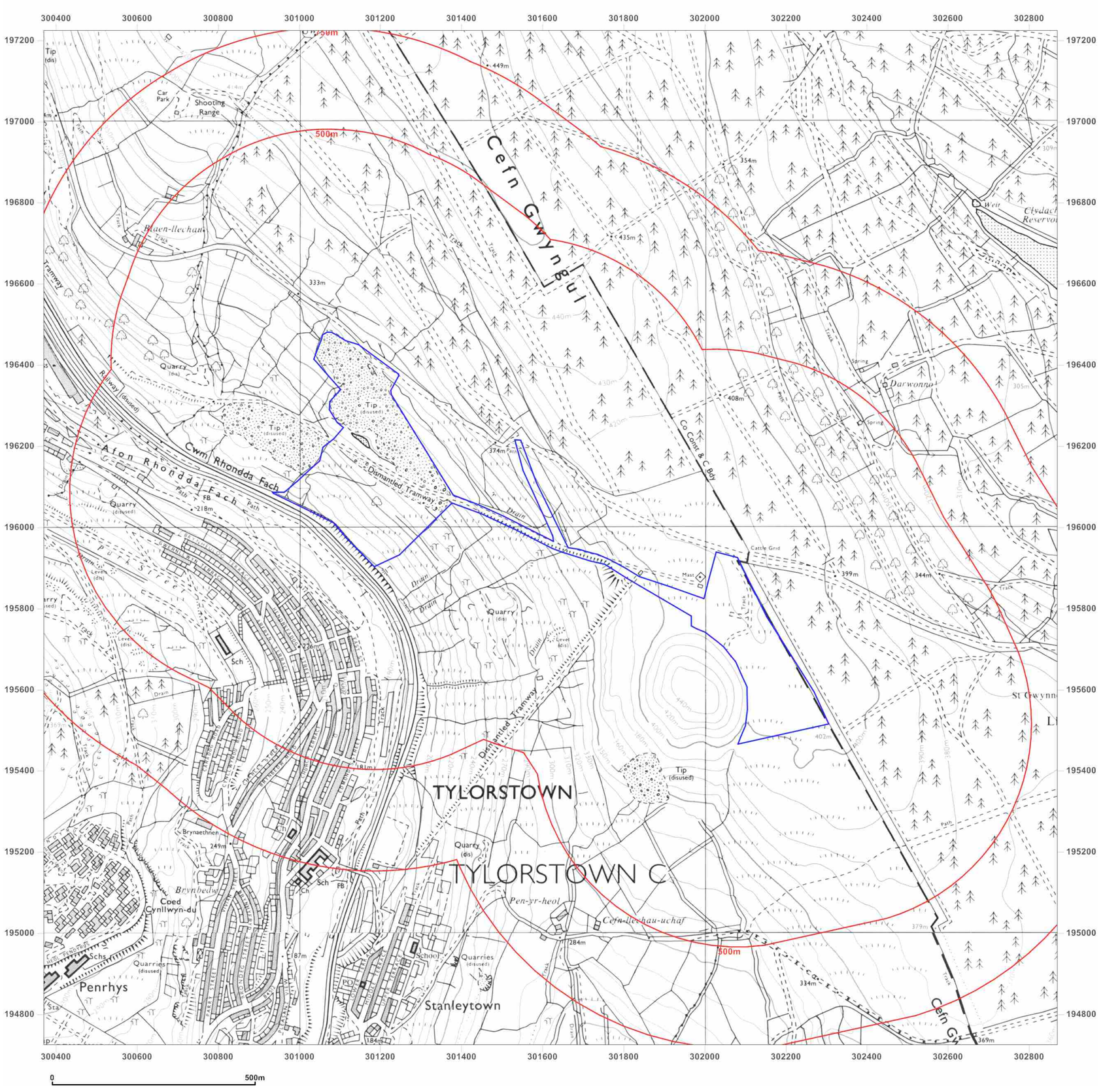

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728
Grid Ref: 301619, 195974

Map Name: National Grid

Map date: **1989-1992**

Scale: 1:10,000

Printed at: 1:10,000

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Surveyed 1972
Revised 1992
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1973
Revised 1989
Edition N/A
Copyright N/A
Levelled N/A

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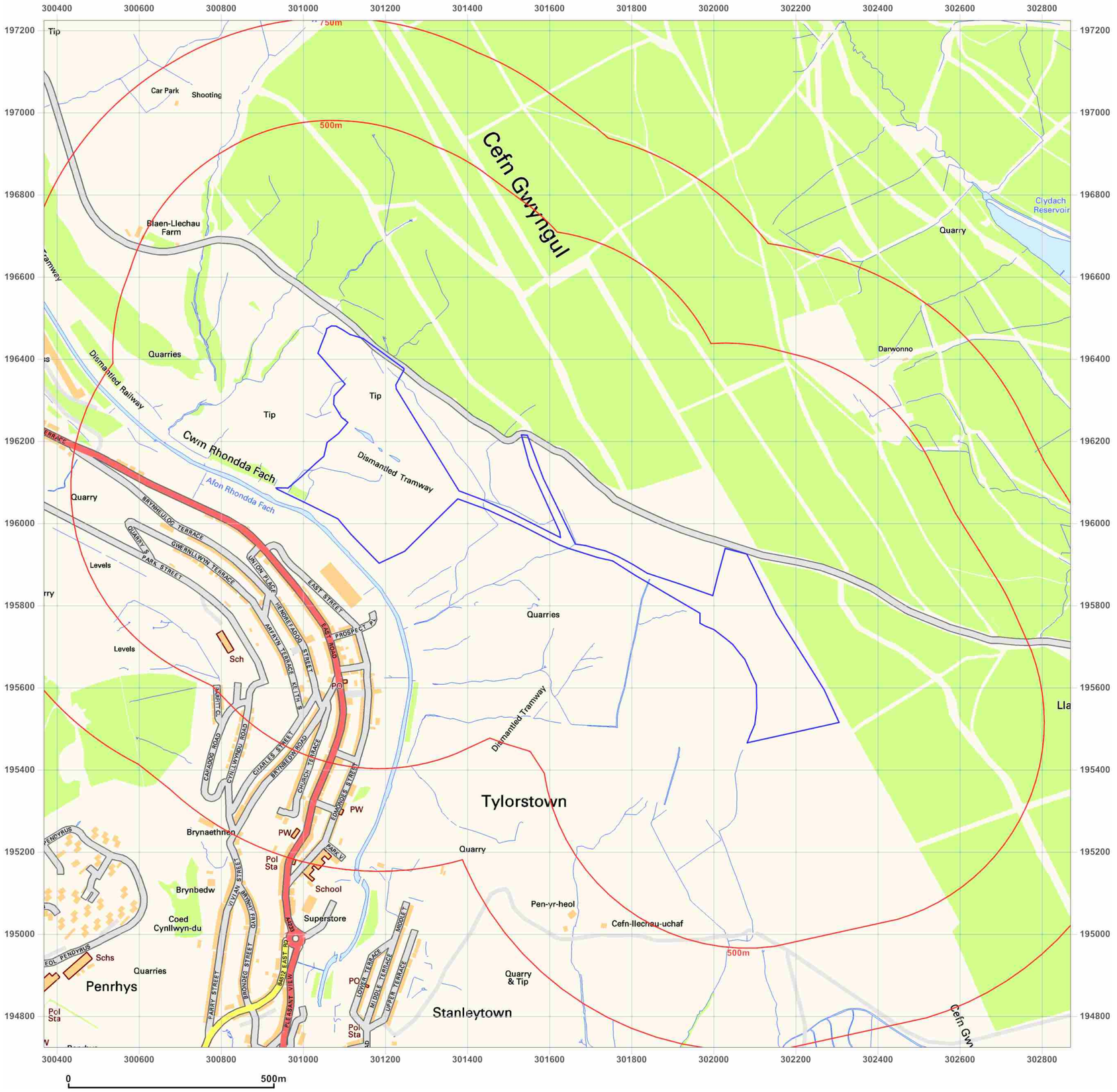

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728
Grid Ref: 301619, 195974

Map Name: National Grid

Map date: **2001**

Scale: 1:10,000

Printed at: 1:10,000

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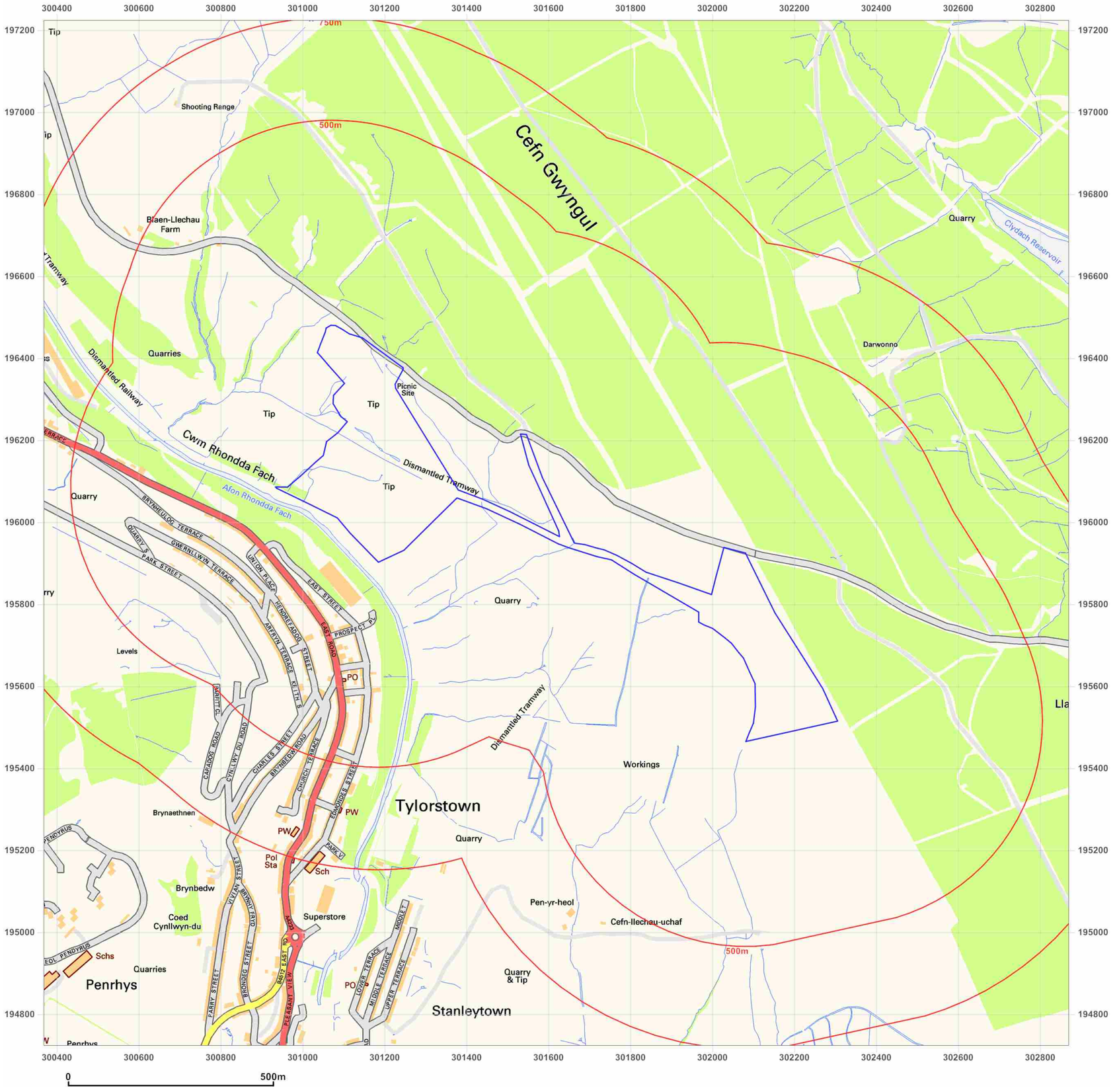

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728
Grid Ref: 301619, 195974

Map Name: National Grid

Map date: **2010**

Scale: 1:10,000

Printed at: 1:10,000

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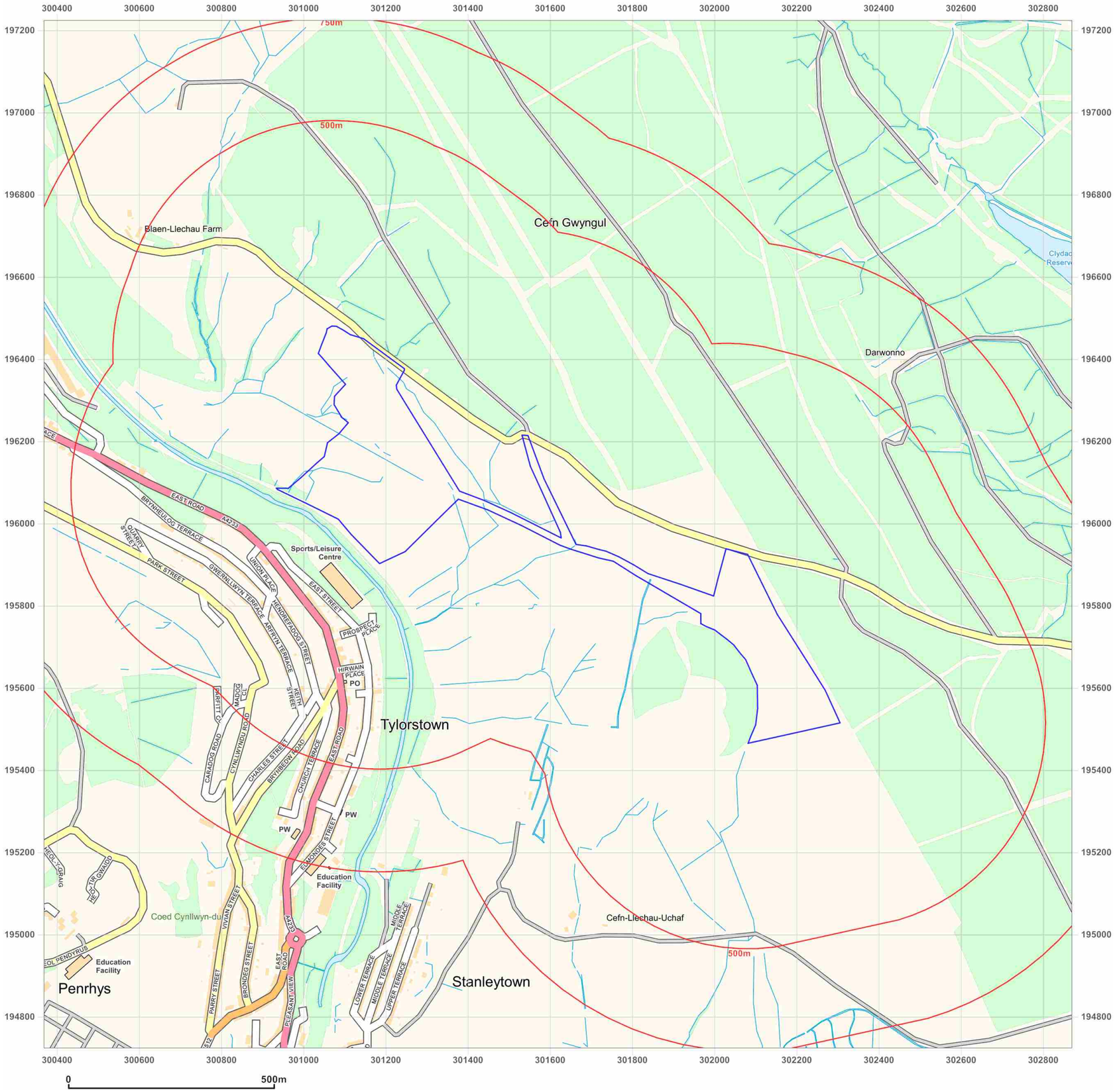

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728
Grid Ref: 301619, 195974

Map Name: National Grid
Map date: **2020**
Scale: 1:10,000
Printed at: 1:10,000

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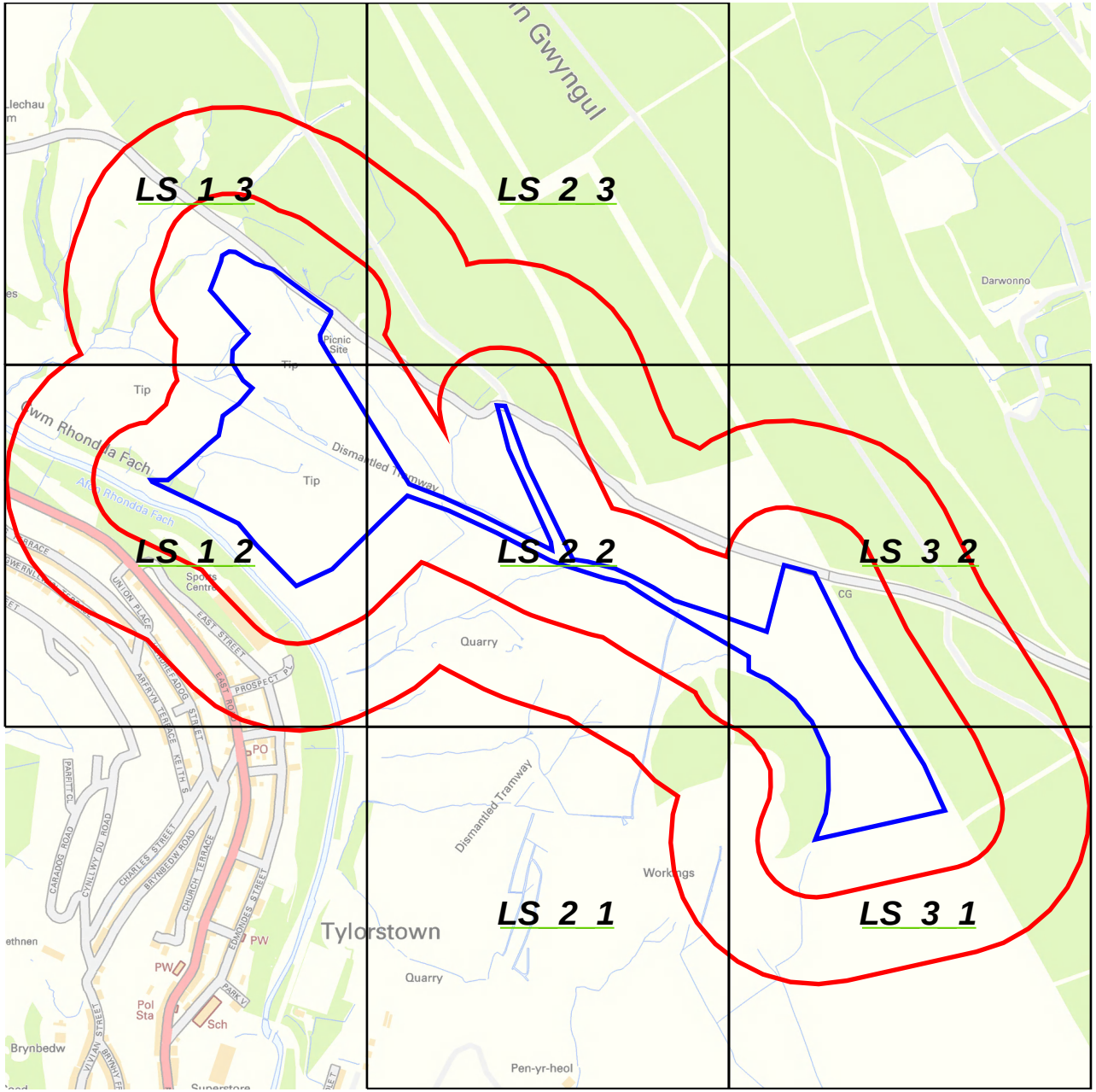

Groundsure INSIGHTS

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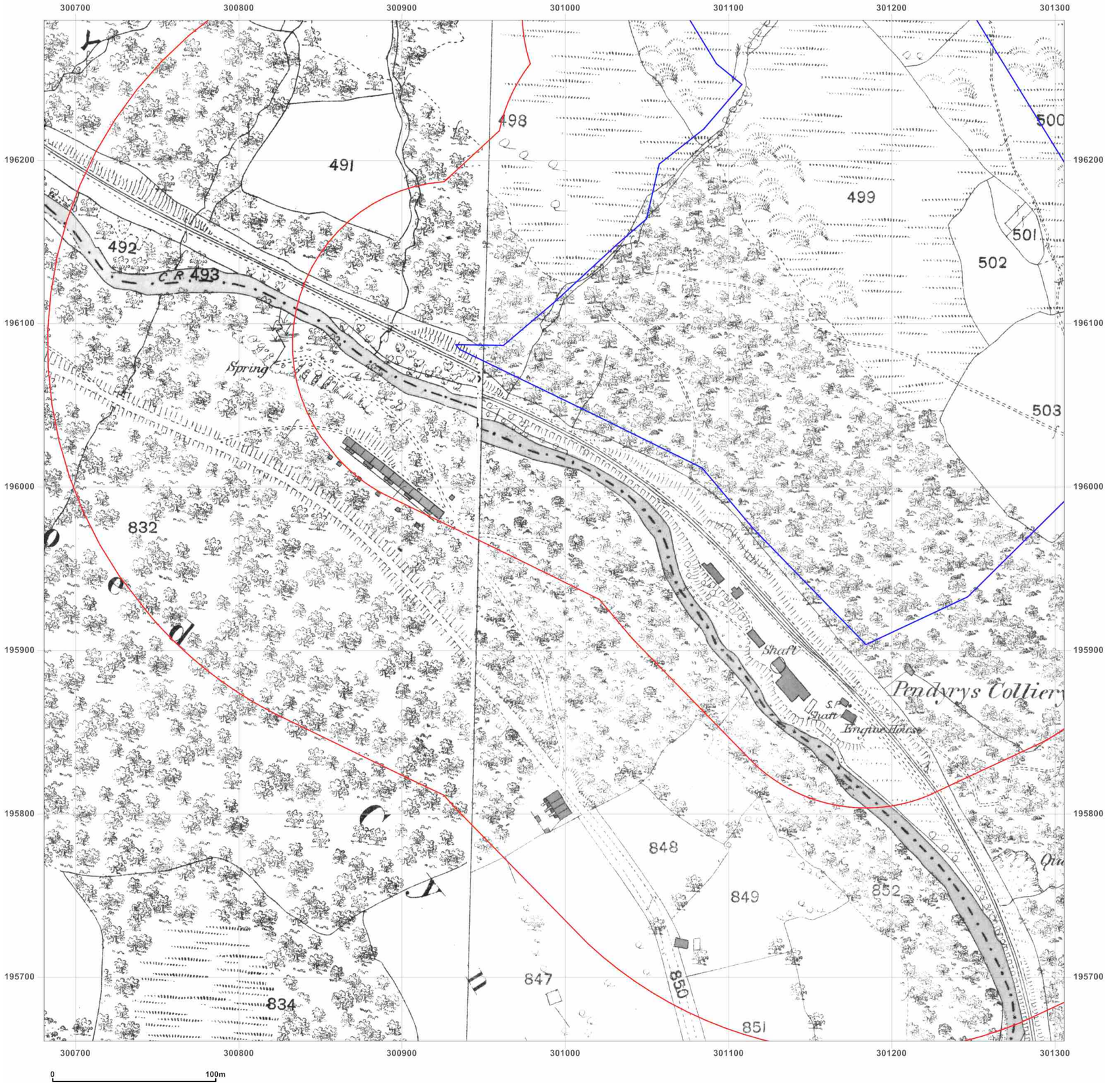
1:2500 Scale Grid Index



Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_2
Grid Ref: 300993, 195973

Map Name: County Series

Map date: **1873-1877**

Scale: 1:2,500

Printed at: 1:2,500

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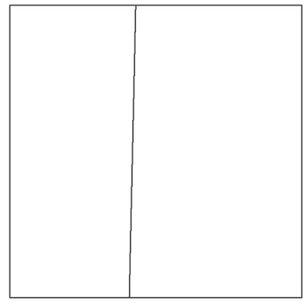

Surveyed 1877
Revised 1877
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1873
Revised 1873
Edition N/A
Copyright N/A
Levelled N/A

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Production date: 22 September 2020

Map legend available at:
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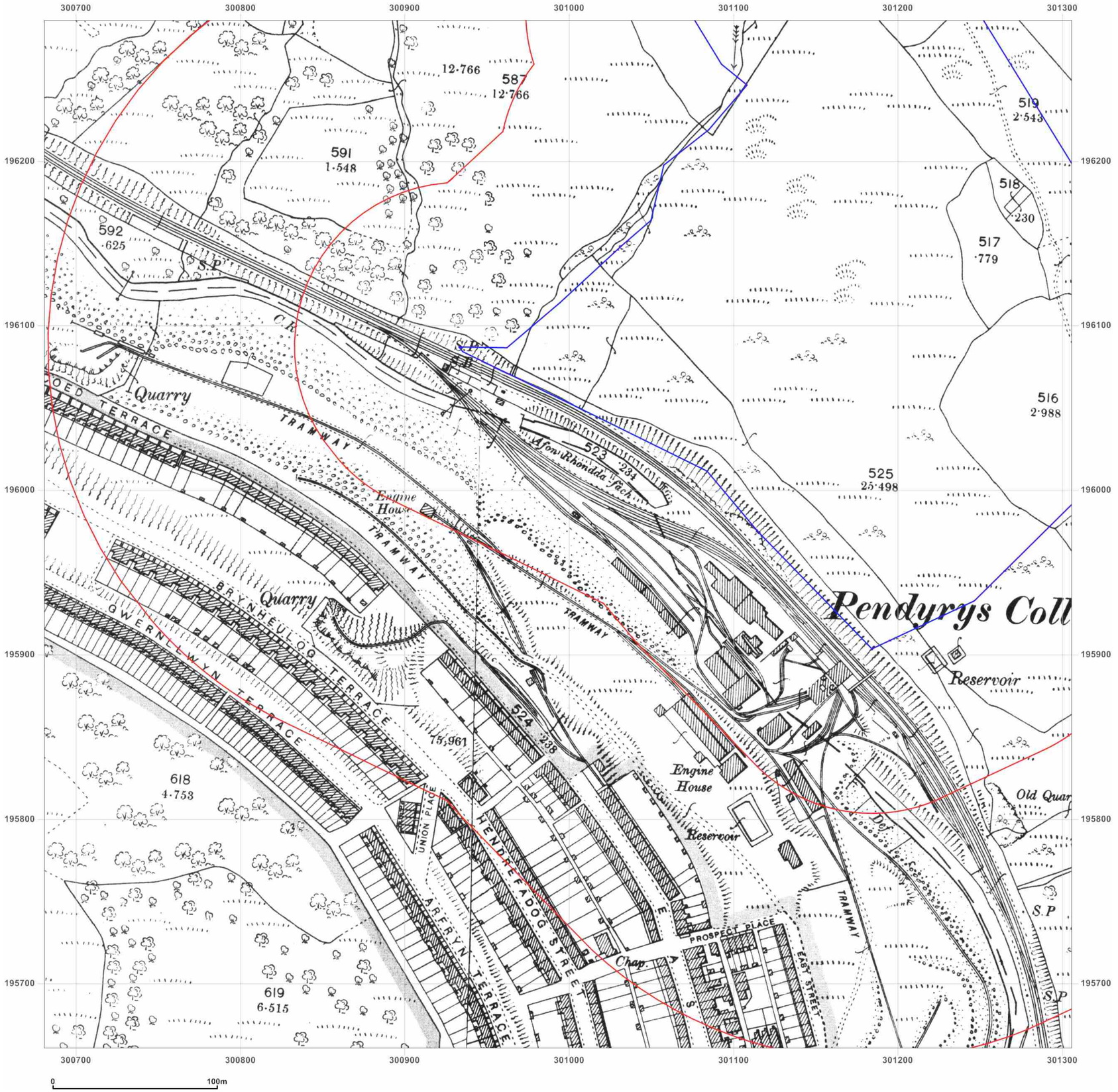

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_2
Grid Ref: 300993, 195973

Map Name: County Series

Map date: **1900**

Scale: 1:2,500

Printed at: 1:2,500

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

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

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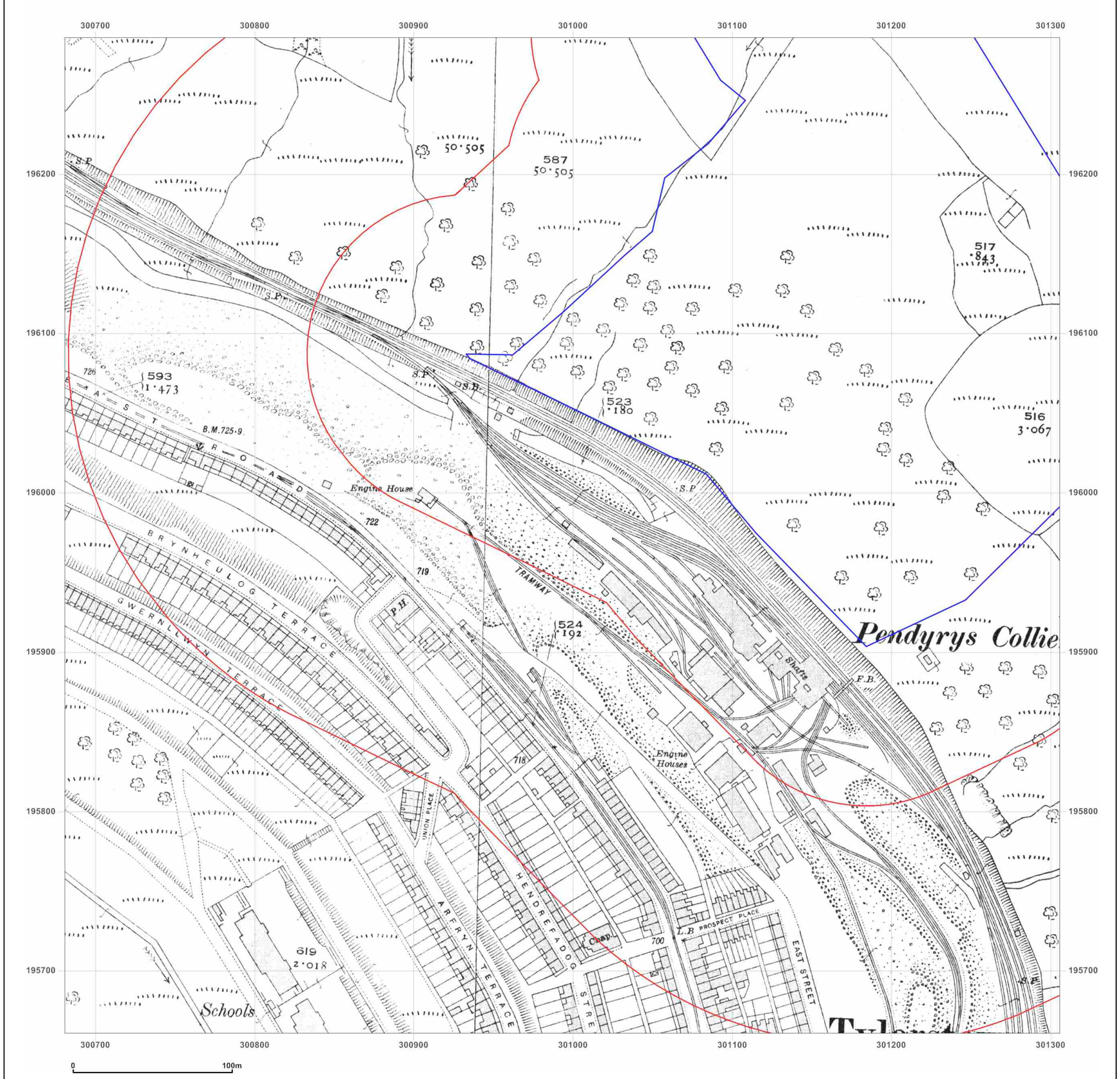


Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_2
Grid Ref: 300993, 195973

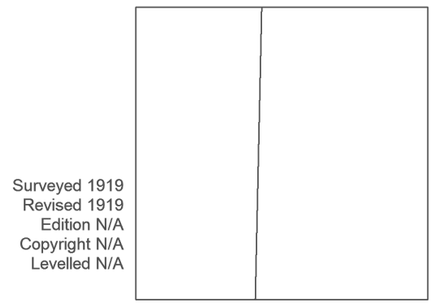
Map Name: County Series

Map date: **1919-1920**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S



Surveyed 1919
Revised 1919
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1920
Revised 1920
Edition N/A
Copyright N/A
Levelled N/A

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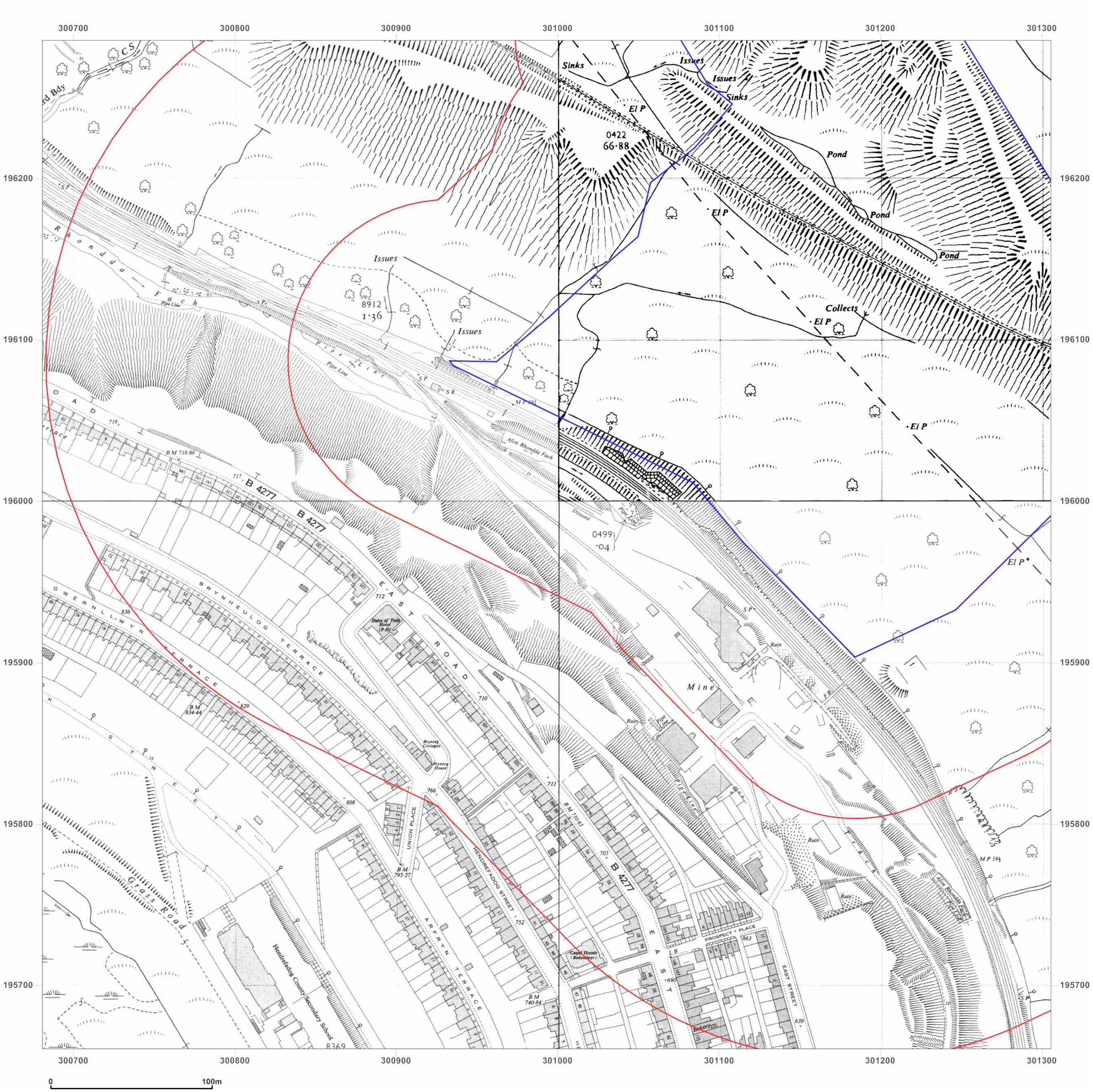

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_2
Grid Ref: 300993, 195973

Map Name: National Grid

Map date: **1957-1961**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1957
Revised 1957
Edition 1959
Copyright 1959
Levelled 1947

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

Surveyed 1961
Revised 1961
Edition 1962
Copyright 1962
Levelled 1957

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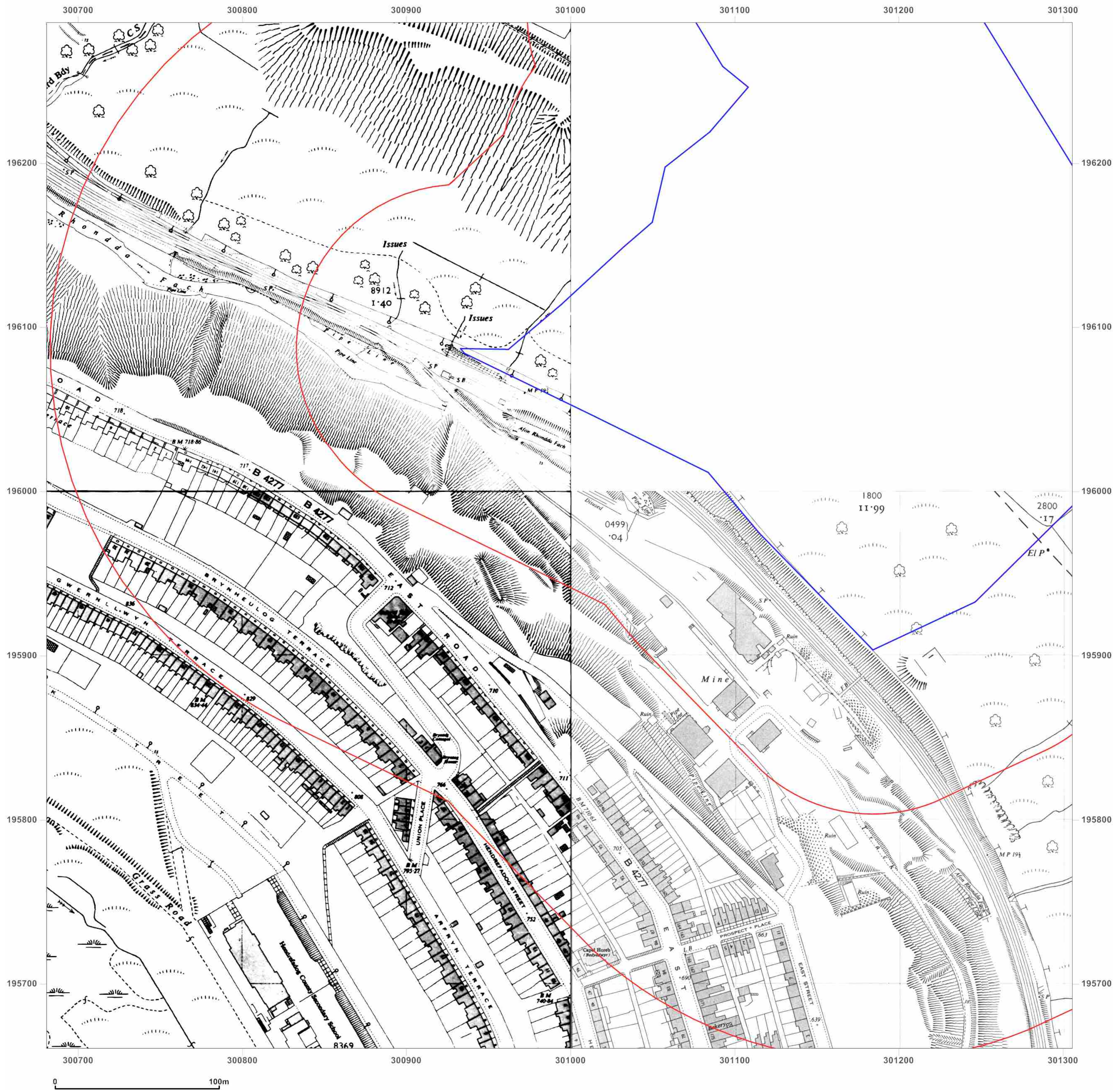

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_2
Grid Ref: 300993, 195973

Map Name: National Grid

Map date: **1958-1962**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

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

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

Surveyed 1958
Revised 1958
Edition 1959
Copyright 1959
Levelled 1948

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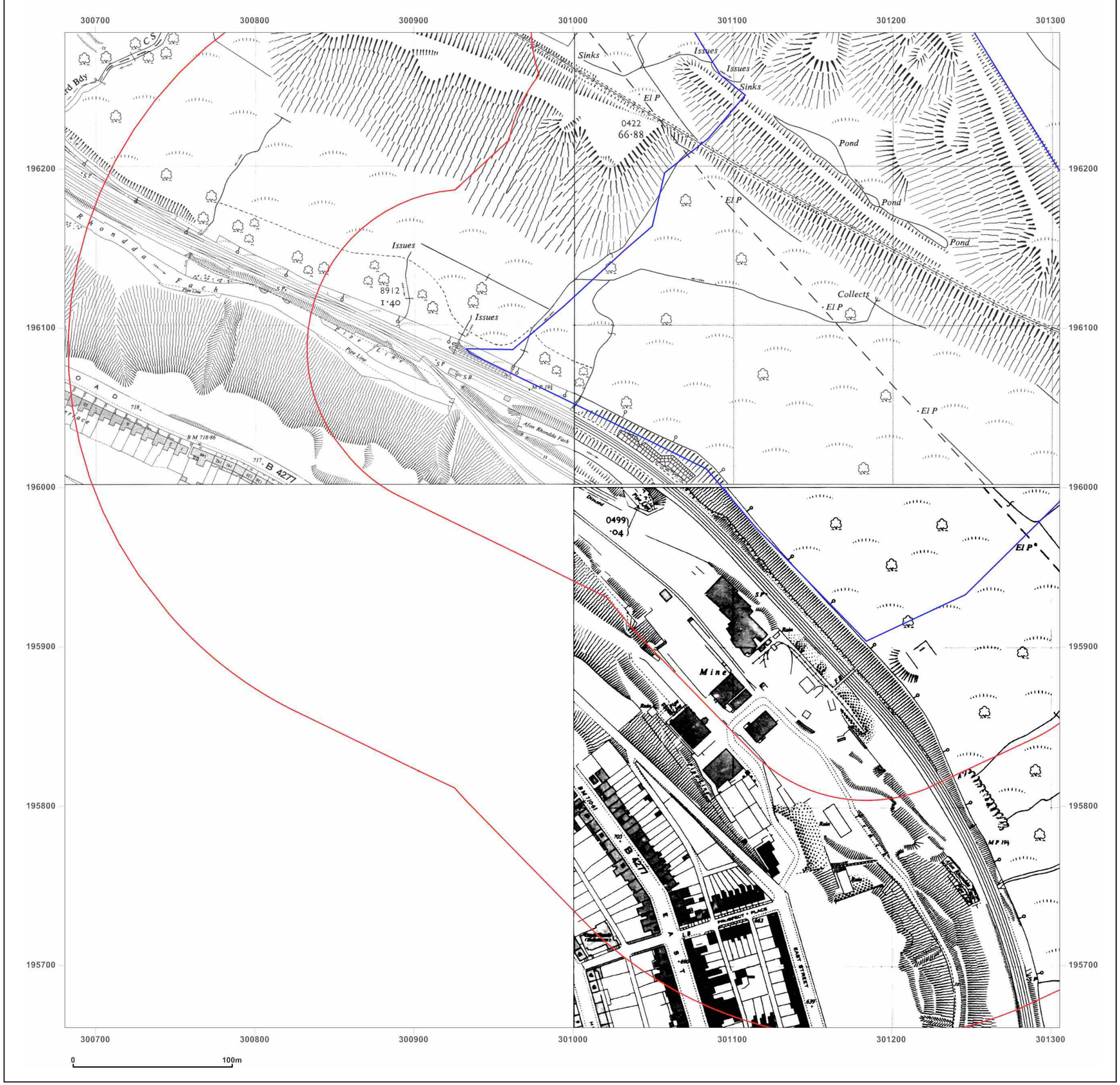


Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_2
Grid Ref: 300993, 195973

Map Name: National Grid

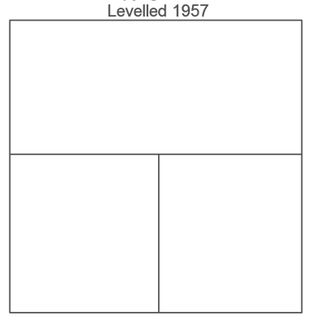
Map date: **1961-1962**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1961
Revised 1961
Edition 1962
Copyright 1962
Levelled 1957



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

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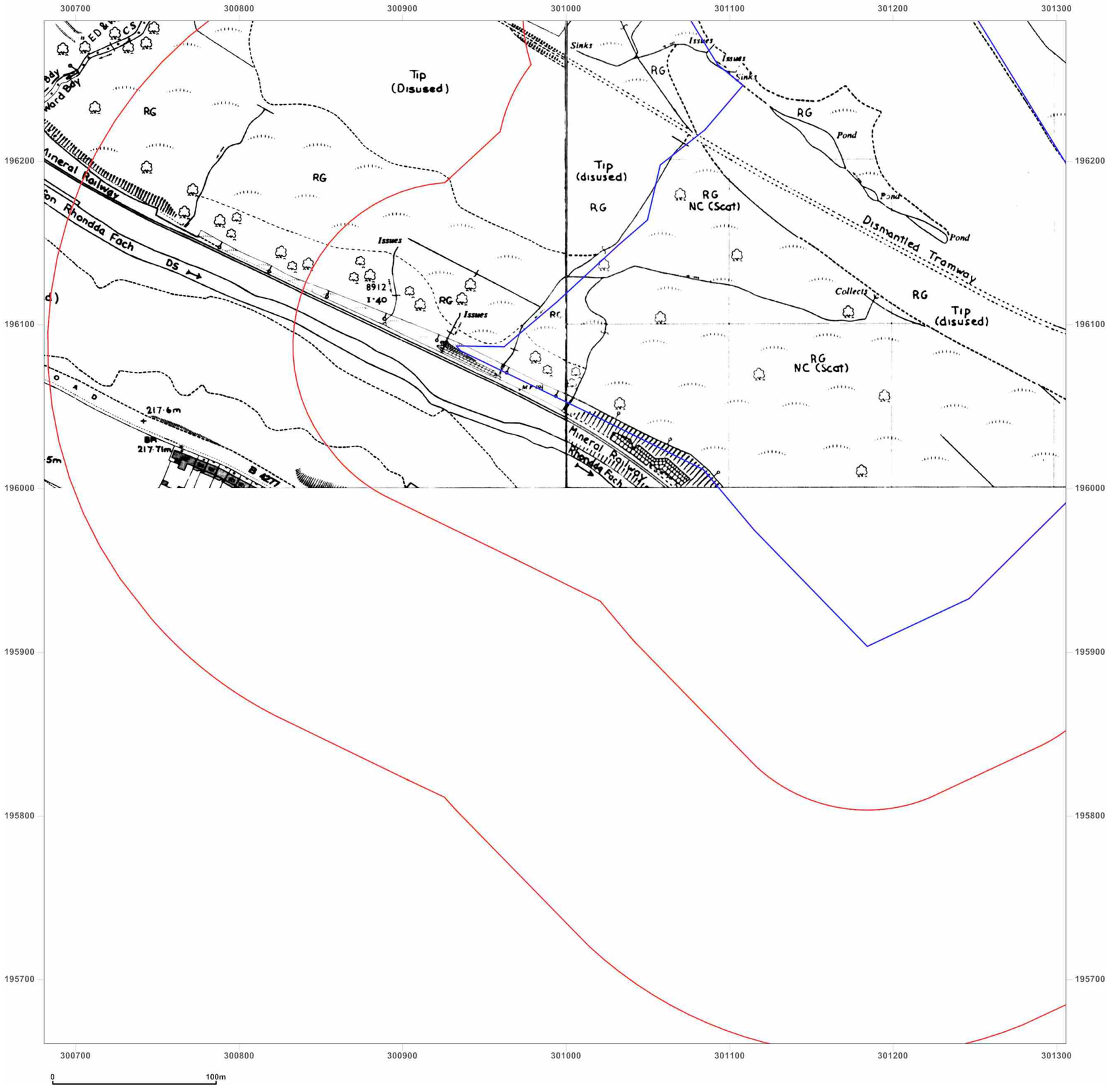


Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_2
Grid Ref: 300993, 195973

Map Name: National Grid

Map date: **1986**

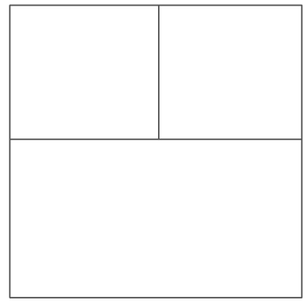
Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

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

Surveyed 1965
Revised 1986
Edition N/A
Copyright 1986
Levelled 1965



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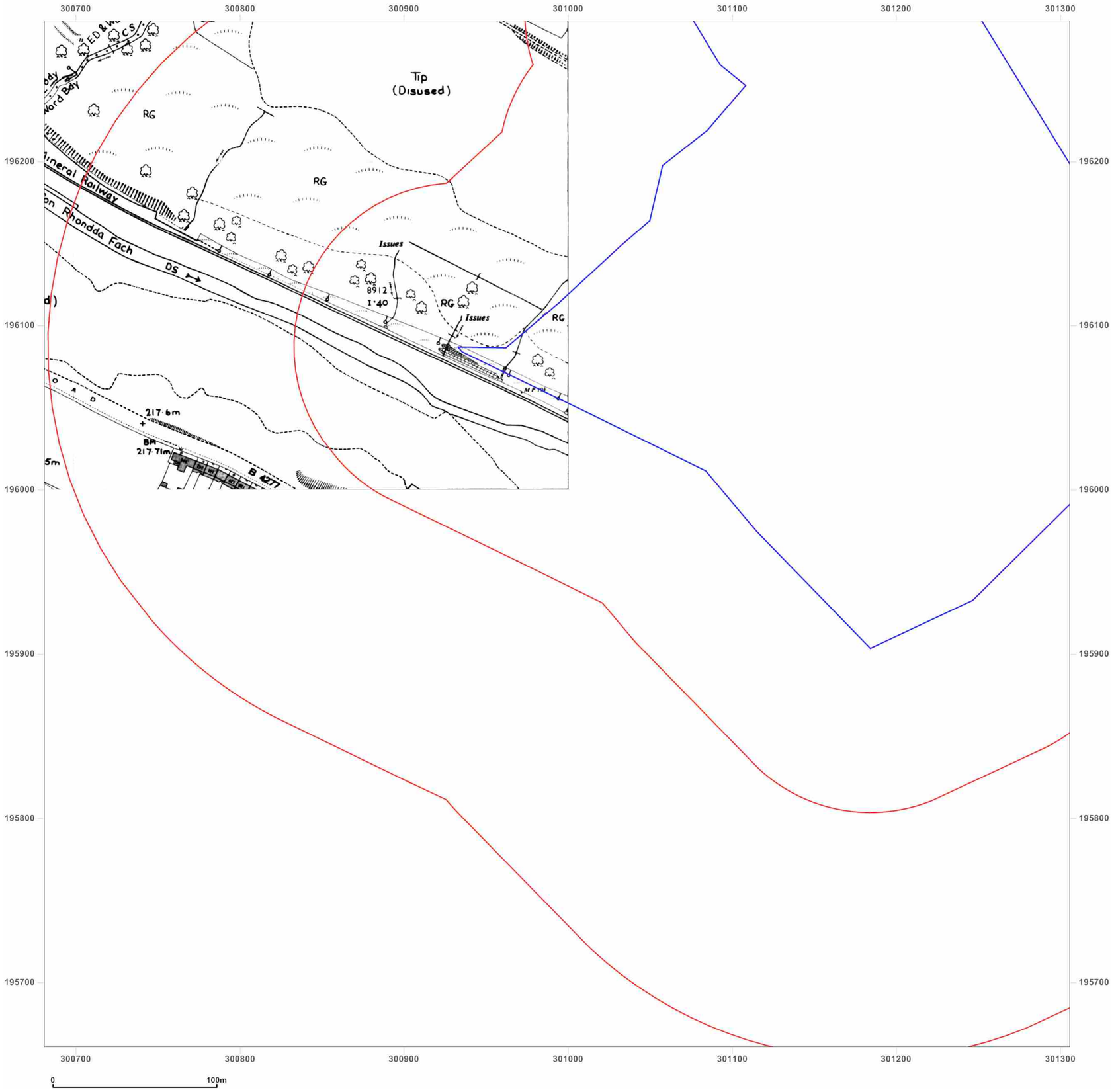


Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_2
Grid Ref: 300993, 195973

Map Name: National Grid

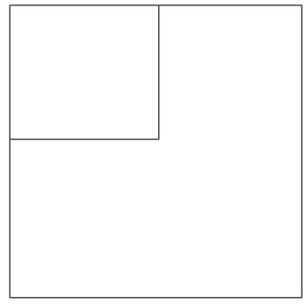
Map date: **1986**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1968
Revised 1986
Edition N/A
Copyright 1986
Levelled 1968



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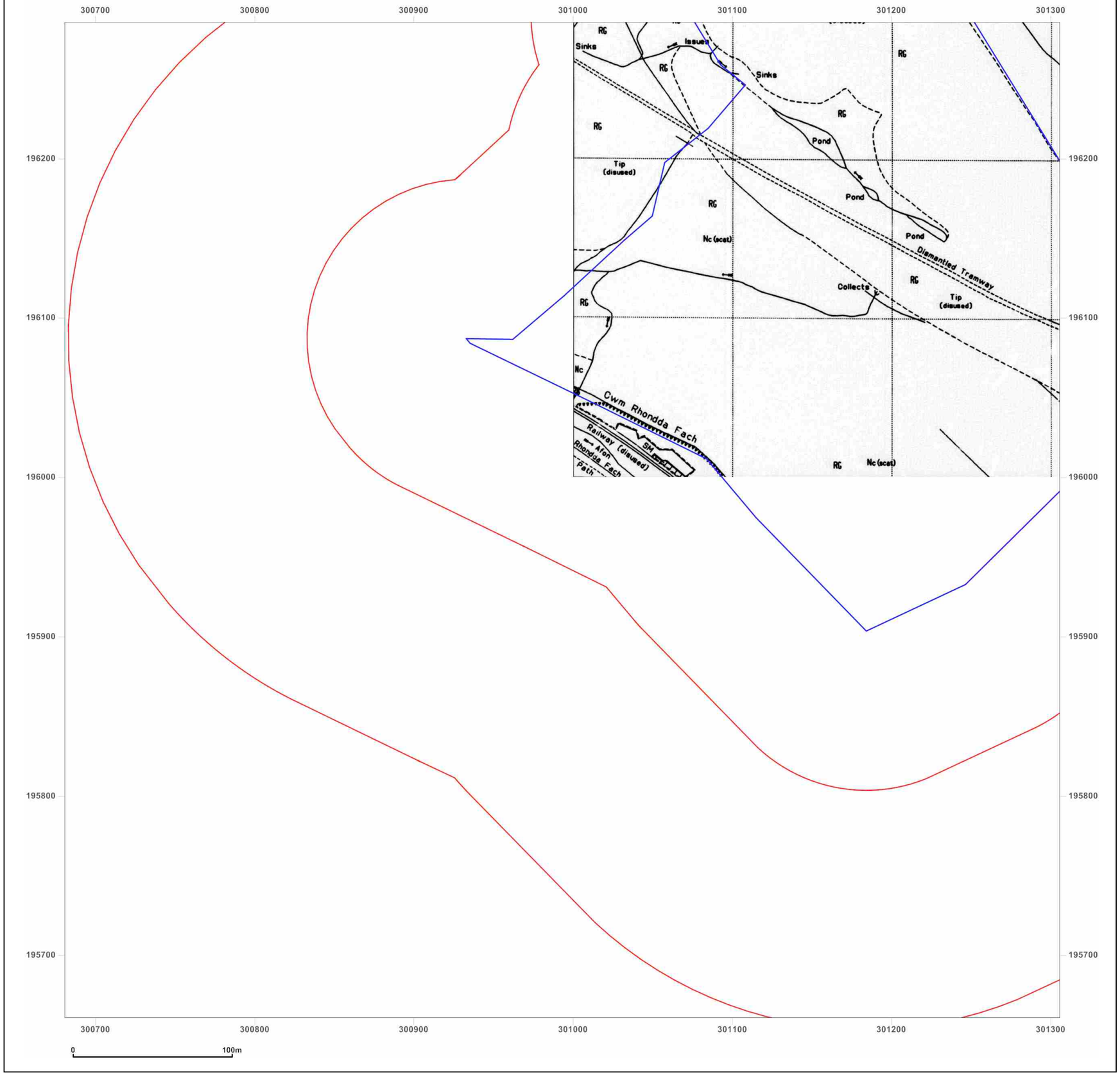


Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_2
Grid Ref: 300993, 195973

Map Name: National Grid

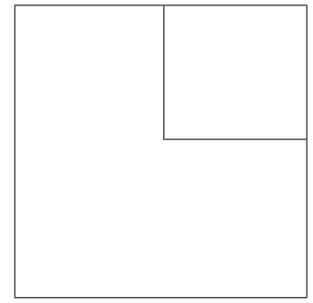
Map date: **1993**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1993
Levelled N/A



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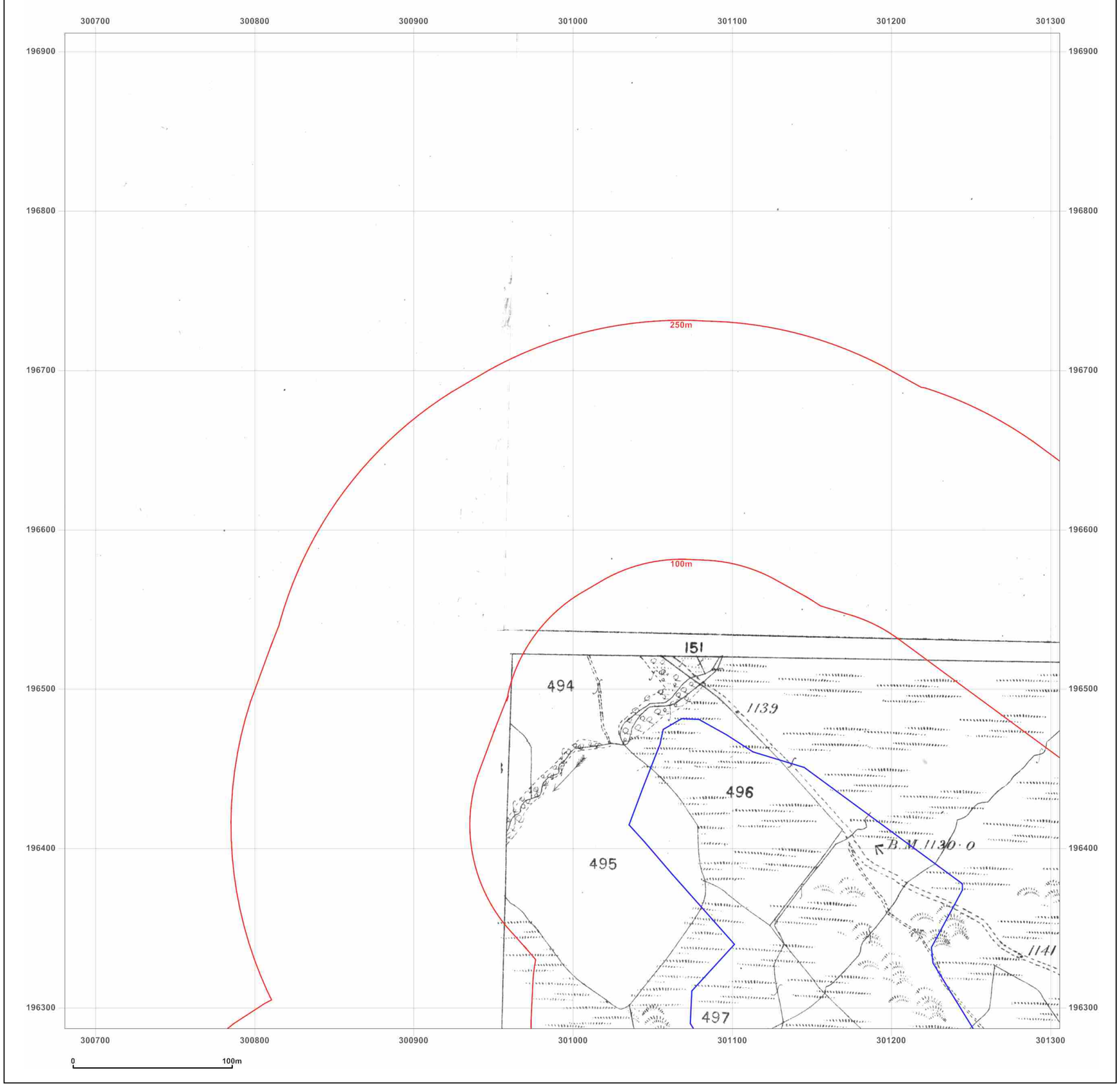


Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

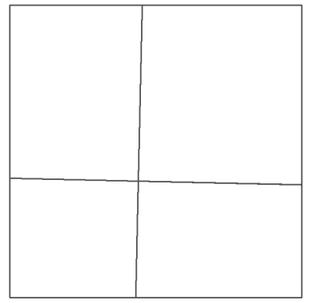
Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_3
Grid Ref: 300993, 196599

Map Name: County Series
Map date: **1869-1873**
Scale: 1:2,500
Printed at: 1:2,500

N
W E
S

Surveyed 1869
Revised 1869
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1869
Revised 1869
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1873
Revised 1873
Edition N/A
Copyright N/A
Levelled N/A

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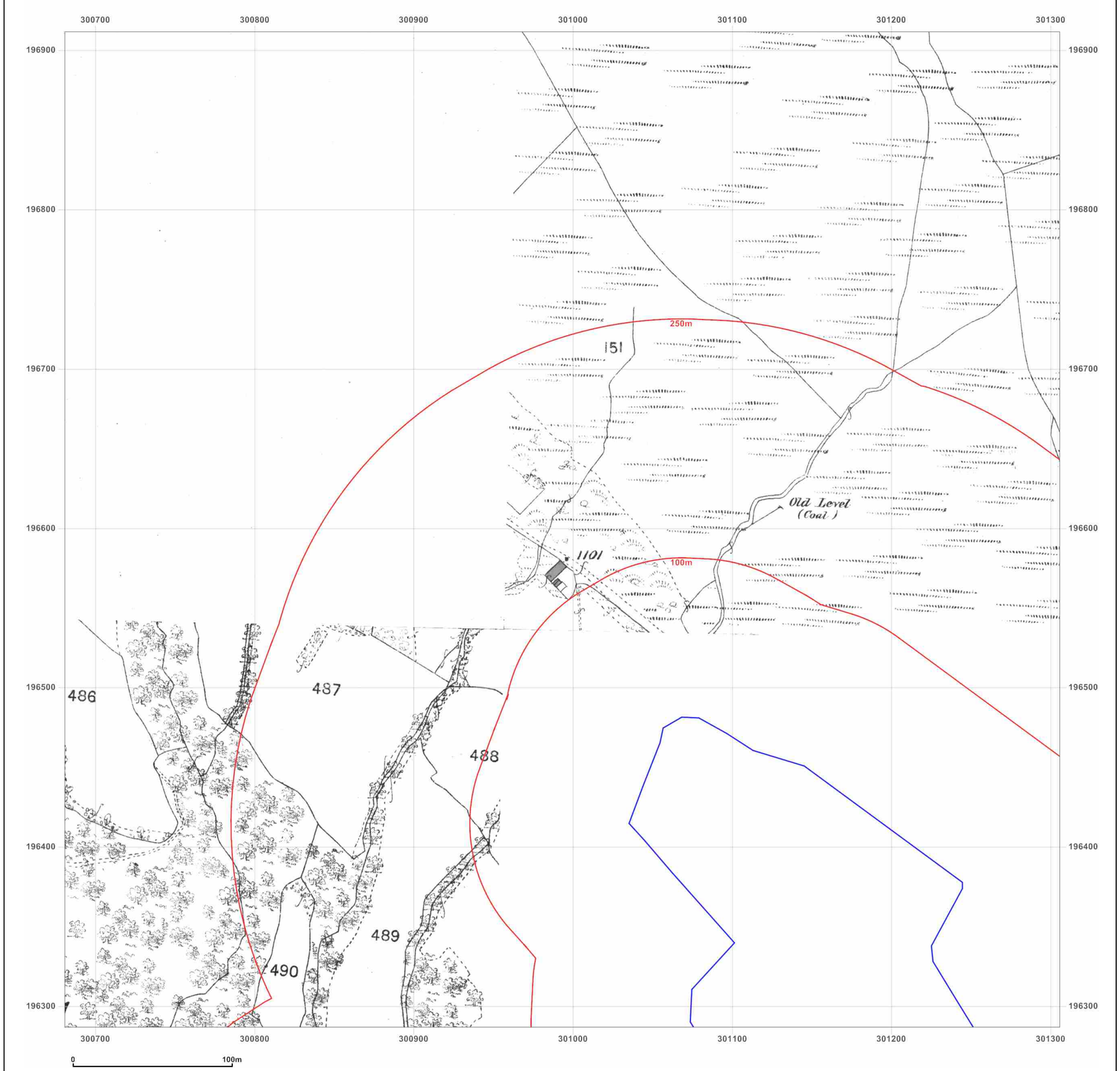

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_3
Grid Ref: 300993, 196599

Map Name: County Series

Map date: **1877-1879**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1879
Revised 1879
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1877
Revised 1877
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1877
Revised 1877
Edition N/A
Copyright N/A
Levelled N/A

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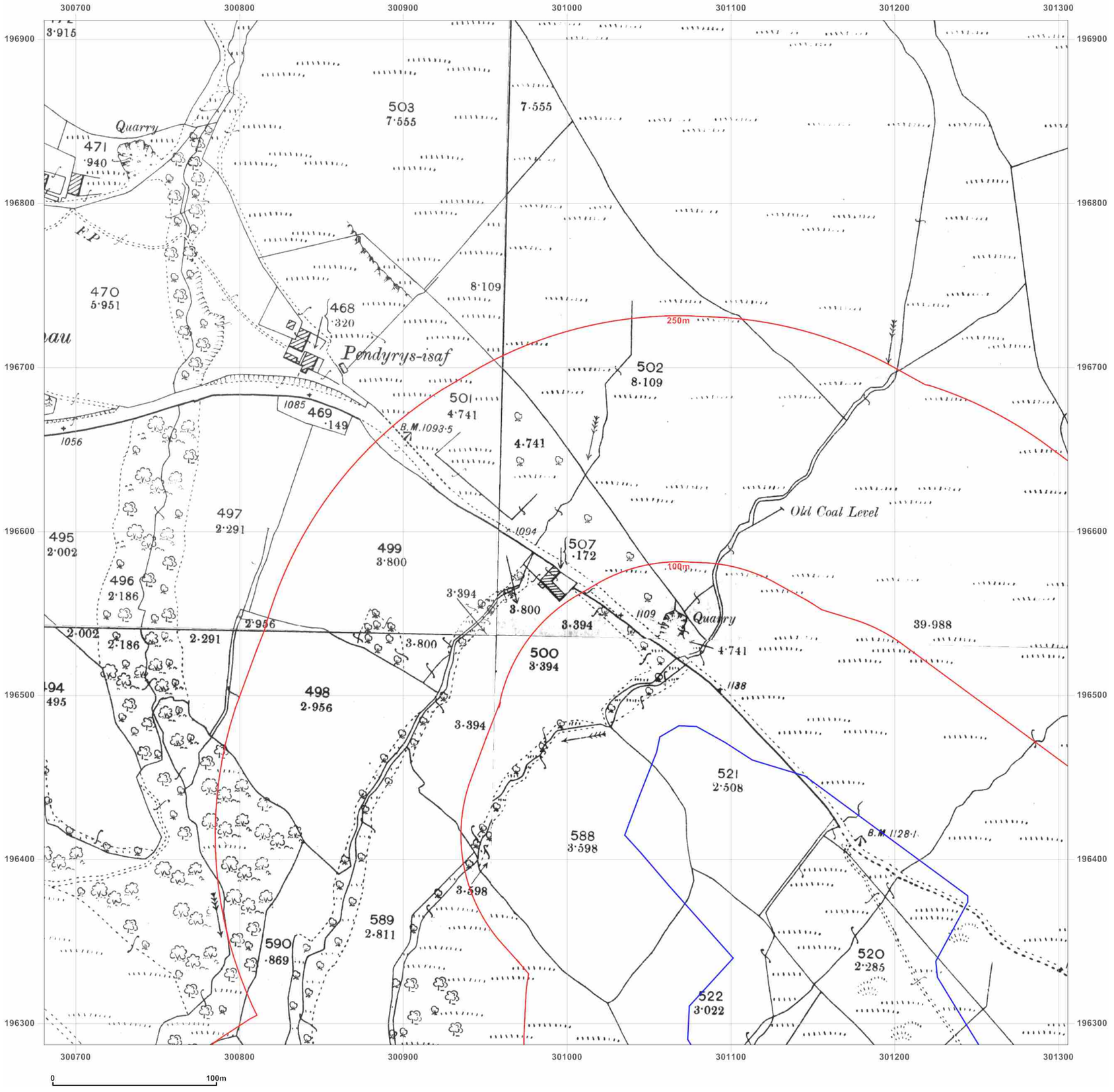

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_3
Grid Ref: 300993, 196599

Map Name: County Series

Map date: **1900**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

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

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

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

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

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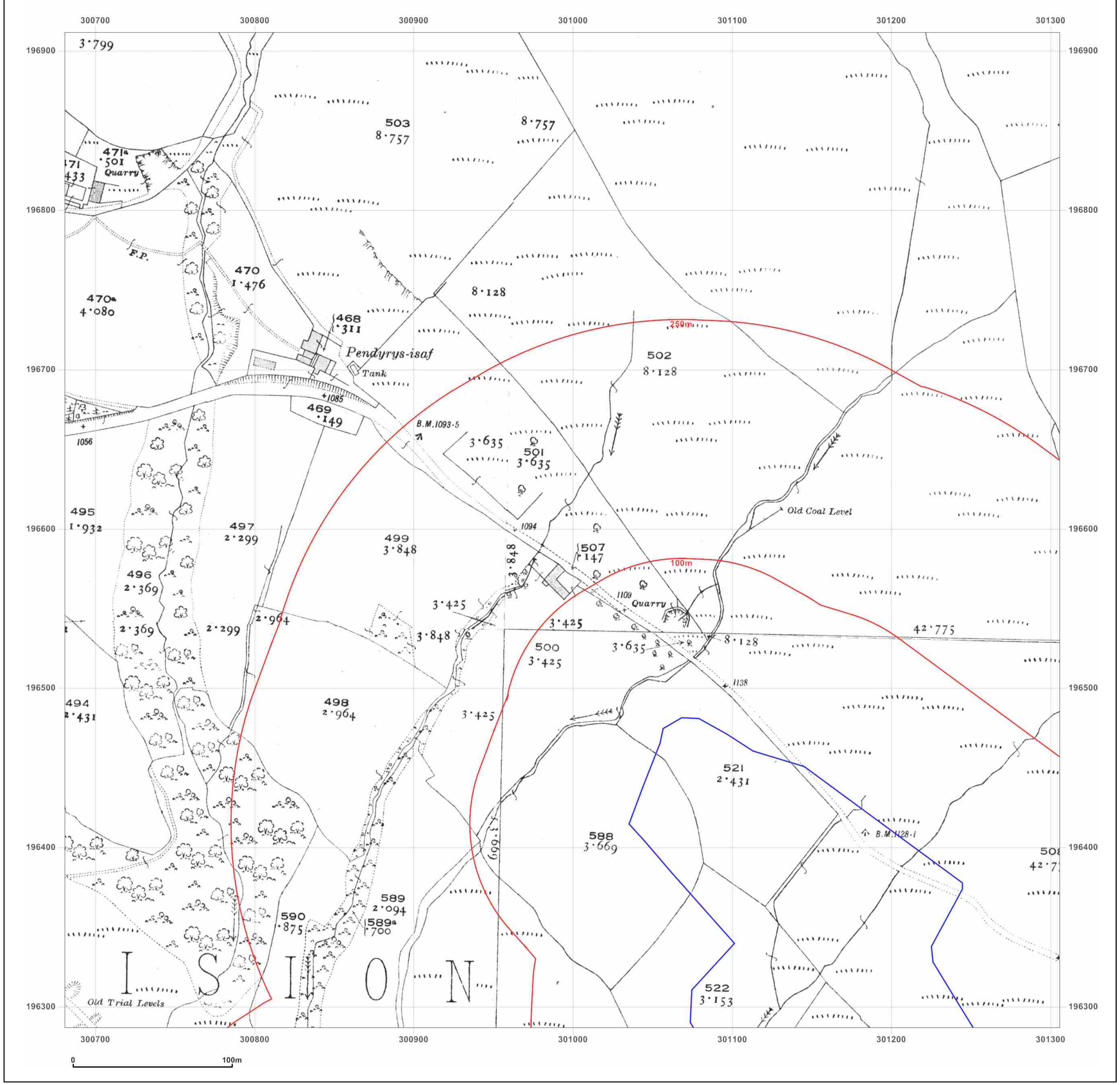

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_3
Grid Ref: 300993, 196599

Map Name: County Series
Map date: **1919-1920**
Scale: 1:2,500
Printed at: 1:2,500

N
W E
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Surveyed 1920
Revised 1920
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1919
Revised 1919
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1919
Revised 1919
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1920
Revised 1920
Edition N/A
Copyright N/A
Levelled N/A

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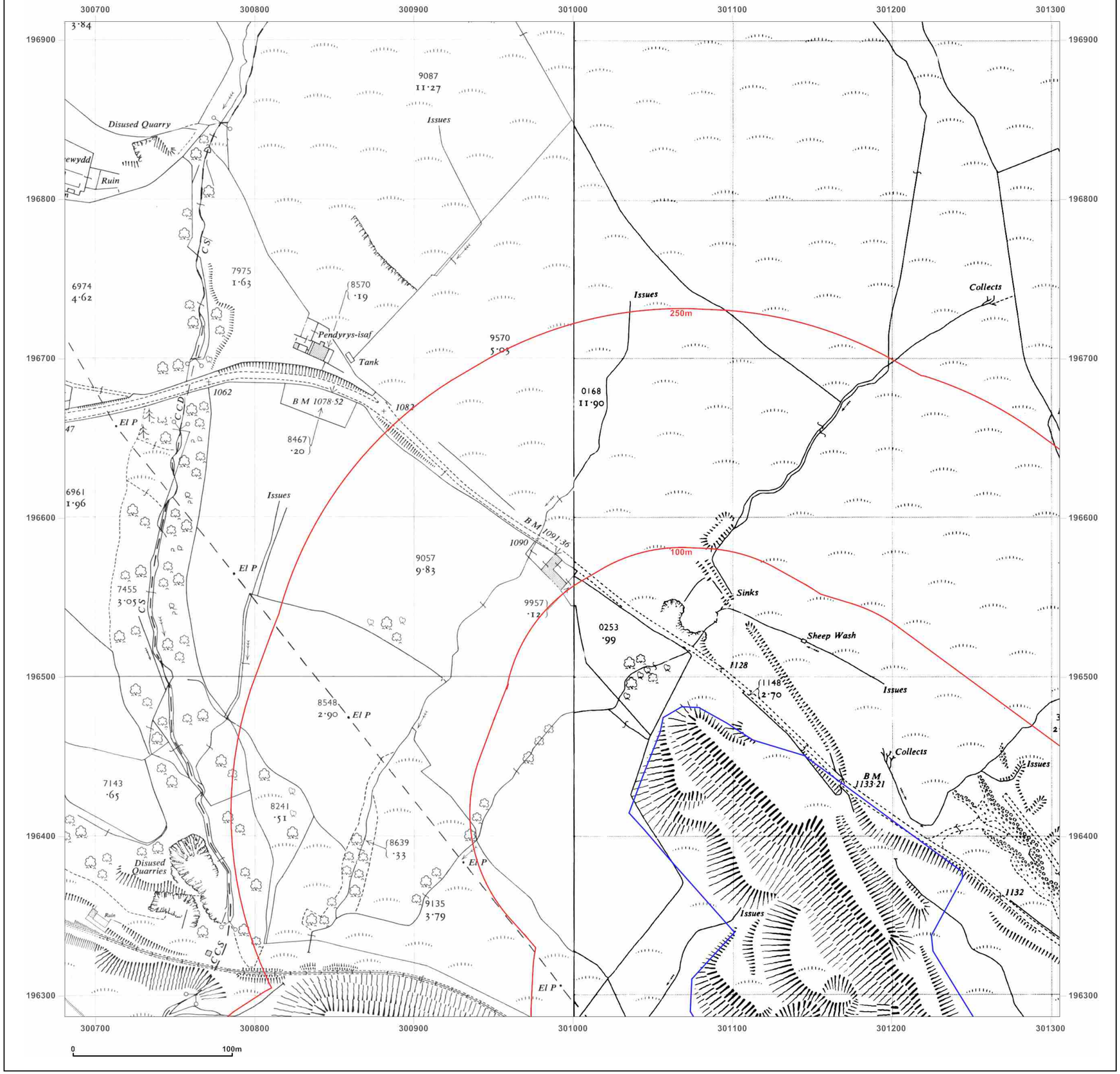

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_3
Grid Ref: 300993, 196599

Map Name: National Grid

Map date: **1957-1961**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1957		Surveyed N/A
Revised 1957		Revised N/A
Edition 1959		Edition N/A
Copyright 1959		Copyright N/A
Levelled 1947		Levelled N/A

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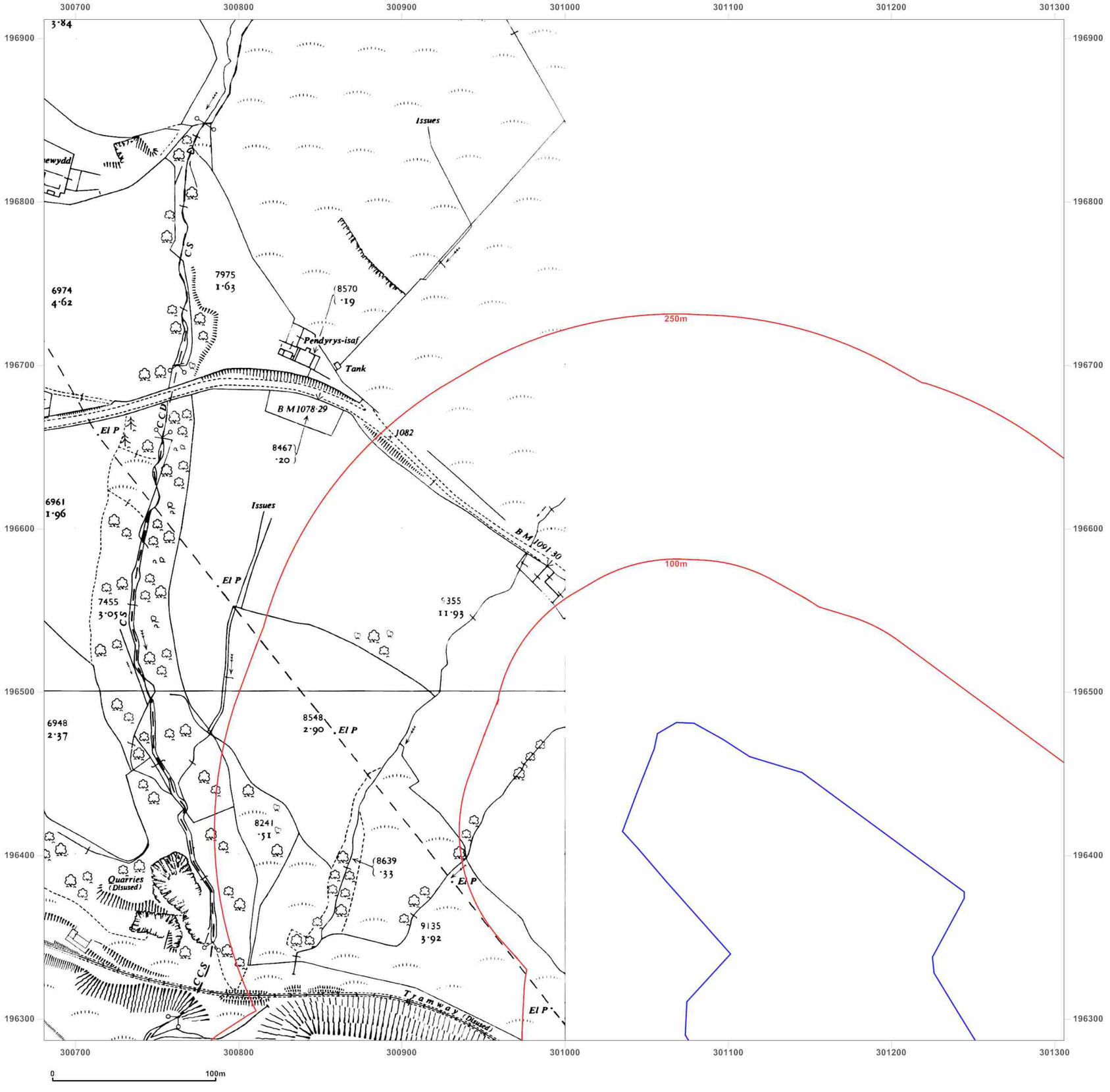

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_3
Grid Ref: 300993, 196599

Map Name: National Grid

Map date: **1961**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

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

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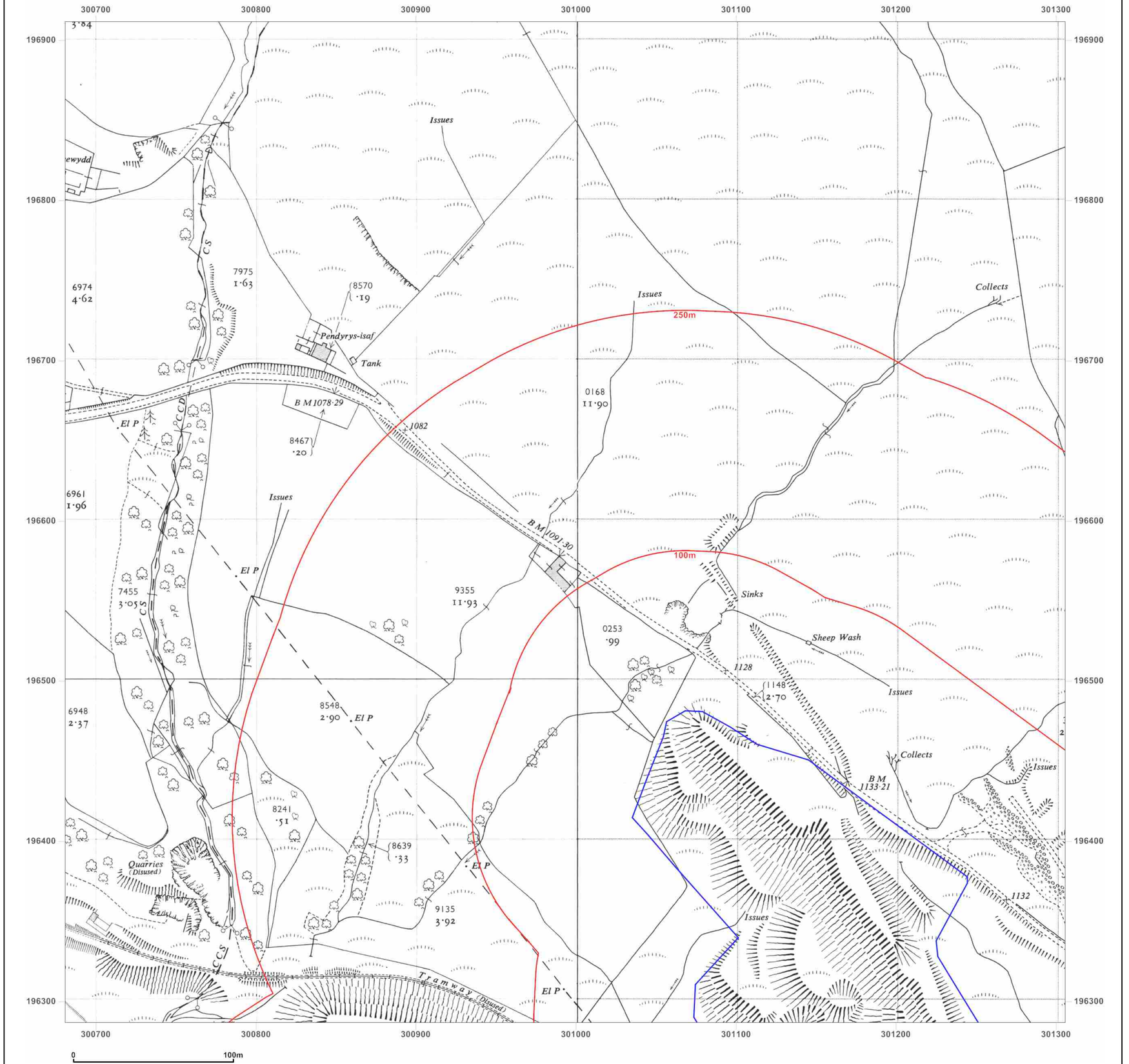

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_3
Grid Ref: 300993, 196599

Map Name: National Grid

Map date: **1961**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1961
Revised 1961
Edition 1962
Copyright 1962
Levelled 1957

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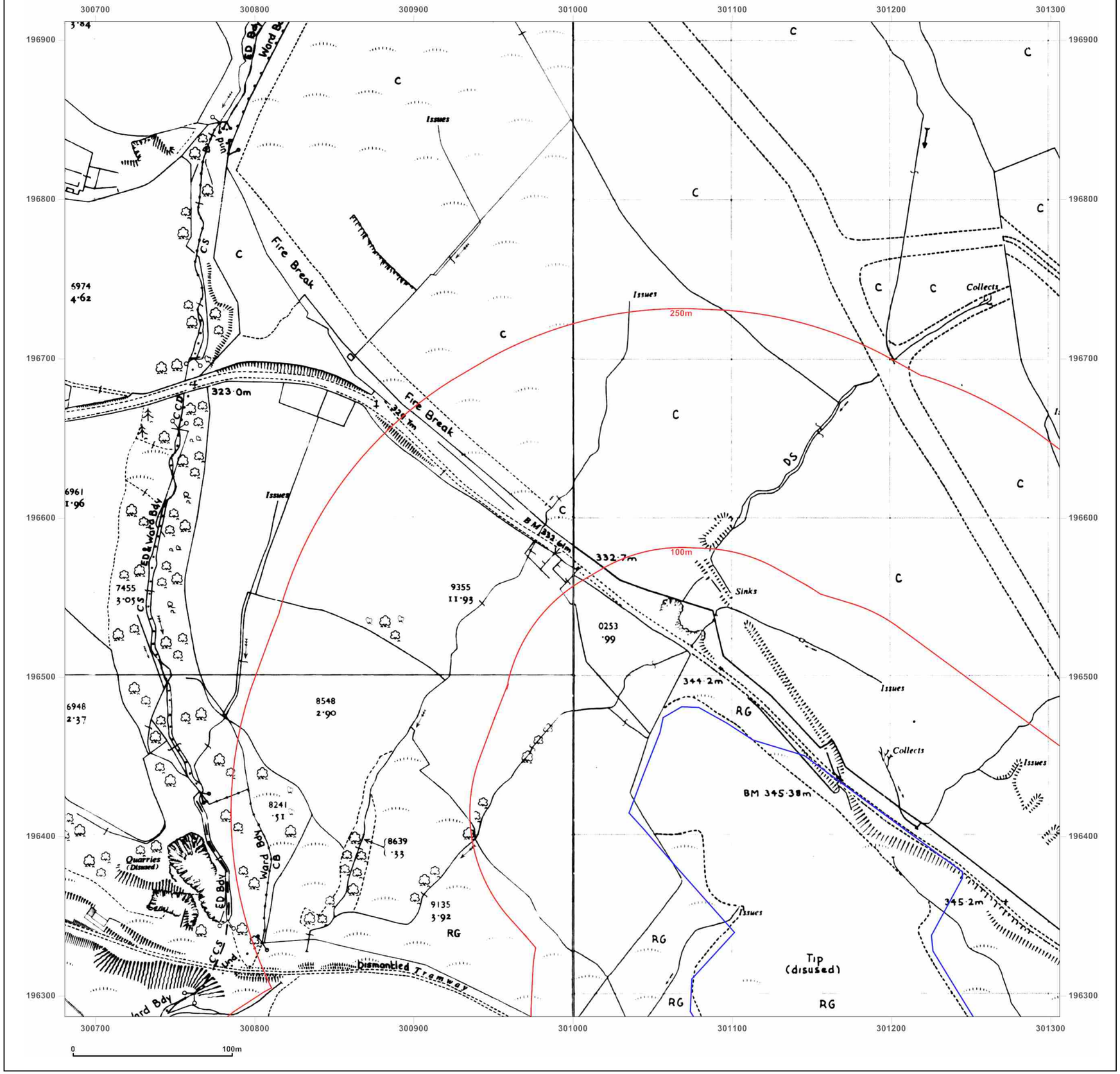

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_3
Grid Ref: 300993, 196599

Map Name: National Grid

Map date: **1986**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

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

Surveyed 1965
Revised 1986
Edition N/A
Copyright 1986
Levelled 1965

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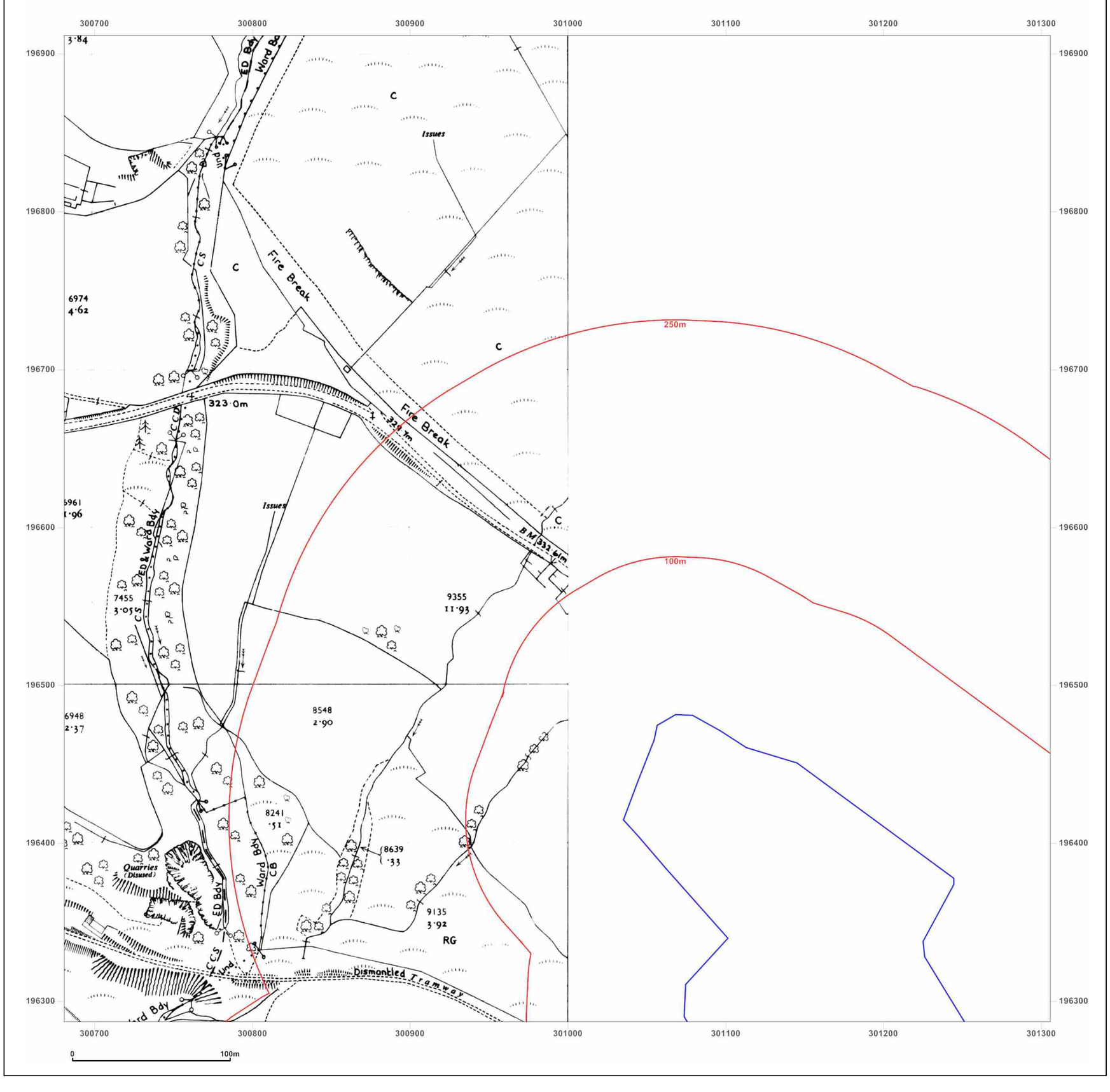

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_3
Grid Ref: 300993, 196599

Map Name: National Grid

Map date: **1986**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1968
Revised 1986
Edition N/A
Copyright 1986
Levelled 1968

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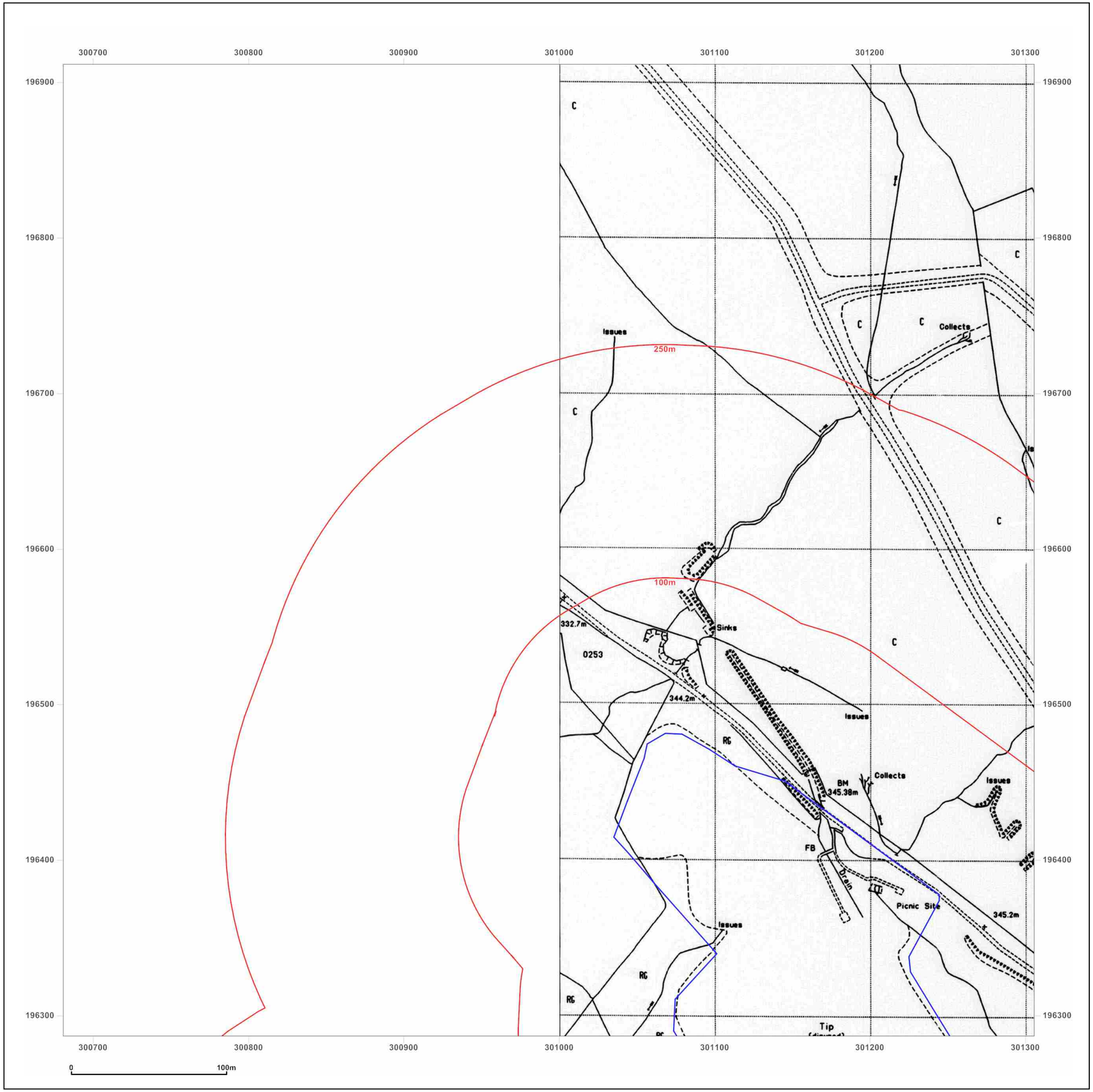

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_3
Grid Ref: 300993, 196599

Map Name: National Grid

Map date: **1993**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1993
Levelled N/A

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Production date: 22 September 2020

Map legend available at:
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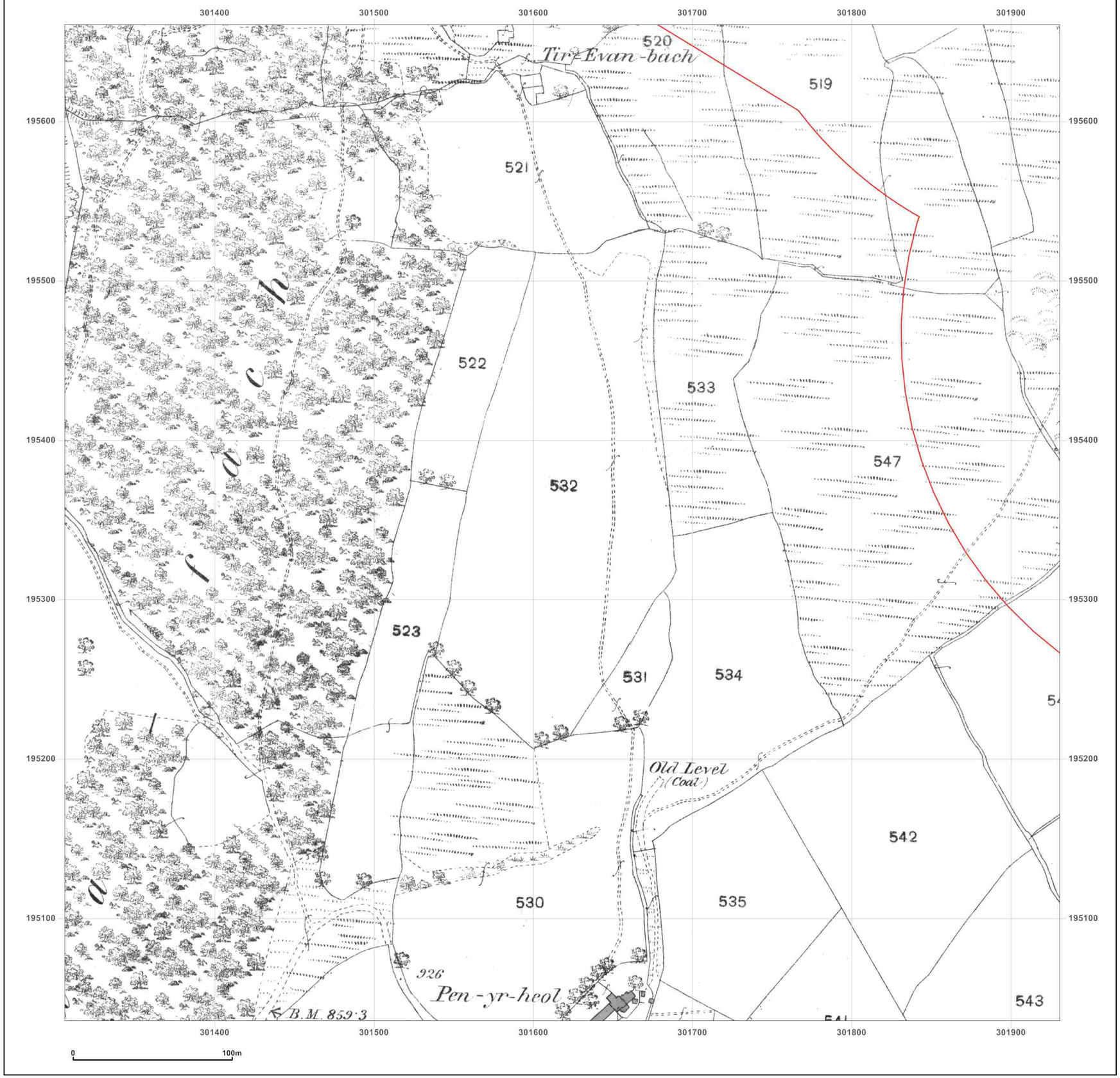

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_1
Grid Ref: 301618, 195348

Map Name: County Series

Map date: **1873**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1873
Revised 1873
Edition N/A
Copyright N/A
Levelled N/A

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Produced by
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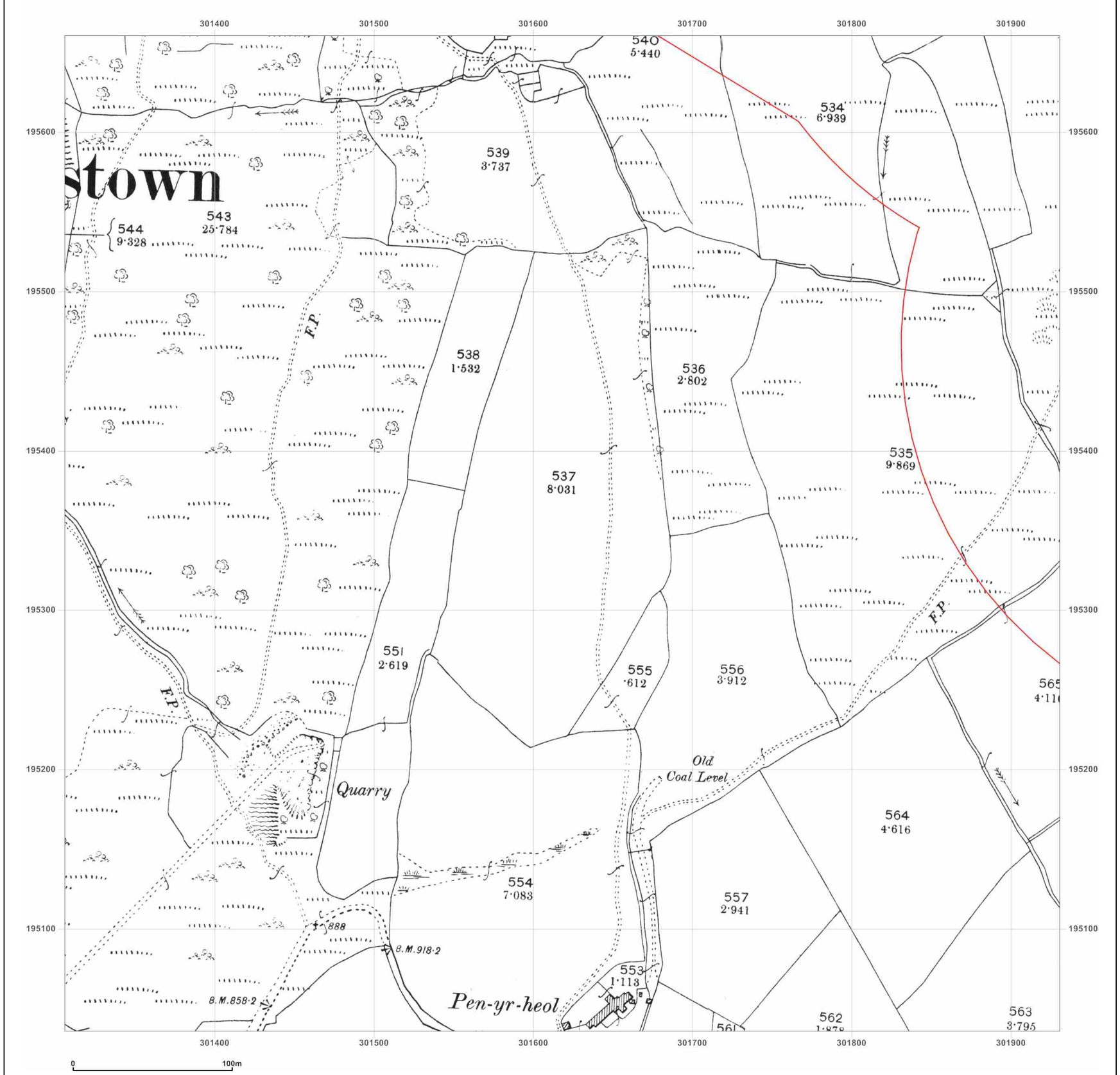
Production date: 22 September 2020

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf



Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_1
Grid Ref: 301618, 195348

Map Name: County Series

Map date: **1900**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

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

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Production date: 22 September 2020

Map legend available at:
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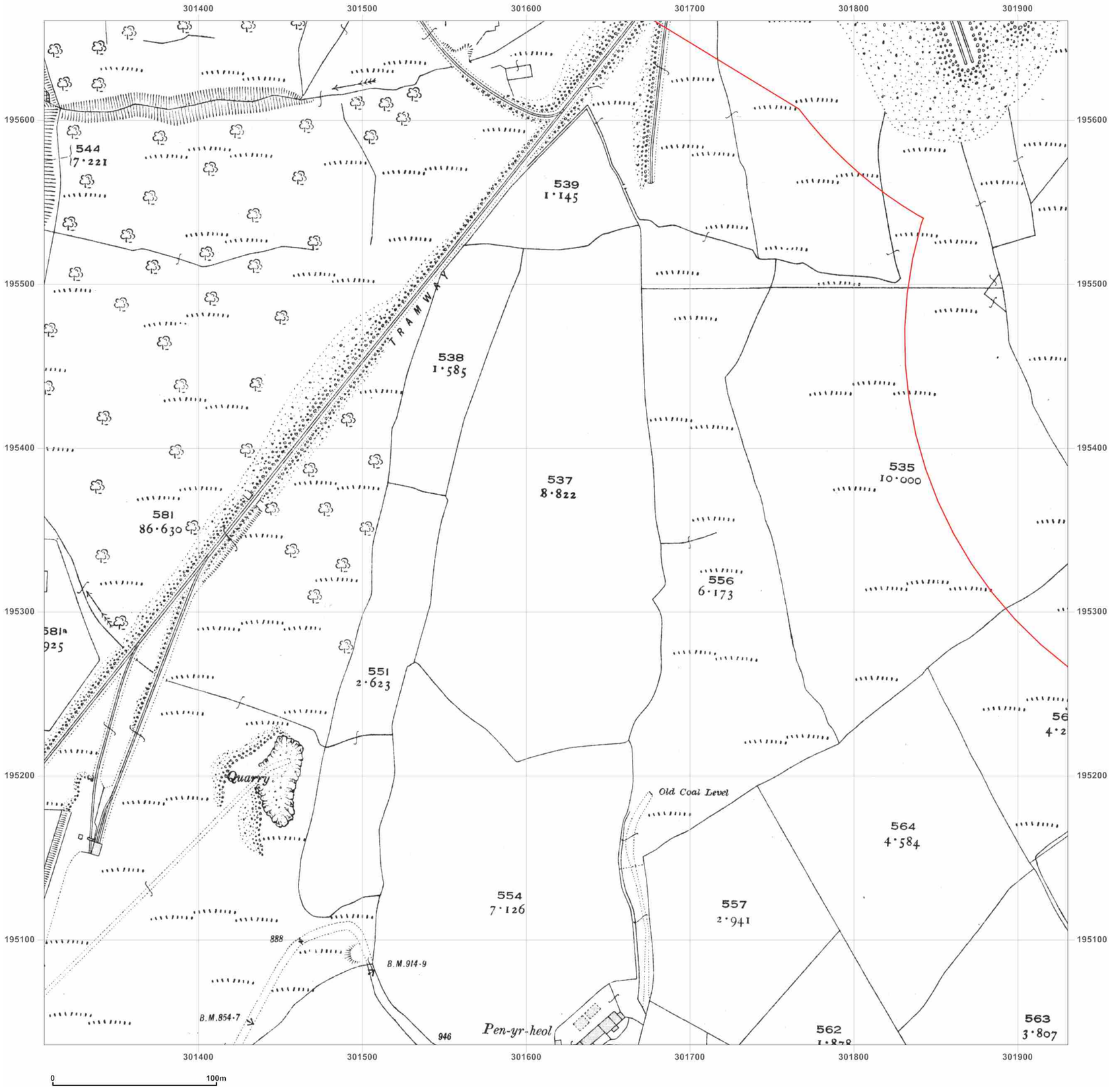

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_1
Grid Ref: 301618, 195348

Map Name: County Series

Map date: **1920**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1920
Revised 1920
Edition N/A
Copyright N/A
Levelled N/A

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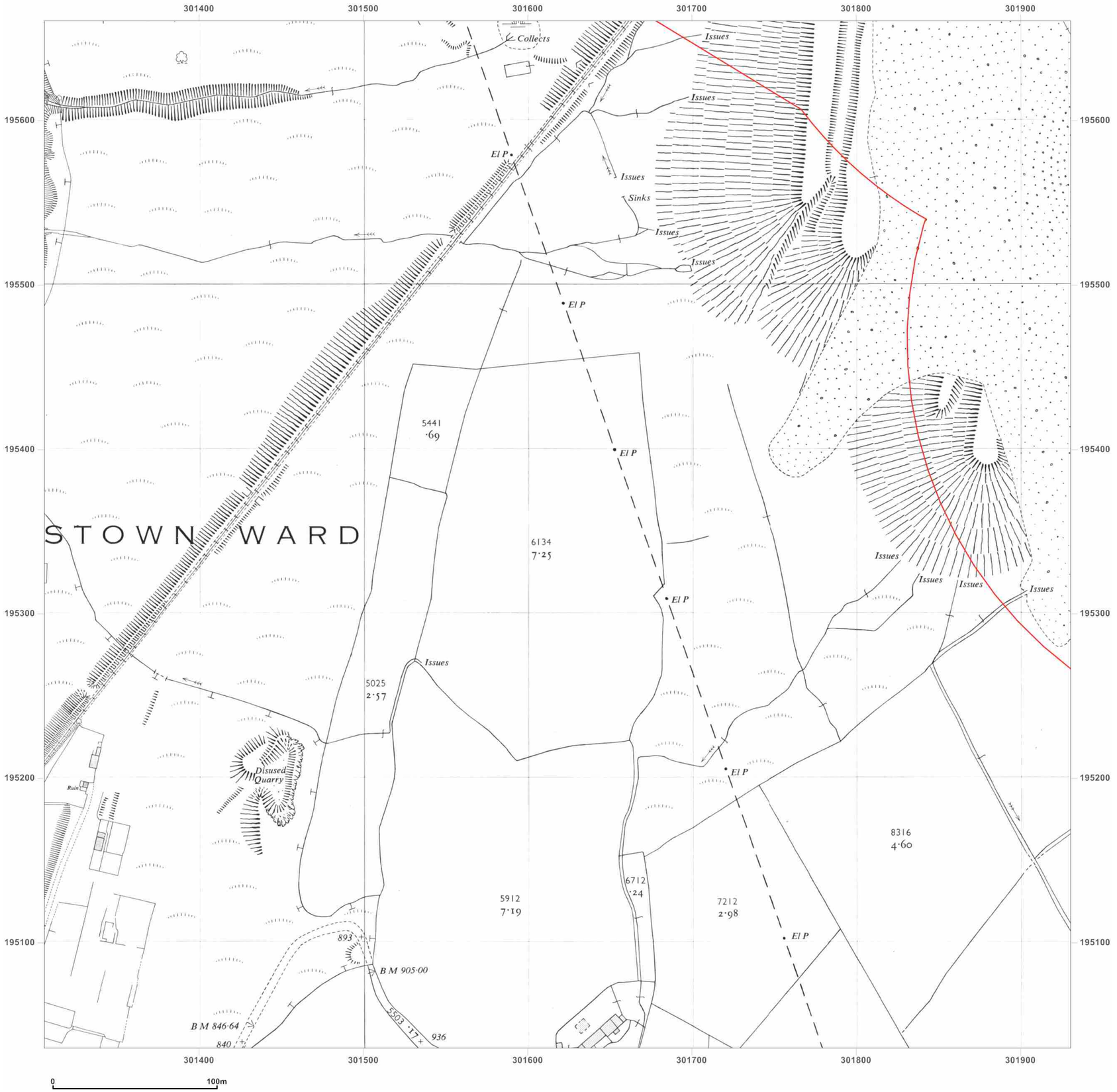

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_1
Grid Ref: 301618, 195348

Map Name: National Grid

Map date: **1958**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1958
Revised 1958
Edition 1959
Copyright 1959
Levelled 1948

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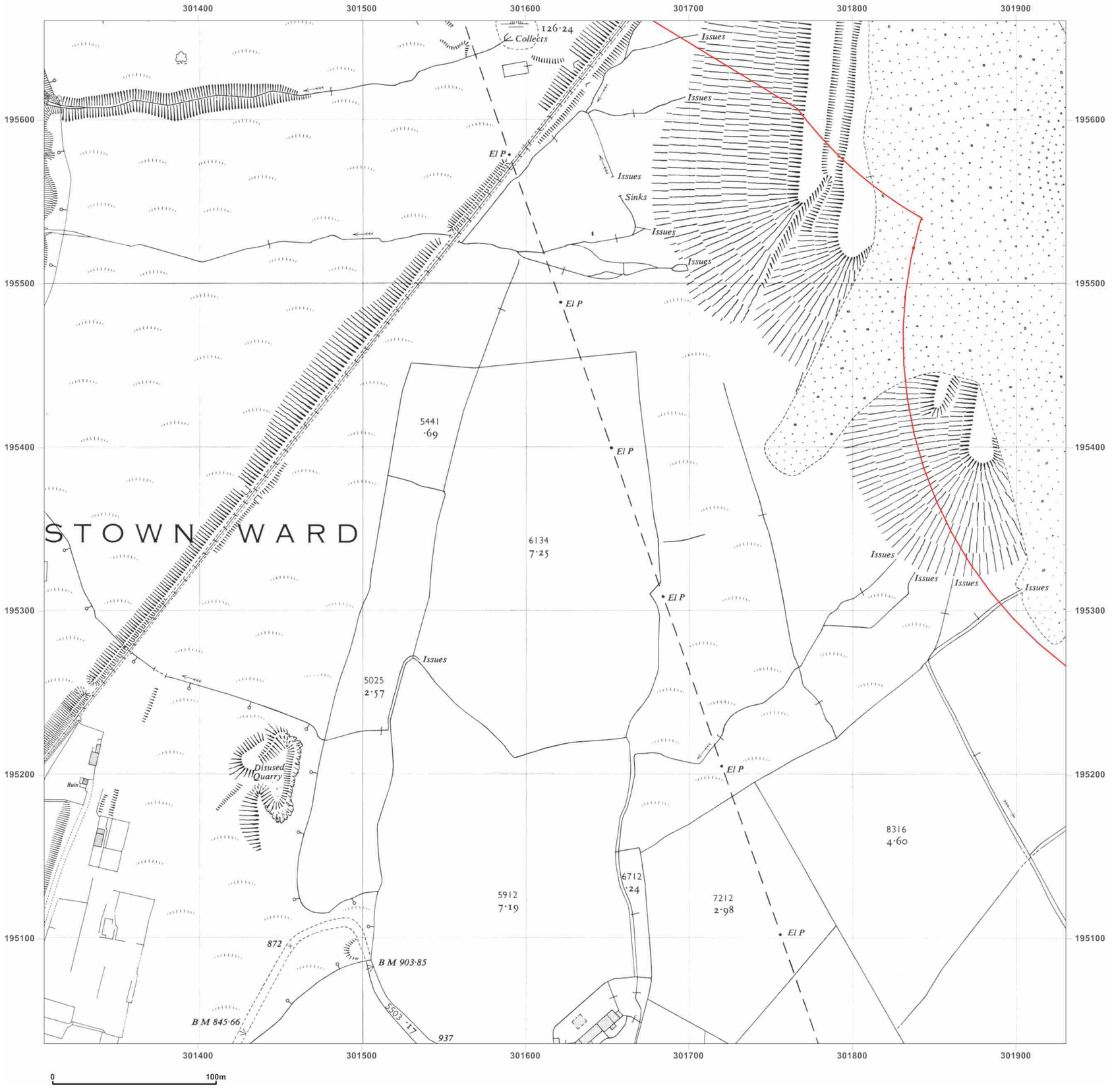

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_1
Grid Ref: 301618, 195348

Map Name: National Grid

Map date: **1961**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1961
Revised 1961
Edition 1962
Copyright 1962
Levelled 1957

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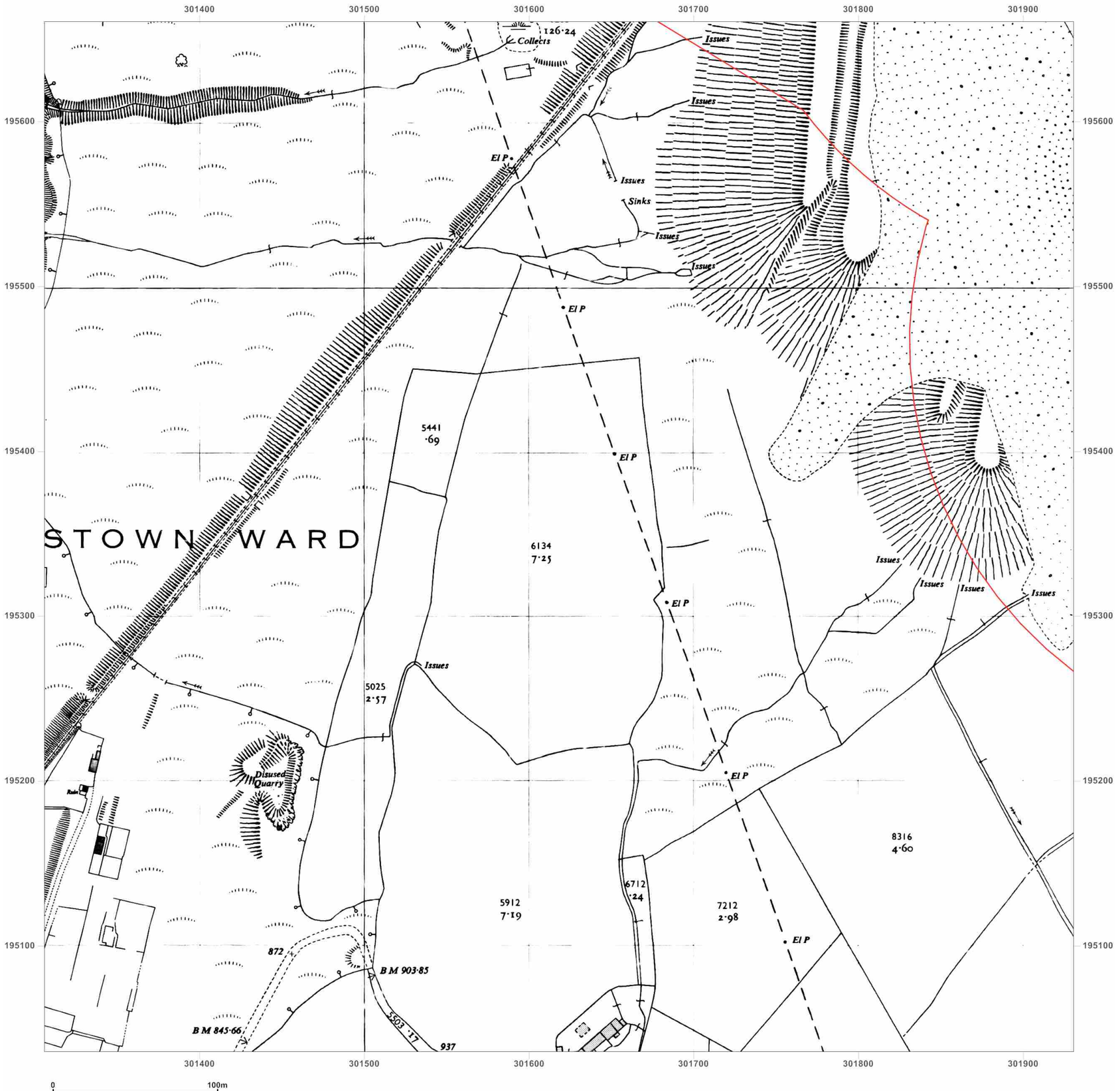

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_1
Grid Ref: 301618, 195348

Map Name: National Grid

Map date: **1962**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

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

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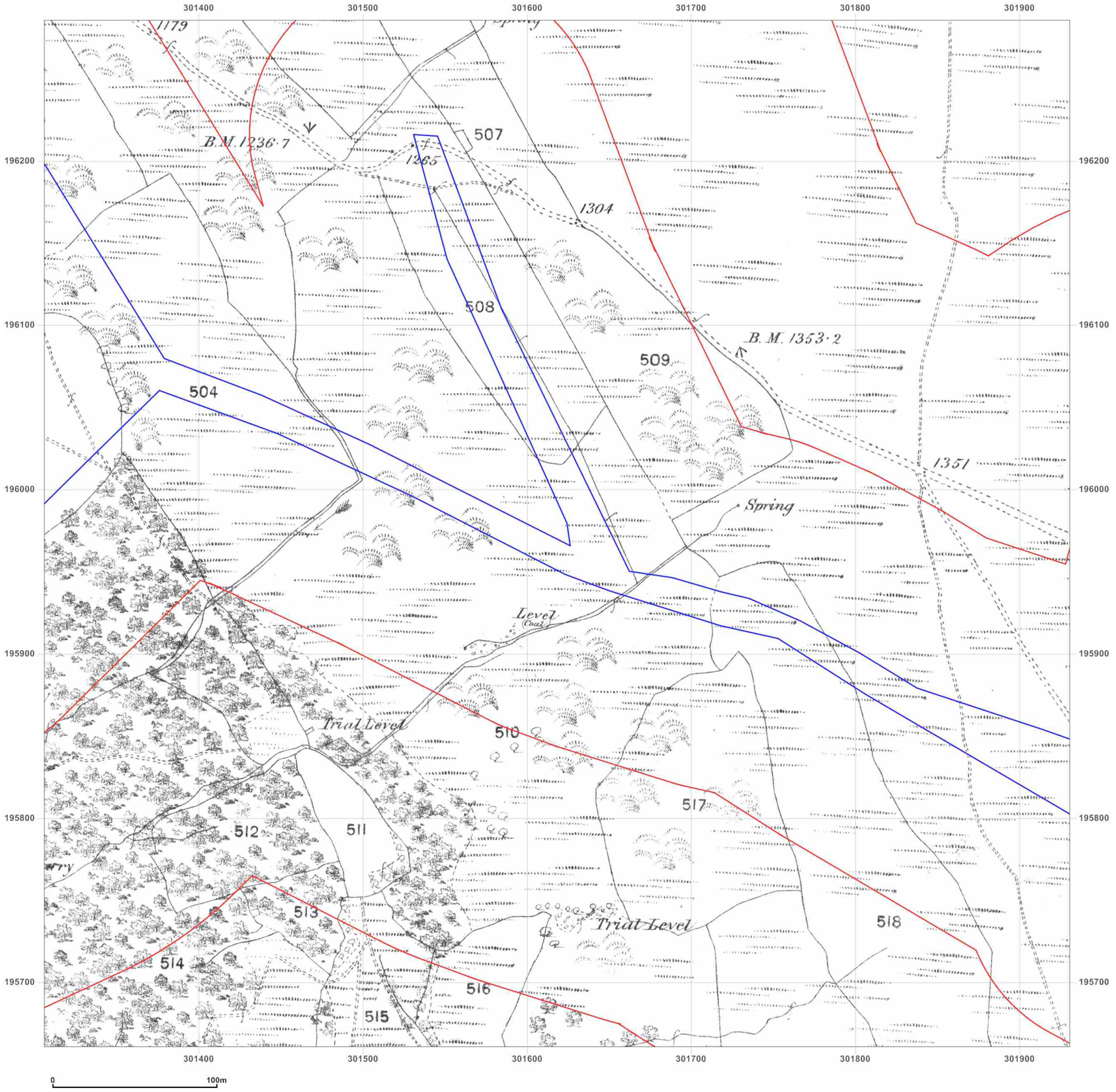

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_2
Grid Ref: 301618, 195973

Map Name: County Series

Map date: **1873**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1873
Revised 1873
Edition N/A
Copyright N/A
Levelled N/A

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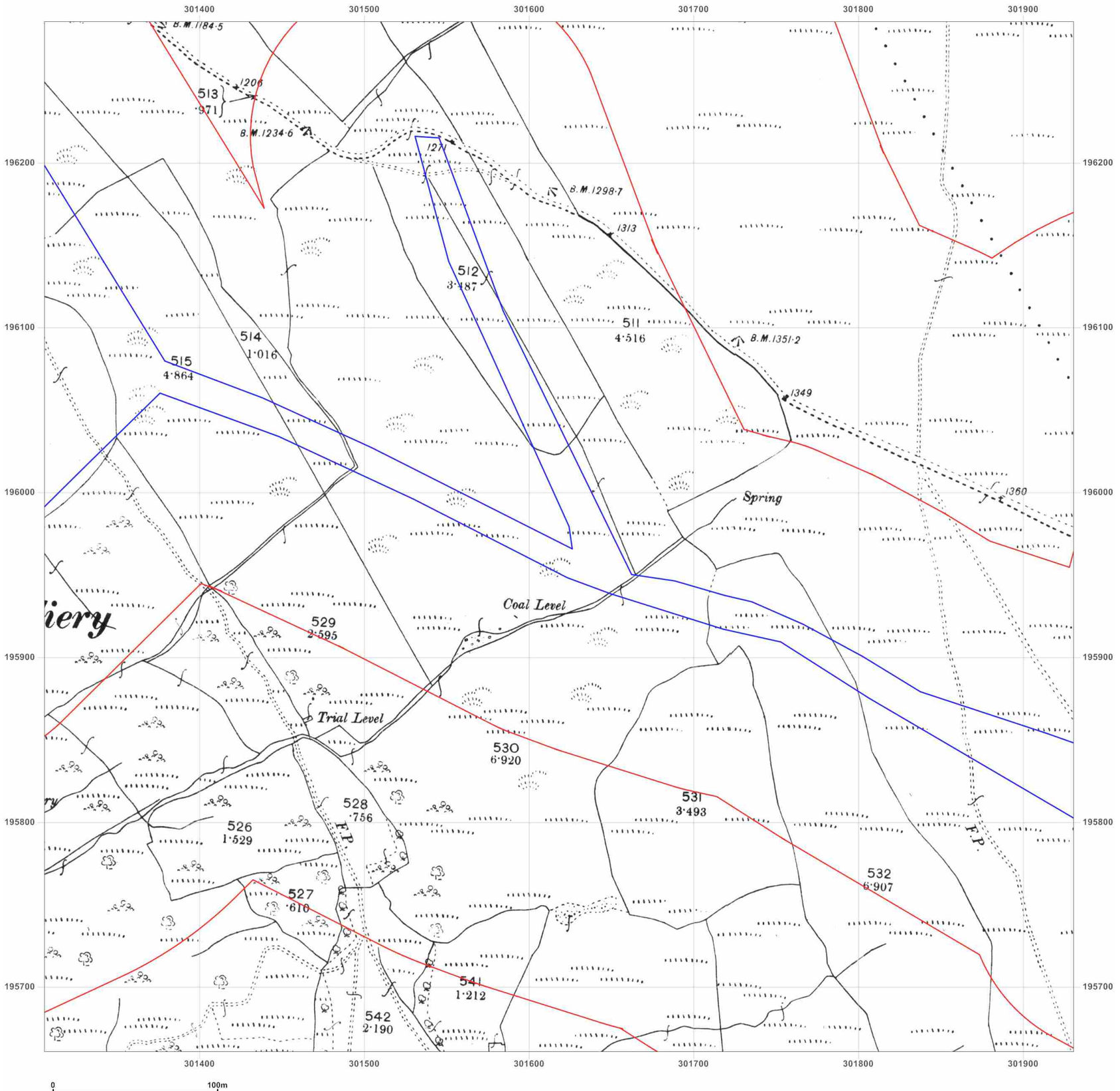
Production date: 22 September 2020

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf



Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_2
Grid Ref: 301618, 195973

Map Name: County Series

Map date: **1900**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

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

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Production date: 22 September 2020

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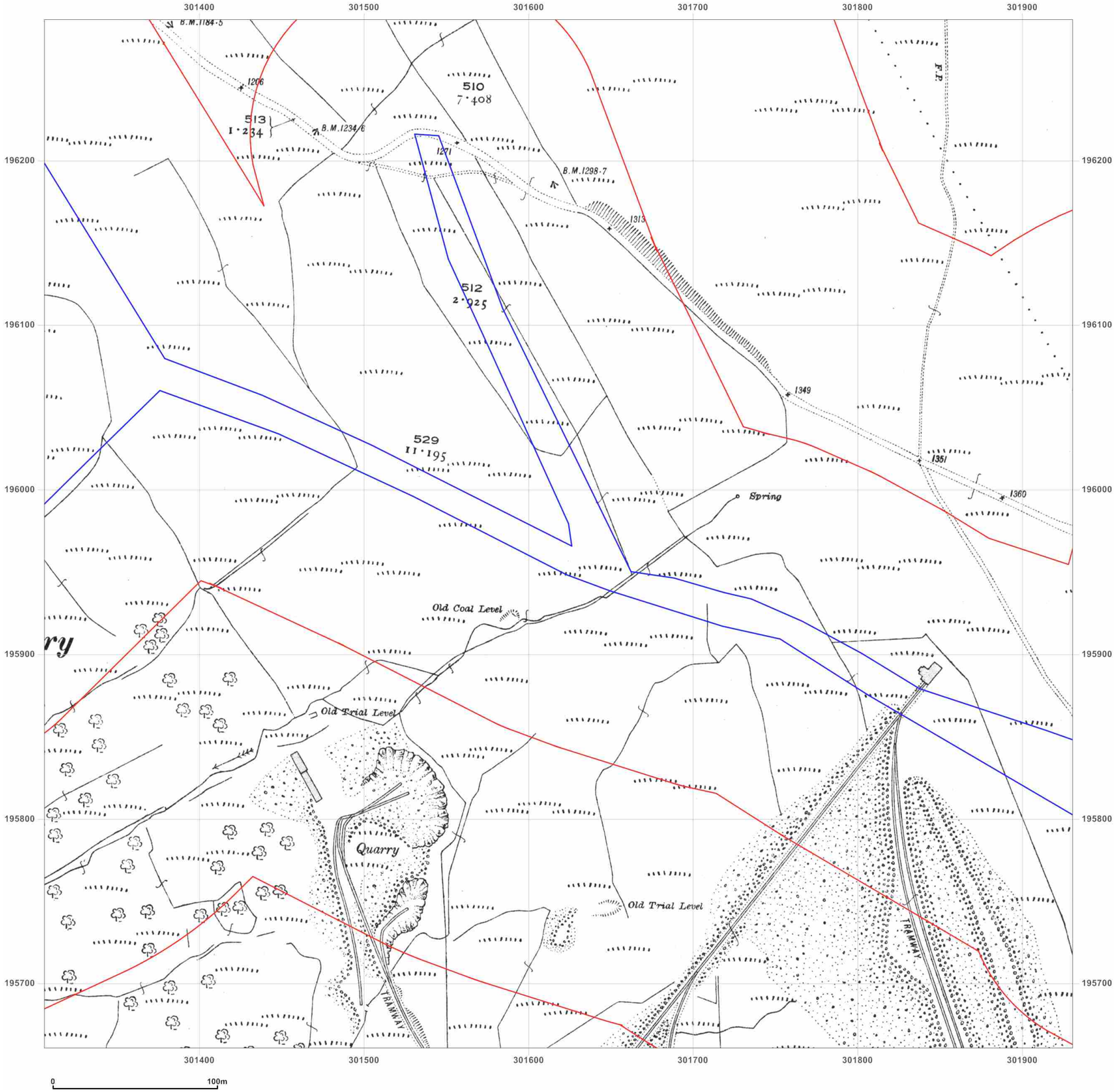

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_2
Grid Ref: 301618, 195973

Map Name: County Series

Map date: **1920**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1920
Revised 1920
Edition N/A
Copyright N/A
Levelled N/A

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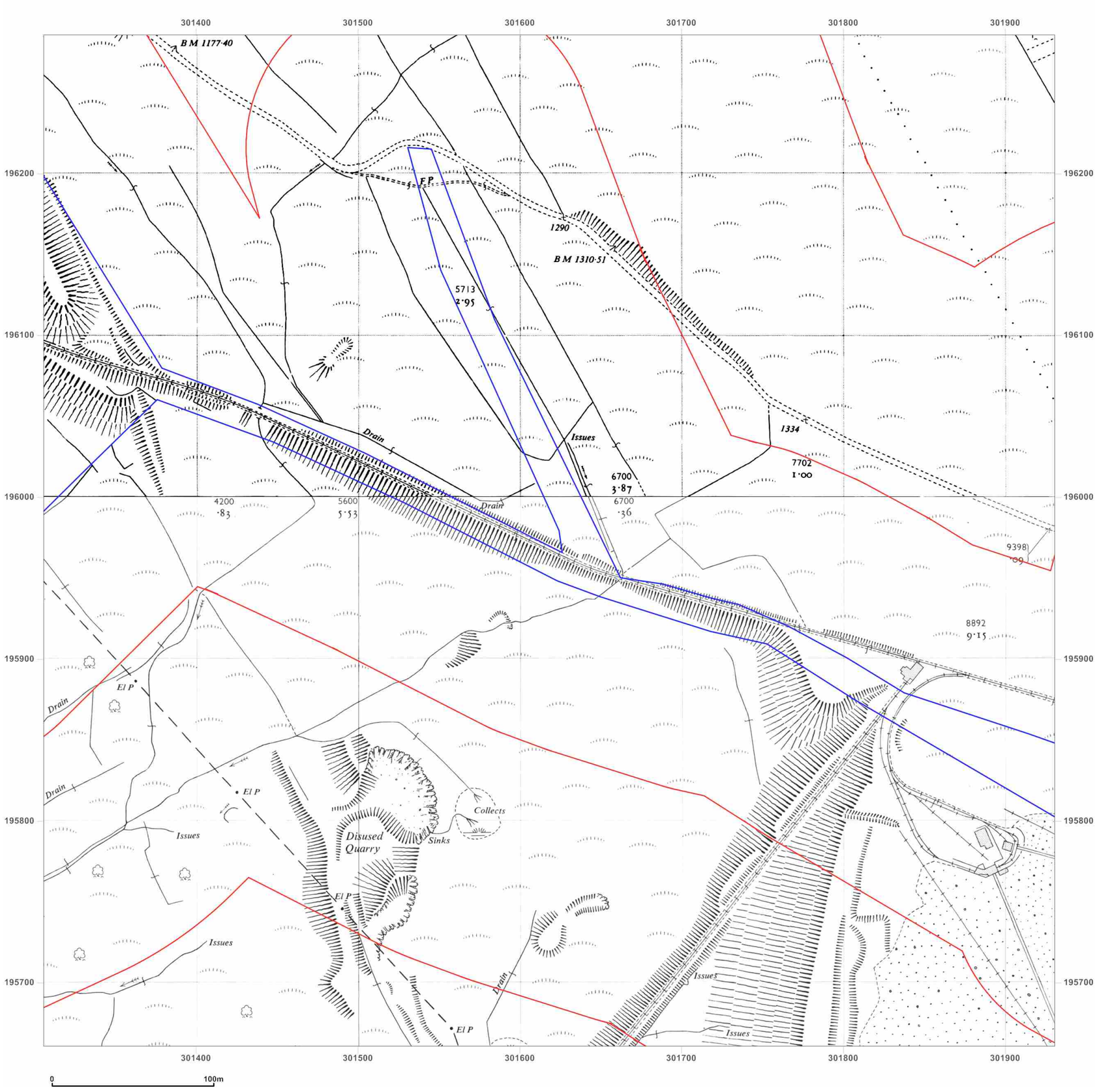

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_2
Grid Ref: 301618, 195973

Map Name: National Grid

Map date: **1958-1961**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

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

Surveyed 1958
Revised 1958
Edition 1959
Copyright 1959
Levelled 1948

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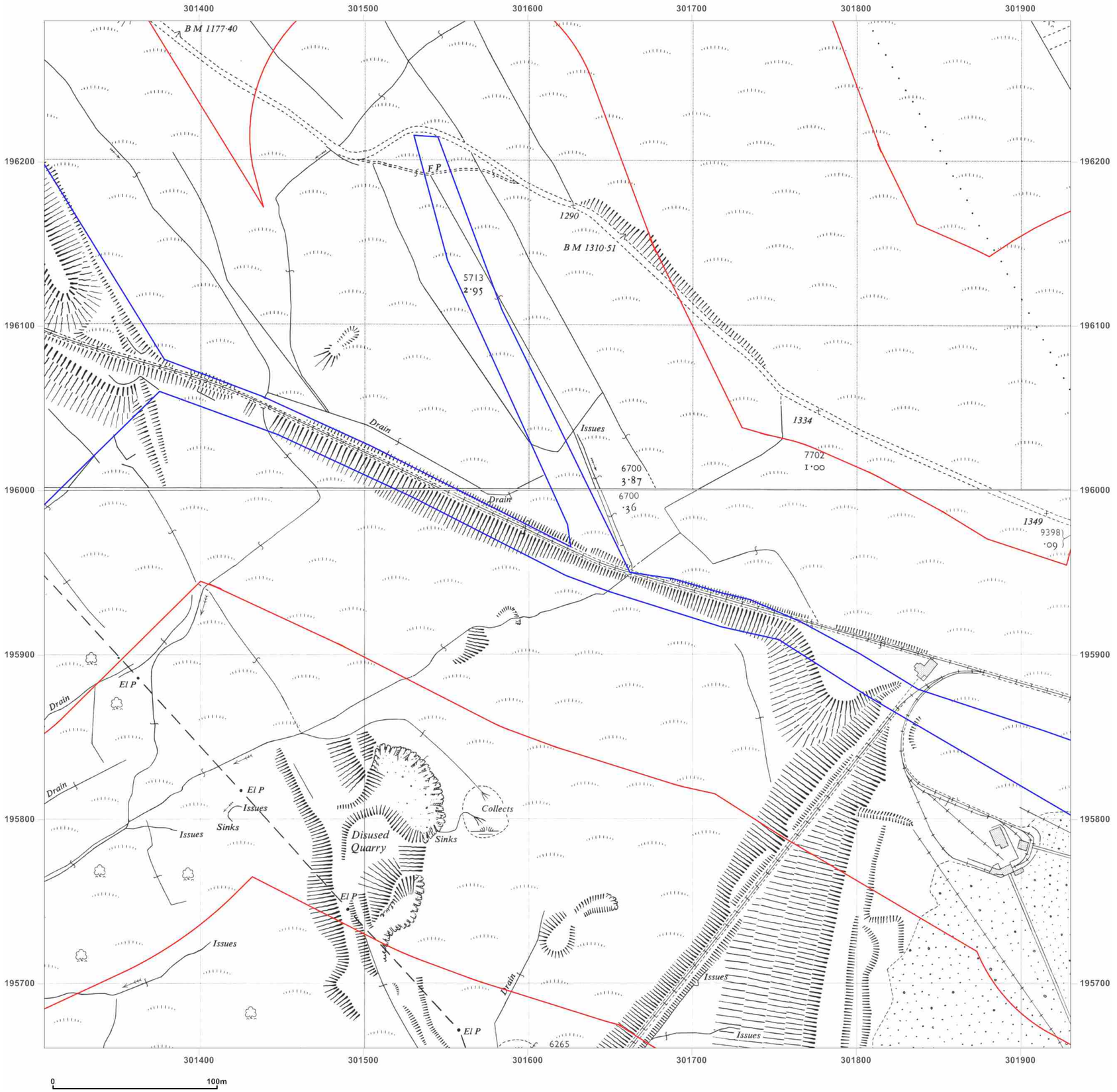


Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_2
Grid Ref: 301618, 195973

Map Name: National Grid

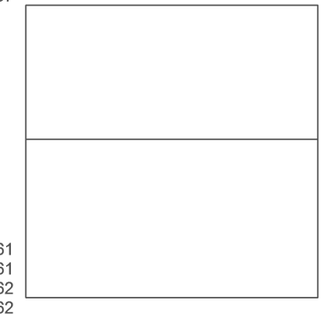
Map date: **1961**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1961
Revised 1961
Edition 1962
Copyright 1962
Levelled 1957



Surveyed 1961
Revised 1961
Edition 1962
Copyright 1962
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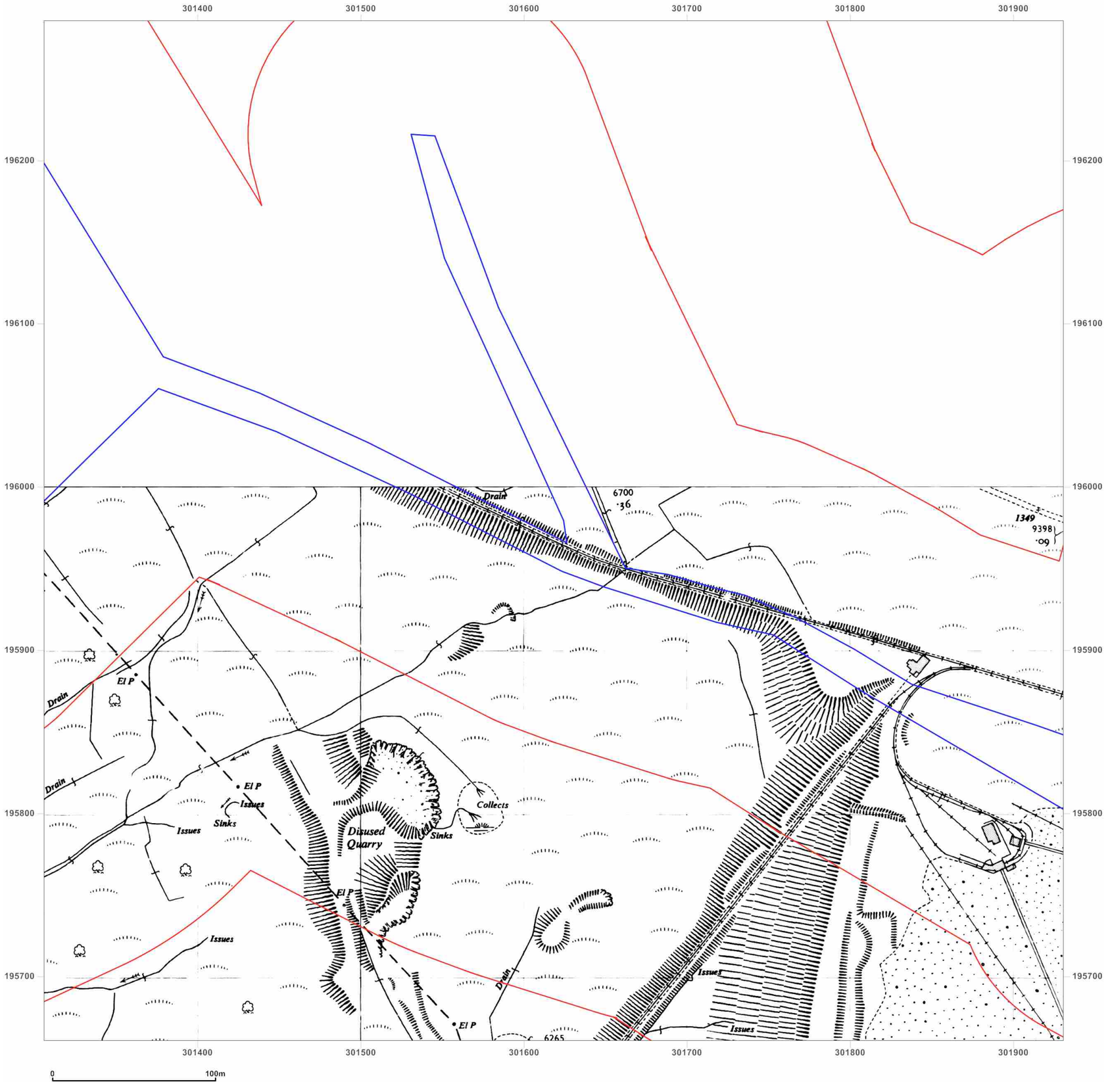

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_2
Grid Ref: 301618, 195973

Map Name: National Grid

Map date: **1962**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

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

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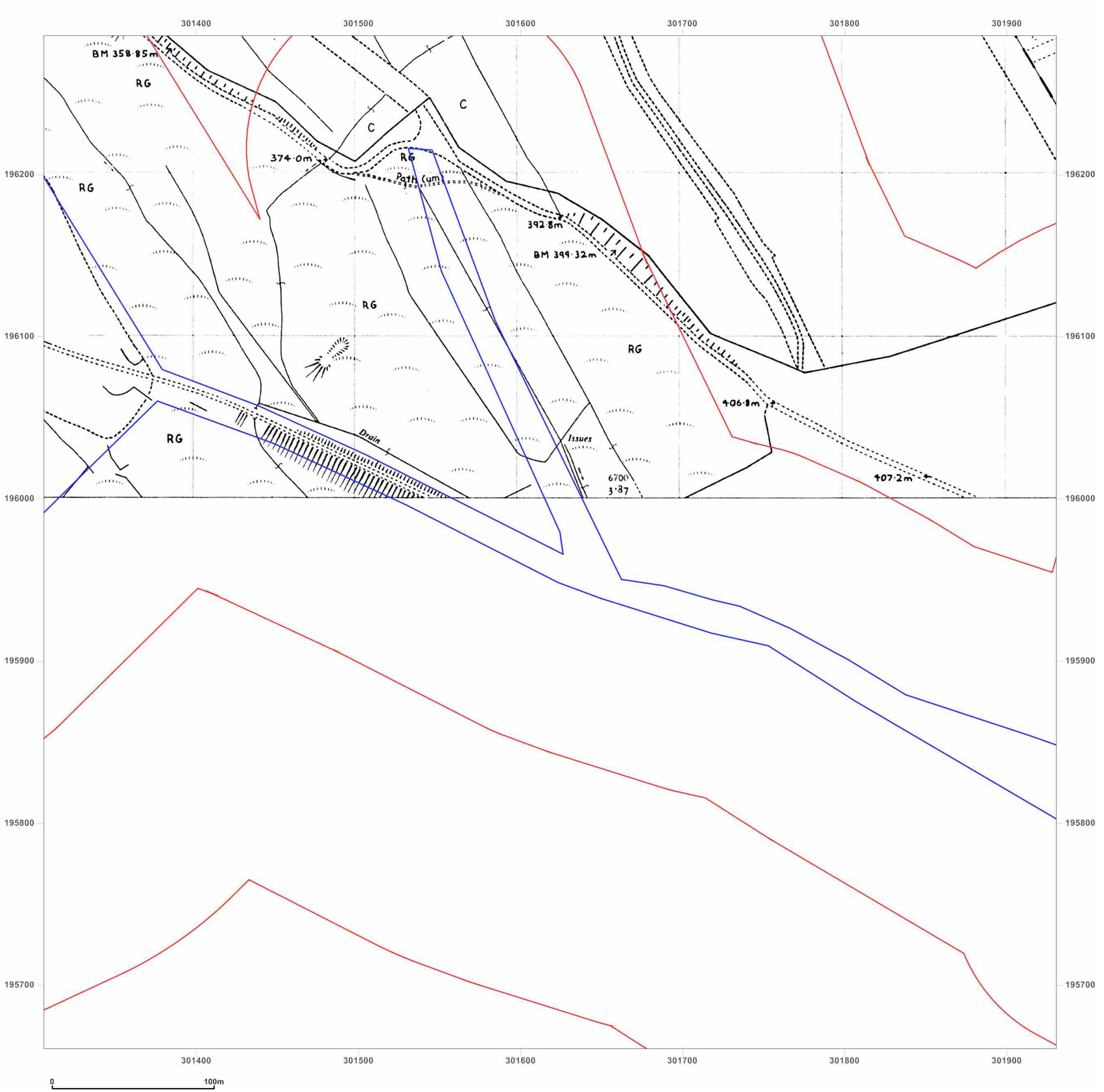

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_2
Grid Ref: 301618, 195973

Map Name: National Grid

Map date: **1986**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1965
Revised 1986
Edition N/A
Copyright 1986
Levelled 1965

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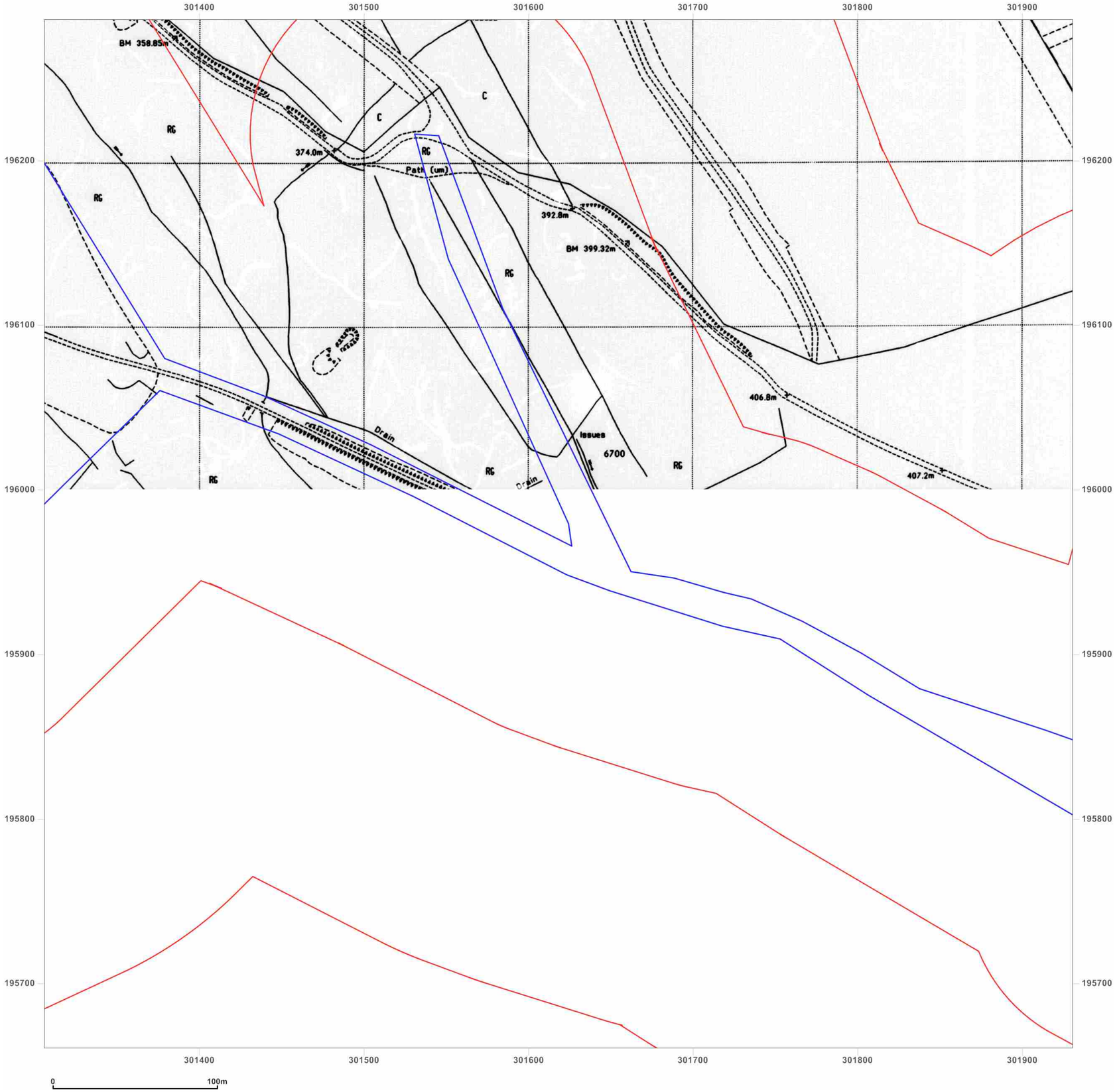

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_2
Grid Ref: 301618, 195973

Map Name: National Grid

Map date: **1993**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1993
Levelled N/A

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Production date: 22 September 2020

Map legend available at:
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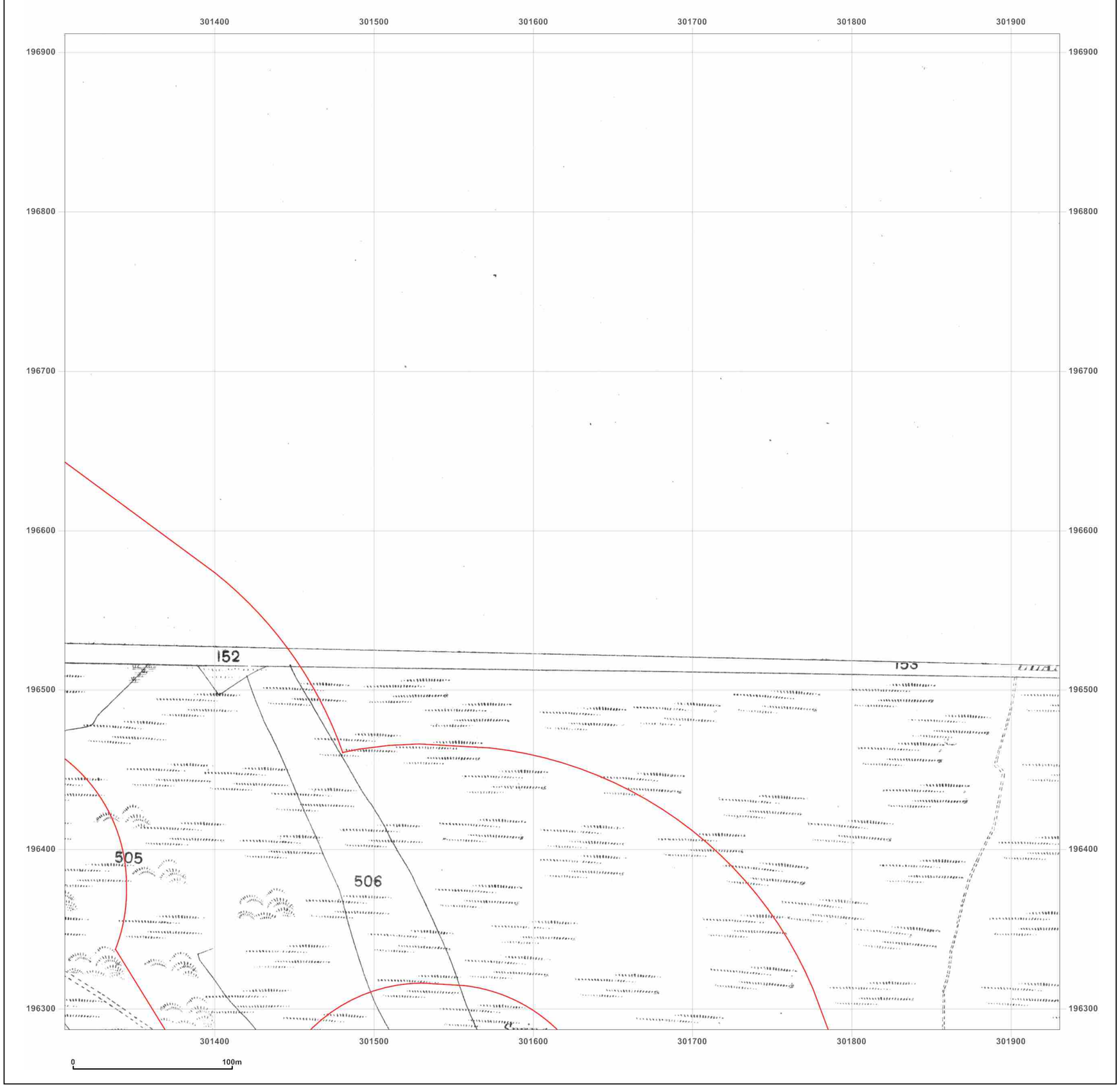

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_3
Grid Ref: 301618, 196599

Map Name: County Series

Map date: **1869-1873**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
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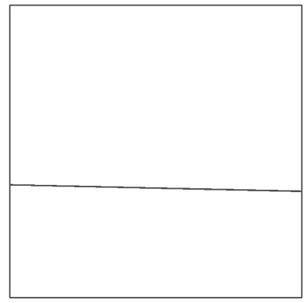
Surveyed 1869
Revised 1869
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1873
Revised 1873
Edition N/A
Copyright N/A
Levelled N/A

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Production date: 22 September 2020

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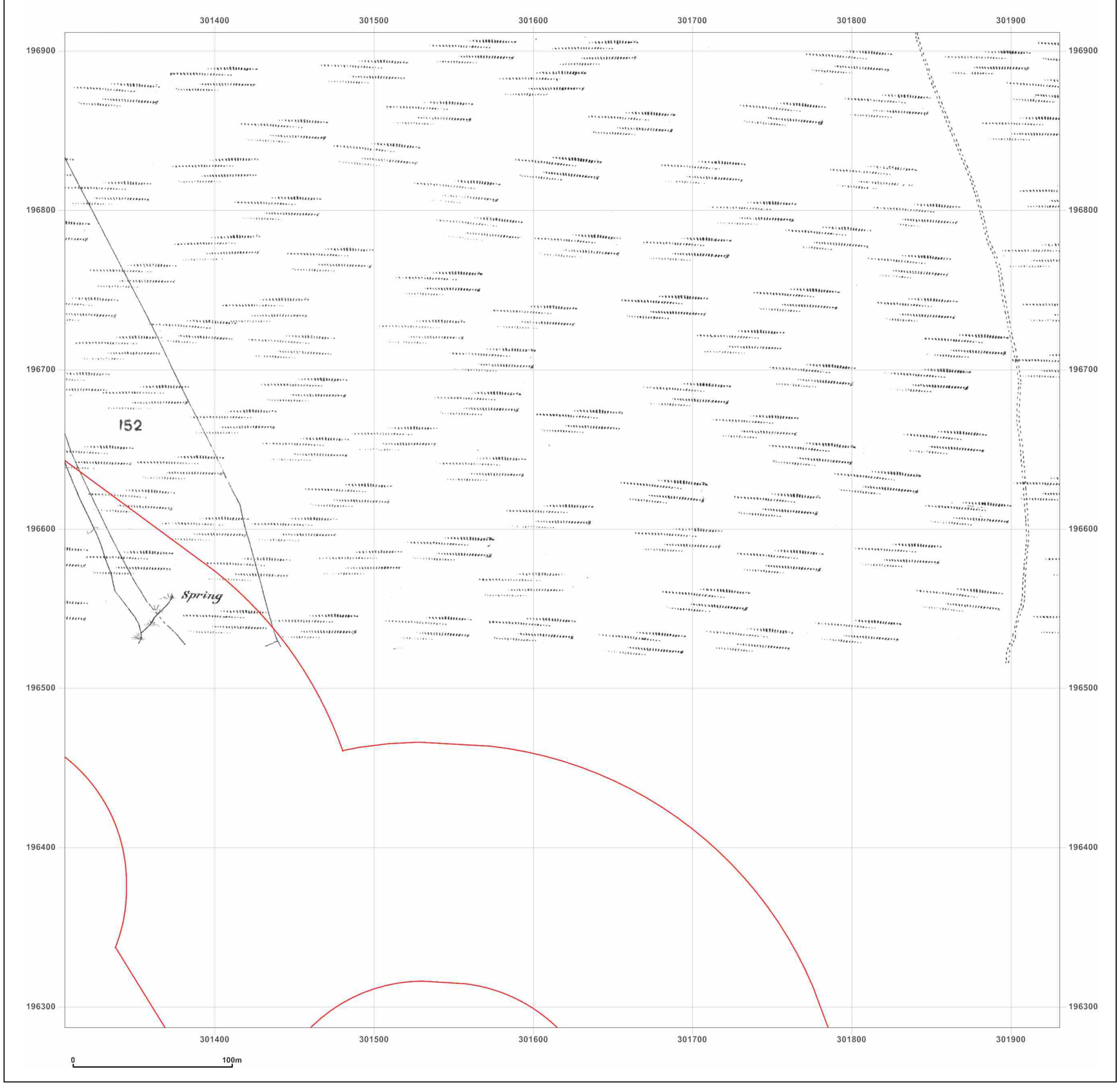

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_3
Grid Ref: 301618, 196599

Map Name: County Series

Map date: **1877**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1877
Revised 1877
Edition N/A
Copyright N/A
Levelled N/A

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Production date: 22 September 2020

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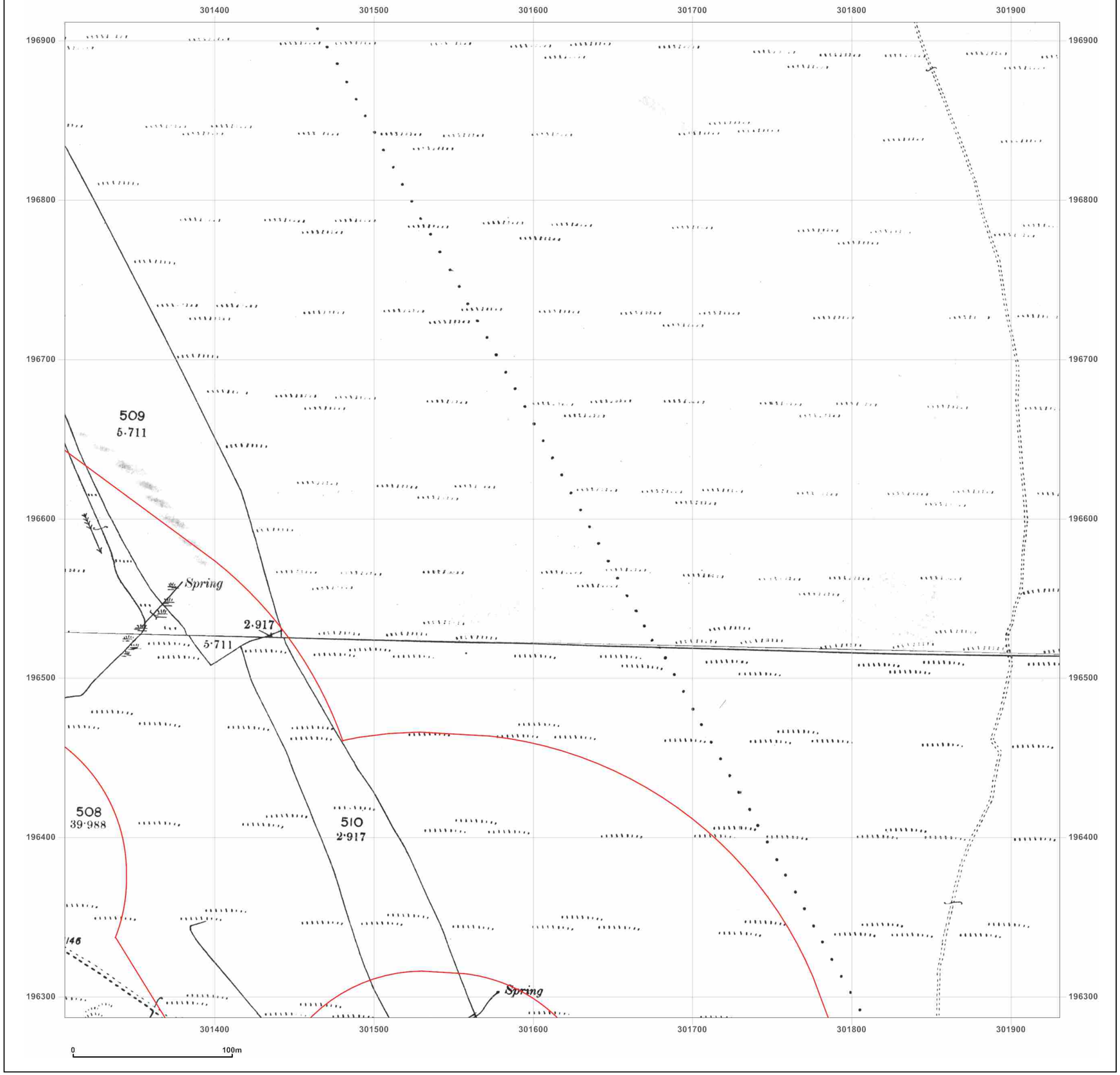


Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_3
Grid Ref: 301618, 196599

Map Name: County Series

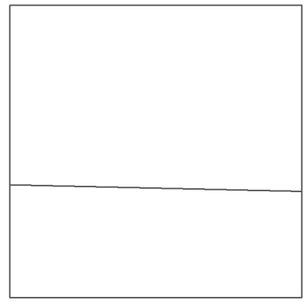
Map date: **1900**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

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



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

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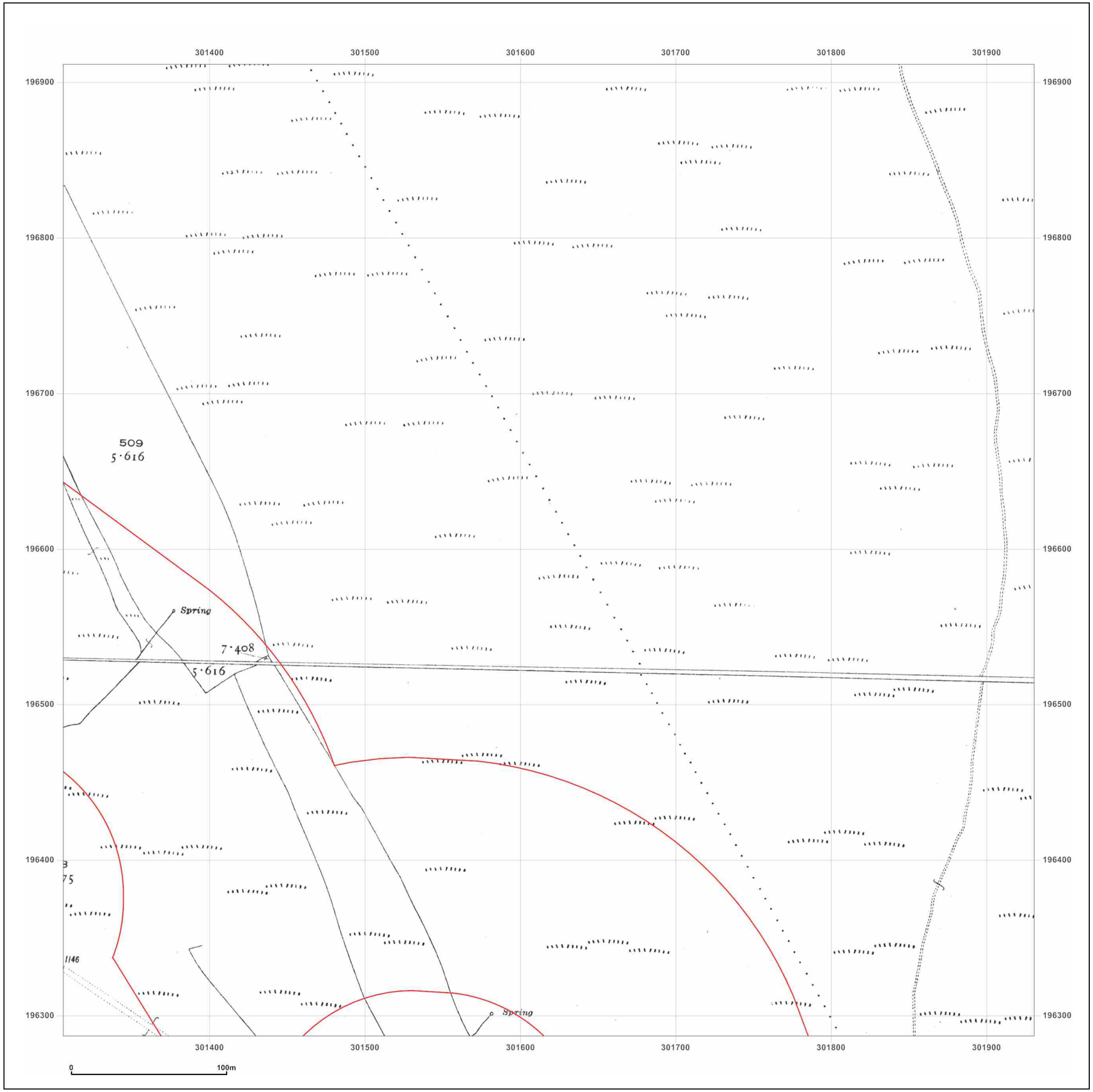

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_3
Grid Ref: 301618, 196599

Map Name: County Series

Map date: **1919-1920**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
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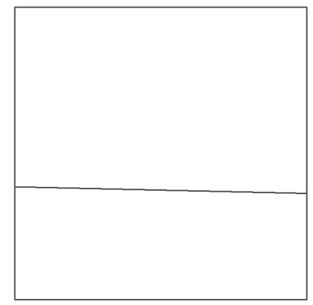
Surveyed 1919
Revised 1919
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1920
Revised 1920
Edition N/A
Copyright N/A
Levelled N/A

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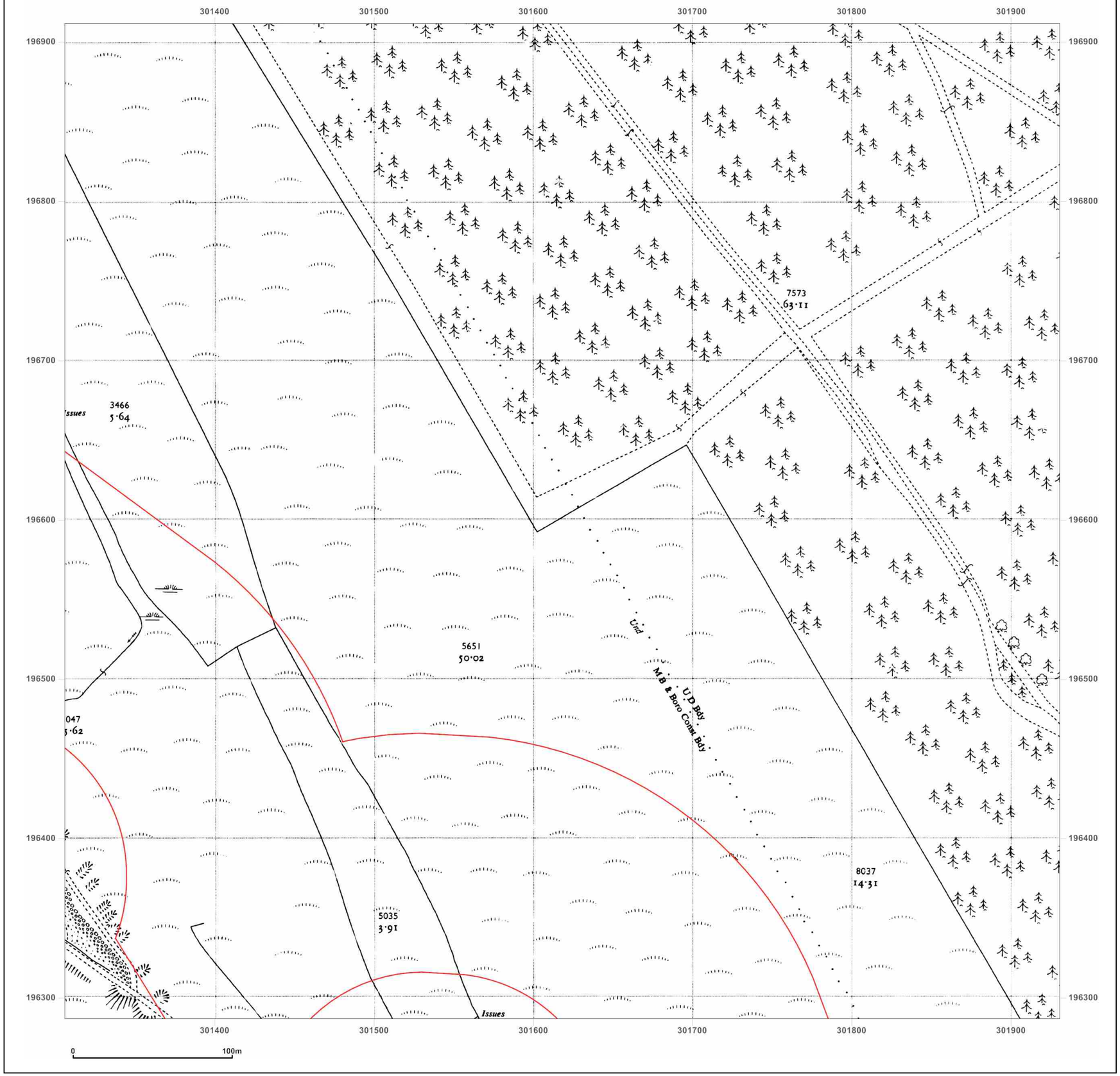

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_3
Grid Ref: 301618, 196599

Map Name: National Grid

Map date: **1961**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

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

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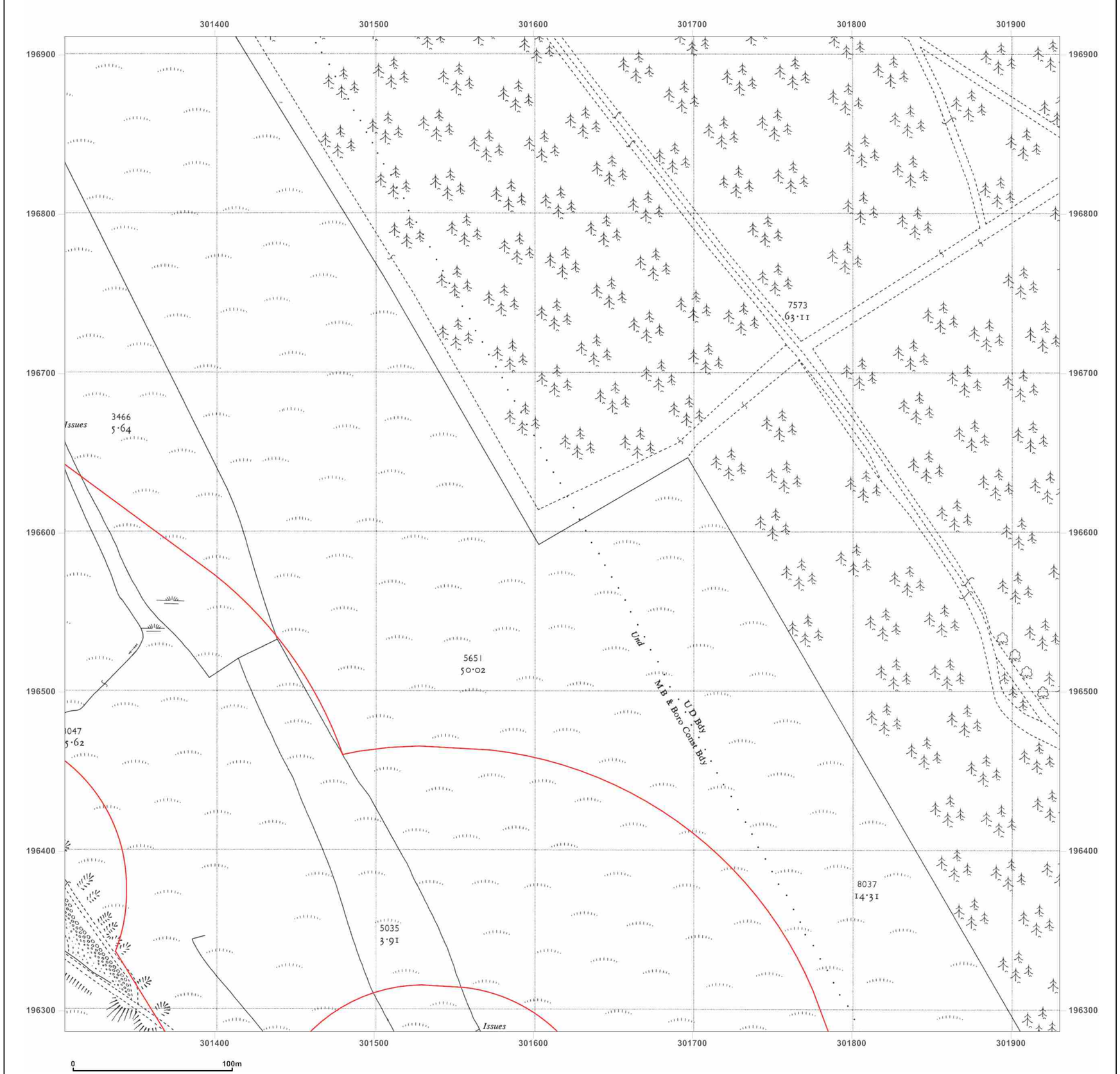

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_3
Grid Ref: 301618, 196599

Map Name: National Grid

Map date: **1961**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1961
Revised 1961
Edition 1962
Copyright 1962
Levelled 1957

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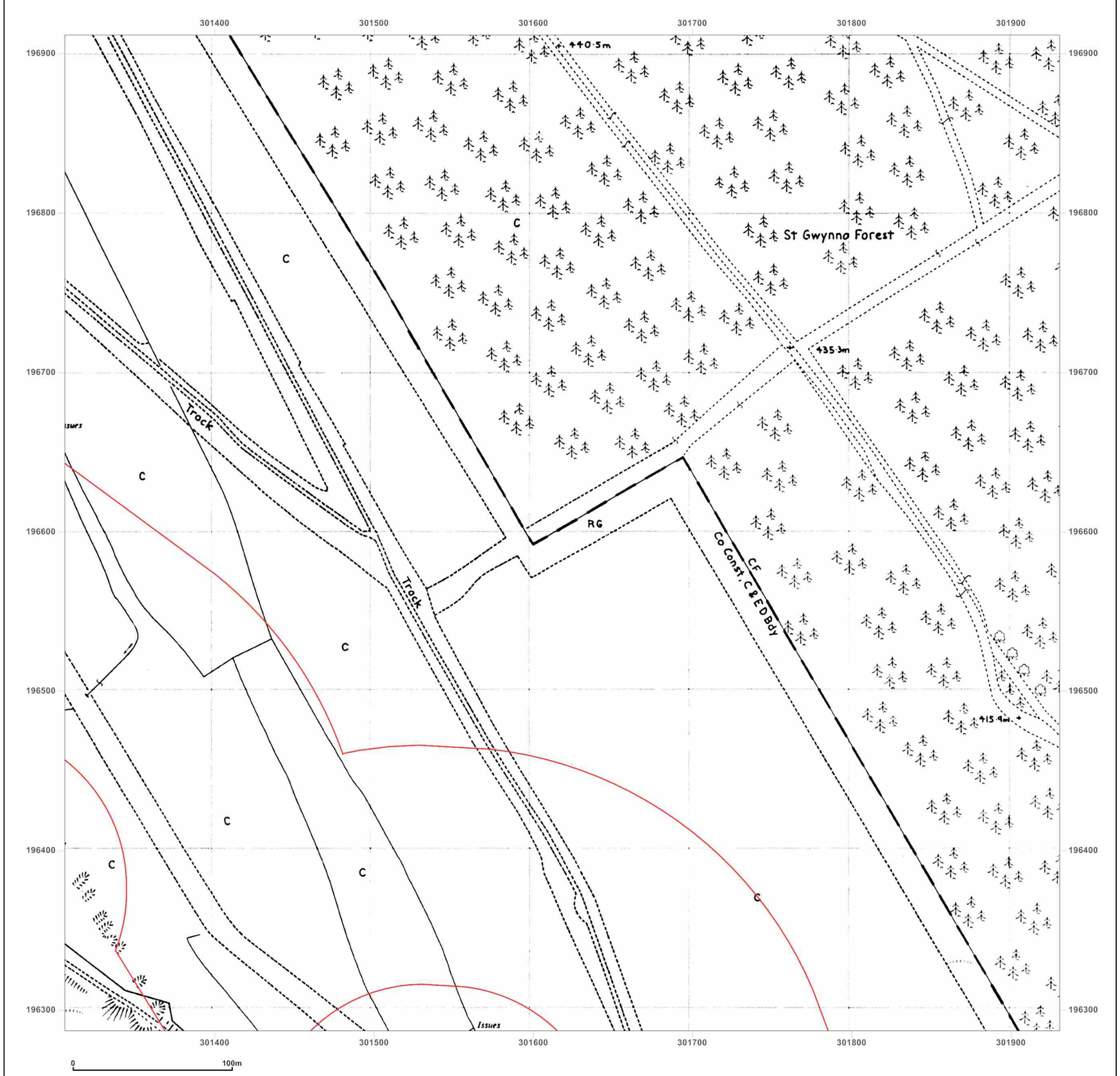

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_3
Grid Ref: 301618, 196599

Map Name: National Grid

Map date: **1986**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1965
Revised 1986
Edition N/A
Copyright 1986
Levelled 1965

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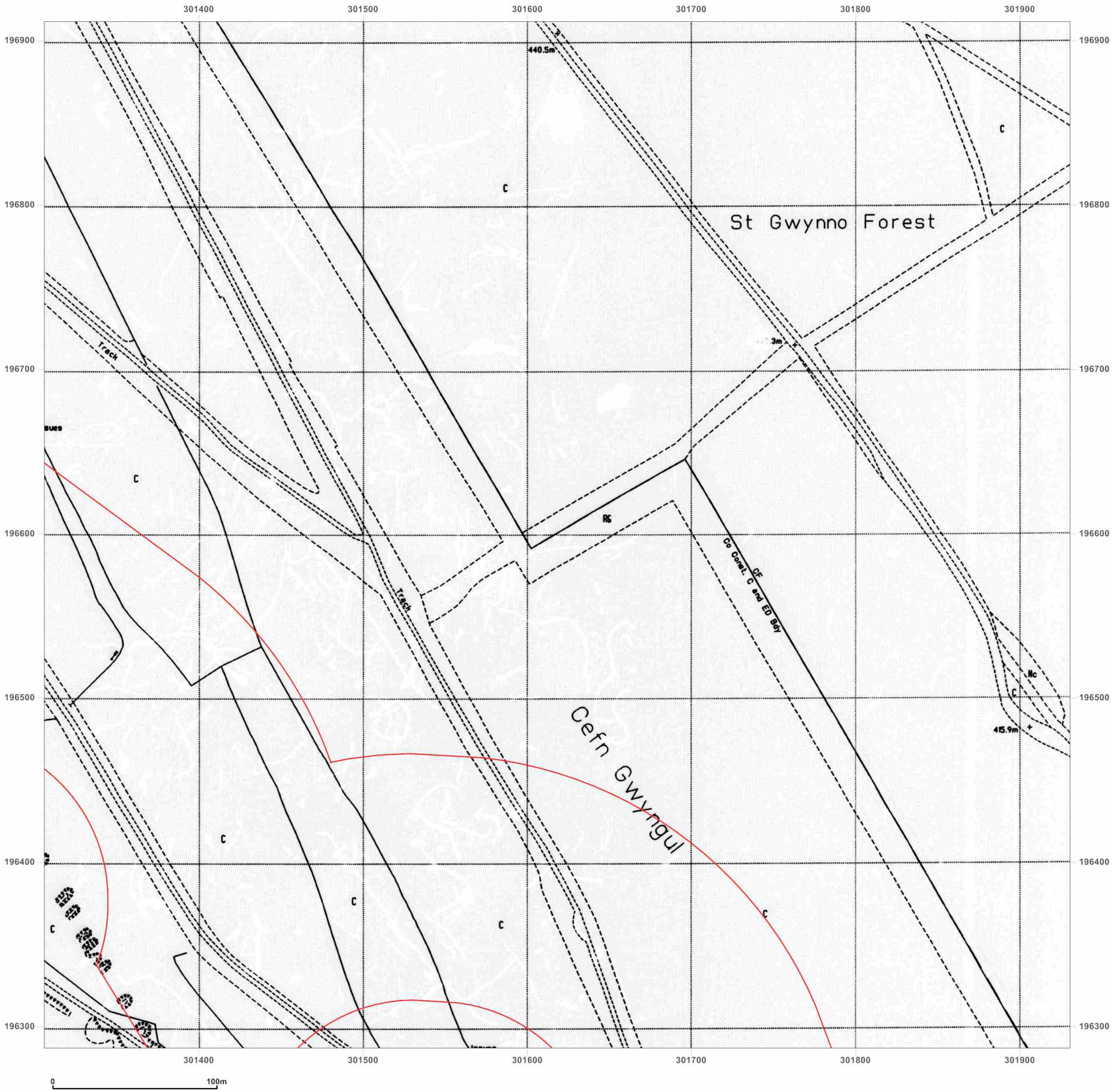
Production date: 22 September 2020

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf



Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_3
Grid Ref: 301618, 196599

Map Name: National Grid

Map date: **1993**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1993
Levelled N/A

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Production date: 22 September 2020

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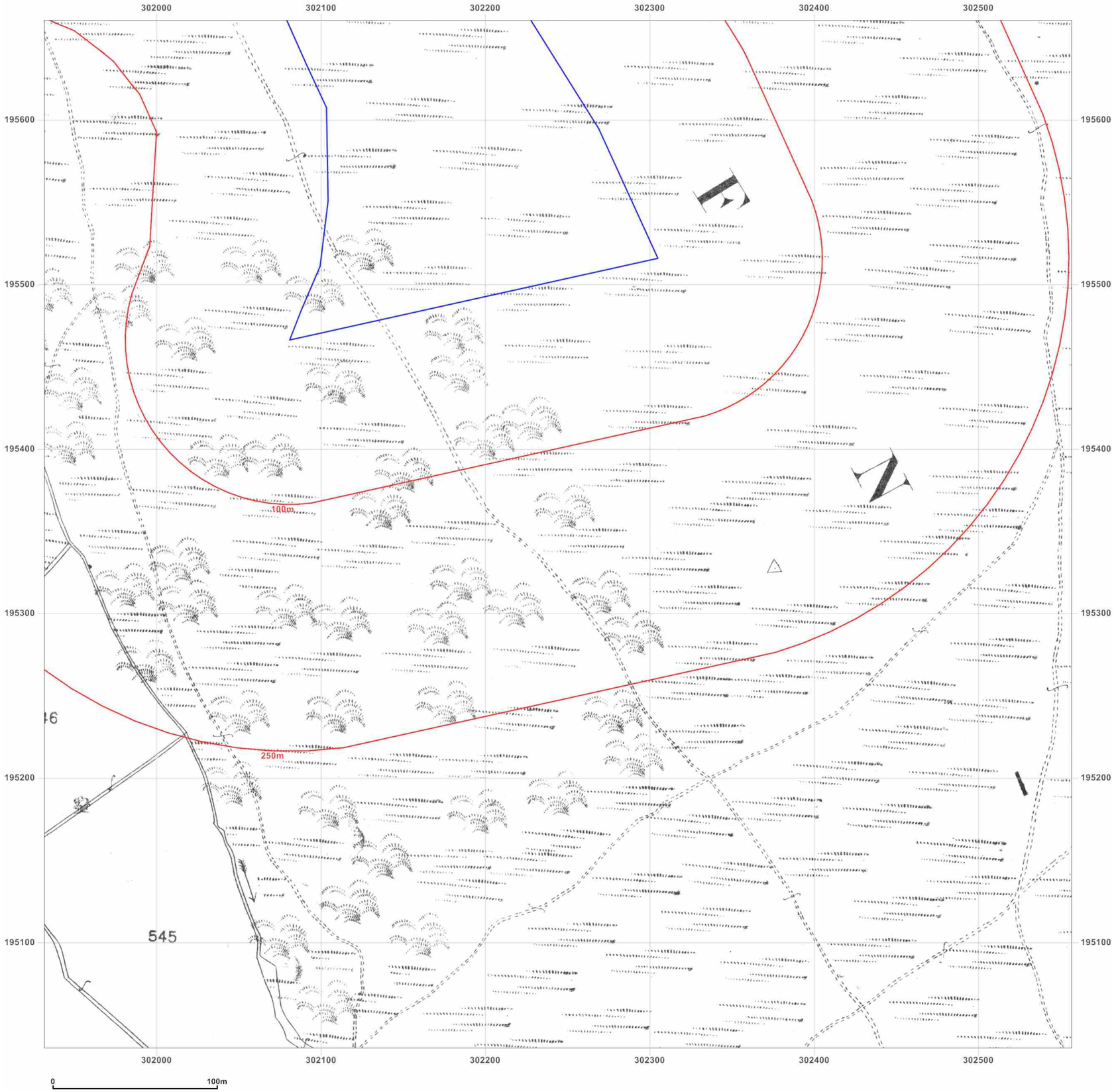

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_3_1
Grid Ref: 302244, 195348

Map Name: County Series

Map date: **1873**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1873
Revised 1873
Edition N/A
Copyright N/A
Levelled N/A

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Production date: 22 September 2020

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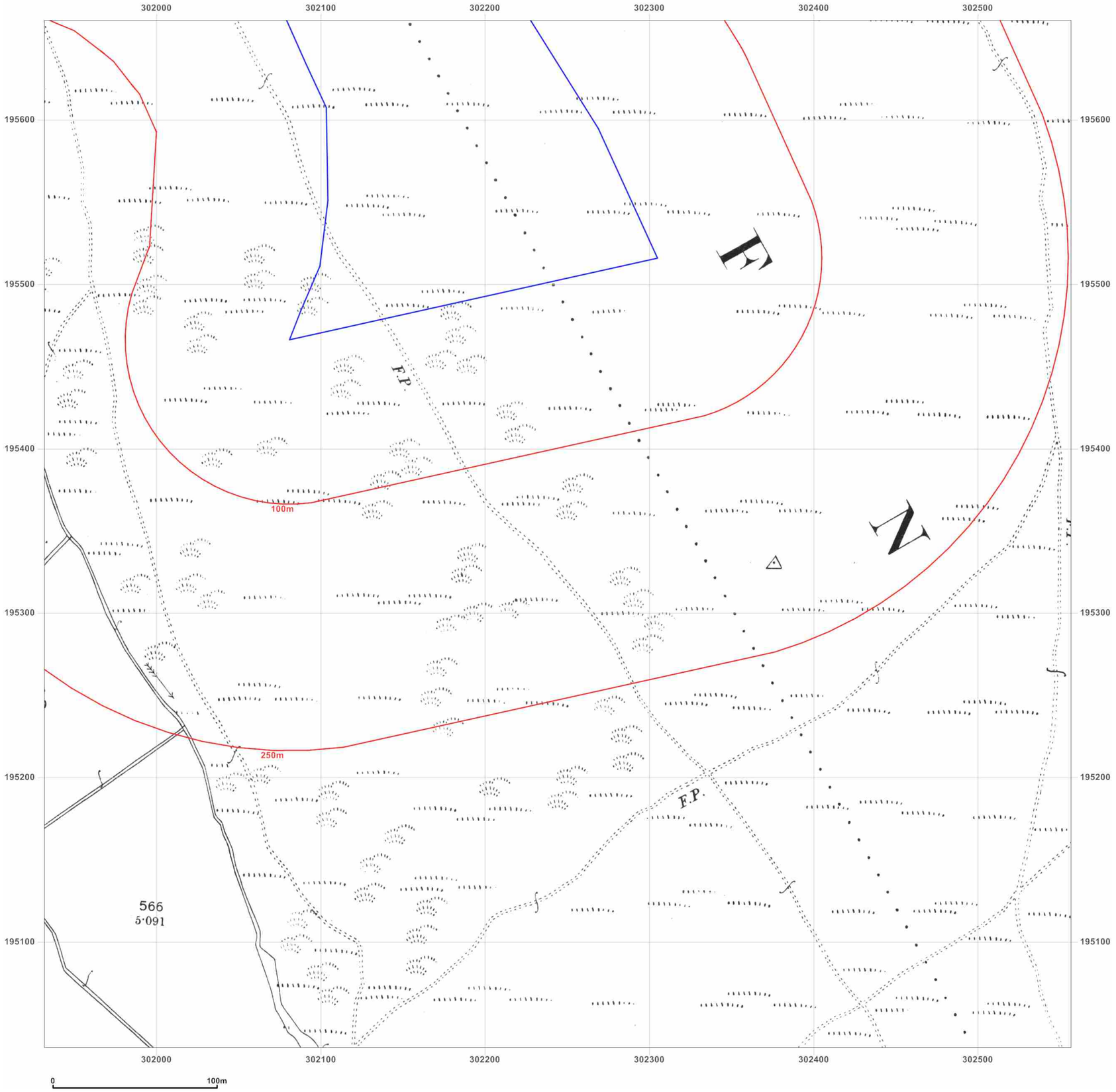
www.groundsure.com/sites/default/files/groundsure_legend.pdf



Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_3_1
Grid Ref: 302244, 195348

Map Name: County Series

Map date: **1900**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

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

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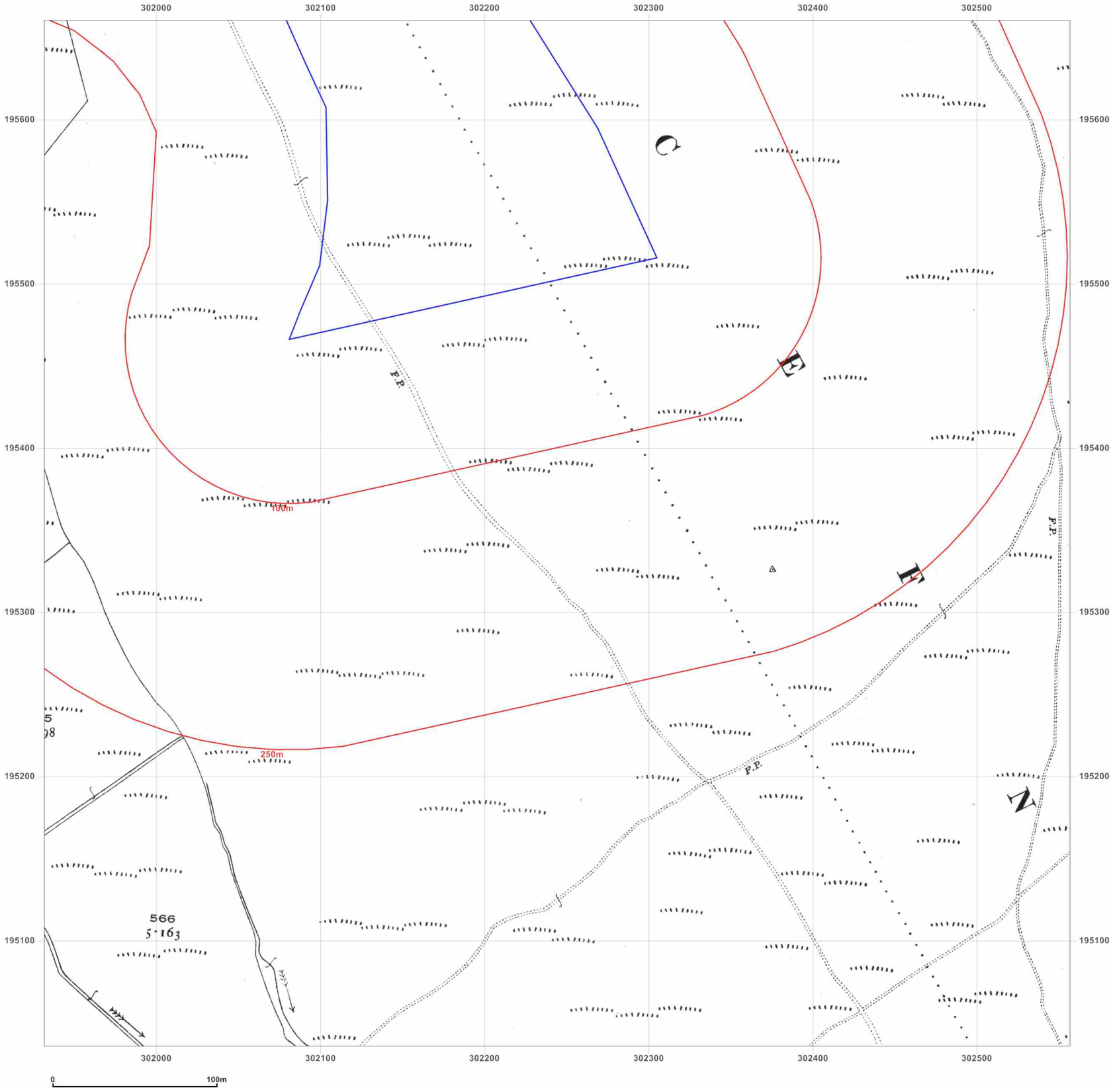

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Report Ref: GS-7076728_LS_3_1
Grid Ref: 302244, 195348

Map Name: County Series

Map date: **1920**

Scale: 1:2,500

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Revised 1920
Edition N/A
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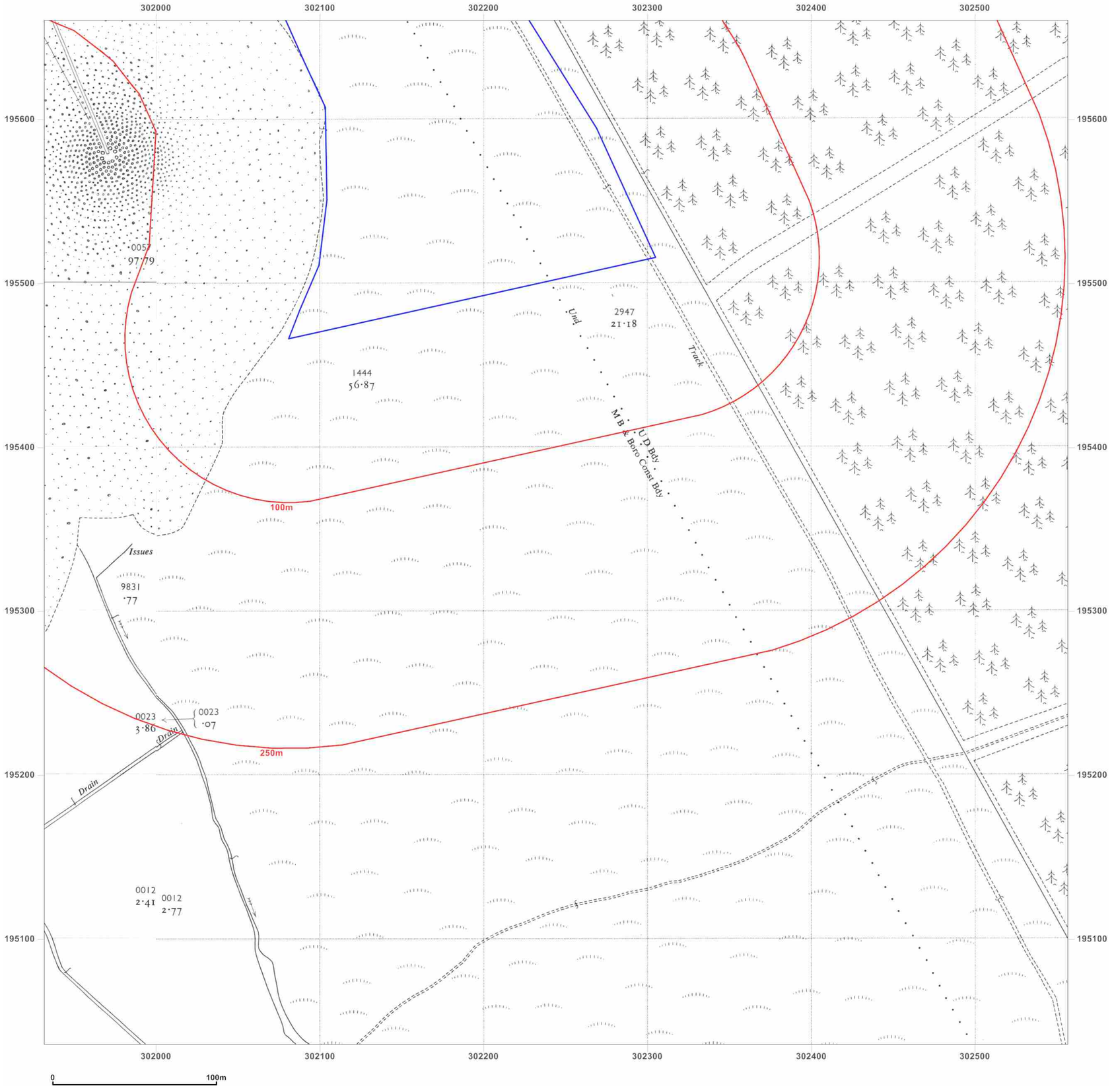

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Map Name: National Grid

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Scale: 1:2,500

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Copyright 1959	Copyright 1962
Levelled 1948	Levelled 1957

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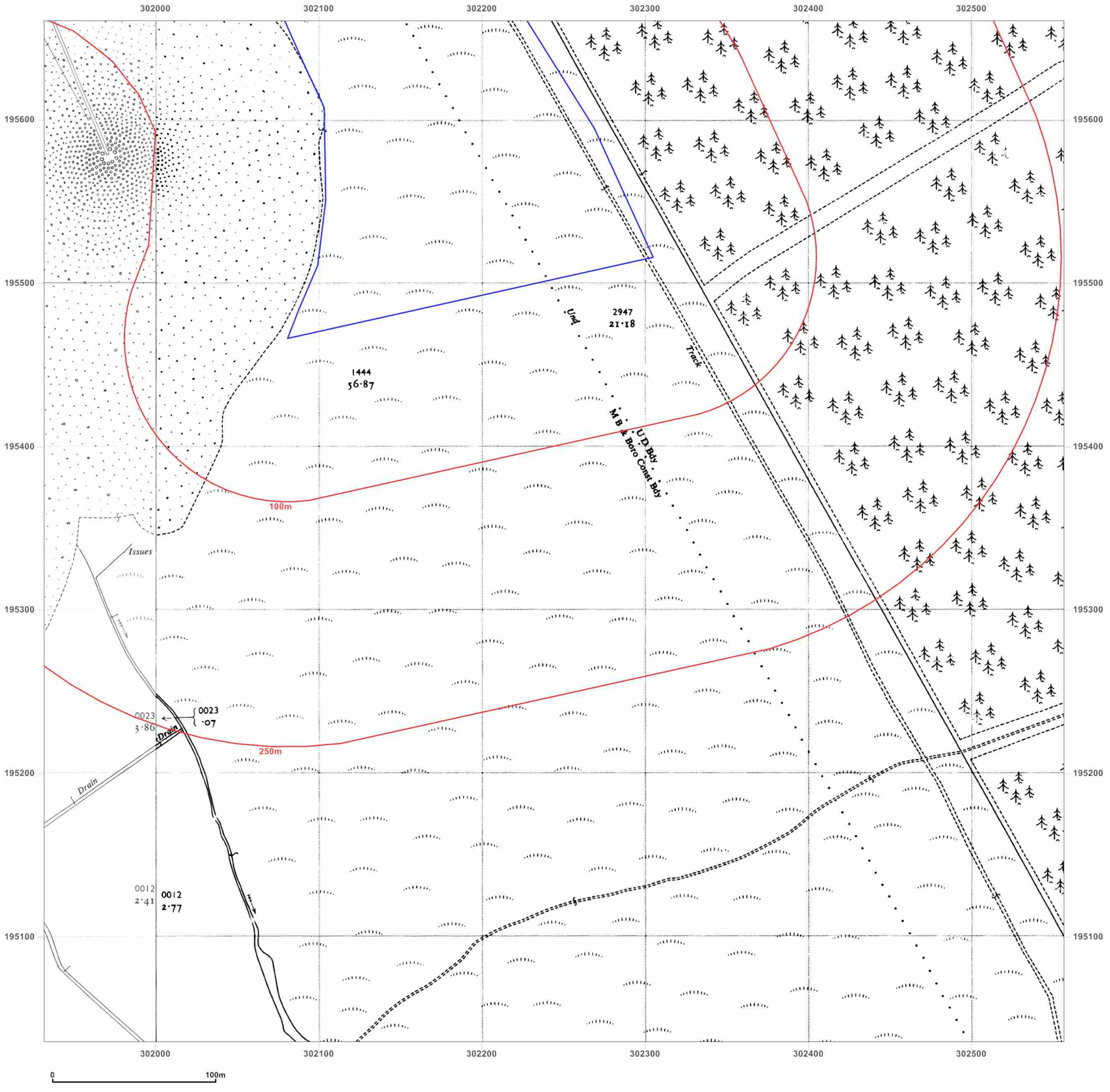

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Map Name: National Grid

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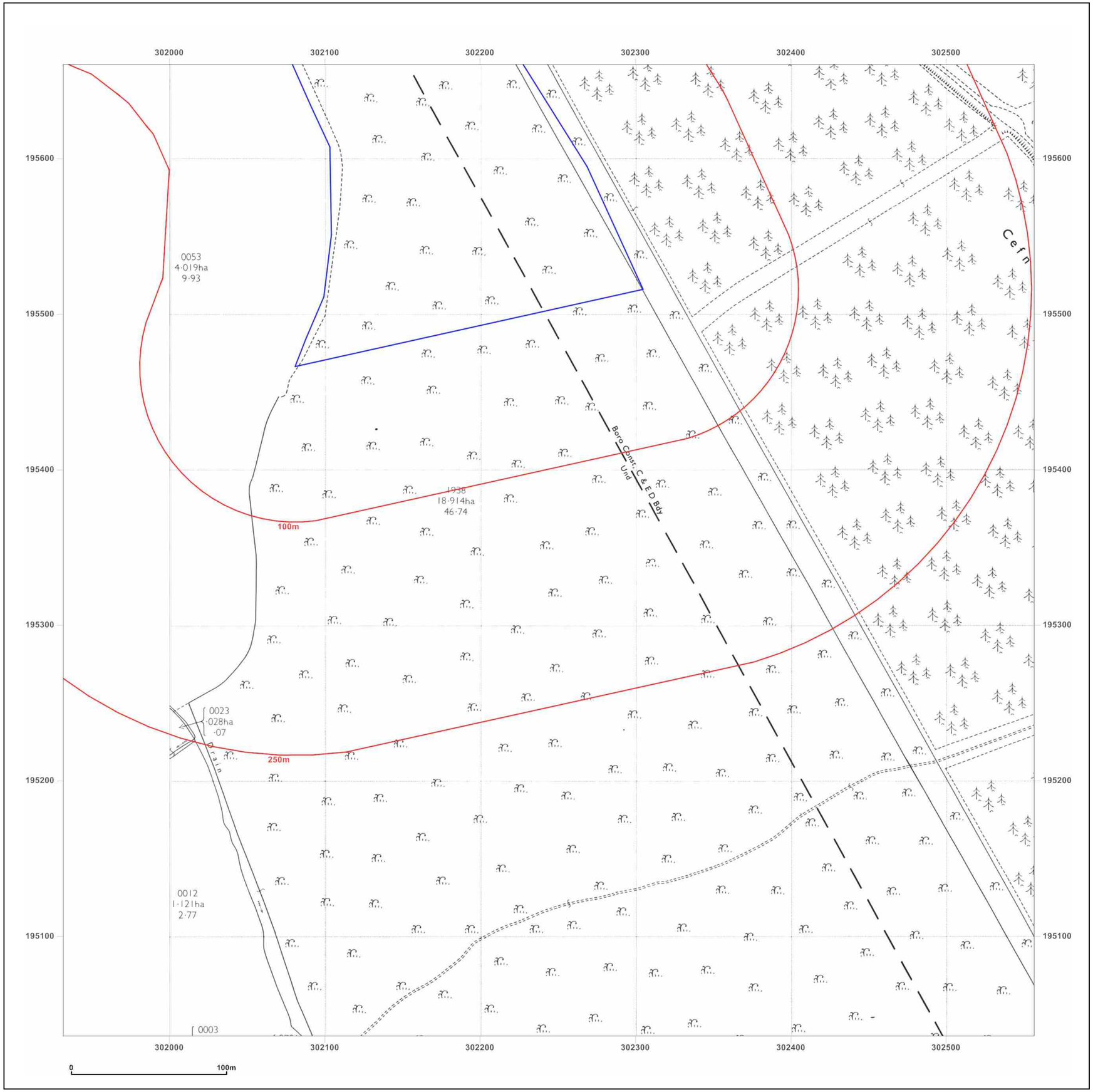

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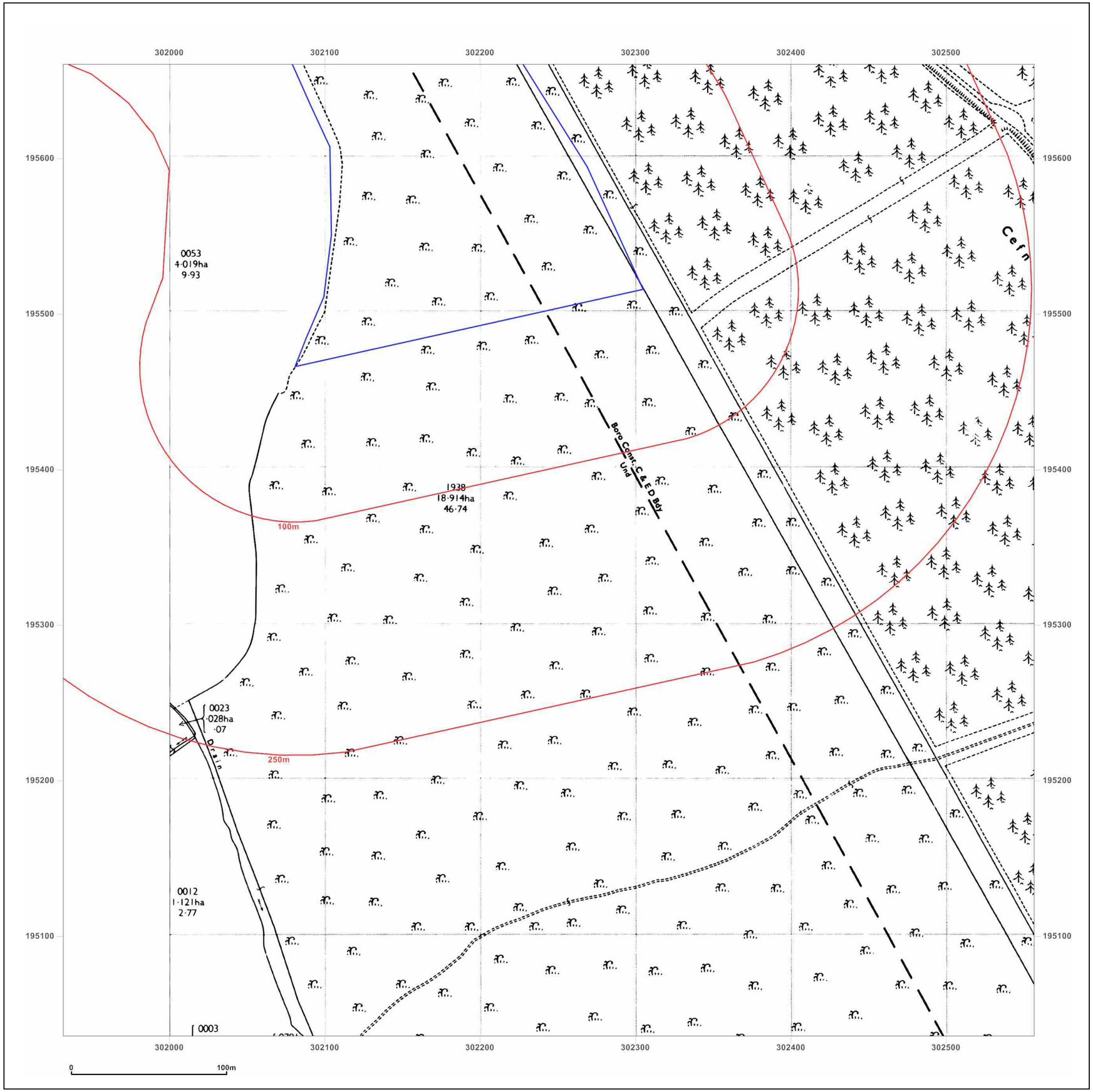

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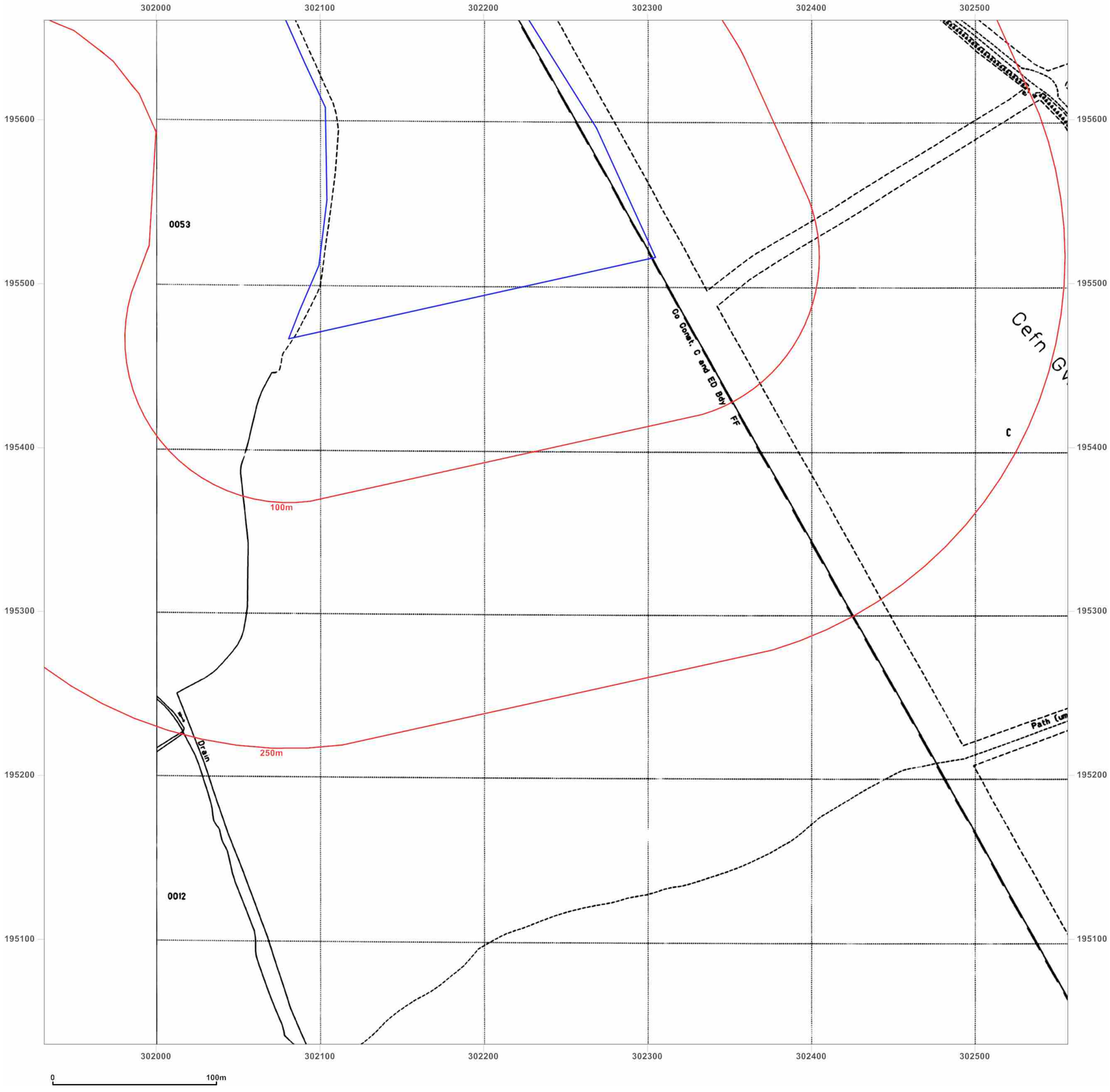

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Map Name: National Grid

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Scale: 1:2,500

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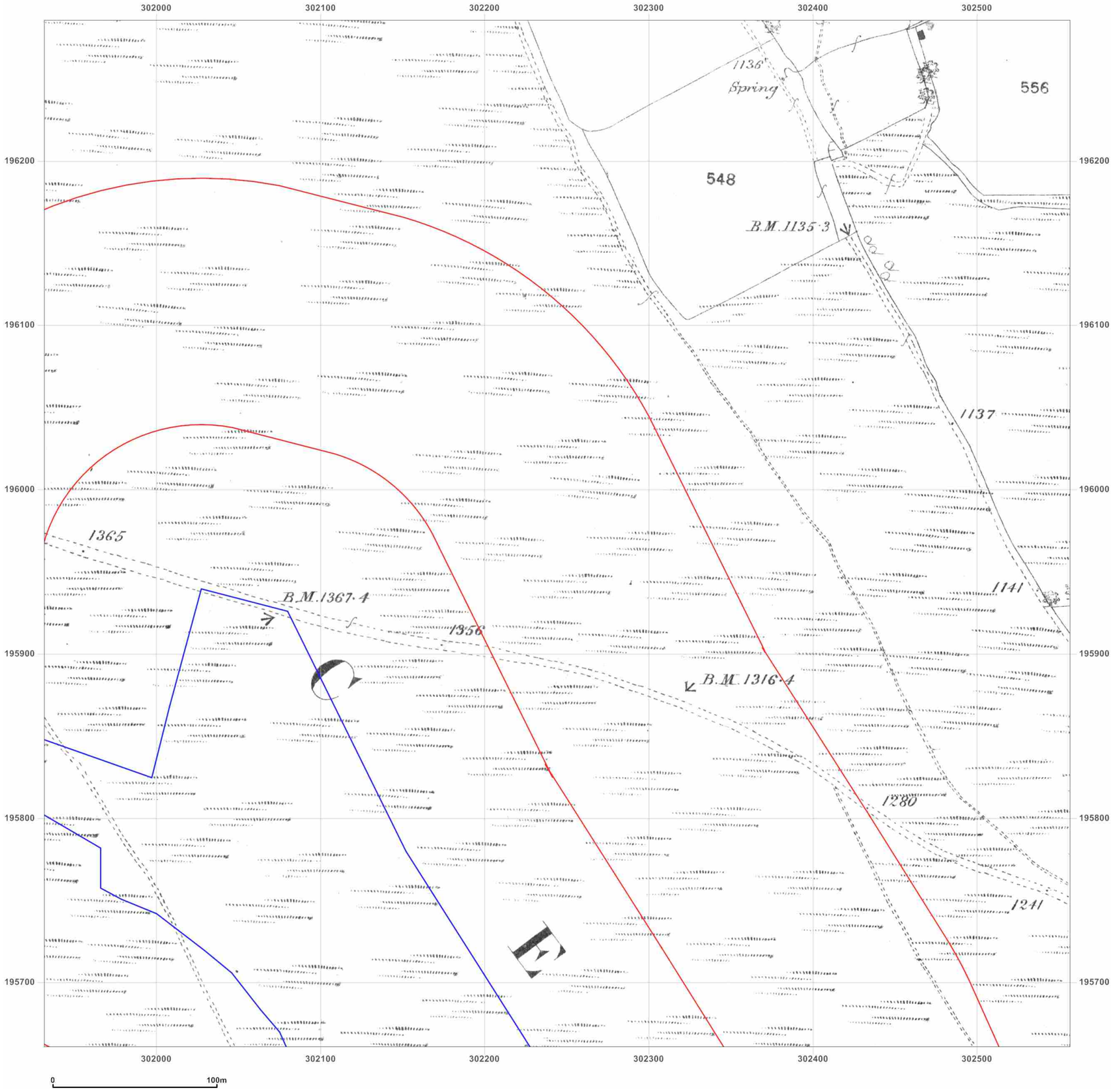

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Map Name: County Series

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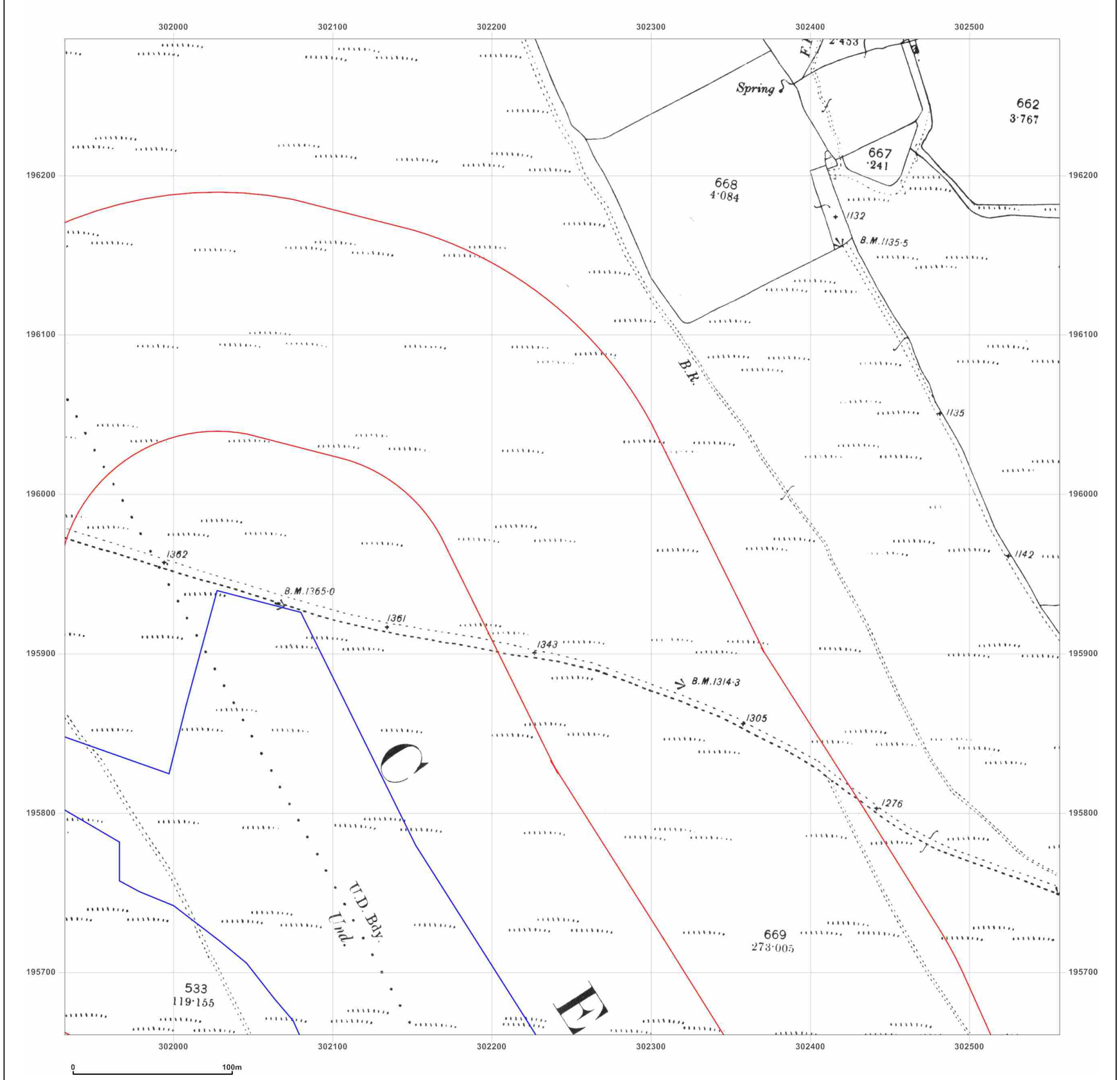

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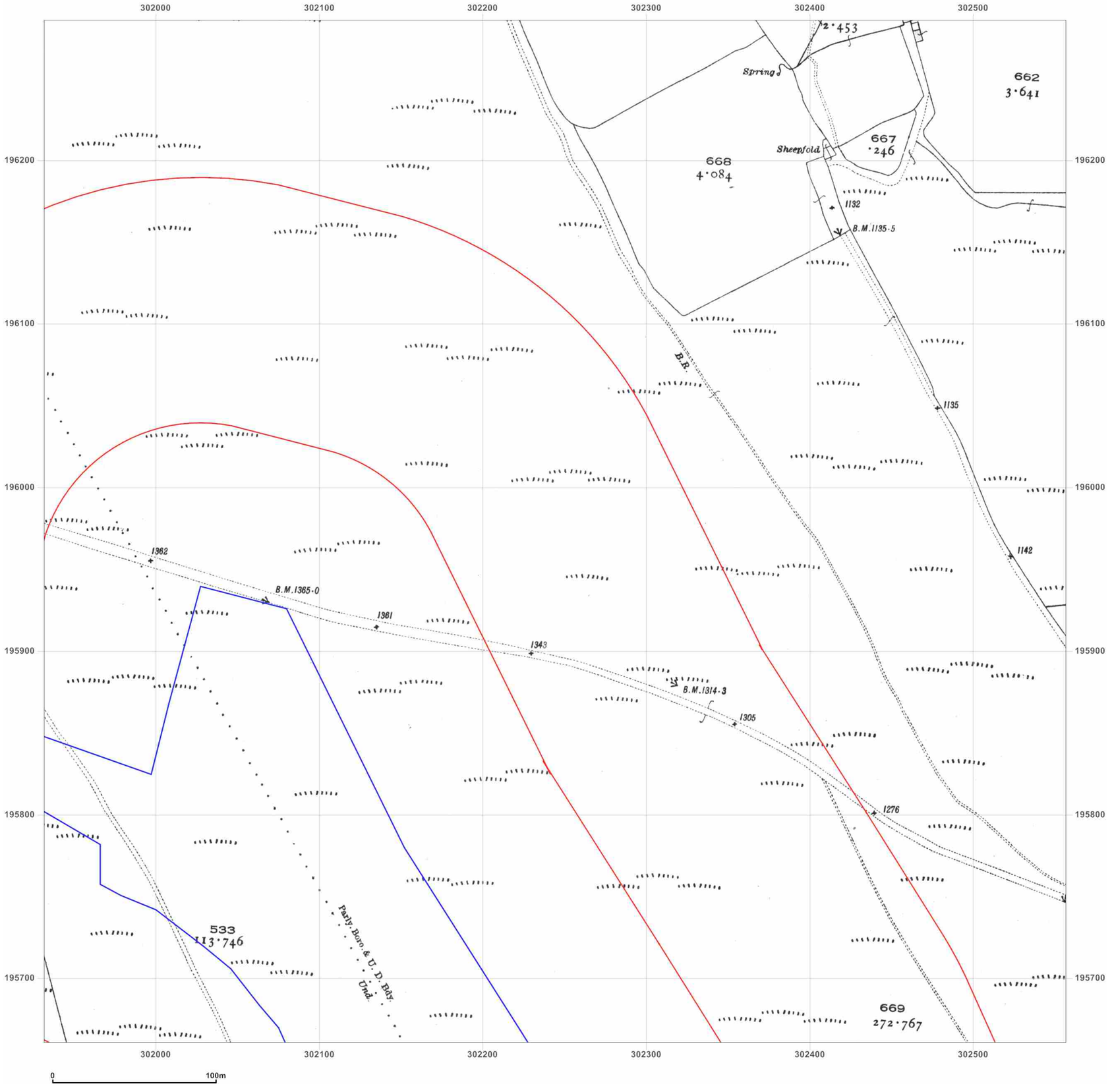

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Grid Ref: 302244, 195973

Map Name: National Grid

Map date: **1958-1961**

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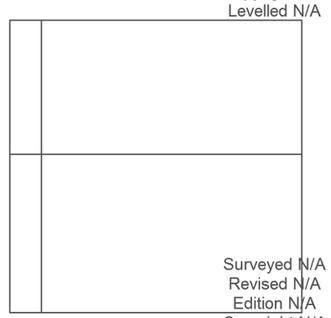

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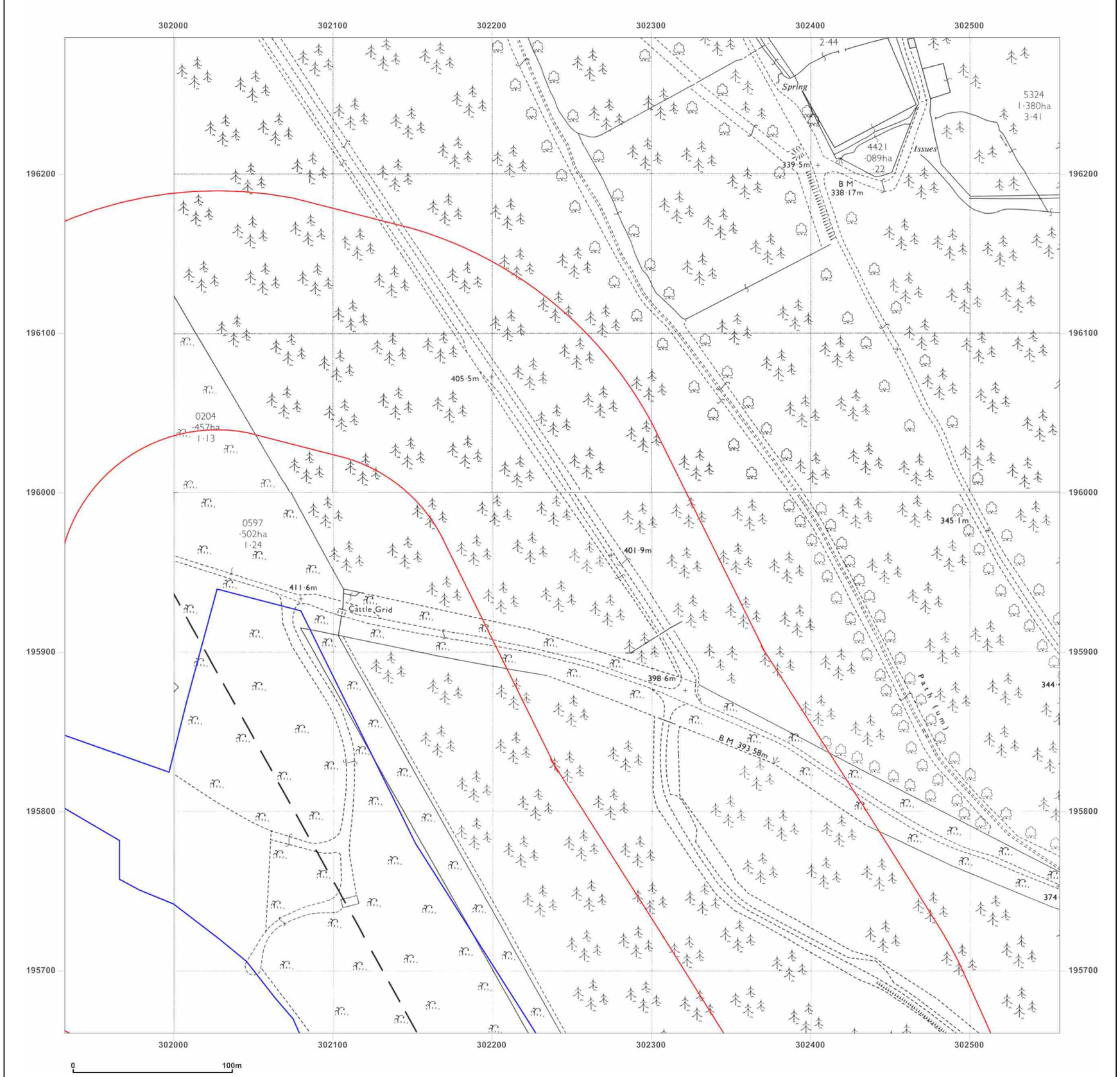

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Edition N/A
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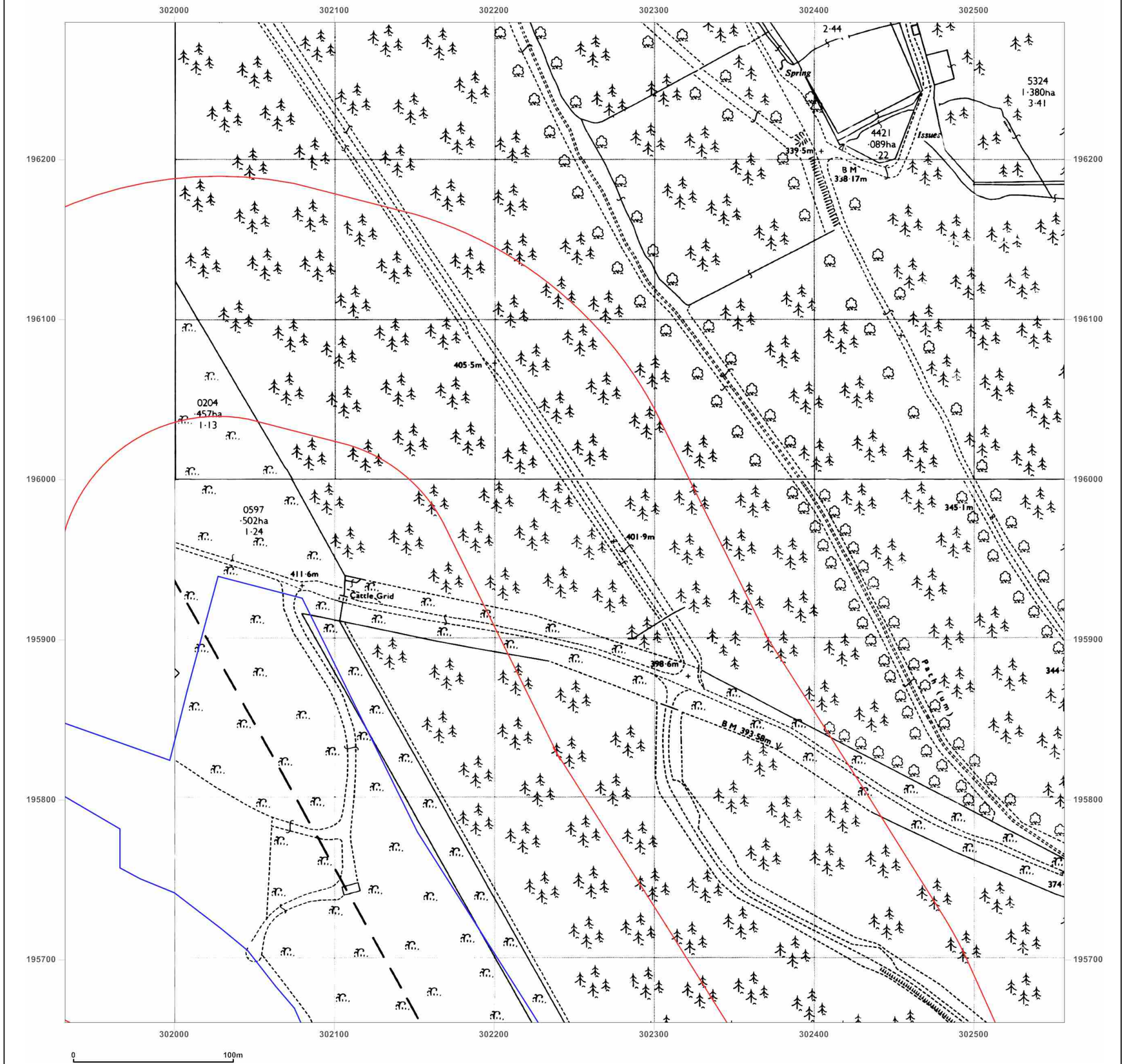

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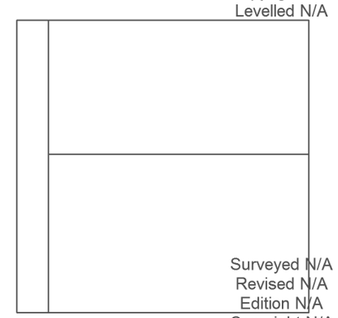

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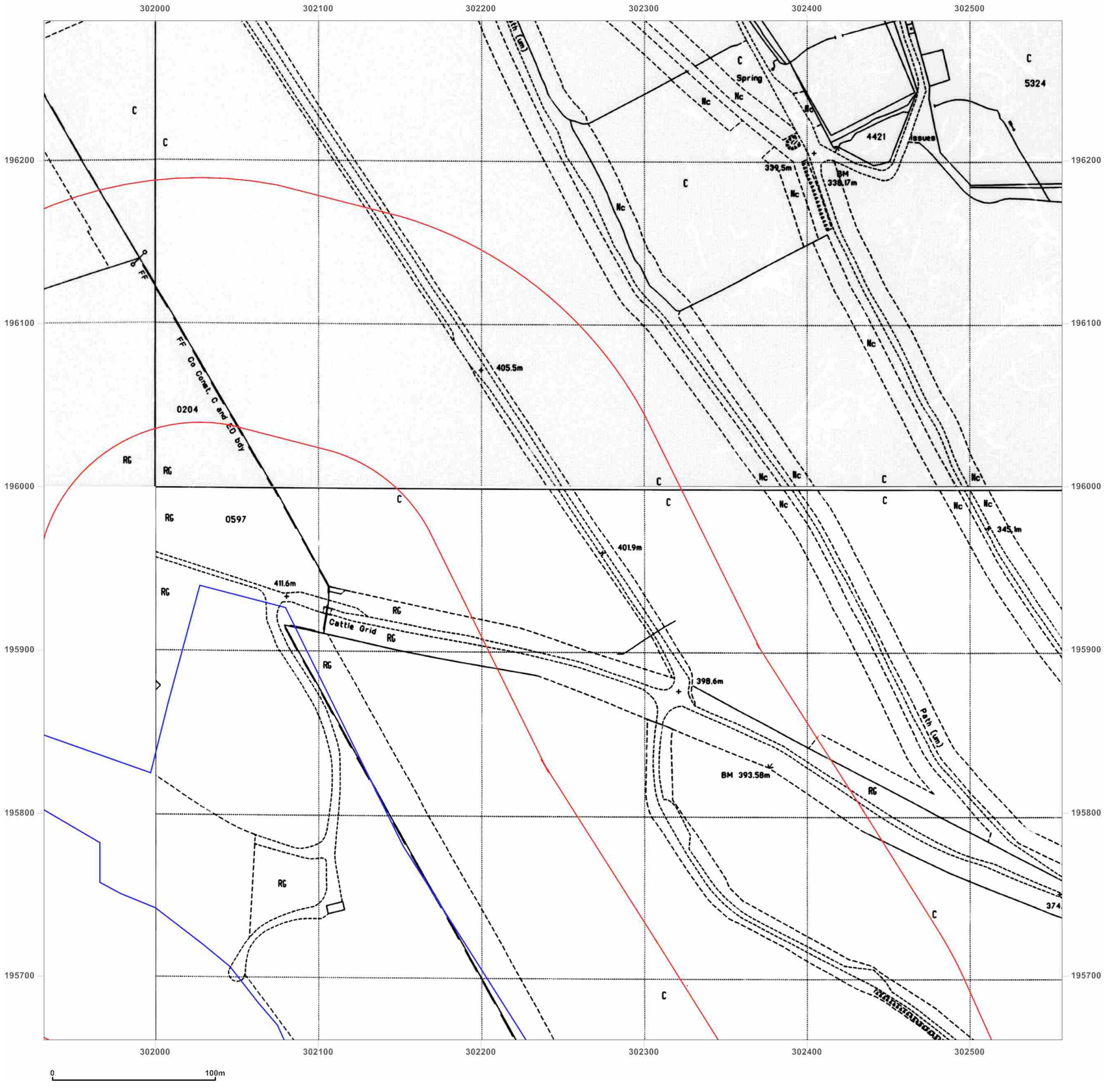

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Appendix 10.2

Coal Mining Risk Assessment

REDSTART

Tylorstown Phase 4

Coal Mining Risk Assessment

February 2021

REDSTART

Project No: CS/100303S Doc Ref: CS/100303/GT/002 Rev: P01

Rhondda Cynon Taf County Borough Council

February 2021

Tylorstown Phase 4

Coal Mining Risk Assessment

	NAME	SIGNATURE	DATE
AUTHOR	Alan Rosier		25/02/2021
CHECKER	Neil Greenwood		25/02/2021
APPROVER	Andrew Hale		25/02/2021

ISSUE RECORD

REV	DATE	DESCRIPTION/COMMENTS	AUTHOR/ PREPARED BY:	APPROVED FOR ISSUE BY:
P01	25/02/2021	First Issue	A Rosier	A. Hale

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Contents

Appendices

1. Introduction

1.1 Background

Rhondda Cynon Taf County Borough Council 'The Client' has instructed 'Capita Property and Infrastructure Ltd' to undertake a Mining Risk Assessment in order to assess the risks associated with mining at the development site.

1.2 Development Proposals

On Sunday 16th February 2020, the Storm Dennis flood surge instigated the failure of Llanwonno Upper Tip (RH01) above the village of Tylorstown and this led to approximately 60,000 m^3 of slipped debris filling the valley bottom including the river channel of the Afon Rhondda Fach. This caused the river to divert in its course, moving across to the western side of the valley bottom and scouring the embankment beneath the local leisure centre.

It is estimated that approximately 150,000 m^3 of debris with potential to further slip in the long term needs to be taken off the remnant slipped feature and taken across the valley to a site where it can be safely deposited on level ground and form a feature which will enhance the local amenity landscape. A separate exercise is underway for dealing with the slipped material lying close to the Afon Rhondda Fach.

A receptor site (allocated the designation RS-C) has been selected for the 150,000 m^3 of relocated material and this lies to the east of the current position of Tylorstown Tip (known locally as Old Smokey).

The two areas are linked by a proposed haul road that will be used for material transfer and this utilises the route of a former mineral tramway.

The area of the donor site (Llanwonno Upper Tip) is approximately 50,000 m^2 (5 Ha) and the area of the landform at Receptor Site - C is approximately the same.

The following development site plans are presented in Appendix A.

- Drawing Reference: CS/GC3613-RED-61-RSC-DR-C-0001: Location Plan
- Drawing Reference: CS/GC3613-RED-61-RSC-DR-C-0002: Tip Reprofile GA
- Drawing Reference: CS/GC3613-RED-61-RSC-DR-C-0003: Receptor Site C GA

1.3 Objectives

The purpose of this report is to provide an assessment of the potential risks and liabilities associated with the site deriving from historical mining activities in the area.

1.4 Methodology

A Mining Risk Assessment is undertaken via collating information on the mining history of the site and the local area, primarily from The Coal Authority.

This is achieved through undertaking the following:

- Review of previous reports (if available) including either or both of a Preliminary Risk Assessment (Phase 1 Geo-environmental Desk Study) and Preliminary Sources Study Report (Geotechnical Desk Study); which should include:
    - Site walkover;
    - Description of the underlying geology based on geological maps and BGS borehole logs;
    - Assessment of the history of the site and its immediate surroundings via a review of historical maps;
    - Anecdotal evidence (from site users);
    - Use of publicly available aerial photographs; and
    - Obtaining a Coal Authority Consultants Report.
- Obtaining additional information such as mine plans from the Coal Authority if they indicate via a requested search that such information is available.

1.4.1 Report Structure

A detailed list of all the references and acronyms used in this document is provided in Sections 7 and 8 below.

1.4.2 Previous Reports

Capita previous undertook a Preliminary Sources (Desk) Study, dated October 2020 (Ref CS/100303/GT001).

2. Site Description

2.1 Site Location

A site location plan is presented in Appendix A (Ref: GC3613-RED-61-RSC-DR-C-0001).

The colliery spoil tips comprising the Phase 4 works are located on the eastern side of the Rhondda Fach valley, close to the centre of the South-East Wales Coal Field. The nearest village in the valley bottom is Tylorstown, with Ferndale lying a little way to its north. The only vehicle access to the tips is via Llanwonno Road, which links to the valley bottom in the village of Blaenllechau, to the north.

The Llanwonno Tips comprise two areas in which colliery spoil was deposited from the former Ferndale Colliery tramway. Llanwonno Upper Tip is the higher of the two adjacent tips and was the source of the 2020 landslip. The Upper Tip is to be reprofiled during the Phase 4 works. The Llanwonno Lower Tip site is located on the lower valley slopes, immediately north-west of the Upper Tip and separated from it by the former tramway.

Llanwonno Upper Tip is centred at NGR (ST) 301250, 196200.

The most immediately obvious colliery spoil tip in the area is Tylorstown Tip, also known as 'Old Smokey'. It's top forms a large conical feature rising over 30 m above the surrounding land and is situated at the valley crest. It lies uphill, approximately 700 m south-east, of the lower lying Llanwonno Tips. The shared former tramway terminates at this tip. The proposed receptor site (Receptor Site C), for the surplus colliery spoil generated by the Llanwonno Upper Tip reprofiling works, is located immediately to the east of 'Old Smokey' on a relatively level plateau edge.

Receptor Site C, to the east of Tylorstown Tip, is centred at NGR (ST) 302150, 195660.

2.2 Site Description

The following site description is based on publicly available aerial photographs of the site and surrounding area and a site walkover.

Topography and Geomorphology

The Rhondda Fach is a steeply incised valley within the large upland plateau of the South-Wales Coalfield. The eastern valley side is stepped due to the alternating geology of hard sandstone, forming the steeper slopes, and weak mudstones, forming broad lower angled steps, known locally as 'slacks'.

Quarries are present at the level of Llanwonno Upper Tip, both up and down valley, and there is a likelihood that a buried quarry lies beneath the southern end of Llanwonno Upper Tip.

Spring lines and boggy ground are present along the slacks, this is due to groundwater in the fractured sandstones being prevented from percolating downwards by the impermeable mudstones and coal seat earths. During and immediately after periods of high/prolonged precipitation the spring lines discharge strongly but dry up during periods of drier weather.

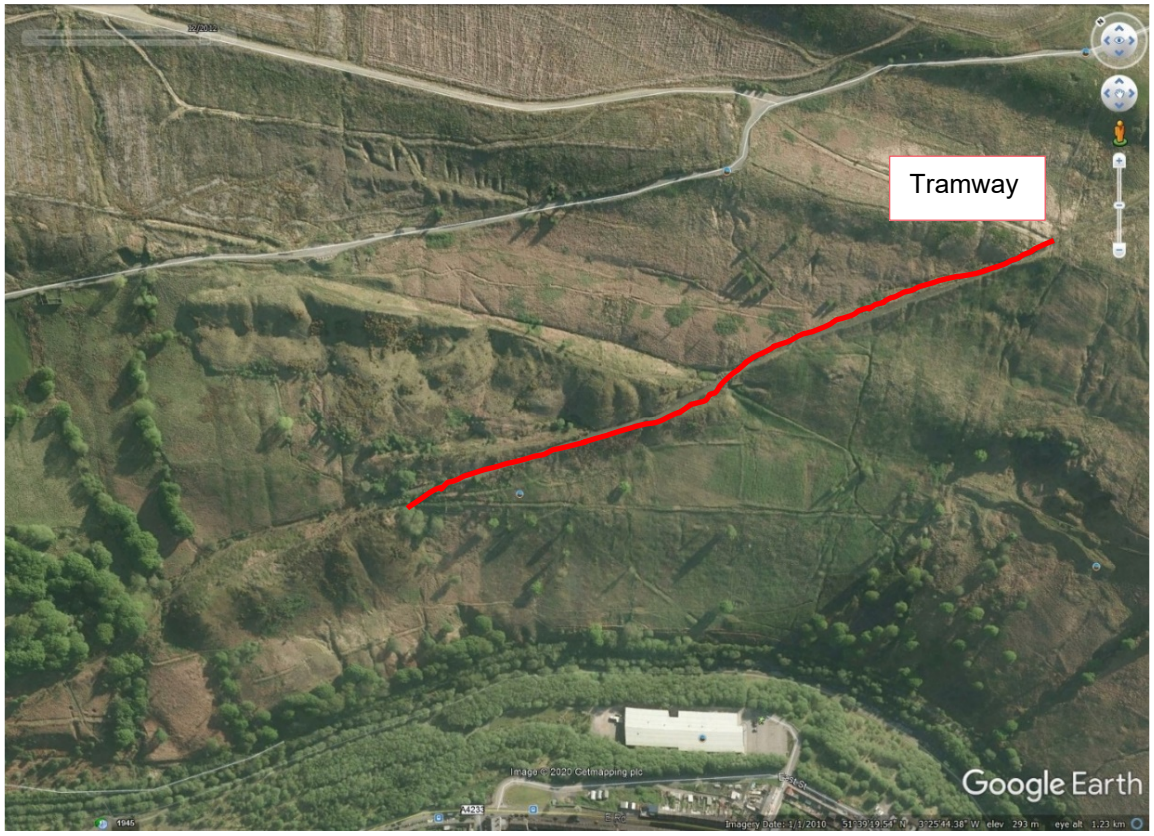
Substantial deep mining across the area has led to past subsidence and mining related fissures, which may have altered natural groundwater flows in the area. Coal crop workings and adits are present on the hillside above the tip and potentially beneath the tips, which issue water during periods of high precipitation.

Llanwonno Upper Tip

Llanwonno Upper Tip is a linear tram tip, which is oversteepened and poorly vegetated. There was a pond in the centre of the tip, above the tramway, which was lost within the recent landslide.

The tip has been placed across a concave area of the hillside formed by the intersection of a steep section and a slack below.

The northern end of the tip is volumetrically smaller than the central and southern parts and is at a slightly higher level. Llanwonno Road is at the same level as the northern end of the tip but rises to the south beyond this point. The crest of the tip falls to the south.



Photograph showing Llanwonno upper tip and lower tip in central area. Terrain subdued terracing can be seen with sports centre to base of photo

It is suggested that an ancient landslide is present within the natural hillside beneath the northern end of Llanwonno Upper Tip, hummocky ground between the Upper and Lower Tips support this landslide concept.

Within the mid-slope area of the northern part of Llanwonno Upper Tip is a tension crack. There are multiple tension cracks in the southern section of the tip, radiating from the landslide back scar.

Within the central portion of the tip, the recent landslide has left a bowl-shaped depression with a steep back scar. In the upper half of the back scar, a wedge of colliery spoil remains (the crest of the tip), whereas in the lower half of the back scar, natural ground (a stiff orange till) is visible. In front of the back scar is a back-tiled block, traversed by a multitude of transverse cracks. In front of the landslide block, the surface is scoured to natural ground with ribbons of colliery spoil remaining from the downhill flow slide.

Photograph showing back scar with a high slope of glacial till exposed in lower third of scarp face

There are several water courses and issues above the tip that have been captured by temporary drainage measures, installed during Phase 1 of the remediation works, which immediately followed the landslide event. These drainage measures form a series of 6-inch plastic pipes that collect water from culverts at Llanwonno Road, pipe them along the valley feature on the uphill side of the tip and subsequently discharge at the southern end of the tip, where it meets the former tramway.

The base of the tip lies on a slack, which has water issues along its entire length and inevitably beneath the tip itself. Since the landslide has occurred, water issues have formed deep erosive gullies down to the valley bottom. It is considered that prior to the slip, a longitudinal drain, beneath the tramway, captured these issues and took the water away to the north, and then down to the valley bottom, via a channel that is still partially present, immediately south of Llanwonno Lower Tip.

Photograph of central parts of slip looking from the northwest with leisure centre in valley base

Tramway

The former Ferndale Colliery tramway is constructed transversely across the valley side, rising from north to south. Within the Phase 4 area, the tramway embankment has been constructed using colliery spoil.

Although the tramway has been destroyed in the landslip area, it remains at the toe of the southern section of Llanwonno Upper Tip. Where the tip meets the tramway, there has been some relatively recent repair work to the toe of the tip, and a masonry wall is present.

At the very southern end of Llanwonno Tip is a tramway turning circle. A culvert is present immediately south of this, passing beneath the tramway. This culvert discharges water flowing from the small valley formed between the natural hillside and crest of the tip into an unlined drain. The culvert has been reformed recently as part of the Phase 1 remediation works so that a series of 6-inch plastic water pipes pass through it.

The tramway traverses (rising as it goes) a further 700 m before reaching Receptor Site C. Over this distance it cuts across slacks and steepenings, with various amounts of fill required to maintain its alignment.

At a point 300 m beyond Llanwonno Upper Tip, the tramway intersects the lower edge of a slack. At this point, the tramway meets a narrow track, leading northwards, up towards Llanwonno Road. Within the slack, the local area uphill is boggy and forms a small drainage basin, which discharges at the intersection of the track and tramway. The water at this intersection has, in the past, flowed down the tramway and resulted in deep erosive gullies that have required periodic repairs.

A further 100 m past the track/tramway intersection, the tramway rises to the plateau area and is constructed upon a small colliery spoil tip with a flat berm extending outwards into the valley. Beyond this, the tramway becomes indistinct due to the lower relief of the plateau.

Receptor Site C

Receptor Site C (RS-C) lies to the east/north-east of Tylorstown Tip (Old Smokey) and south/south-east of Llanwonno Road (vehicular access point to RS-C). The eastern edge of RS-C is bounded by conifer plantations, owned by Natural Resources Wales (NRW). Currently, WPD are erecting a new 33 kV overhead line diversion (October 2020) immediately to the south of RS-C, which will meet the NRW plantation and follow its external boundary northwards, in underground cabling, to meet the access point of Llanwonno Road in the northern corner of RS-C.

The ground levels are relatively flat over RS-C with a gentle fall from the north-west to the south-east behind Old Smokey. South-east of Old Smokey the ground levels become more naturally undulating. Old Smokey is perched on the crest of the plateau and deposited mostly upon the steep valley side below, so ground levels on the south-western edge of RS-C fall rapidly in that direction.

Immediately to the rear of Old Smokey (east) is a large area of bare ground, comprising a surface of burnt colliery shale, and east of this is a shallow depression or man-made ephemeral pond, which lies in the centre of RS-C.

Draining the bare ground area, is an informal eroded channel running to the north-west and discharging into a formal drain, labelled ‘issues’ on OS plans, that runs from the former tramway in the north down the northern side of Old Smokey. A wide and shallow concrete drain (ie a spoon drain) is present on the southern edge of Old Smokey.

The area is generally well drained. Standing water is present within depressions immediately east of Old Smokey, although these have been noted to dry up. No spring lines are present.

2.2.1 Surrounding Area

The site is located within open access land.

Table 2.0: Surrounding Area Land Uses

Direction	Site Specific Data
North of the site	Natural Resources Wales forestry land. Farms. Llanwonno Road.
East of the site	Natural Resources Wales forestry land.
South of the site	Open Access land. Farms.
West of the site	Valley bottom. Afon Rhondda Fach.

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3. Site History

3.1 Sources of Information

Information relating to the historical development of the site has been obtained from historical maps including Ordnance Survey Maps at three different scales (1:10,000 / 1:10,560, 1:2,500 and 1:1,250) copies of which are presented in Appendix B.

The historical maps have been reviewed and relevant features are described in Table 3.0 below.

A summary description of land uses associated with the site and its immediate surroundings based on the historical Ordnance Survey map extracts is provided below.

3.2 Description of Historical Map Extracts

Table 3.0: Description of Historical Map Extracts

Map Date and Scale	On site Features	Surrounding Area Features
1873-1877 1:2,500 1875 1:10,560	Unoccupied with several footpaths crossing the site. Three springs to the north-east feed streams which flow through the western and central portions of the site.	An old coal level is shown 130m north of Llanwonno Upper Tip at National GR 301125, 196610. A coal level is shown south of the tramway between Tylorstown Tip and RS-C, at approx. National GR 310600, 195920. Two trial levels are shown further downslope than the coal level located above. An old coal level is shown 500m SW of 'Old Smokey' at National GR 301685, 195195 Pendyrys Colliery is located at the valley bottom, approx. 50m south of the site boundary, comprising about six buildings. The Taff Vale Railway runs adjacent south of the site boundary at the valley bottom. Five further streams spring and run from the top of the valley to the bottom. A track runs along the north of the site boundary in the same location as the current Llanwonno Road. Ferndale Colliery is located approx. 1km north west of the site. This comprises an old shaft, engine house, a working shaft and a smithy.
1898 1:10,560 1900 1:2,500	No significant change.	Pendyrys Colliery has expanded, comprising at least 14 buildings with a dedicated tramway. The Afon Rhondda Fach has been culverted beneath the colliery. The Cynllwyn-du Colliery is present in the valley bottom near Stanleytown. Tylorstown is now marked on the map as the first residential properties have appeared, with at least 100 houses within 500m of the site. Three quarries are also present within 500m.

Map Date and Scale	On site Features	Surrounding Area Features
1915 1:10,560	Primarily unchanged, though a tramline originating from Cynllwyn-du Colliery 800m south bisects the site centrally running to the top of the valley and has started depositing at Tylorstown Tip.	A large amount of spoil is present at the base of the valley. The tramway network from Cynllwyn-du Colliery has a branch connected to a sandstone quarry located 140m south of the site, halfway up the slope. Tylorstown continues to expand and a school is now present. A sawmill is located close to Ferndale Colliery.
1919-1920 1:2,500 1921 1:10,560	No significant change.	No significant change.
1945 1:10,560	The northern slopes of Tylorstown Tip begin to fall within the site boundary.	No significant change.
1948 1:10,560	The Llanwonno Upper has now been deposited in the western part of the site. A new tramline has been built along the top of the valley, connecting the LLanwonno Tips to Tylorstown Tip. The stream which crossed the site, towards the western end of Llanwonno Upper tip, is no longer present, with the new spoil tip deposited built atop its former route.	Llanwonno Lower tip has been deposited. Tylorstown Tip now shows two levels of deposited spoil. The nearby sandstone quarries are now marked as disused.
1957-1961 1:2,500 1965 1:10,560	Both Llanwonno and Tylorstown tip have grown, but the tramway which connects the two onsite heaps is now (1961) marked as disused. The western stream has been diverted where it now emanates from beneath Llanwonno Upper tip. The ponds within Llanwonno Upper Tip are now present.	A series of adits are shown north west of Llanwonno Road, above Llanwonno Upper Tip. An unlabelled excavation (likely trial adit) is present north of the tramway, at National GR 301490, 196090. New drains are shown running along the northern side of the tramway and tip, merging and passing under the tramway. A pad with a mast is present north of Tylorstown Tip, at the termination of the tramway. By 1959 the Ferndale Colliery is labelled as closed.
1974 1:10,000	Both onsite tips are now marked as disused and the connecting tramway apparatus appears to have been removed.	Pendyrys Colliery is no longer operational, with most buildings removed and replaced with a tip. The Cynllwyn-du Colliery is also no longer operational and the tramway up the valley to Tylorstown Tip has been dismantled. Llanwonno Lower tip is also labelled as disused. Ferndale Colliery has gone being replaced by open land.
1992 1:10,000	Tylorstown Tip is no longer labelled as a tip and appears as a large hill with a summit at 440m AOD.	The railway line at the base of the valley is labelled disused.
2001 1:10,000	No significant change.	A leisure centre has been built in Tylorstown 80m from the site boundary.
2010 1:10,000	No significant change.	No significant change.
2020 1:10,000	No significant change.	No significant change.

3.3 Summary

Earliest mapping from the 1870s shows that mining had already taken place with the following evidence:

- An old coal level is shown 130m north of Llanwonno Upper Tip at National GR 301125, 196610 (anticipated to be CA Mine Entry Ref. 301196-003).
- A coal level is shown south of the tramway between Tylorstown Tip and RS-C, at approx. National GR 310600, 195920 (anticipated to be CA Mine Entry Ref. 301195-072).
- Two trial levels are shown further downslope than the coal level located above (anticipated to be CA Mine Entry Ref. 301195-071 and 301195-073).
- An old coal level is shown 500m SW of 'Old Smokey' at National GR 301685, 195195 (anticipated to be CA Mine Entry Ref. 301195-074).

Later 1957-1961 maps show mining still occurring via adits even though deep mining in the valley bottom was the dominant method of extraction at this time:

- A series of adits are shown north west of Llanwonno Road, above Llanwonno Upper Tip (anticipated to be within the Brithdir seam).
- An unlabelled excavation (likely trial adit) is present north of the tramway, at National GR 301490, 196090.

The deep mines were closed by the 1970s and included:

- Pendyrys Colliery was present in the valley bottom immediately below Llanwonno Tip and the subsequent landslide.
- Ferndale Colliery, approx. 1.5km upstream, supplied the spoil creating Llanwonno Upper and Lower tips.
- Cynllwyn-du Colliery, which supplied spoil for Tylorstown tip.

4. Geological Setting

4.1 Sources of Information

The following sources have been referenced to determine the geological setting of the site:

Table 4.0: Data Sources

Data Source	Reference
Groundsure Enviro+Geo Insight Report	See Appendix C
BGS Geological Maps	Sheet 248, Pontypridd
BGS GeoIndex	https://mapapps2.bgs.ac.uk/geoindex/home.html
BGS Borehole Scan Viewer	http://www.bgs.ac.uk/data/boreholescans/home.html
Coal Authority Interactive Maps	https://mapapps2.bgs.ac.uk/coalauthority/home.html
References	1. Tylorstown and Llanwonno Tips Interpretative Report and Feasibility Study, Parkman Environment, 1993 2. LLanwonno Tips Reclamation Scheme Stability Report, Halcrow Group Ltd., 2004 3. Tylorstown Landslip – Factual Report on Ground Conditions, Intégral Géotechnique, 2020

4.2 Published Geology and Encountered Ground Conditions

4.2.1 Made Ground

There is no Made Ground shown on the geology mapping, however large quantities of colliery spoil are known to be onsite in the Llanwonno Upper tip and tramway corridor and in the surrounding areas. Additionally, exposed ground at the RS-C includes areas of burnt shale north-east of Old Smokey.

4.2.2 Superficial (Drift) Geology

Geological mapping shows the site to be largely devoid of superficial deposits. A band of Glaciofluvial Deposits are predicted in the south of the site at the base of the valley, described by the BGS as sand and gravel, locally with lenses of silt, clay or organic material.

Lying just to the north of this band, and only predicted to encroach on a very small area of the site, is an area of Till which extends westwards. This typically consists of a heterogenous mixture of clay, sand, gravel, and boulders varying widely in size and shape.

Observations of deep scours above the railway cutting, at the valley bottom, revealed the Glaciofluvial Deposits to be brown sand and sub-rounded to rounded gravel, with many cobbles and occasional boulders.

Observations of the slip back-scar reveal a Till composed of stiff orange/brown clay with some sand, gravel and occasional cobbles.

Within the middle to southern regions of RS-C orange/brown sand gravel was observed at the ground surface.

4.2.3 *Solid (Bedrock) Geology*

RS-C and Tramway

These portions of the Phase 4 area are underlain fully by the Brithdir Member of the Pennant Sandstone Formation. This is described by the BGS as having green-grey, lithic arenites with conglomerate lenses at bases of units; thin mudstone/siltstone and seatearth interbeds and mainly thin coals.

Photograph of quarry located to the west of (below) the proposed haul road showing Pennant Sandstone Formation

Llanwonno Upper Tip

The Llanwonno Upper Tip is shown to be underlain by juxtaposed bands of Brithdir Member, Rhondda Member both belonging to the Pennant Sandstone Formation. The Rhondda Member is described as green-grey, lithic arenites with thin mudstone/siltstone and seatearth interbeds and mainly thin coals.

4.2.4 *Structural Geology*

Bedding is shown on the 1:50,000 scale map as dipping between 6 and 7 degrees, to the SSE.

The site lies between two faults: the Llanwonno fault present along the valley top trending NNW-SSE and downthrown to the east, and an unnamed fault along the valley bottom also trending NNW-SSE and downthrown to the east. Neither directly underlie the Phase 4 site area. Refer geology map extract cross section in Figure 4.0 and Figure 4.1 for illustration of the structure.

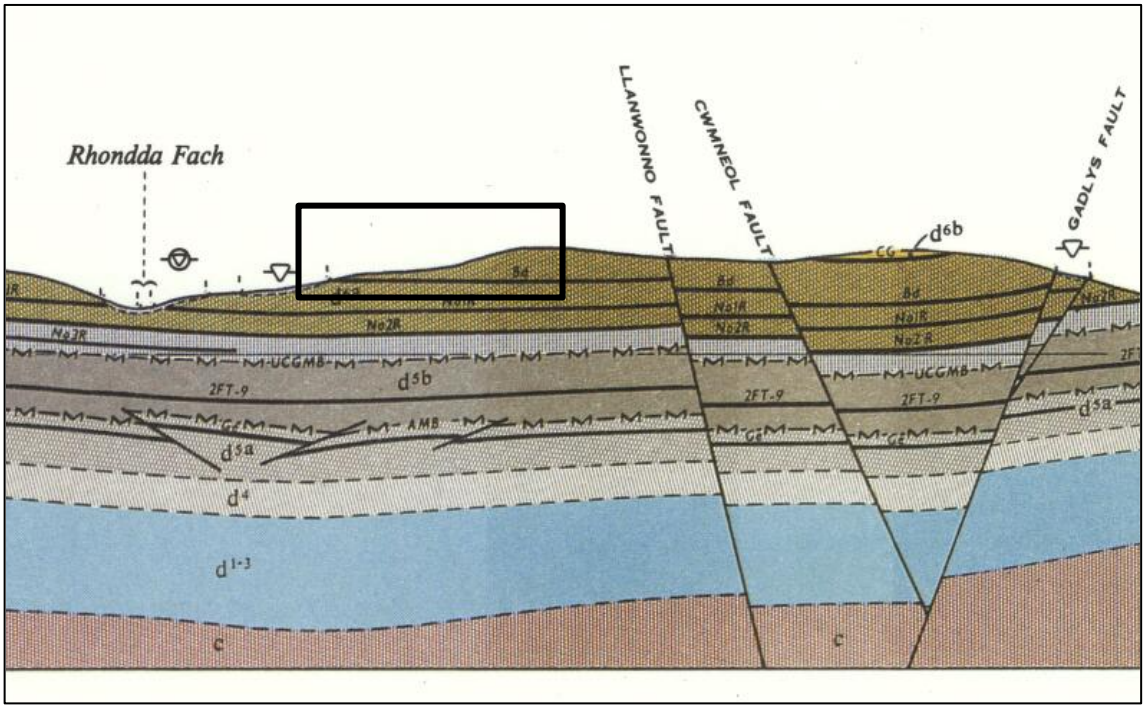

Figure 4.0 – BGS geological cross section, approximate location of Phase 4 site indicated by blue box

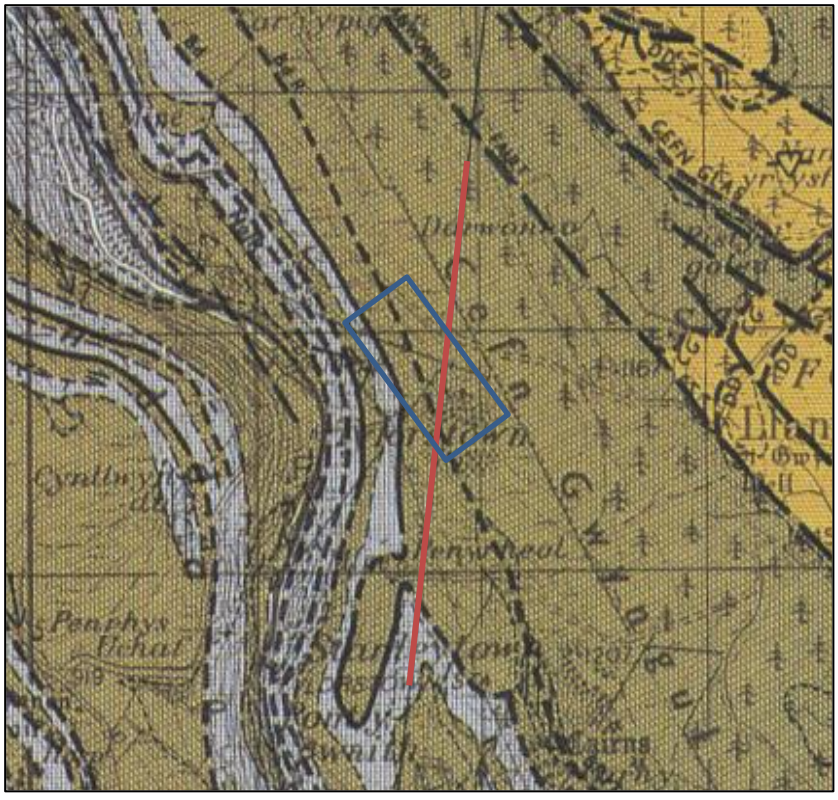

Figure 4.1 – location of geological cross section highlighted red, with the approximate location of the Phase 4 area indicated in blue

4.2.5 *Historical Boreholes*

British Geological Survey (BGS) records of historical boreholes were reviewed for the site. The locations of the boreholes are shown on page 100 of the Groundsure Report (Appendix C). They are summarised below.

It should be noted that the depths to identified coal seams from these logs do not tally with the understood geology of the area from geological mapping because these exploratory holes were considered to have been sunk from within the subterranean coal workings.

A summary of selected boreholes is provided below. A copy of the original log is contained in Appendix D.

Table 4.1: Summary of Historical Boreholes

BGS Borehole ID	Coordinates	Depth (m BGL)	Starting Level (mAOD)	Summary of Log / Ground Conditions (m BGL)
ST09NW12 No. 9 Pit Ferndale	302020,195120 Approx. 500m south of Tylorstown Tip summit	30.07	Not provided.	Alternating bands of clay, stone and coal down to the top of the 5ft coal seam at the base of the borehole.
ST09NW13 No. 6 Pit Ferndale	301560,196250 Approx. 60m north of un-named road at top of valley	21.46	832 ft BOD 116 m BOD.	Alternating bands of coal, clay and shale. The 5ft seam is hit at 19.94m and the top of the Gellideg seam is found at the base of the borehole.

4.2.6 *Coal Seam Stratigraphy*

The generalised stratigraphically vertical section, associated with 1:50,000 geological map, indicates the following coal seam succession outcrops within the site boundaries:

- Brithdir Rider (or Dirty),
- Brithdir (or Graig Uchaf),
- A thin impersistent coal,
- No.1 Rhondda Rider (or Graig Isaf),
- No.1 Rhondda,

Figure 4.3 overleaf is a reproduction of the local vertical section.

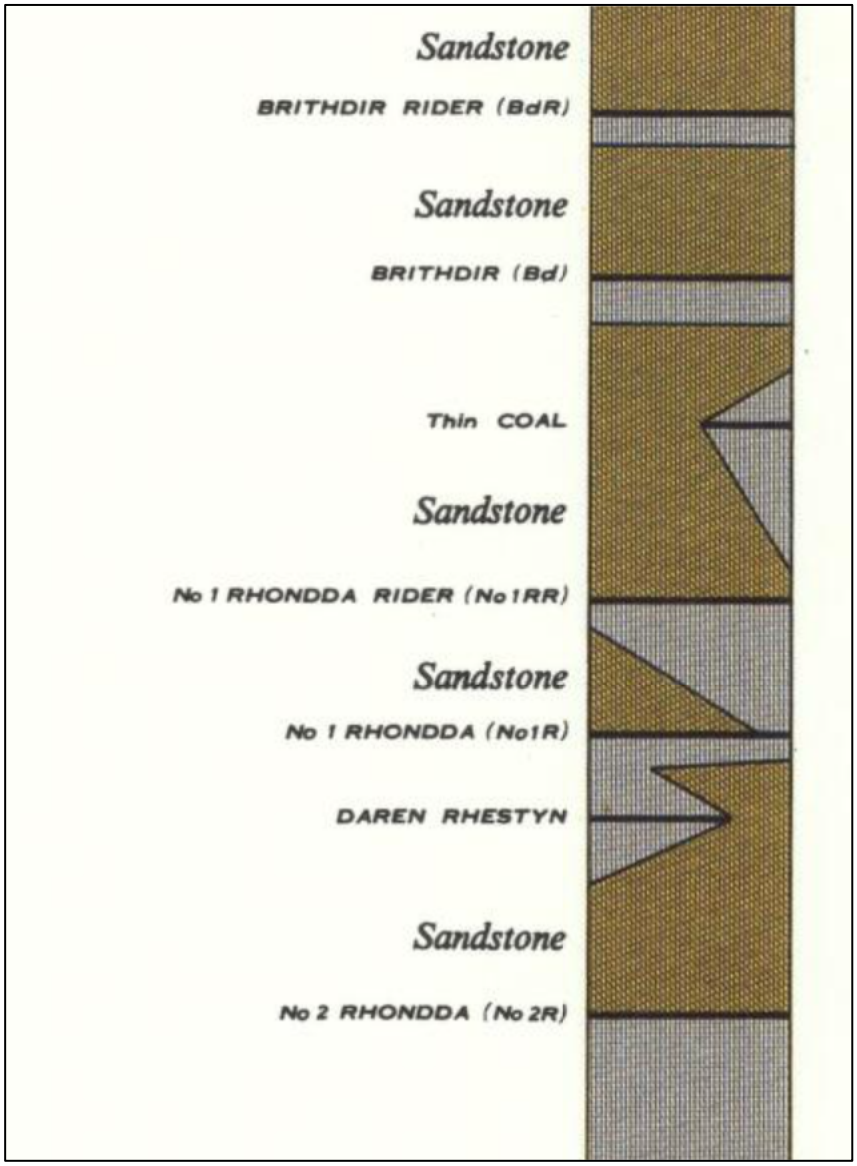

Figure 4.1 – Generalised Vertical section from Sheet 248 Pontypridd.

5. Coal Mining Risk Assessment

5.1 Introduction

The following Coal Mining Risk Assessment follows the Coal Authority / UK Government Guidance stated on this website:

https://www.gov.uk/guidance/planning-applications-coal-mining-risk-assessments

5.2 Sources of Information

The following sources have been referenced to determine the coal mining legacy of the site:

Table 5.0: Data Sources

Data Source	Reference
Groundsure Enviro+Geo Insight Report	See Appendix C
BGS 1:50,000 scale, Geological Maps	Sheet 248, Pontypridd
BGS Borehole Scan Viewer	http://www.bgs.ac.uk/data/boreholescans/home.html
The Coal Authority Consultants Coal Mining Report	See Appendix E
The Coal Authority Interactive Maps	https://mapapps2.bgs.ac.uk/coalauthority/home.html
The Coal Authority Coal Authority Surface Hazards Incident Report	See Appendix F
The Coal Authority Mining Abandonment Plans	SWR1261 (10 sheets)

5.2.1 Groundsure Report

The Groundsure Report indicates that the site is “in an area which may be affected by coal mining activity”.

There are no natural cavities in the vicinity of the site.

5.2.2 Coal Authority Interactive Map

In addition to the Consultants Coal Mining Report, the Coal Authority Interactive Map was also consulted to identify further information regarding the sources of the potential risks to the site area and proposed developments.

Critically, this indicates that although there are developmental high risk areas within the donor site (Llanwonno Upper tip) and the former tramway to Tylorstown tip (proposed haul road). The high risk areas correspond to local coal seam outcrops.

Furthermore, mine entries are shown, whose location matches those on historical maps and the Coal Mining Consultants Report.

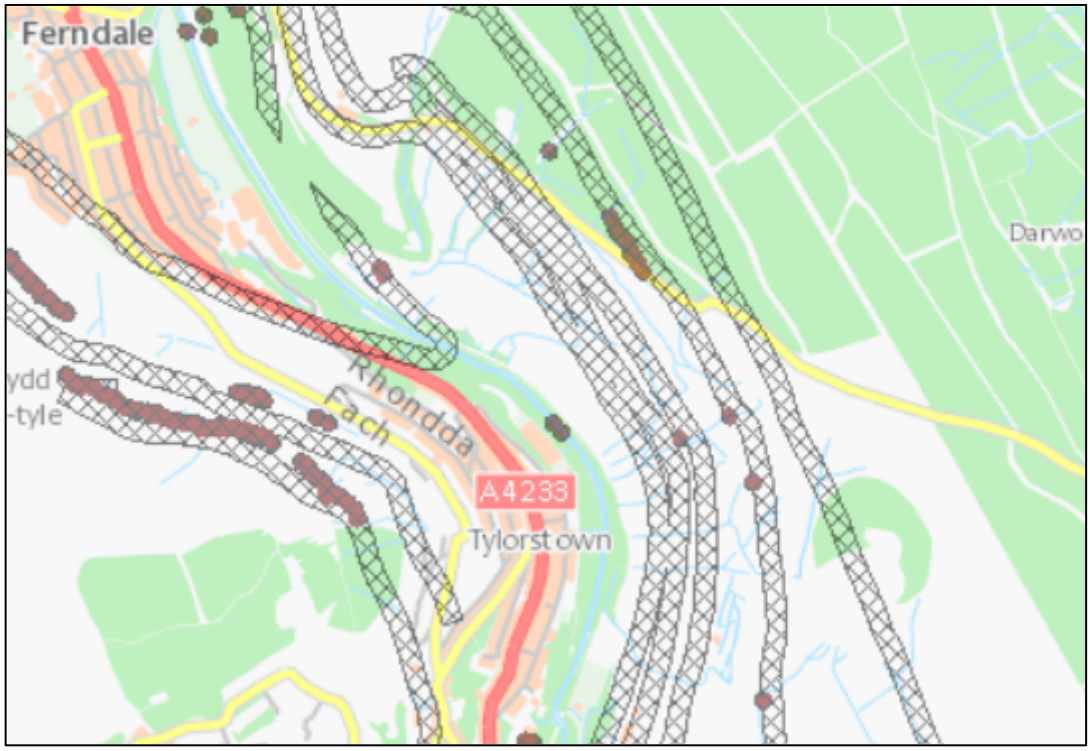

Figure 5.0: High Risk Development Areas (hatched) and Mine Entries

5.2.3 Coal Authority Mining Report

A Consultants Coal Mining Report was obtained from the Coal Authority on 10 September 2020 and is enclosed in Appendix E.

A summary of the findings of the report is presented in the Table 5.1 below.

Table 5.1 : Summary of Coal Authority Report

Coal Mining Aspect	Comment	Potential to Impact Site
Past Underground Coal Mining	Approx. 15 seams were historically worked beneath the site at depths between 278m (Four Foot coal) and 752m bgl.	No
Probable unrecorded shallow workings	None.	No
Faults, fissures and breaklines	None recorded.	No
Open Cast Mined	None recorded within 500m of the site boundary.	No
Coal Mining Subsidence	The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres since 31st October 1994.	No
Mine Gas	None recorded within 500m of the site boundary.	No
Mine Water Treatment Schemes	None recorded within 500m of the site boundary.	No
Mine Entries	Two shafts are reported adjacent south of the site, both have been filled and plugged with clay by the local authority. 12 disused adits are reported, 11 of which lie to the north of the site and one below the former tramway.	Yes
Future Underground Mining	None recorded.	No
Coal Mining Licencing	None recorded within 200m of the site boundary.	No
Development Advice	The site is within an area of historical coal mining activity.	No
Remediated Sites	The site is within an area of previous interest. It is close to where the Coal Authority has investigated and where necessary remediated mine entries and/or shallow coal mine workings following specific reported hazards. The site requires further investigation and may influence your risk assessment. The Coal Authority Surface Hazards Incident Report, is recommended.	No

In general, the Coal Authority report does not indicate the presence of any known issues relating to coal mining associated with the site.

Mining is generally deep, and historical with those extracted seam voids having closed some time ago and associated ground movement ceased.

However, there are several adits that have extracted coal from a seam outcropping within the site boundaries. The majority of these adits lie uphill of the site and are anticipated to have mine water discharge onto the highway (Llanwonno Road), which is currently managed using a network of pipes installed as Llanwonno Upper tip Phase 1 emergency works.

An extract from the Consultants Coal Mining Report is presented in Table 5.2, detailing outcropping seams in the area.

Table 5.2– Coal Outcrops from Consultants Coal Mining Report

Seam name	Mineral	Seam workable	Distance to outcrop (m)	Direction to outcrop	Bearing of outcrop
BRITHDIR RIDER	Coal	Yes	20.8	West	158
BRITHDIR RIDER	Coal	Yes	Within	N/A	166
NO.1 RHONDDA	Coal	Yes	Within	N/A	142
NO.1 RHONDDA	Coal	Yes	Within	N/A	324
TILLERY BRITHDIR	Coal	Yes	Within	N/A	140
TILLERY BRITHDIR	Coal	Yes	Within	N/A	318
TILLERY RIDER NO.1	Coal	Yes	Within	N/A	329
TILLERY RIDER NO.2	Coal	Yes	Within	N/A	158
TILLERY RIDER NO.2	Coal	Yes	Within	N/A	337

In general, the Coal Authority report does not indicate the presence of any known issues relating to coal mining associated with the site.

5.2.4 *Coal Authority Surface Hazards Incident Report*

The surface hazards incident report (see Appendix F), relates to a series of adits north west of Llanwonno Road, above Llanwonno Upper Tip, dating to between 1957-1961.

One of the adits, at OS NG Reference 301370,196300, was excavated locally at the surface and secured with a concrete block wall prior to surface restoration.

5.2.5 *Mining Abandonment Plans*

Mining abandonment plans were obtained for the area, series SWR1261 Ferndale Collieries No.2 Yard (or 5ft).

Table 5.3 summarises information on No. 6 and No.7 Pits at Pendyrys Colliery, located in the valley bottom at the landslip site, and No. 8 and No. 9 Pits at Cynllwyn-du Colliery, in the valley bottom WSW of Old Smokey.

Table 5.3 : Summary of Abandonment Plans

Abandonment Plans SWR 1261				
Pit No.	6	7	8	9
Showing workings	5ft Seam	4 ft Seam	6ft Seam	Bute Seam
Top (Pit Head) ft AOD	625.55	624.5	570.9	508.83
Bottom (Coal Level) ft BOD	724.45	361.5	800.81	961.53
Depth to Coal ft	1350	986	1371.1	1541.83

The extract below (Figure 5.1) shows the sequence of worked seams at Pendrys Colliery.

This suggests that the No.3 Rhondda seam at 321 ft AOD has been removed and the shafts join with a lodge room at that level. There are no records of workings within the No.3 Rhondda and, with a dip to the SSE, nevertheless even if unrecorded workings were to occur, the seam is over 100m depth across the site area.

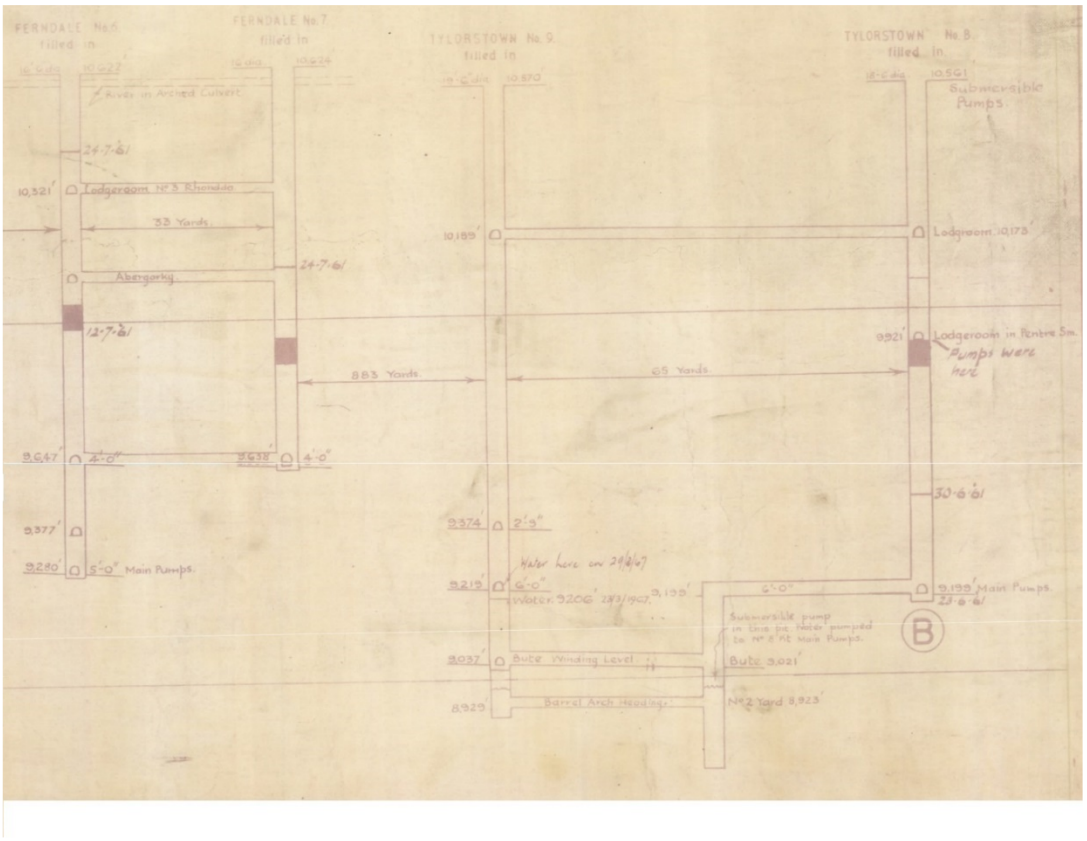

Figure 5.1: Extract from SWR1261

5.2.6 Historical Reports

"The Llanwonno Tips Reclamation Scheme Stability Report, by Halcrow Group Ltd, 2004 describes the following assessment of coal mining at the location of Llanwonno Upper Tip.

As described in the '2000 Report ', at least two seams have been worked from outcrop on the hillside in the vicinity of Llanwonno Tips. In descending order in the sequence, they are:

- *The Brithdir Seam, exploited from a large number of crop workings uphill of Llanwonno Road, and to the north west of Tylorstown Tip. There are some small associated spoil heaps in the forestry plantation above Llanwonno Road.*

- *Un-named thin coal, into which there is a trial level some 200m south east of the Upper Tips within an area of shallow instability.*

No evidence has been found in the investigations of any mine entries or workings beneath or adjacent to the tips in the No 1 Rhondda Rider or the No 1 Rhondda Seams.

Between 1858 and about 1960, deeper seams were worked from shafts in the valley floor at Ferndale Pits 1 and 5, and Tylorstown Pits 6, 7, 8 and 9, as described in the '1971 Report'. Benchmarks along Llanwonno Road indicate that the road experienced subsidence of some 4m between 1910 and 1960/61. All subsidence associated with coal extraction from those seams should now have ceased."

Historical boreholes described in this report indicate the presence of two coals underlying Llanwonno Upper Tip, the un-named thin coal (above) and the No. 1 Rhondda Rider (below).

5.3 Identification and Assessment of Site-Specific Coal Mining Risks

5.3.1 Mine Entries

The Coal Authority identified no mine entries within the site red line development boundary.

Two shafts exists to the south west of the site in the valley bottom (Pendyrys Colliery), these extend to deep coal seams, which are anticipated to have collapsed already or at worse collapse in the future but not propagate or cause settlement at the ground surface. Both shafts have been filled and capped.

Several adits are present north east, accessing the Brithdir seam. These adits are outside of the site boundaries and are not anticipated to interfere with strata beneath the site. One of these has been treated.

Two trial adits exist to the south west of the site, which are unlikely to have removed any significant volumes of rock.

A further two adits exist to the south west of the site, which may have intersected and removed coal from beneath the site. The location of these in relation to the site area is indicated on Figure 5.2. They are anticipated to be along the crop of the Brithdir seam.

The northern adit (CA Mine Entry Ref 301195-072) is shown to enter the hillside to the north-east beneath the former tramway.

The southerly adit (anticipated to be CA Mine Entry Ref. 301195-07) is shown on historical maps and is transposed as a red dot onto Figure 5.2.

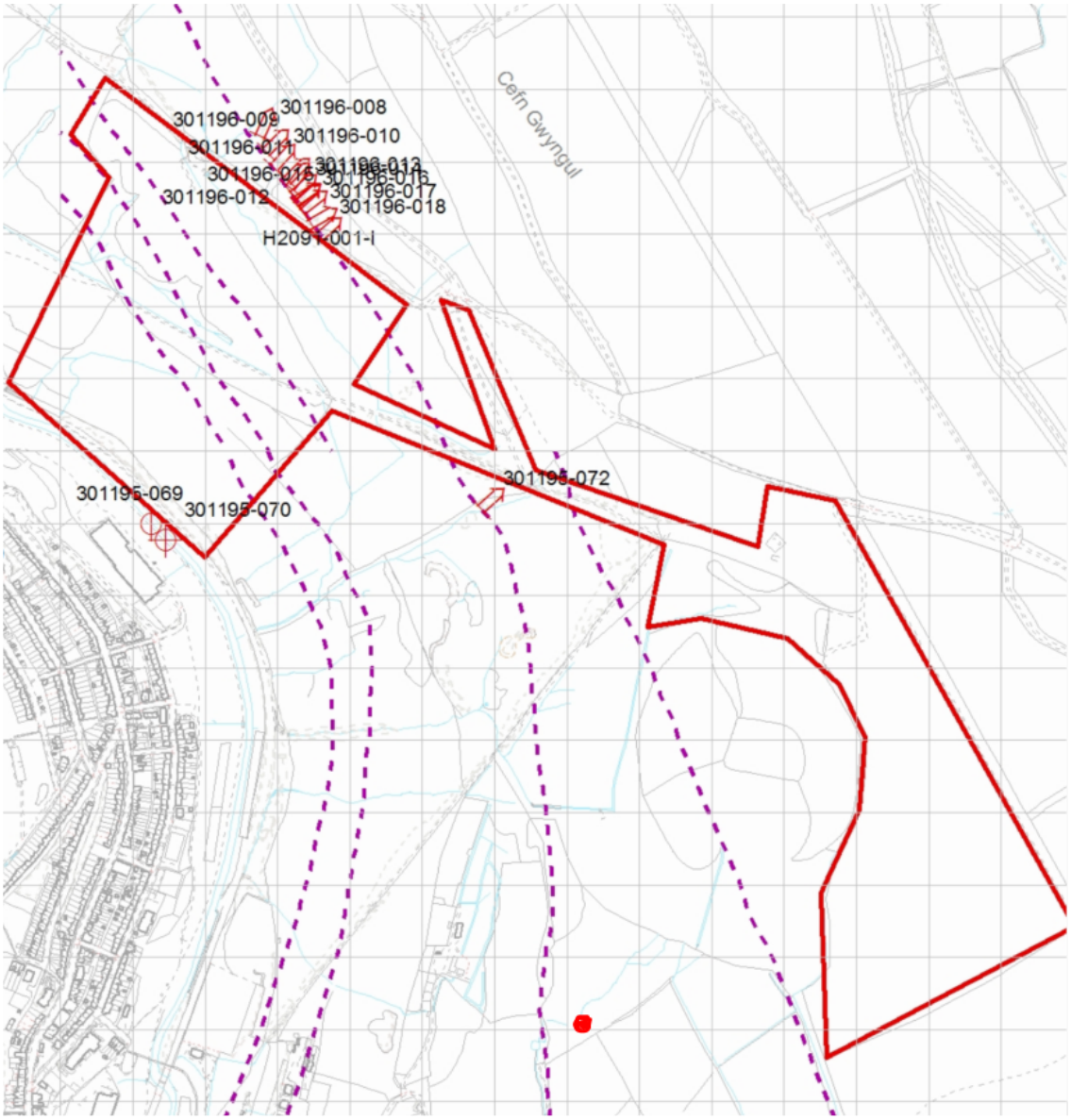

Figure 5.2: Extract from Coal Authority Consultants Coal Mining Report indicating the locations of the mine entries identified on-site.

5.3.2 Shallow Coal Workings

The CA Interactive Map does not show areas of 'Past Shallow Coal Mining' or 'Probable Shallow Coal Mine Workings' within or close to the site.

The Coal Authority's definition of shallow coal mining is: "s*hallow coal mining is defined as lying at a depth of up to 10 x the thickness of coal seam extraction down to a maximum depth of 30 metres*".

However, there are off-site historical mine entries, adits at outcrop, suggesting that workings are likely to have occurred at shallow depths. Two of these are of interest as they access strata underlying the site. The adit entrance south of the haul road (301195-072) suggests that shallow workings have occurred beneath the haul road area / north-east of the haul road. However, beneath RS-C, any workings accessed from adit south-west of Old Smokey (301195-07) will be at over 30m depth due to the distance from the adit entrance, strata dip and topography.

5.3.3 Workable Coal Seam Outcrops

The Consultants Coal Mining Report indicates that no future mining plans are recorded. It is considered from this response that the coal reserves, at shallow depths beneath the site, are currently uneconomical to extract.

5.3.4 Mine Gas

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

5.3.5 Recorded Coal Mining Related Hazards

The Consultants Coal Authority report indicates states that the property has not been subject to remedial works carried out by or on the behalf of the Coal Authority under its Emergency Hazard Call Out procedures.

5.3.6 Geological Features

Geological mapping has indicated that faulting, fissures, or any other recorded linear features (i.e. break lines) are not present underlying the site area, and this statement is confirmed by the 1:50,00 scale geological map of the area.

5.3.7 Former Surface Mining Sites

The Consultants Coal Authority report indicates that no opencast sites are within 500m of the site boundary.

5.3.8 Ground Stability

It is understood that the bedrock geology is comprised of Pennant Sandstone Formation rocks exclusively, which in turn comprise of interbedded mudstones, siltstones, massively bedded sandstones, and frequent coal seams. It is, therefore, assumed that the bedrock is considered ‘competent’ strata.

It is not possible to judge the competency of the on-site till deposits without undertaking intrusive site works. However, exposures at the landslip within Llanwonno Upper Tip show variably soft and stiff gravelly clay deposits.

5.4 Proposed Mitigation Strategy

The following questions highlighted in bold are required by the Coal Authority guidance to be answered in a Coal Mining Risk Assessment. The text after each question is Capita's response.

- **Explain how coal mining issues have influenced the proposed layout and design of the development, where necessary.**

  No change to existing plans – Coal mining issues are not considered to pose a significant issue to the proposed works.

  An historical adit passes beneath the former tramway / proposed haul road for the works. This is a temporary haul road and any subsidence occurring during the works poses a low risk to the overarching scheme.

- **Set out, and illustrate with plans in the case of mine entries, how on-site issues identified above will be dealt with to ensure safety and stability of the development.**

  High tensile geogrid reinforcement shall be incorporated into the haul road construction to ameliorate the risks from collapse of the adit. This shall form part of the designer's risk assessment, for inclusion within the tender documents for the works.

- **Assessment of mine gas and mitigation measures required as necessary.**

  Not identified as an issue in Coal Authority data. The scheme is not susceptible to mine gas issues.

- **Consideration should also be given to other mining related issues which may be relevant such as rising mine water.**

  The mine water discharges from the adits above Llanwonno Road are being considered as part of the drainage works for the remediation of Llanwonno Upper Tip.

- **Where desk based study cannot fully discount risks, details of proposed intrusive site investigation works necessary to establish the legacy present should be set out with the report.**

  A ground investigation is designed, and the strategy document provided in Appendix G.

- **A Coal Authority permit is required for intrusive activities which will disturb or enter any coal seams, coal mine workings, or coal mine entries, including shafts and adits.**

  The appointed Ground Investigation Contractor has applied for The Coal Authority permit on behalf of RCTCBC.

6. Conclusions and Recommendations

6.1 Conclusions

6.1.1 Summary of Coal Mining Legacy Risks

- The Receptor Site C site lies outside the development high risk area.
- Llanwonno Upper Tip (donor site) lies within the development high risk area.
- Two mineshafts from Pendyrys Colliery lie in the valley bottom.
- Deep mining is recorded but is of an age (<1950) and at a depth which suggests that any subsidence will have occurred and if not, is unlikely to affect the development.
- Several mine adits occur uphill of the site, which are thought to discharge water.
- Two mine adits occur in the hillside beneath the site. The first adit is thought to have worked a seam, which indicates the potential presence of shallow mine workings beneath the haul road, and another which is a moderate depth seam as a result the topography rising in the area of RS-C and increasing the separation between ground surface and top of seam.
- There are no recorded ground stability or subsidence risks.
- The are no recorded or indicated mine gas risks.

6.2 Recommendations

Intrusive ground investigation is recommended to assess the ground conditions beneath Receptor Site C and determine the position of the Brithdir Rider.

High tensile geogrid reinforcement shall be incorporated into the haul road construction to ameliorate the risks from collapse of the adit (CA Mine Entry Ref 301195-072). This shall form part of the designer's risk assessment, for inclusion within the tender documents for the works.

A post works ground investigation is proposed at Llanwonno Upper Tip (the donor site) post remediation to install groundwater monitoring and tip stability safety checks. Several ground investigations have already been undertaken at the site of Llanwonno Upper Tip. Further investigations at the present time are not deemed to be safe or necessary to determine the ground profile.

The Ground Investigation Strategy document is presented in Appendix G.

7. References

- Tylorstown landslip Phase 4 - Preliminary Sources (Desk) Study, dated October 2020 (Ref CS/100303/GT001).
- Tylorstown and Llanwonno Tips Interpretative Report and Feasibility Study, Parkman Environment, 1993
- LLanwonno Tips Reclamation Scheme Stability Report, Halcrow Group Ltd., 2004
- Tylorstown Landslip – Factual Report on Ground Conditions, Intégral Géotechnique, 2020

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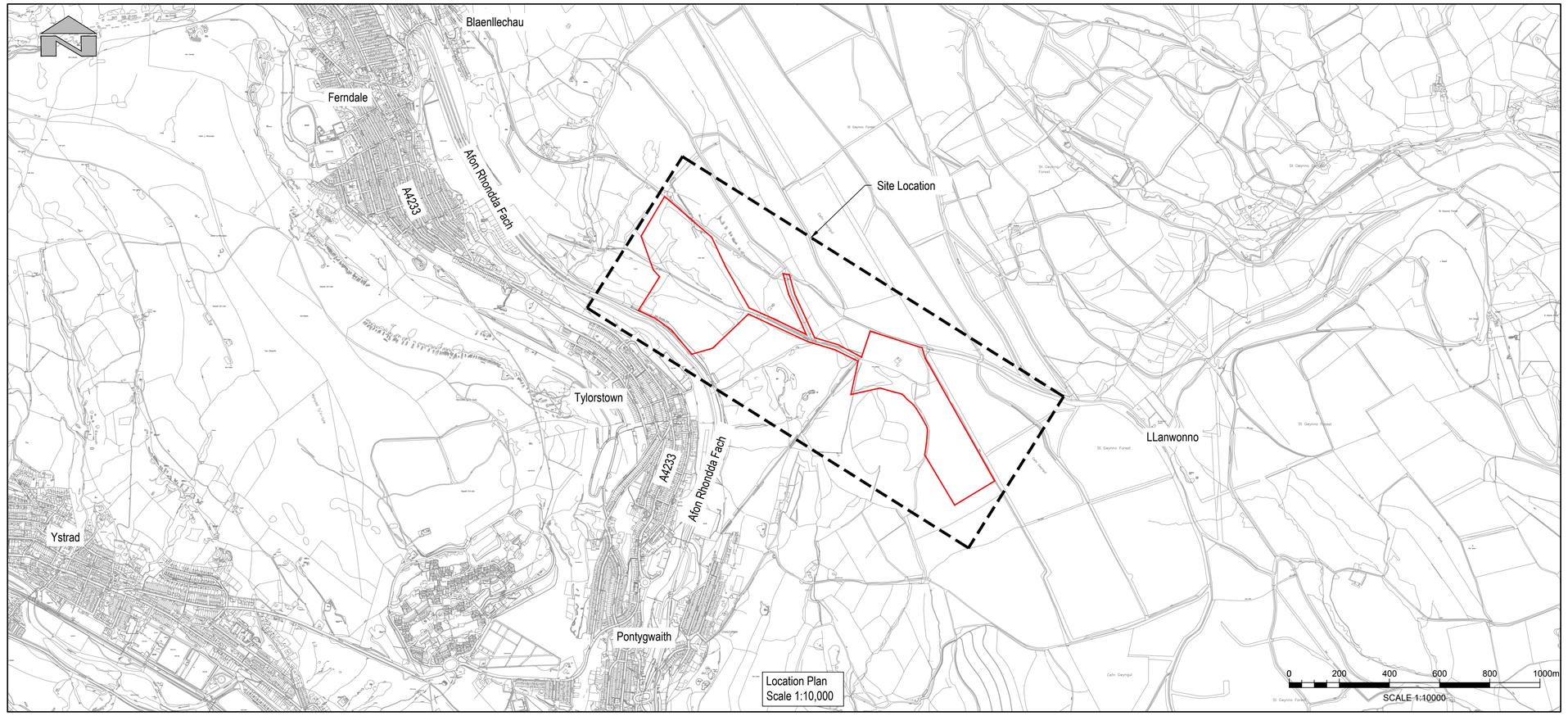
APPENDIX A

DRAWINGS

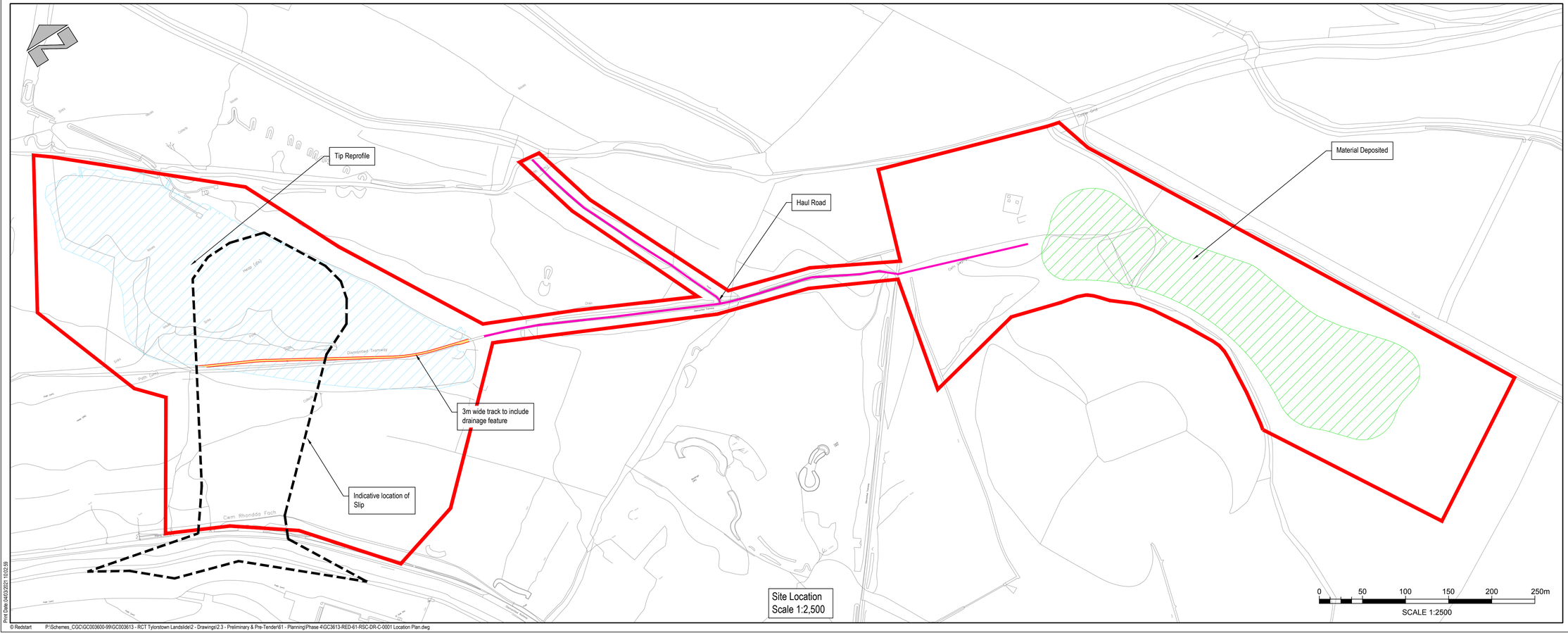


Key:

- Planning Boundary
- Proposed Tip Reprofile (including Tramway)
- Proposed Material deposit
- Proposed Haul Route
- Proposed 3m wide track to include drainage feature
- Indicative location of Slip

Notes:

1. For Tip Reprofile General Arrangement refer to drawing : GC3613-RED-61-RSC-DR-C-0002
2. For Receptor Site C General Arrangement refer to drawing : GC3613-RED-61-RSC-DR-C-0003
3. For cross sections of Tip Reprofile refer to drawings: GC3613-RED-61-RSC-DR-C-0004-0008
4. For cross sections of Receptor Site C refer to drawings: GC3613-RED-61-RSC-DR-C-0009-0013



Rev	Drwn	Chkd	Apprd	Description	Date

Purpose of Issue
D5 - Suitable for Planning

Classification
Public

Client
Rhondda Cynon Taf
County Borough Council

Project
Tylorstown Landslide

Drawing
Phase 4
Location Plan

Scale @ A1	Drawn	Checked	Approved
As Shown	MH	NG	PH

Project No.: GC/3613
Date: March 2021

Drawing Identifier (Project - Originator - Zone - Level - File Type - Role - Number): GC3613-RED-61-RSC-DR-C-0001
BS1192 Compliant revision: P01

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 P:\Schemes_CGC\GC003600-99\GC003613 - RCT Tylorstown Landslide\2 - Drawings\2.3 - Preliminary & Pre-Tender\61 - Planning\Phase 4\GC3613-RED-61-RSC-DR-C-0001 Location Plan.dwg

Print Date: 04/03/2021 10:02:59

Typical Section
Scale 1:50

Key:

- Proposed Tip Reprofile (including Tramway)
- Proposed 2m wide track and 1m wide drainage feature
- Existing Drainage Ditch

Notes:

1. For Location Plan refer to drawing : GC3613-RED-61-RSC-DR-C-0001
2. For Receptor Site C General Arrangement refer to drawing : GC3613-RED-61-RSC-DR-C-0003
3. For cross sections of Tip Reprofile refer to drawings: GC3613-RED-61-RSC-DR-C-0004-0010
4. For Receptor Site C Cross Sections refer to drawings: GC3613-RED-61-RSC-DR-C-0009-0013

Rev	Drwn	Chk'd	Appd	Description	Date

Purpose of Issue
D5 - Suitable for Planning

Classification
Public

Client
Rhondda Cynon Taf
County Borough Council

Project
Tylorstown Landslide

Drawing
Phase 4
General Arrangement
Tip Reprofile

Scale @ A1	Drawn	Checked	Approved
As Shown	MH	NG	PH

Project No.: GC/3613
Date: March 2021

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number
GC3613-RED-61-RSC-DR-C-0002
BS1192 Compliant revision: P01

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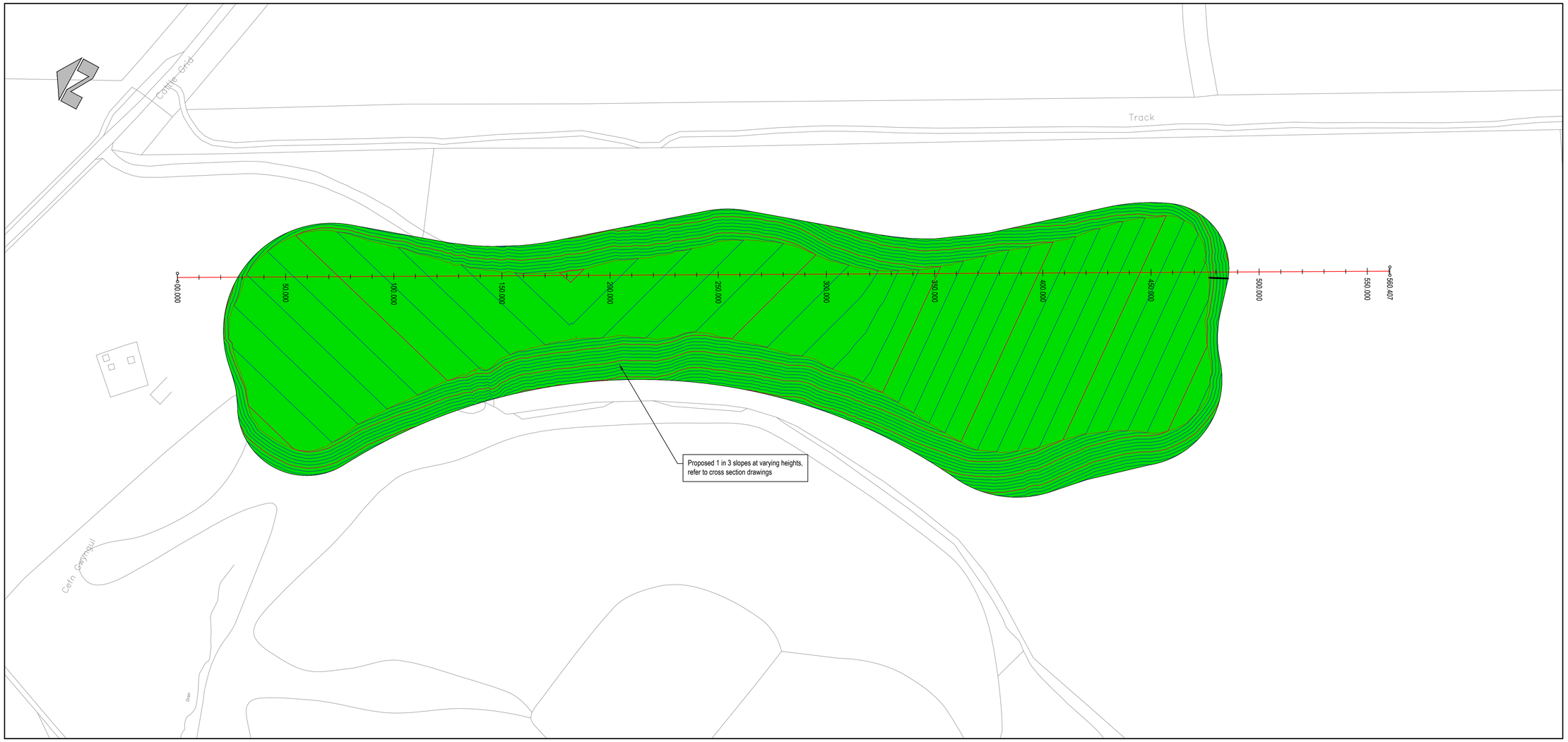

Key:

- Proposed Deposited Material
- Proposed Contour Major (2.5m intervals)
- Proposed Contour Minor (0.5m intervals)

Notes:

1. For Location Plan refer to drawing : GC3613-RED-61-RSC-DR-C-0001
2. For Tip Reprofile General Arrangement refer to drawing : GC3613-RED-61-RSC-DR-C-0002
3. For cross sections of Tip Reprofile refer to drawings: GC3613-RED-61-RSC-DR-C-0004-0008
4. For cross sections of Receptor Site C refer to drawings: GC3613-RED-61-RSC-DR-C-0009-0013

Rev	Drwn	Chkd	Appd	Description	Date

Purpose of Issue
D5 - Suitable for Planning

Classification
Public

Client
Rhondda Cynon Taf
County Borough Council

Project
Tylorstown Landslide

Drawing
Phase 4
General Arrangement
Receptor Site C

Scale @ A1	Drawn	Checked	Approved
As Shown	MH	NG	PH

Project No.
GC/3613

Date
March 2021

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number
GC3613-RED-61-RSC-DR-C-0003

BS1192 Compliant
revision
P01

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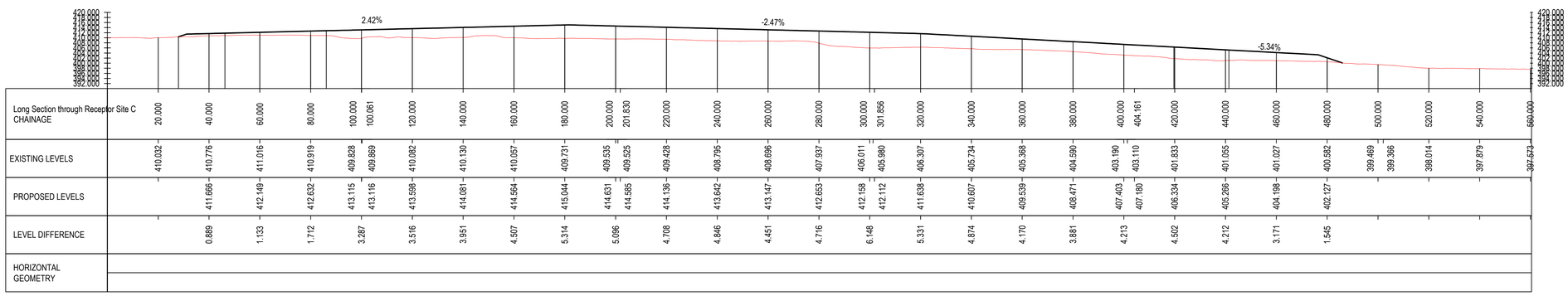
Key:

- Existing Ground Lidar
- Proposed Ground



Long Section through Receptor Site C
SCALE: H 1:1000, V 1:1000

0 20 40 60 80 100m
SCALE 1:1000

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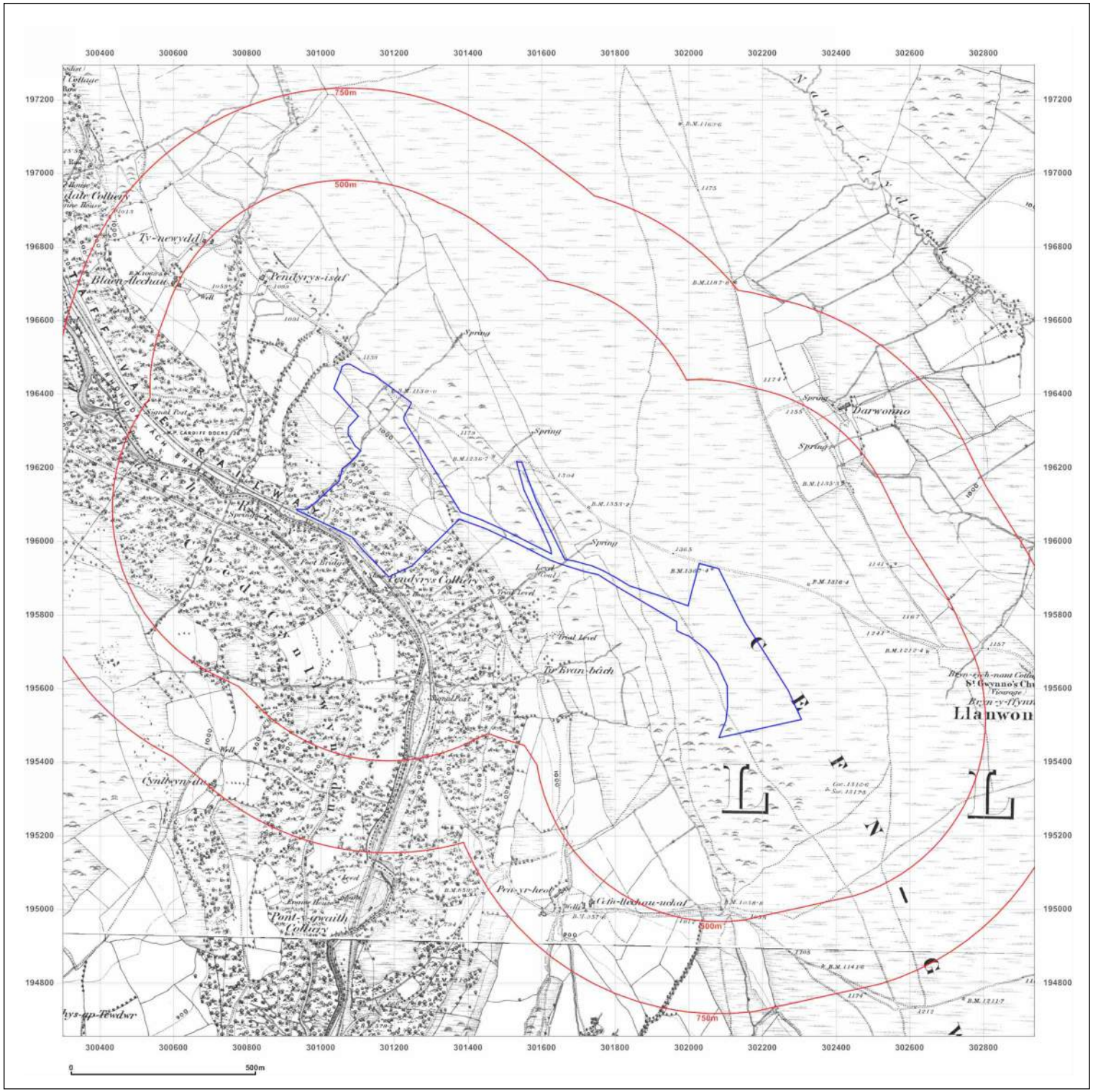
APPENDIX B
HISTORICAL MAPS



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Tylorstown, Pontypridd, CF37 3PH

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Report Ref: GS-7076728
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Map Name: County Series

Map date: **1875**

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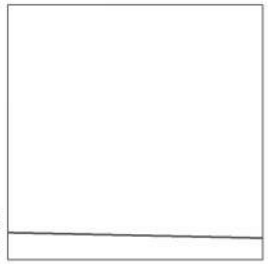
Revised 1875
Edition N/A
Copyright N/A
Levelled N/A



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Revised 1875
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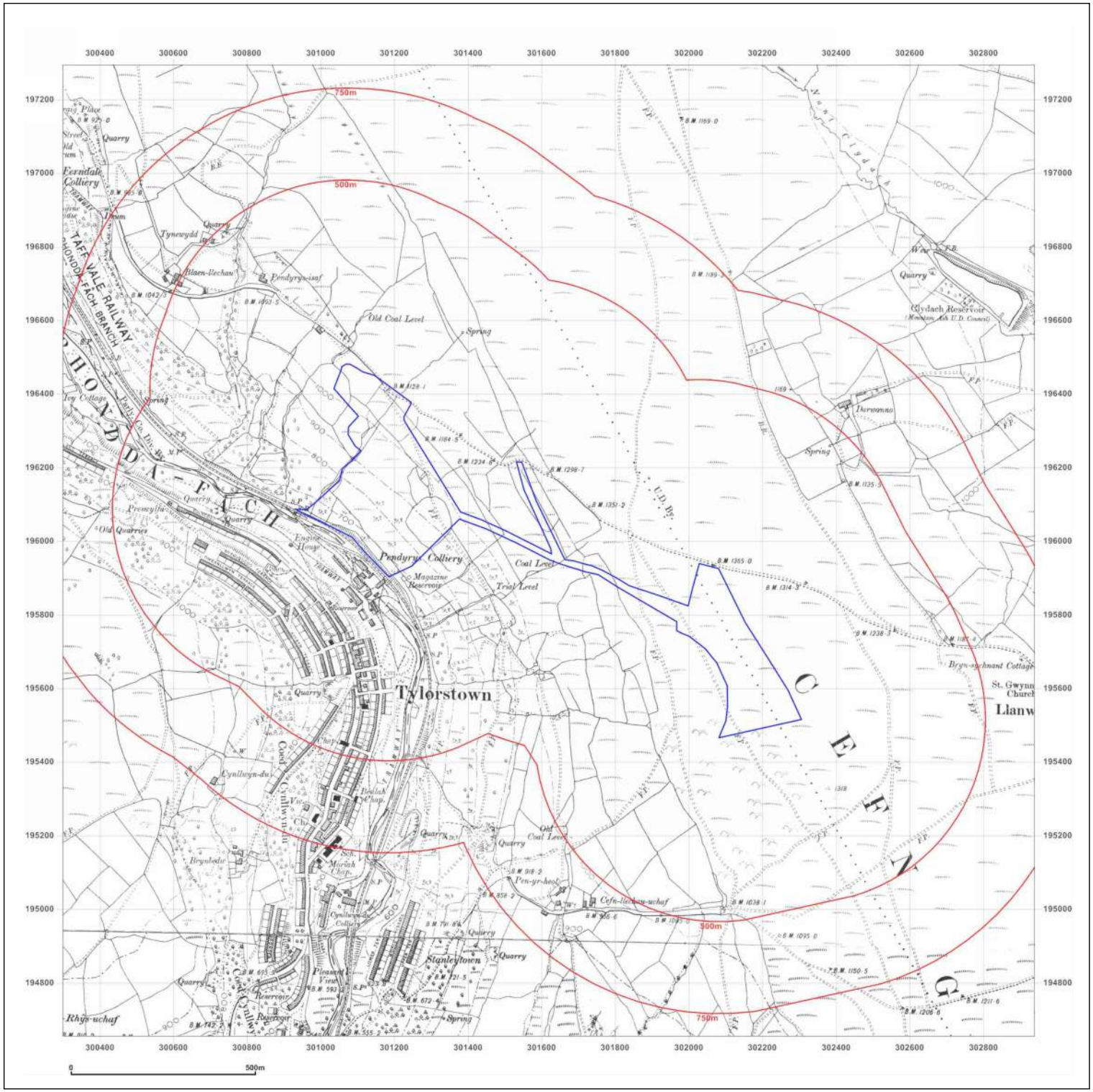

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Surveyed 1874
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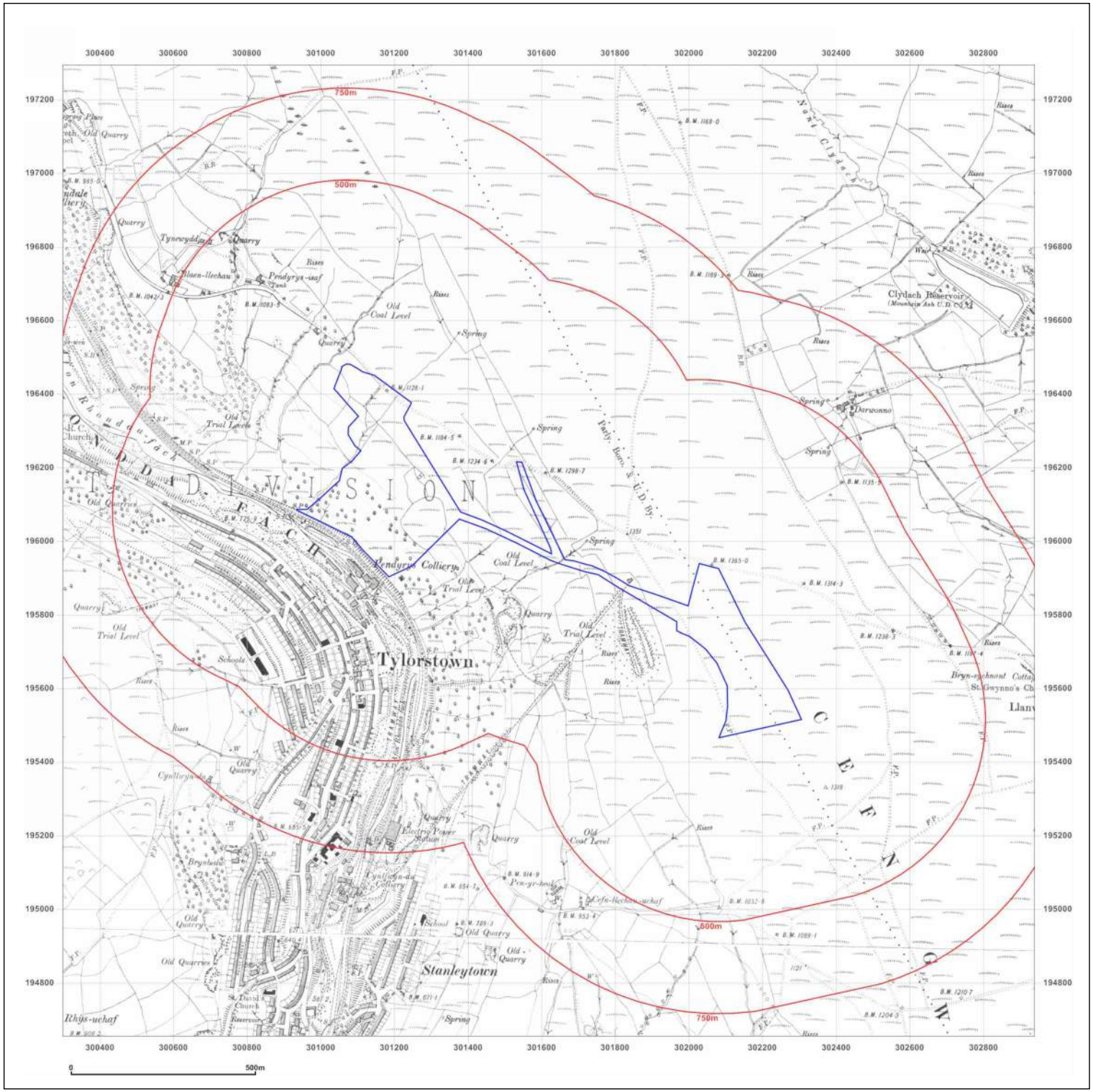

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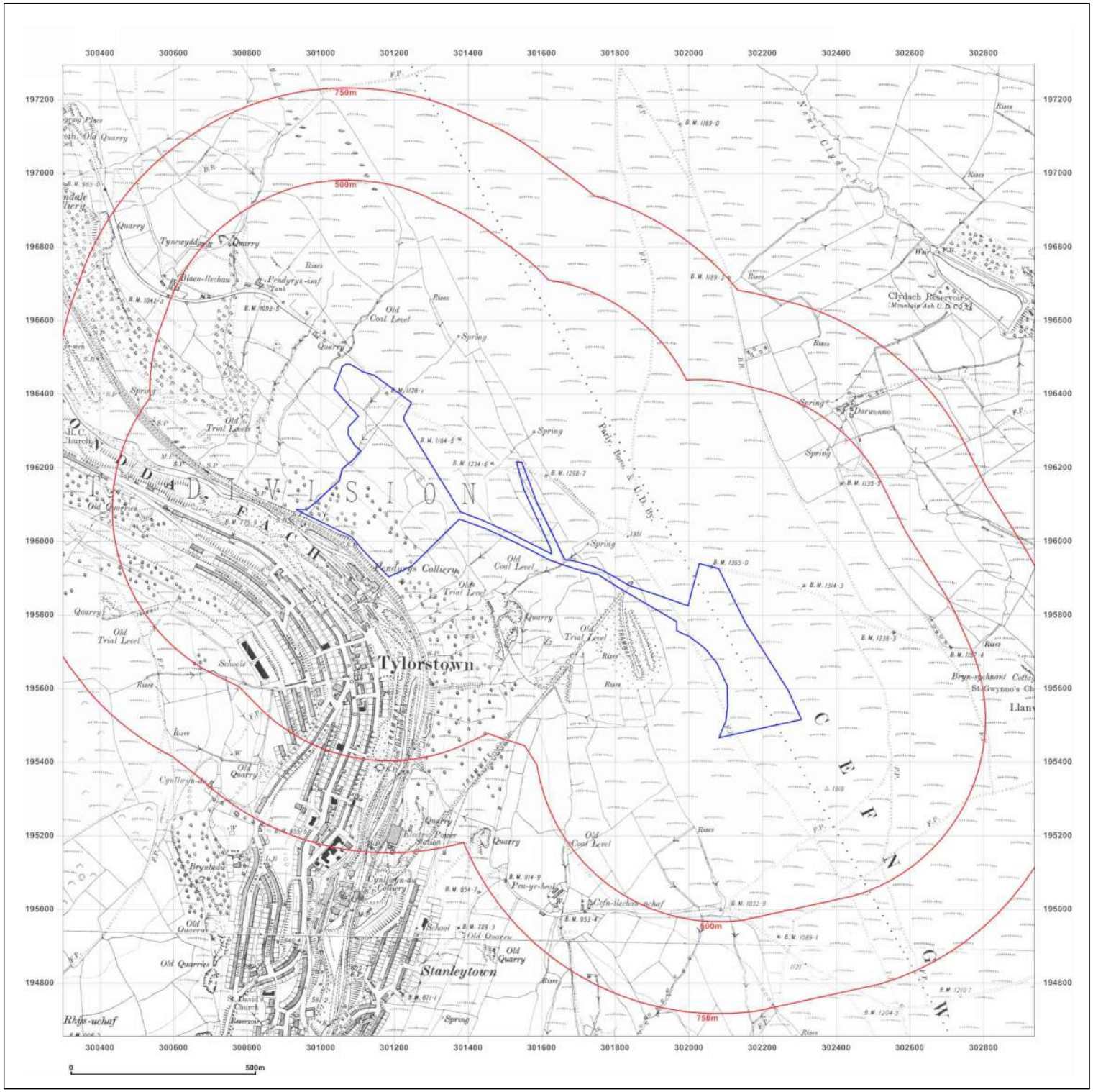

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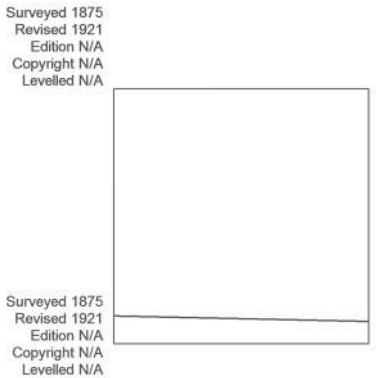

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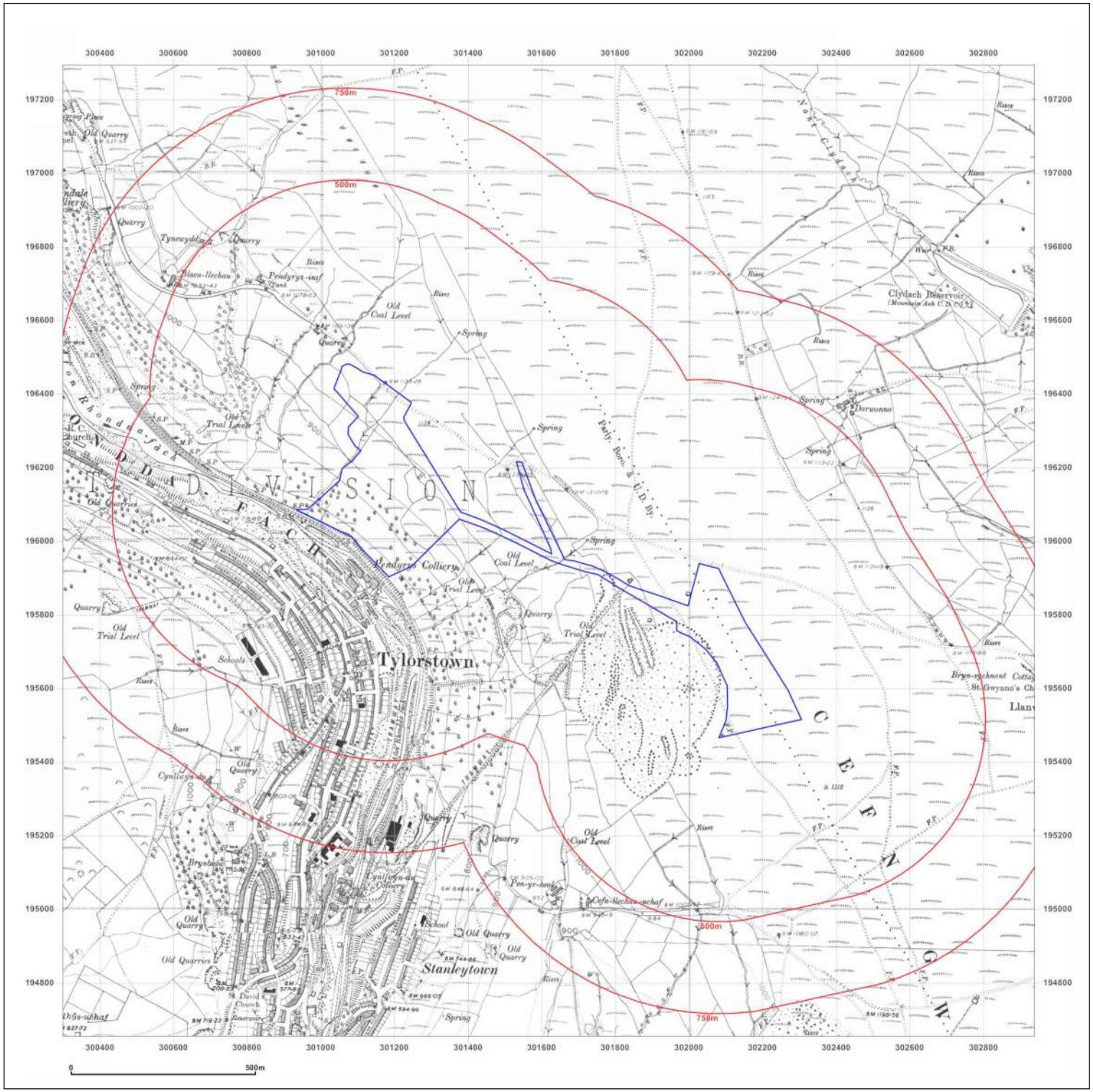

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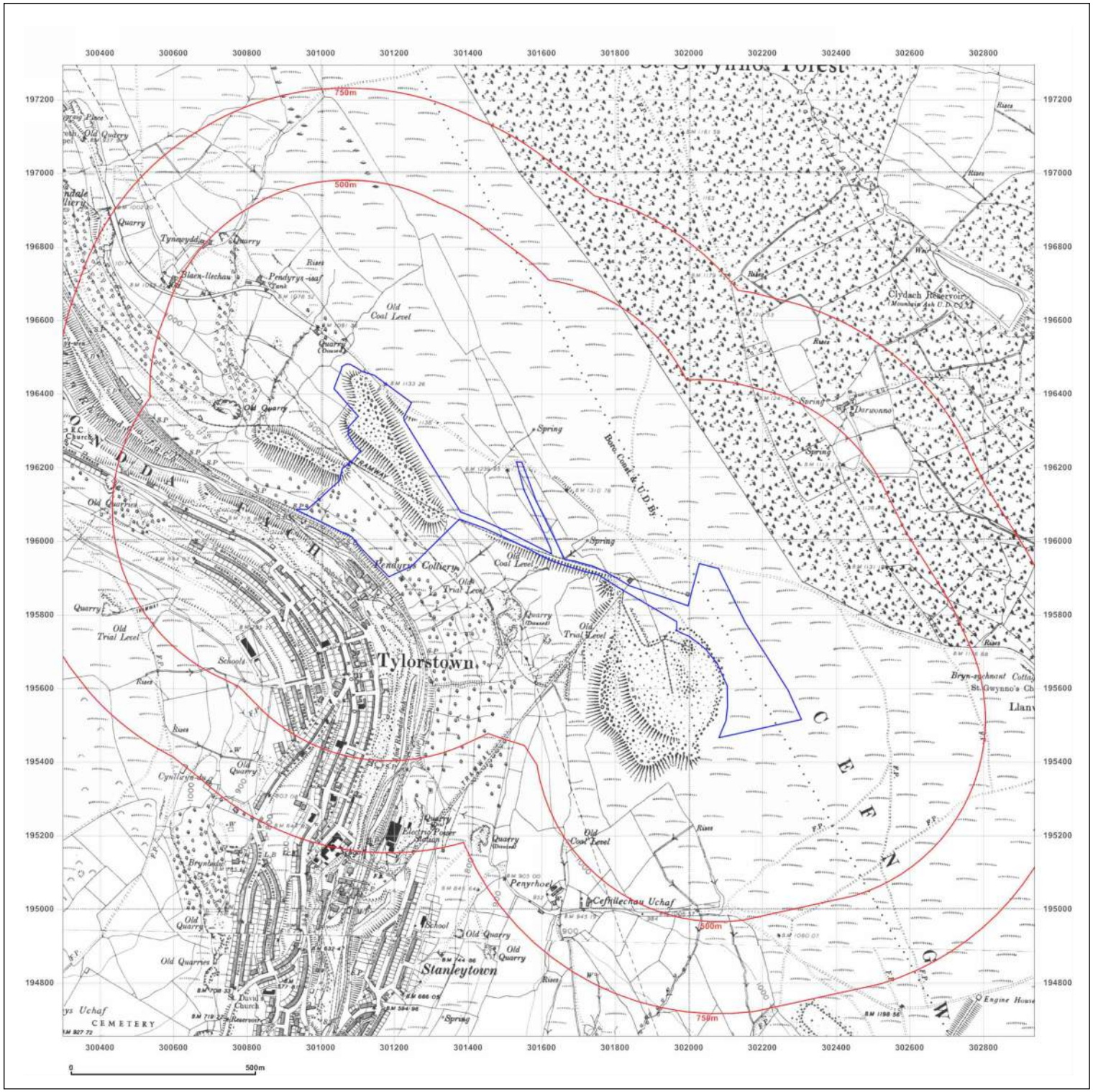

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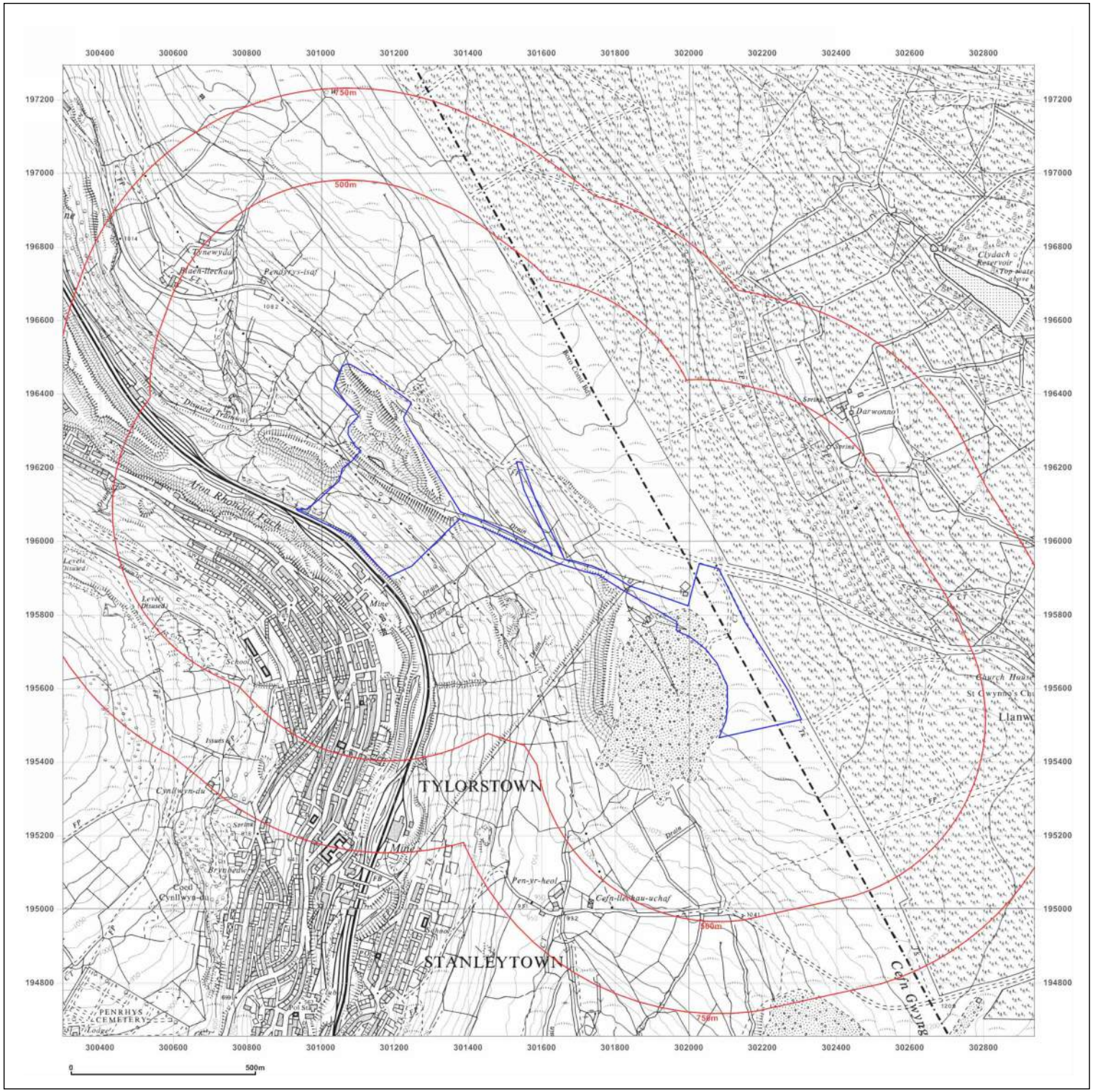

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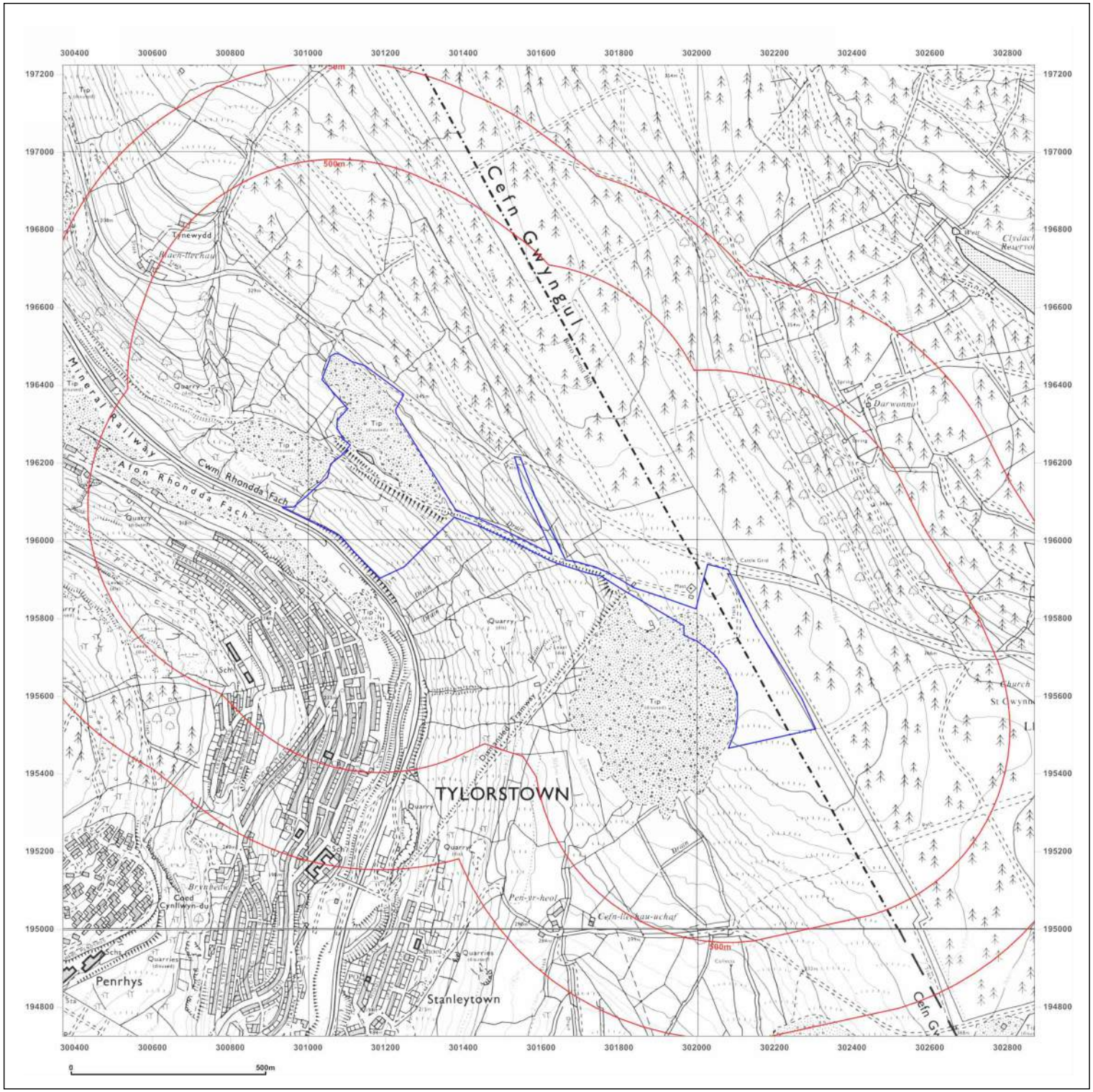

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Surveyed 1973
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Edition N/A
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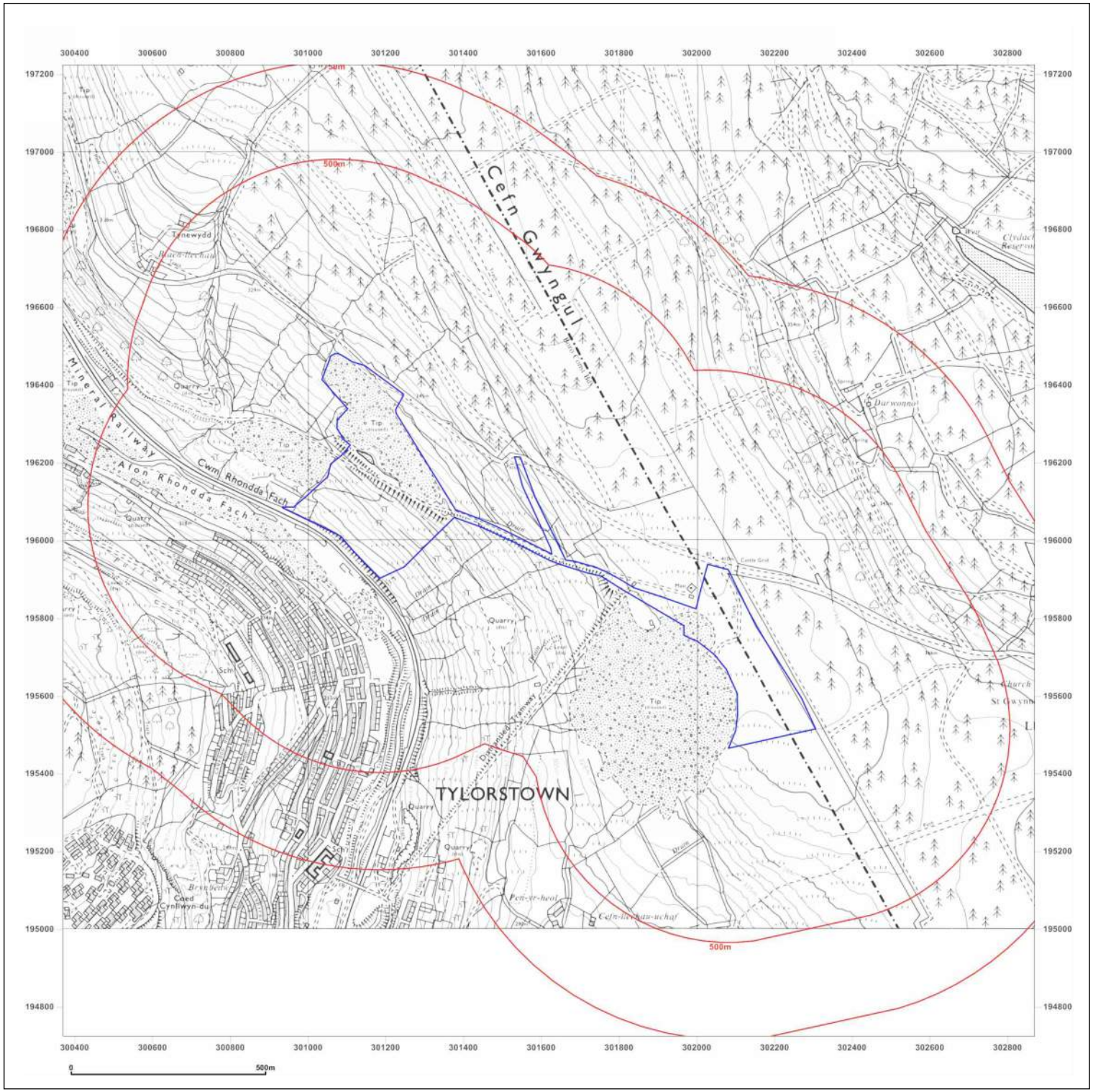

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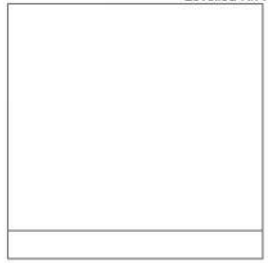

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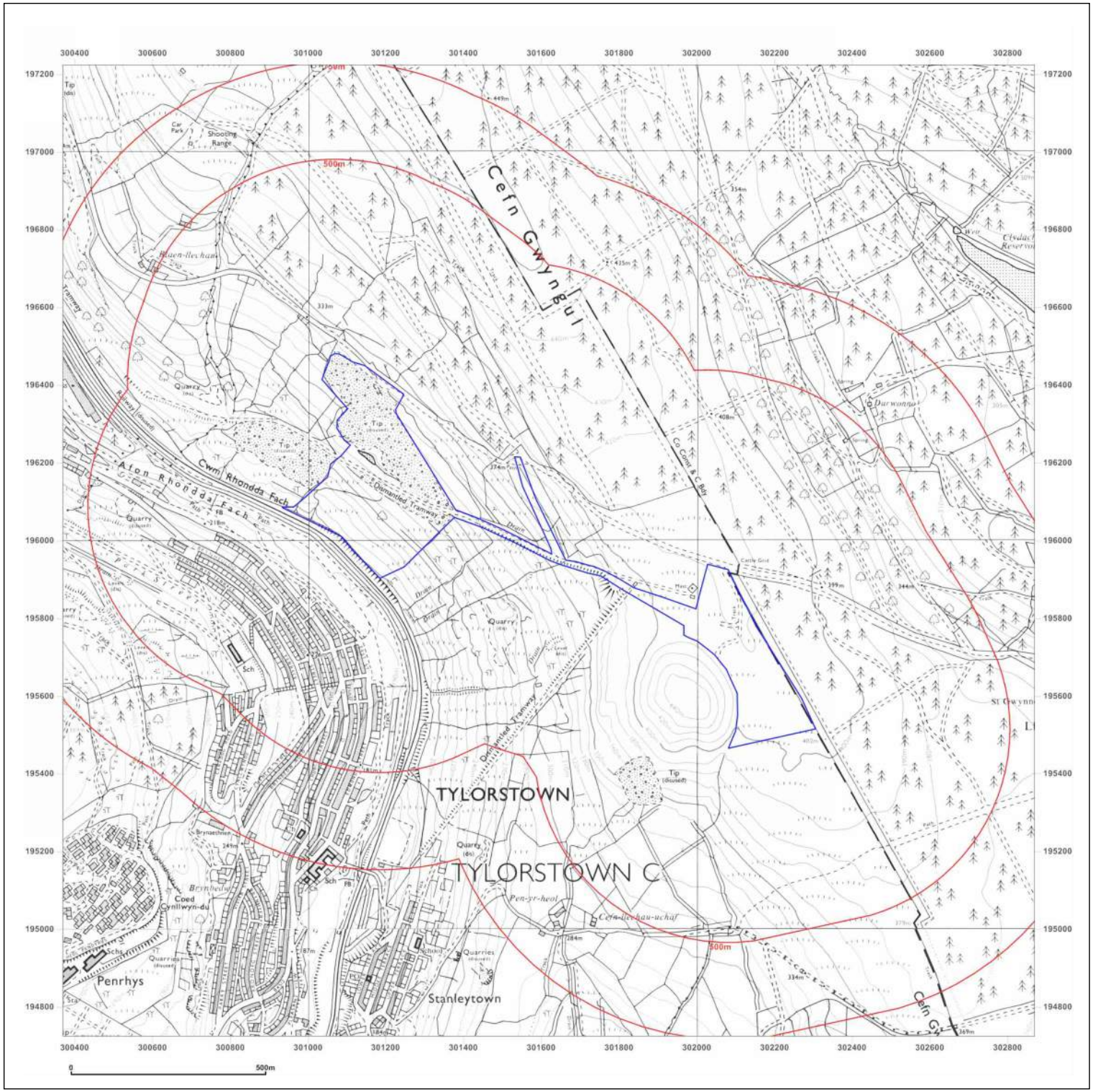

Groundsure INSIGHTS

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Report Ref: GS-7076728
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Surveyed 1973
Revised 1989
Edition N/A
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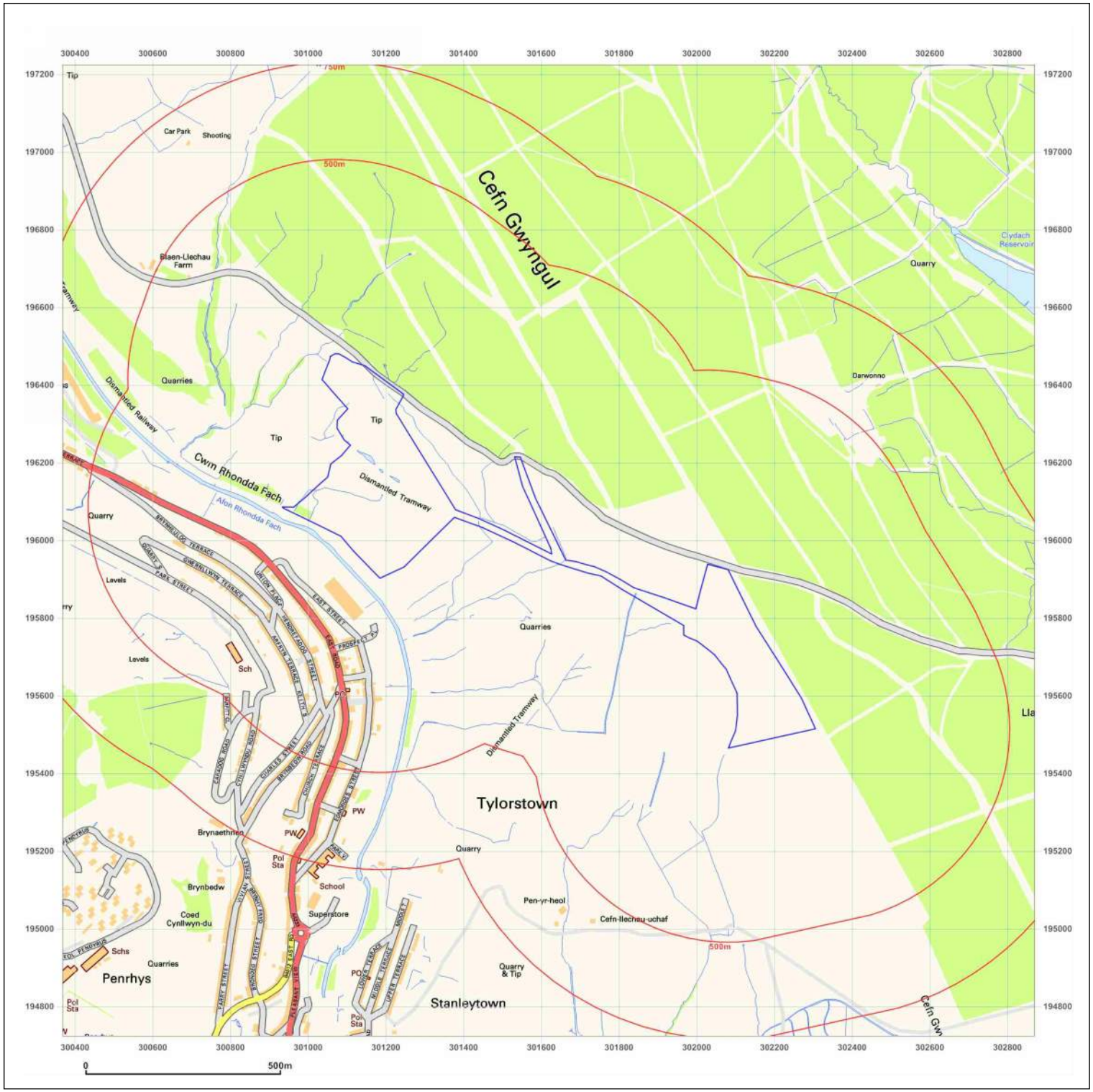

Groundsure INSIGHTS

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Tylorstown, Pontypridd, CF37 3PH

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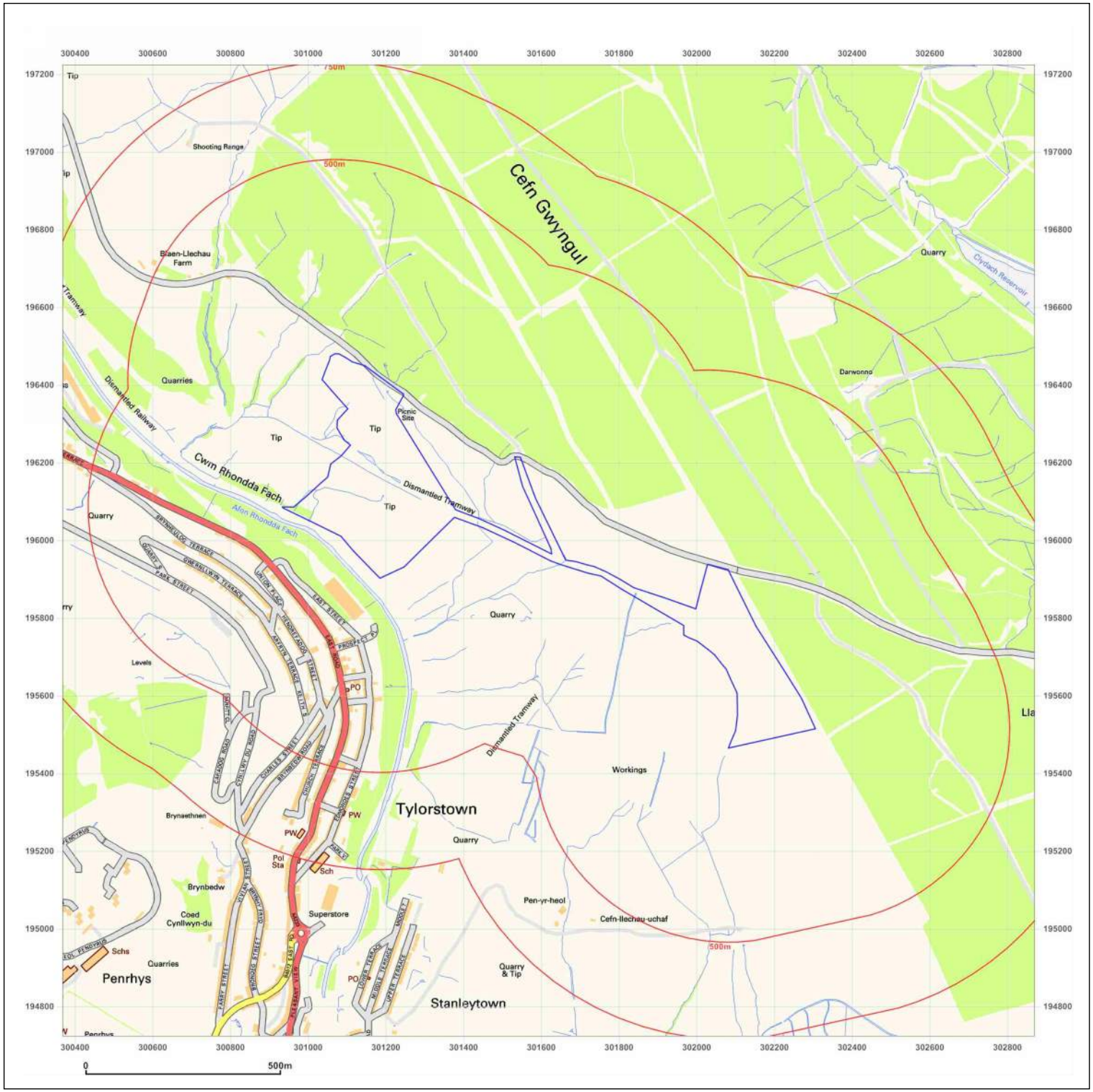

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

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Report Ref: GS-7076728
Grid Ref: 301619, 195974

Map Name: National Grid
Map date: 2010
Scale: 1:10,000
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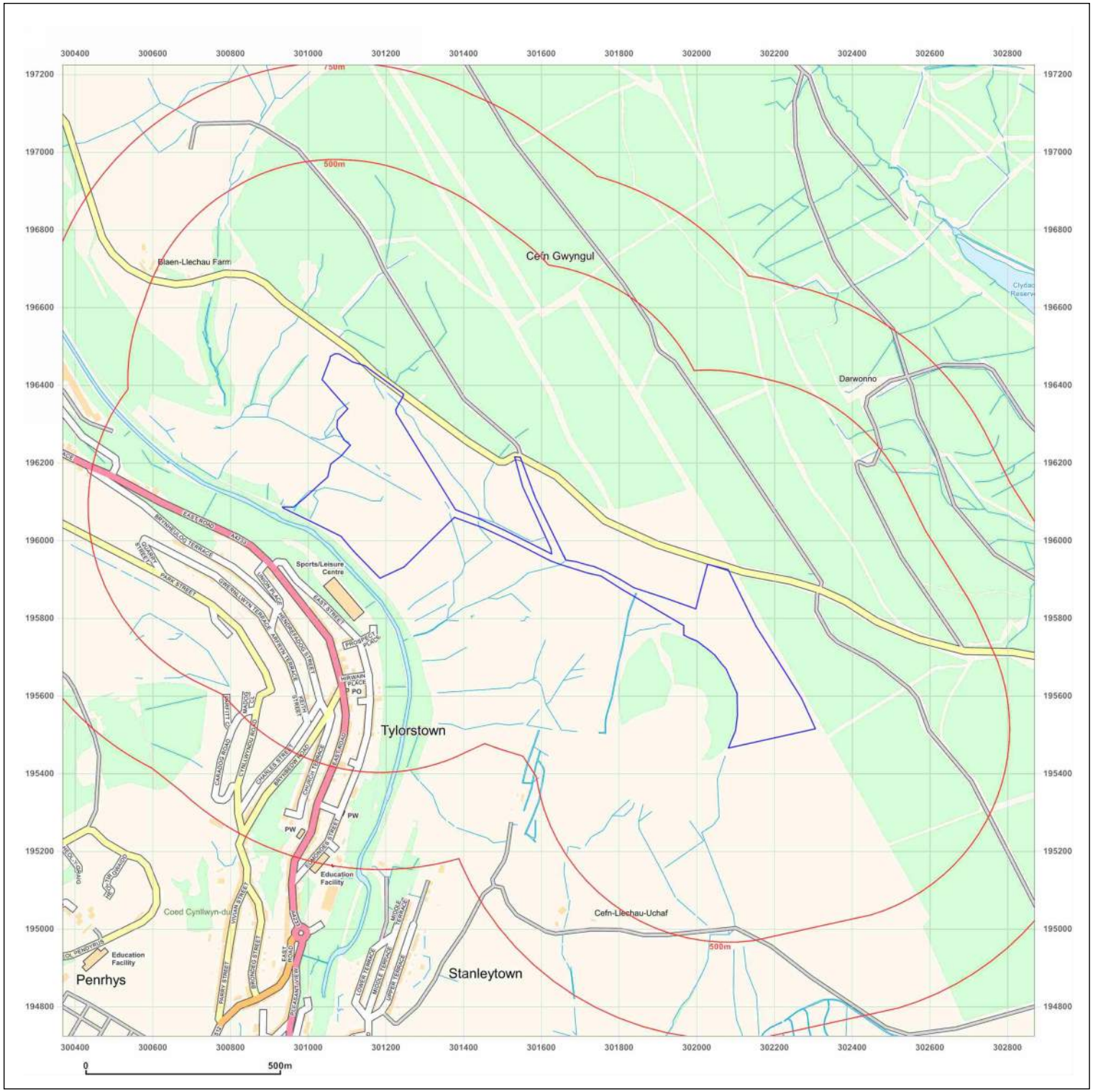

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728
Grid Ref: 301619, 195974

Map Name: National Grid
Map date: 2020
Scale: 1:10,000
Printed at: 1:10,000

N
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2020

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Production date: 22 September 2020

Map legend available at:
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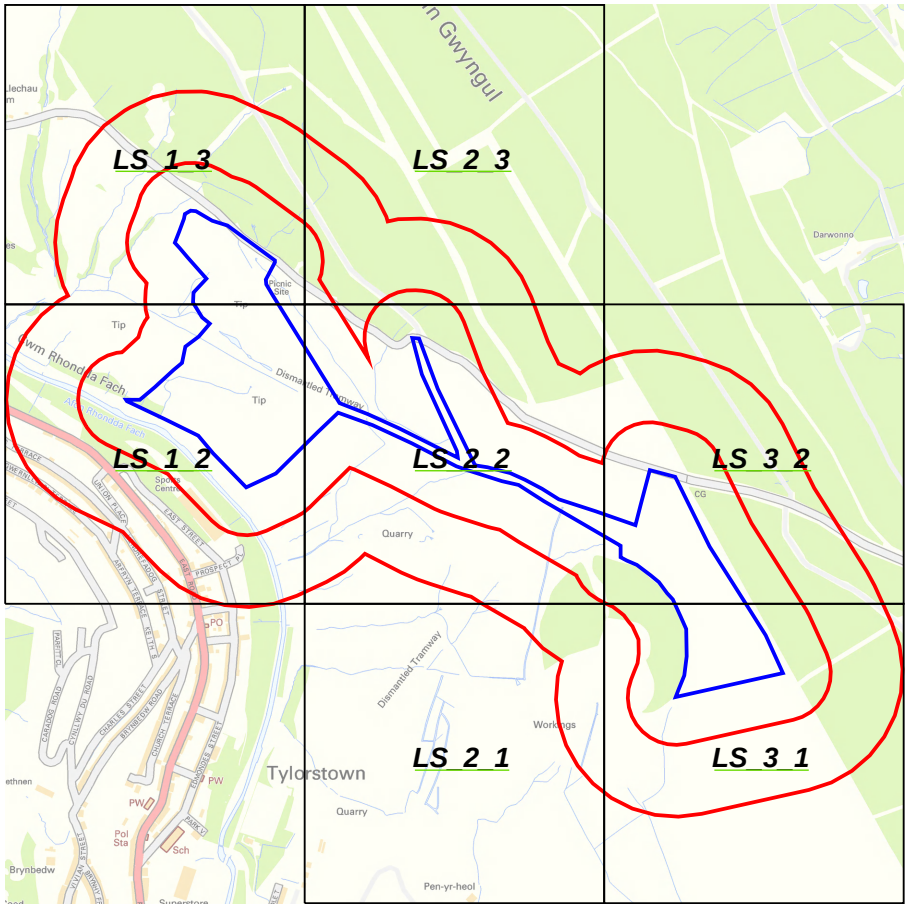
REDSTART

APPENDIX C

GROUNDSURE GEO & ENVIRO INSIGHT REPORT



Groundsure
INSIGHTS

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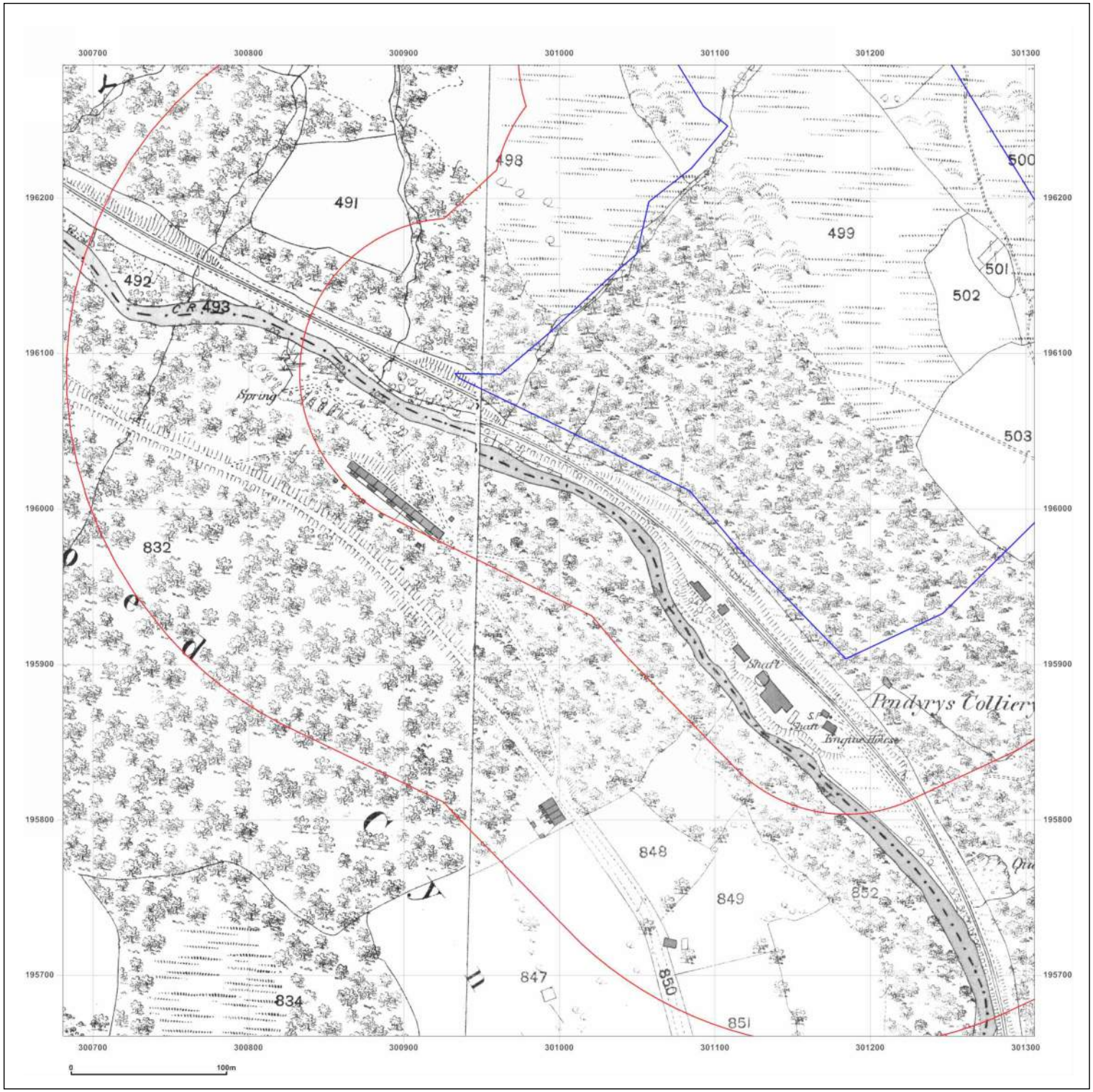
1:2500 Scale Grid Index



Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_2
Grid Ref: 300993, 195973

Map Name: County Series
Map date: **1873-1877**
Scale: 1:2,500
Printed at: 1:2,500

N
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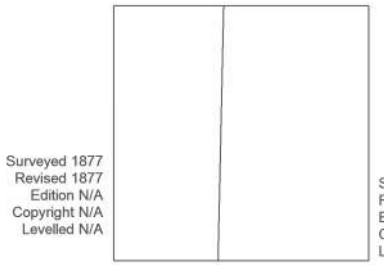

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Production date: 22 September 2020

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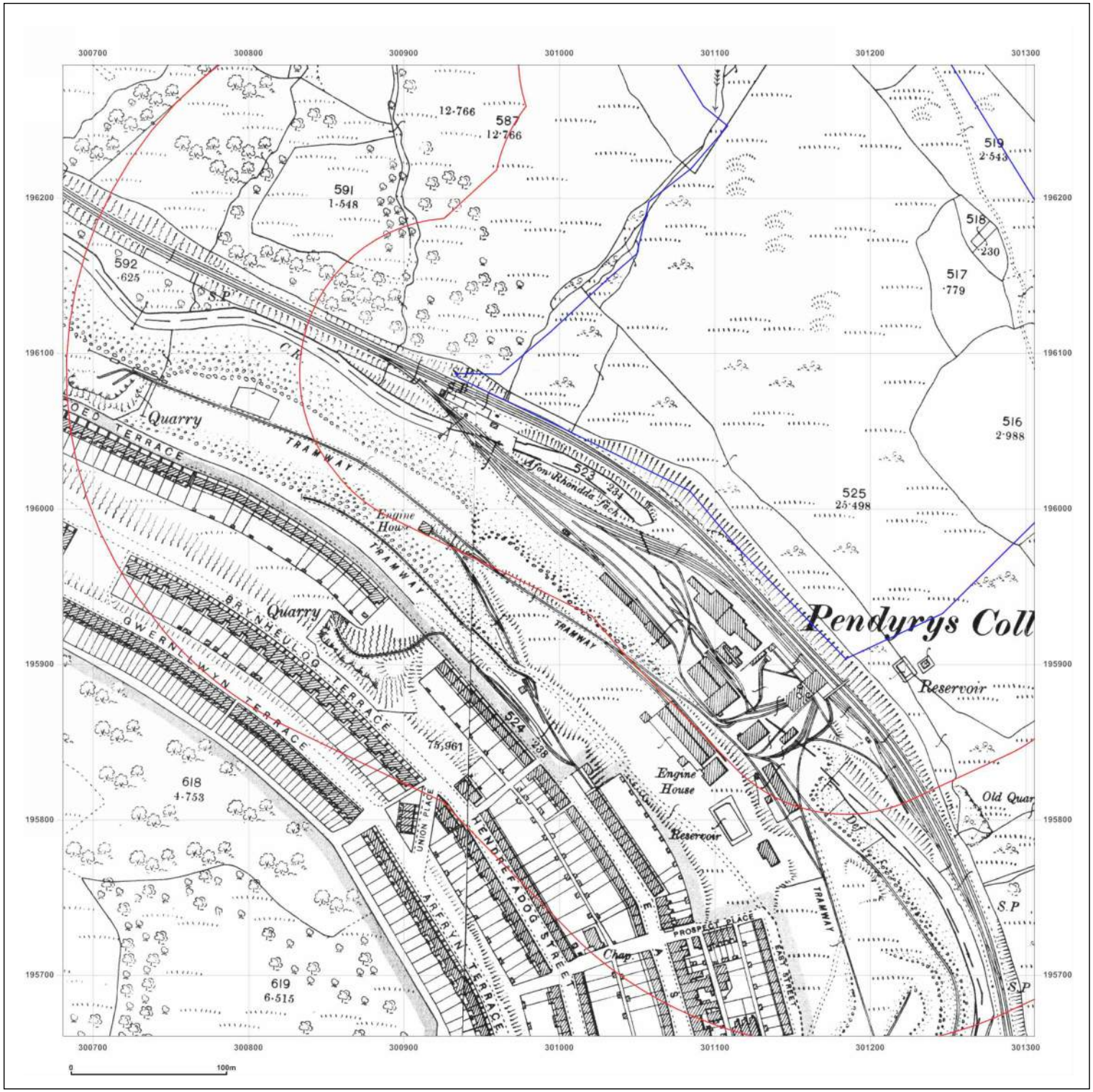

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_2
Grid Ref: 300993, 195973

Map Name: County Series
Map date: **1900**
Scale: 1:2,500
Printed at: 1:2,500

N
W E
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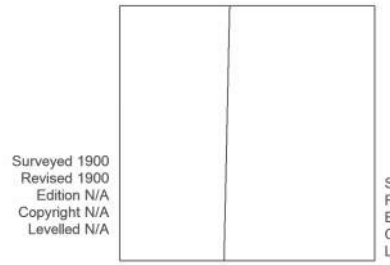

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Production date: 22 September 2020

Map legend available at:
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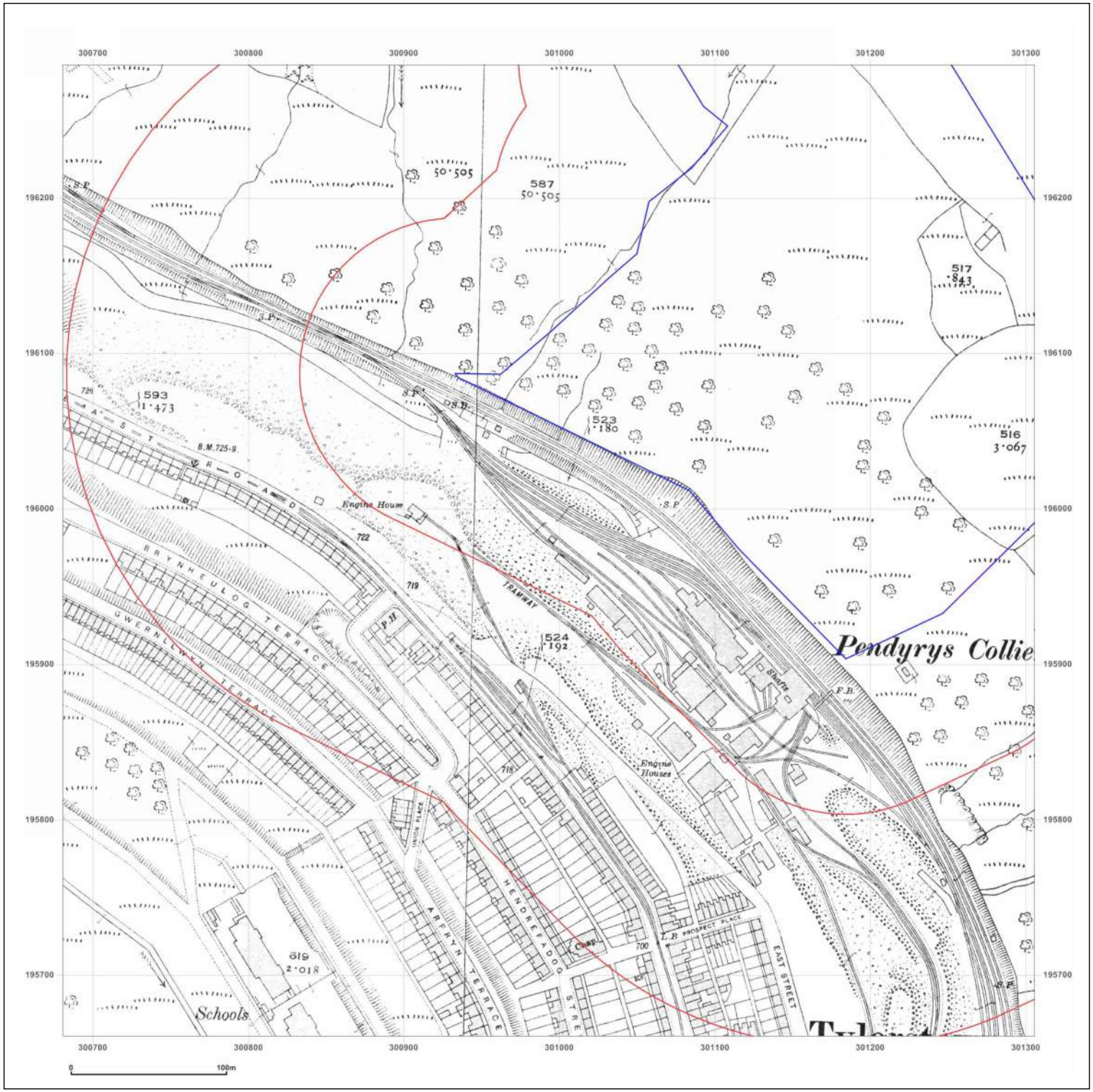

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_2
Grid Ref: 300993, 195973

Map Name: County Series
Map date: **1919-1920**
Scale: 1:2,500
Printed at: 1:2,500

N
W E
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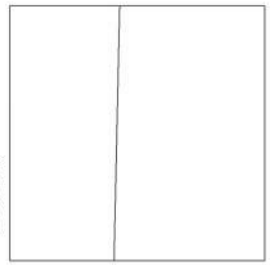

Surveyed 1919
Revised 1919
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1920
Revised 1920
Edition N/A
Copyright N/A
Levelled N/A

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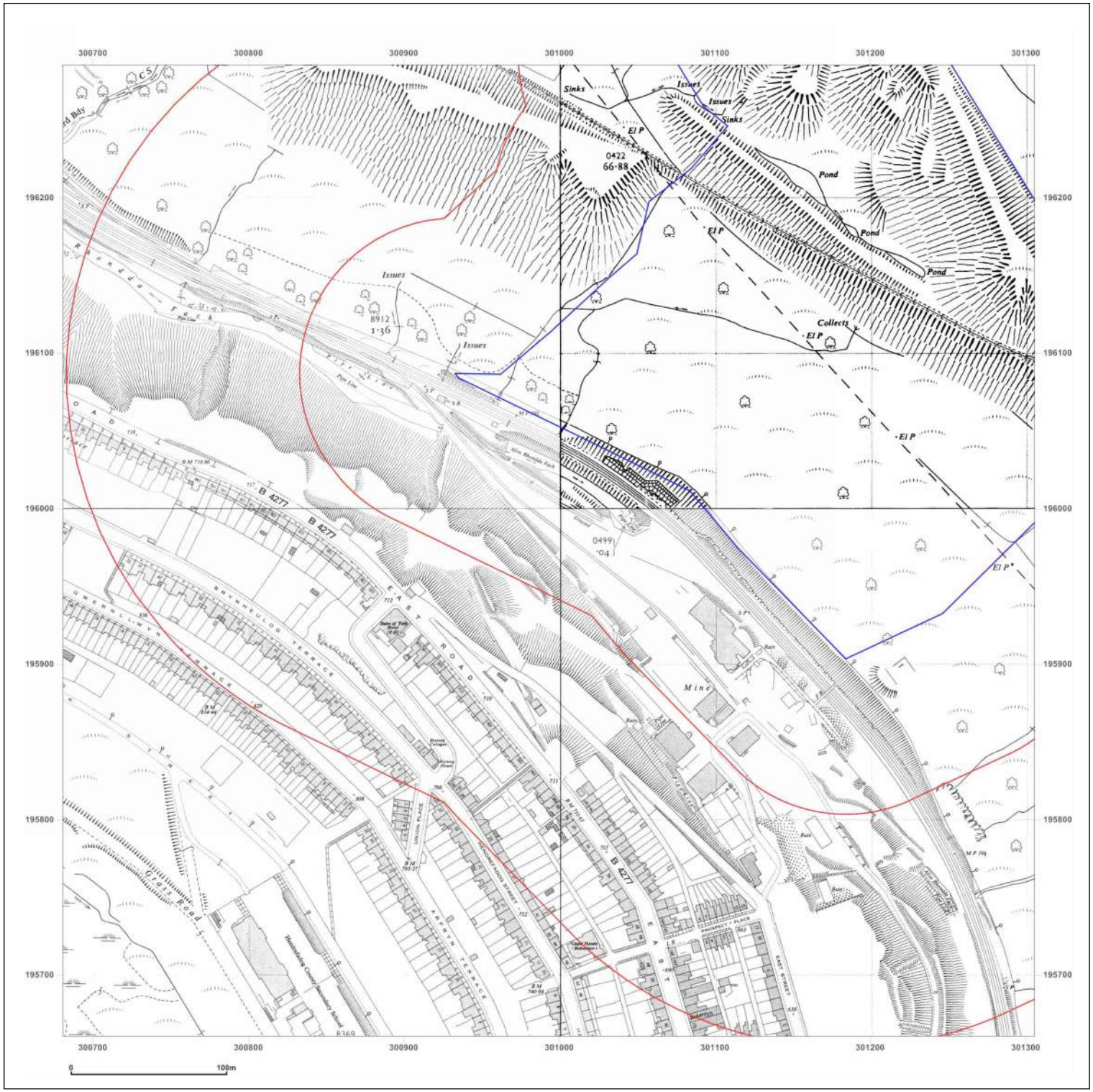

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_2
Grid Ref: 300993, 195973

Map Name: National Grid

Map date: **1957-1961**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
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Surveyed 1957
Revised 1957
Edition 1959
Copyright 1959
Levelled 1947

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

Surveyed 1961
Revised 1961
Edition 1962
Copyright 1962
Levelled 1957

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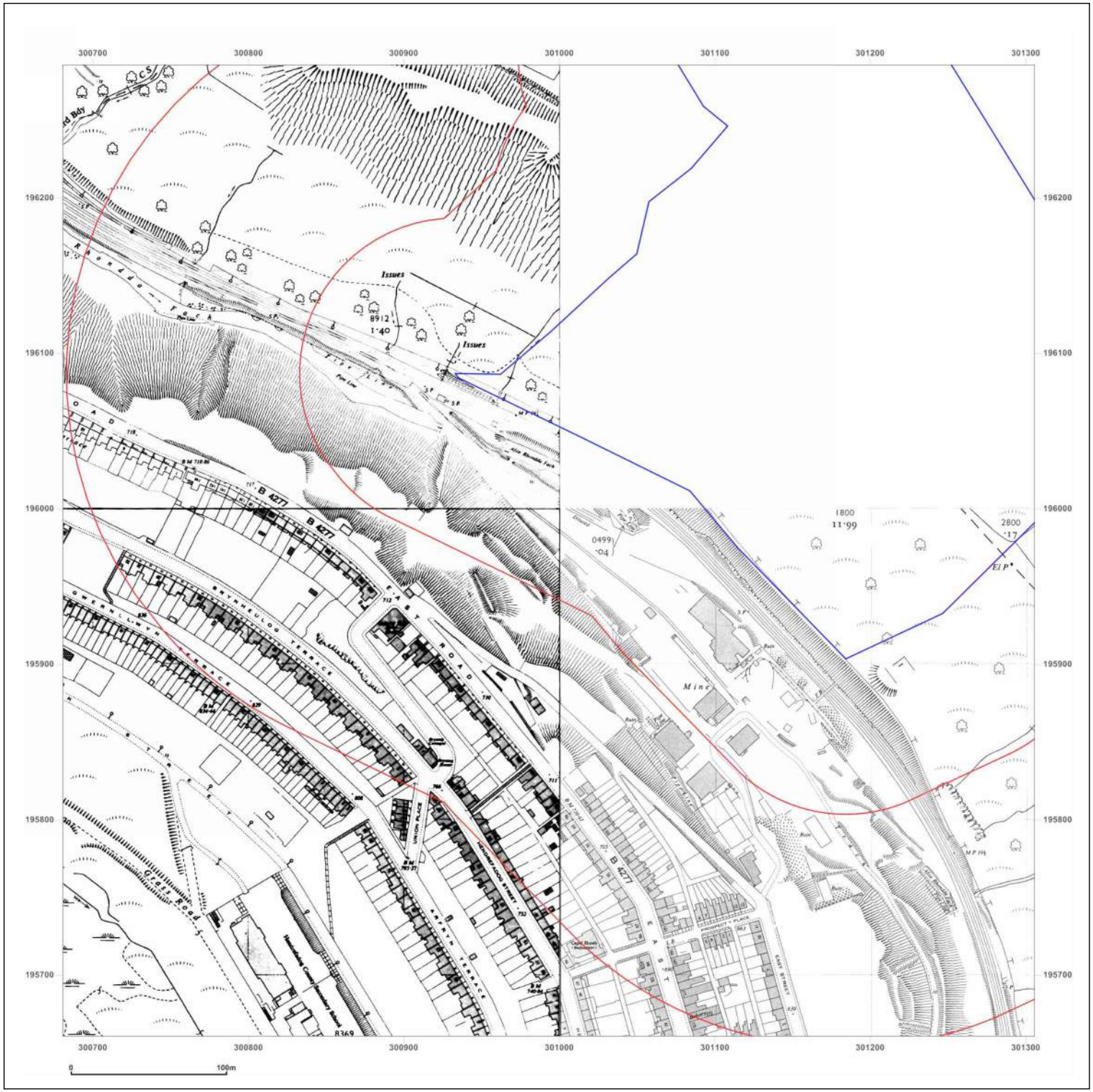

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_2
Grid Ref: 300993, 195973

Map Name: National Grid

Map date: **1958-1962**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
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Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

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

Surveyed 1958
Revised 1958
Edition 1959
Copyright 1959
Levelled 1948

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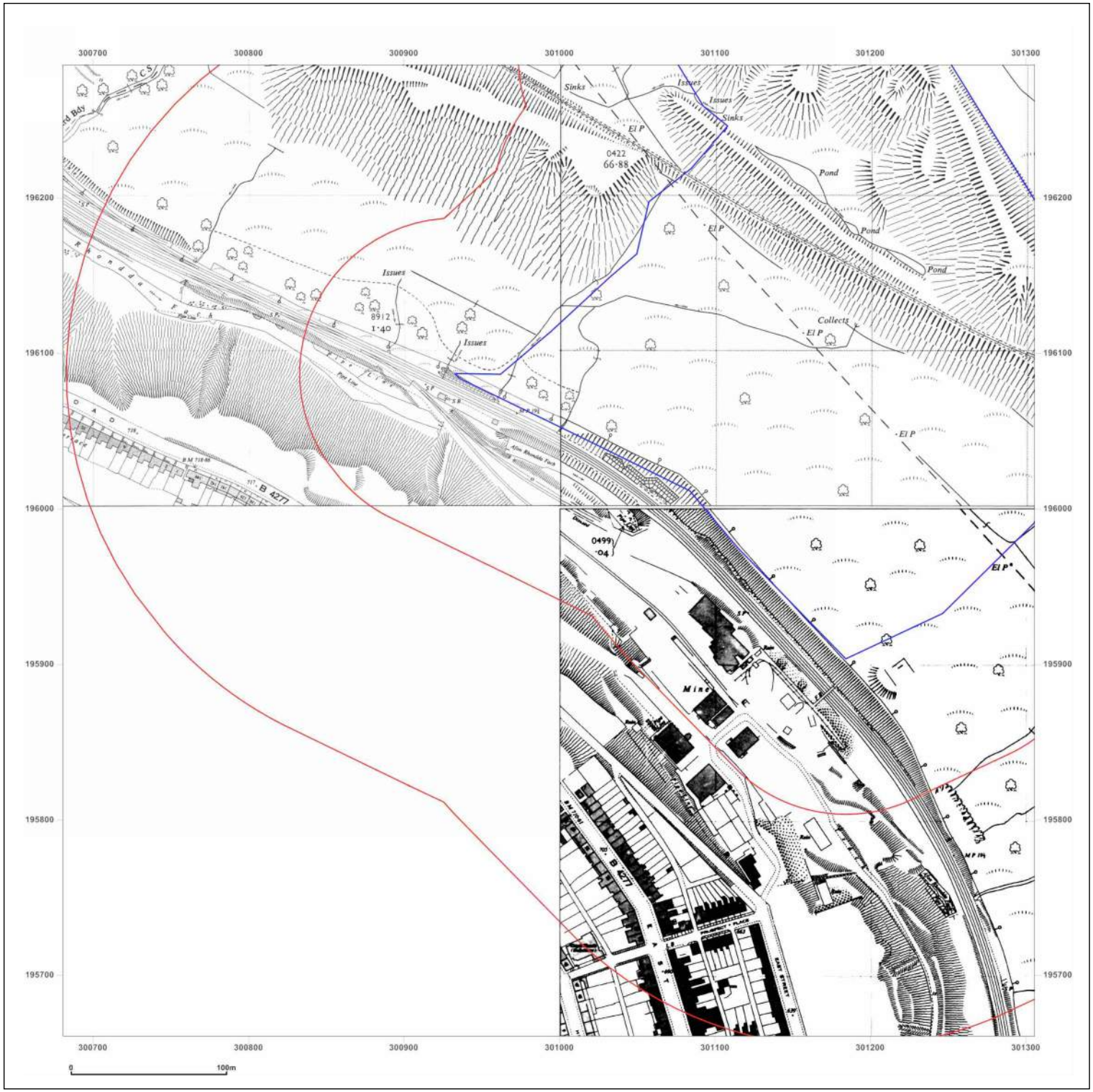

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_2
Grid Ref: 300993, 195973

Map Name: National Grid

Map date: **1961-1962**

Scale: 1:2,500

Printed at: 1:2,500

N
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Surveyed 1961
Revised 1961
Edition 1962
Copyright 1962
Levelled 1957

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

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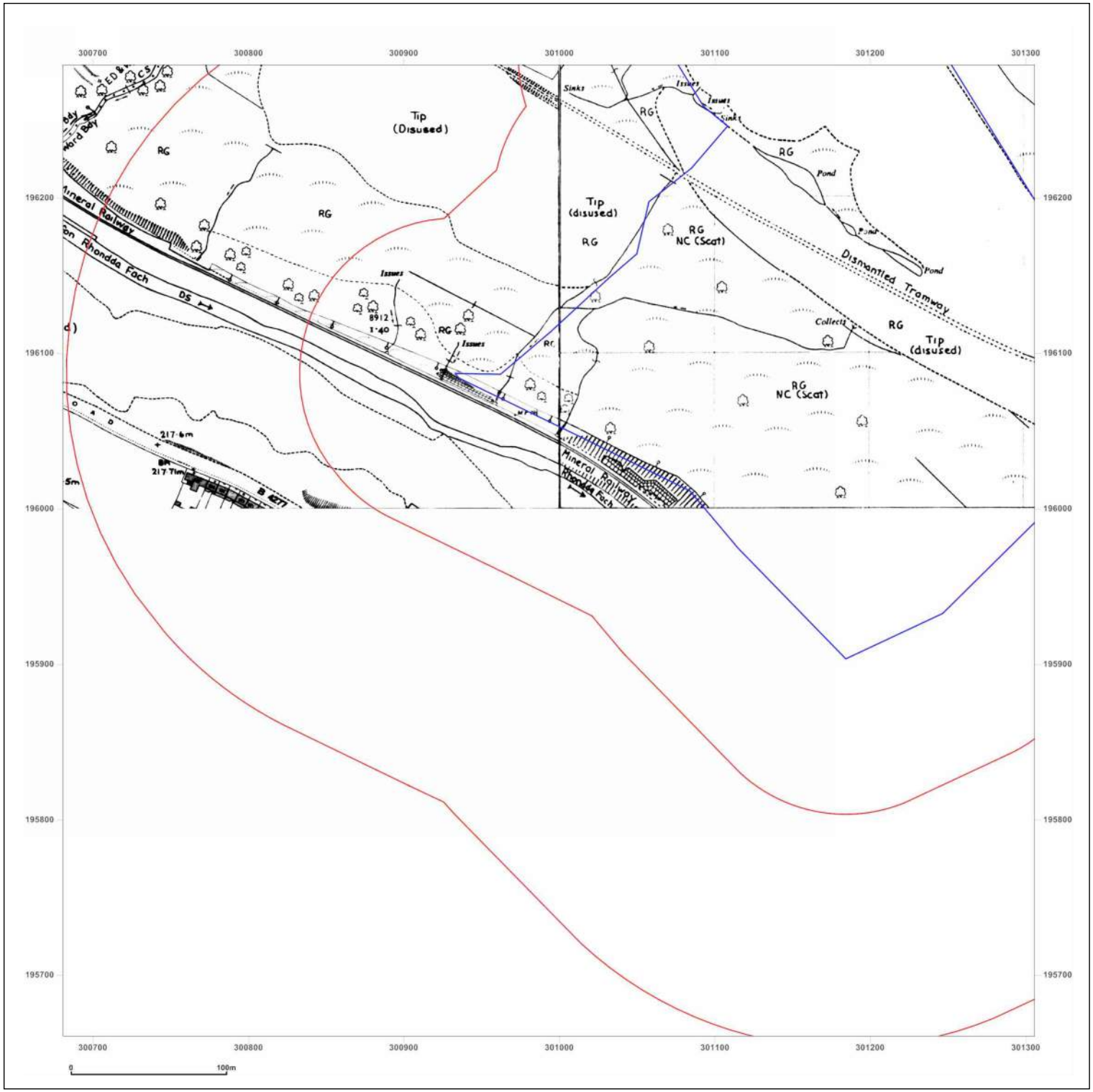

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_2
Grid Ref: 300993, 195973

Map Name: National Grid
Map date: 1986
Scale: 1:2,500
Printed at: 1:2,500

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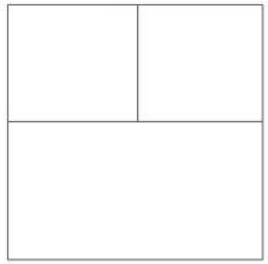
Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1965
Revised 1986
Edition N/A
Copyright 1986
Levelled 1965



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Production date: 22 September 2020

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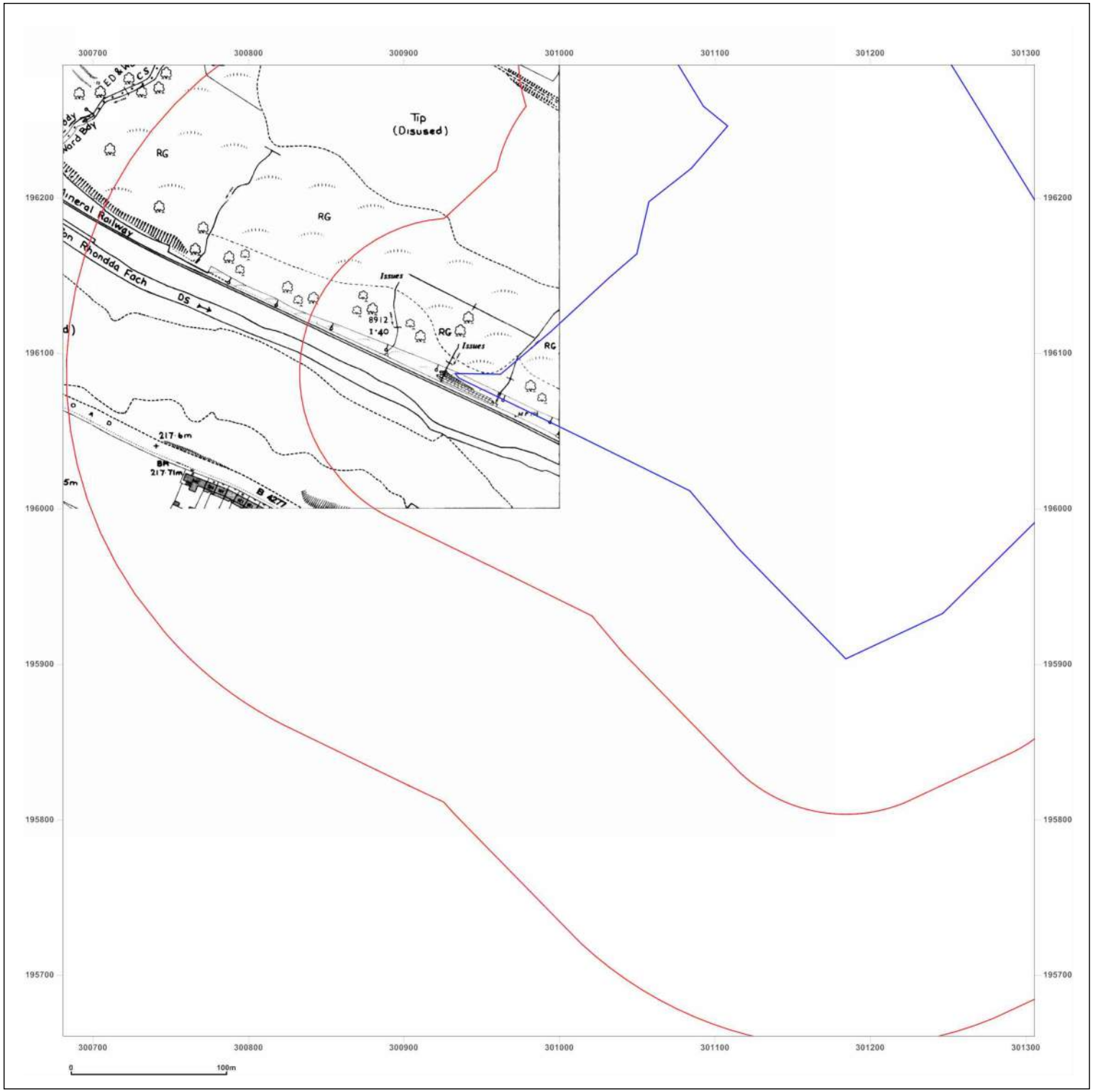

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_2
Grid Ref: 300993, 195973

Map Name: National Grid
Map date: **1986**
Scale: 1:2,500
Printed at: 1:2,500

N
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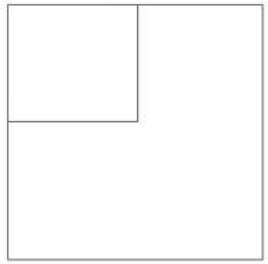
Surveyed 1968
Revised 1986
Edition N/A
Copyright 1986
Levelled 1968



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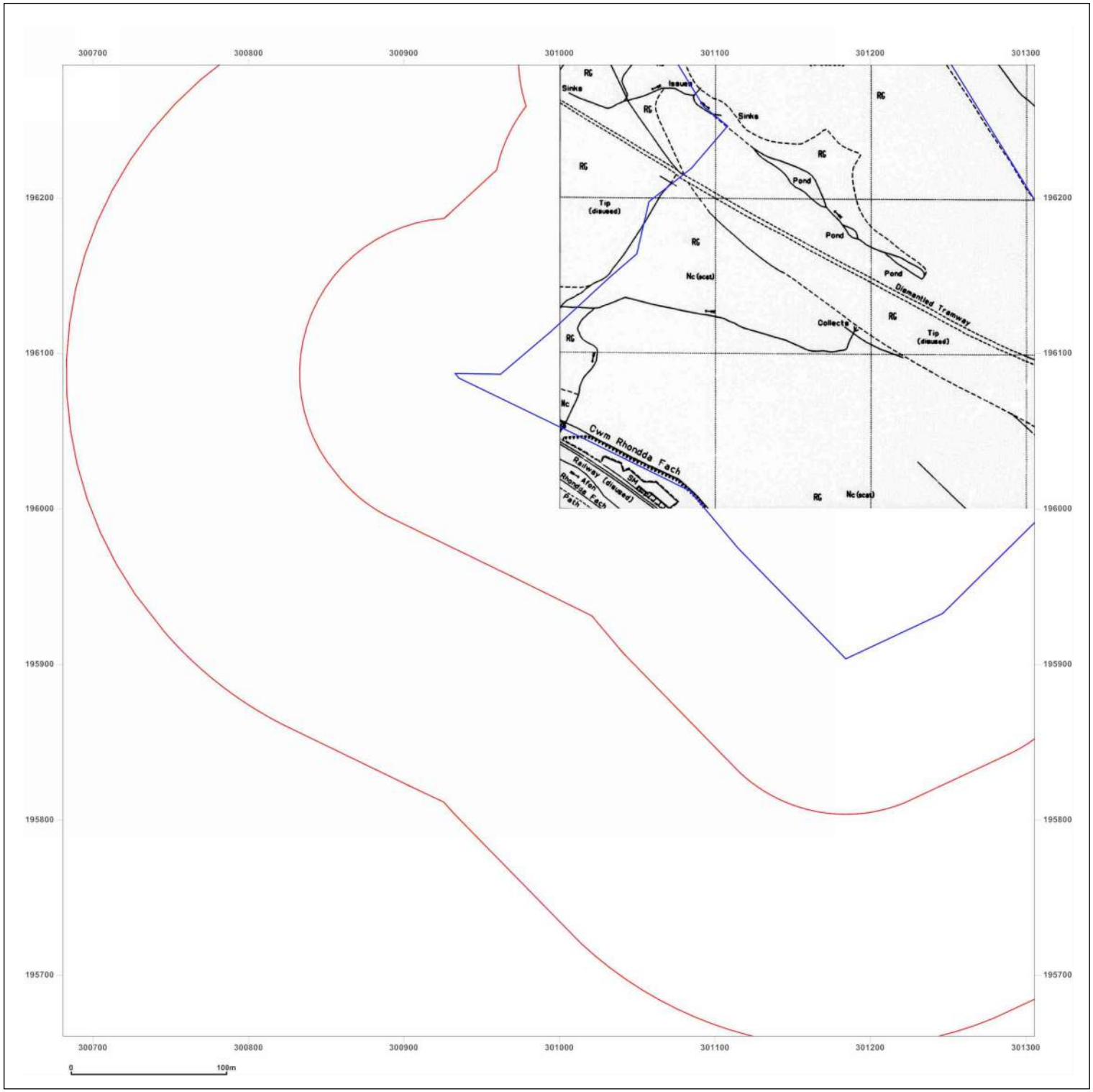

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_2
Grid Ref: 300993, 195973

Map Name: National Grid
Map date: 1993
Scale: 1:2,500
Printed at: 1:2,500

N
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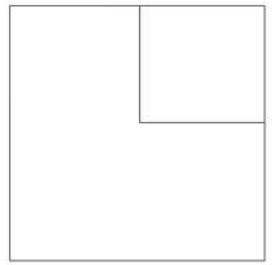
Surveyed N/A
Revised N/A
Edition N/A
Copyright 1993
Levelled N/A



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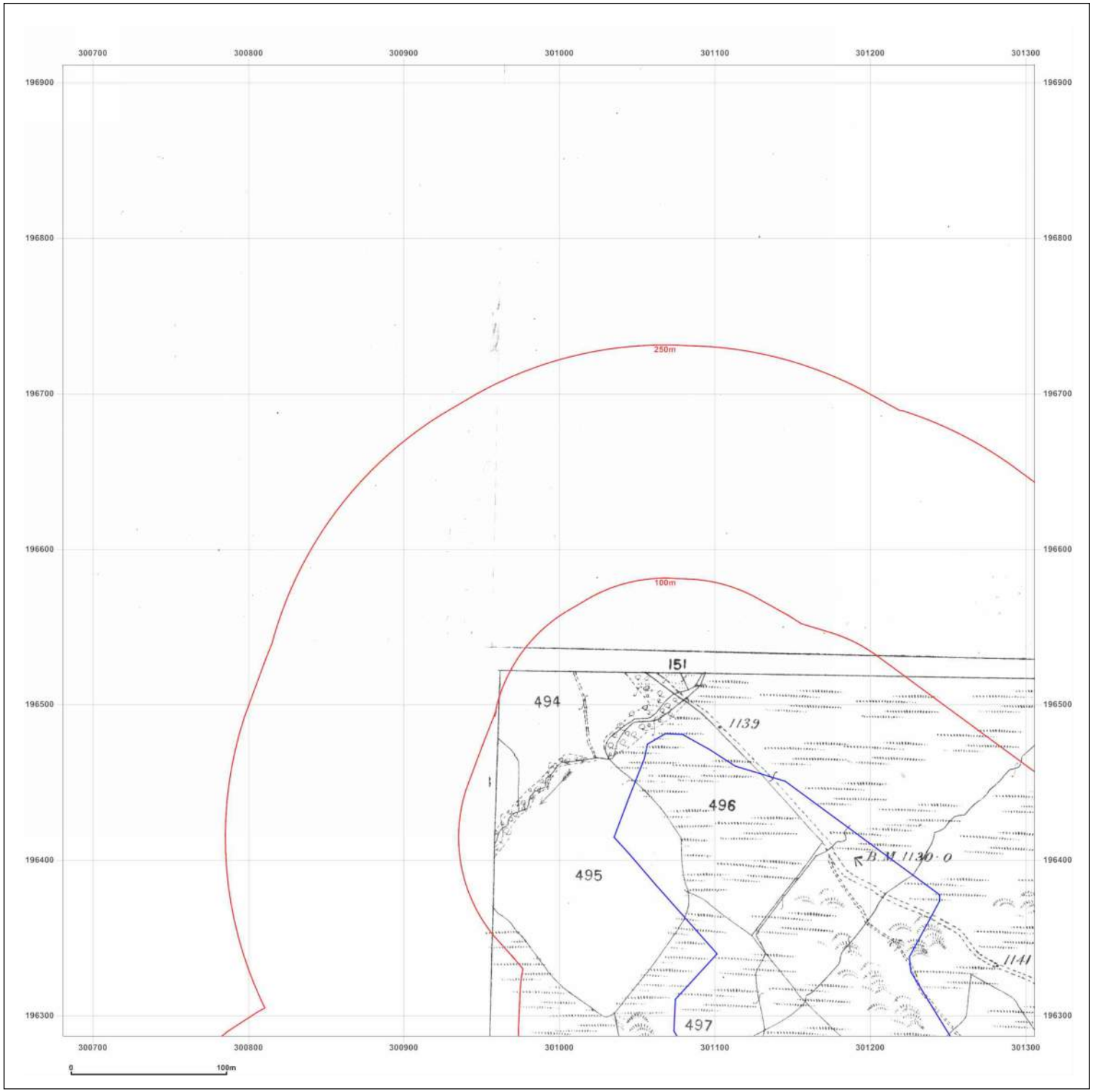

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_3
Grid Ref: 300993, 196599

Map Name: County Series
Map date: **1869-1873**
Scale: 1:2,500
Printed at: 1:2,500

N
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Surveyed 1869
Revised 1869
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1869
Revised 1869
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1873
Revised 1873
Edition N/A
Copyright N/A
Levelled N/A

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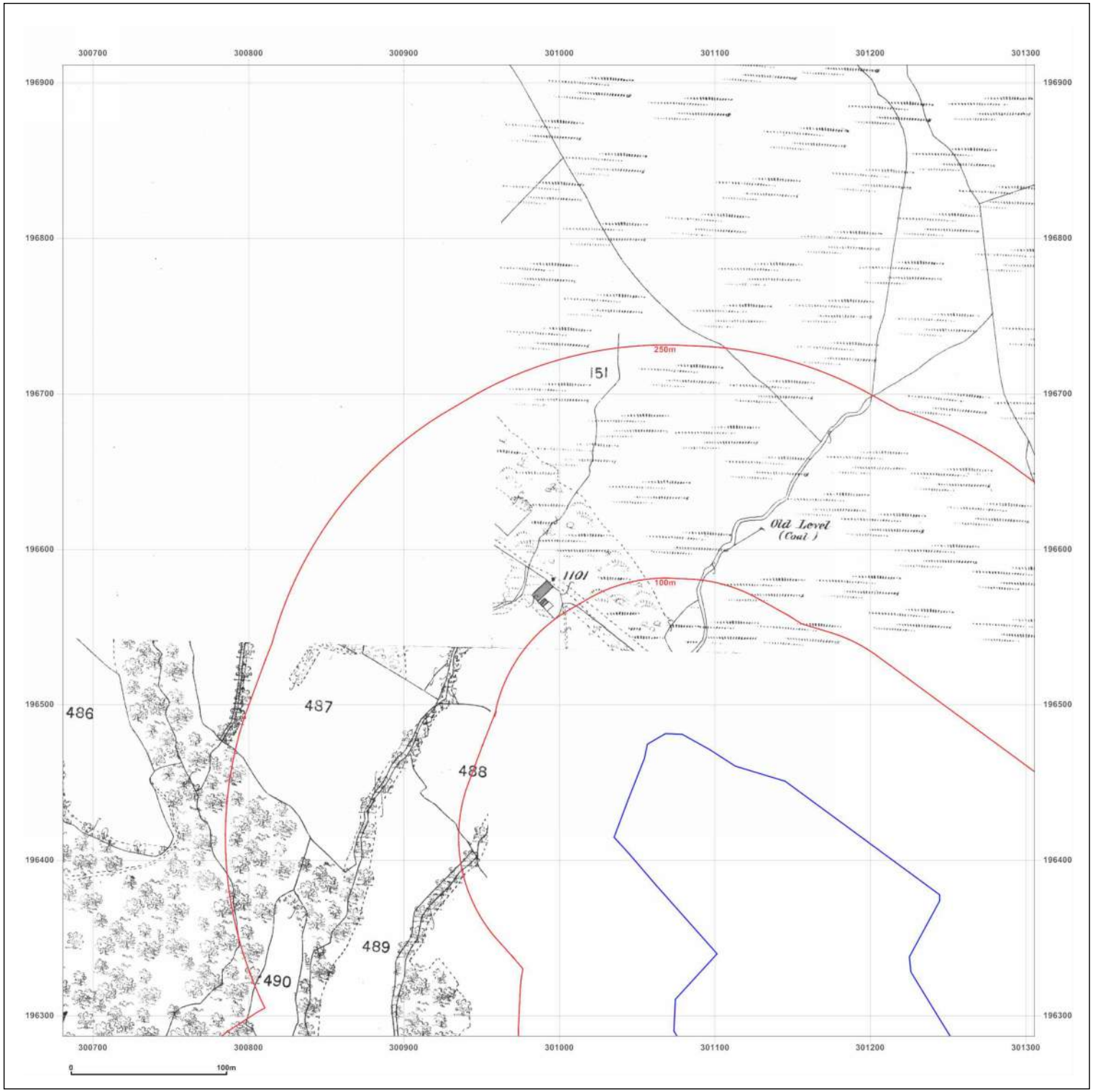

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_3
Grid Ref: 300993, 196599

Map Name: County Series
Map date: **1877-1879**
Scale: 1:2,500
Printed at: 1:2,500

N
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Surveyed 1879
Revised 1879
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1877
Revised 1877
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1877
Revised 1877
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1877
Revised 1877
Edition N/A
Copyright N/A
Levelled N/A

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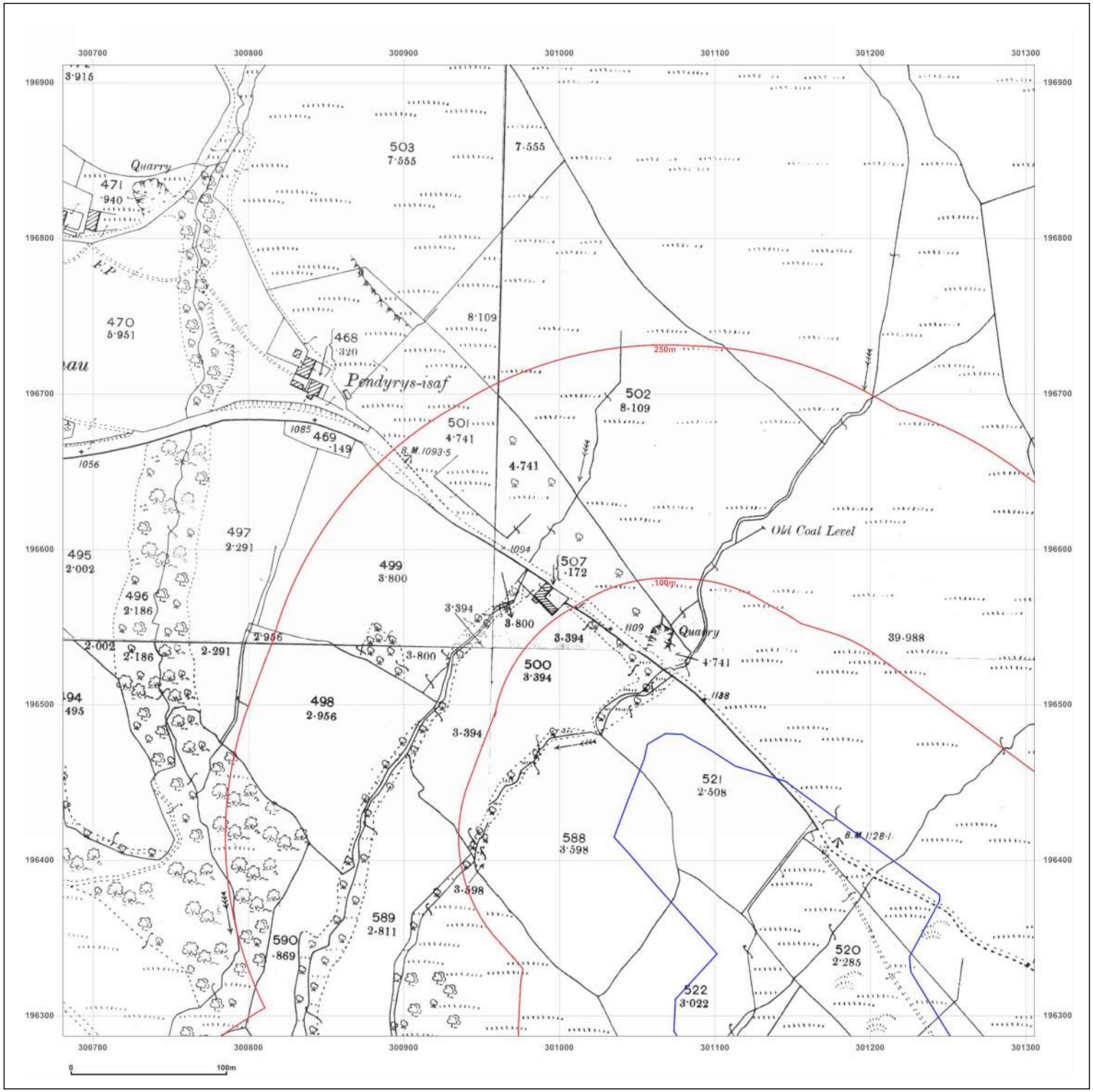

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_3
Grid Ref: 300993, 196599

Map Name: County Series
Map date: 1900
Scale: 1:2,500
Printed at: 1:2,500

N
W E
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Surveyed 1900
Revised 1900
Edition N/A
Copyright N/A
Levelled N/A

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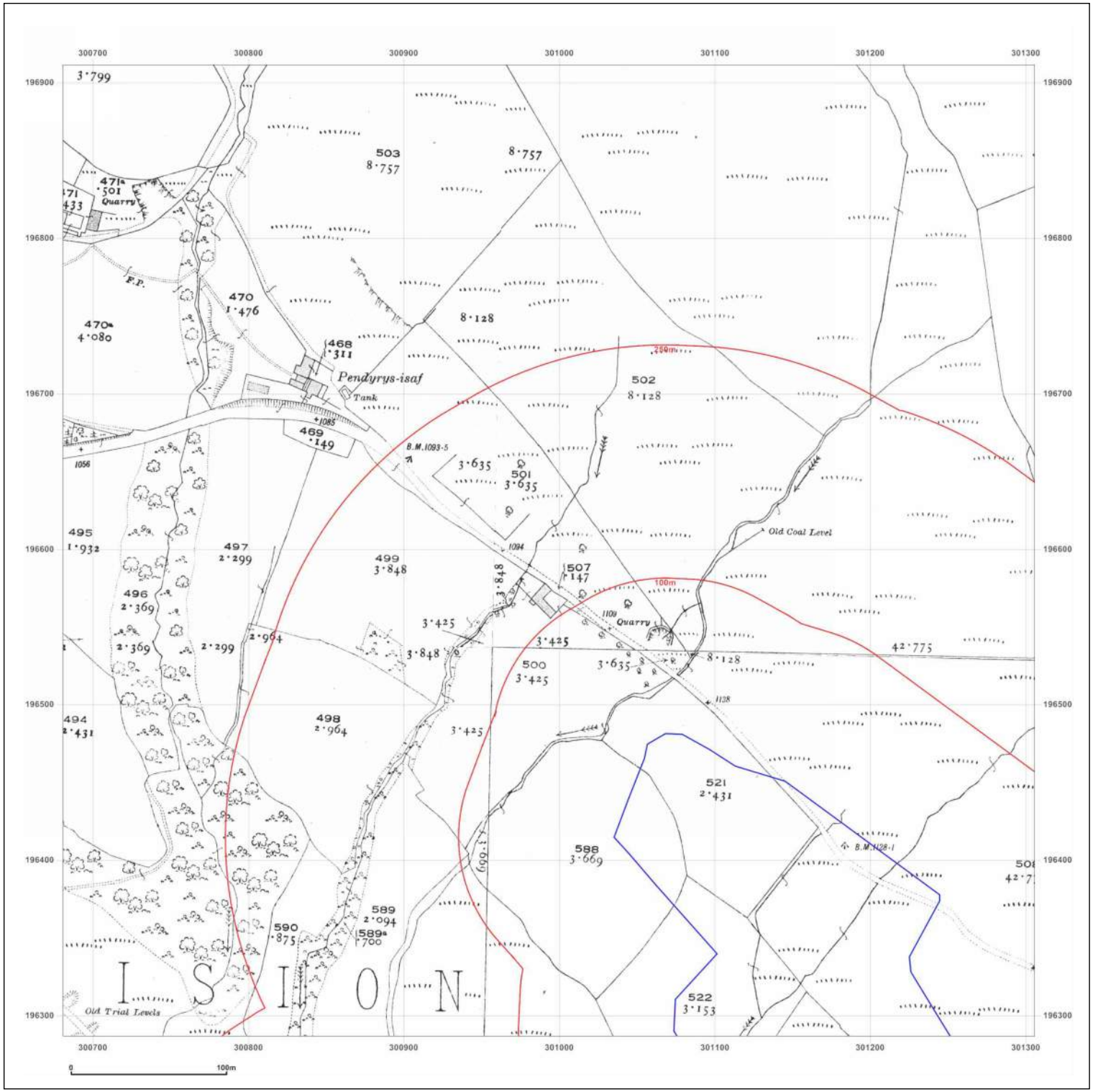

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_3
Grid Ref: 300993, 196599

Map Name: County Series
Map date: **1919-1920**
Scale: 1:2,500
Printed at: 1:2,500

N
W E
S

Surveyed 1920
Revised 1920
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1919
Revised 1919
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1919
Revised 1919
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1920
Revised 1920
Edition N/A
Copyright N/A
Levelled N/A

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Map legend available at:
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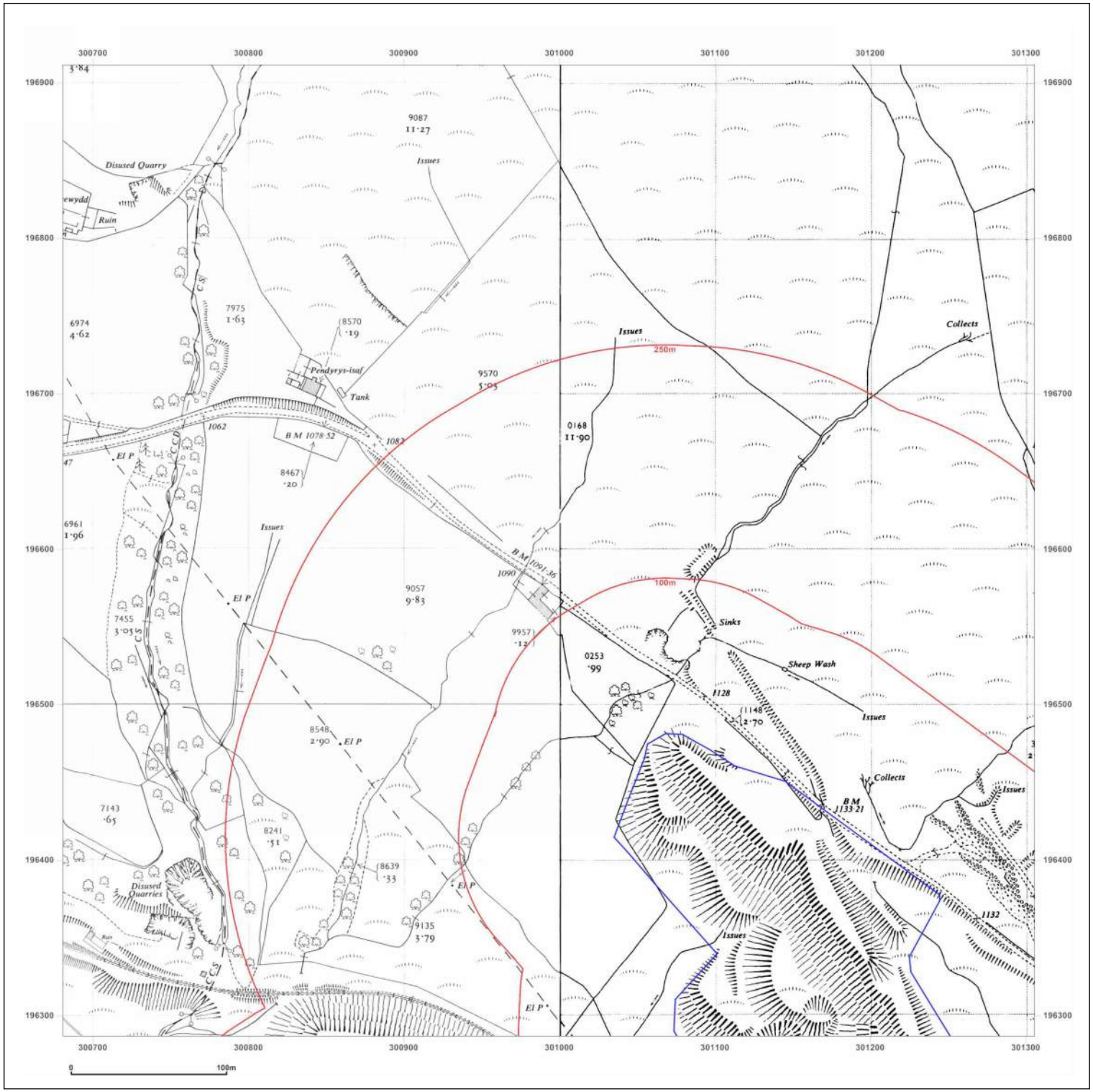

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_3
Grid Ref: 300993, 196599

Map Name: National Grid
Map date: **1957-1961**
Scale: 1:2,500
Printed at: 1:2,500

N
W E
S

Surveyed 1957	Surveyed N/A
Revised 1957	Revised N/A
Edition 1959	Edition N/A
Copyright 1959	Copyright N/A
Levelled 1947	Levelled N/A

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Map legend available at:
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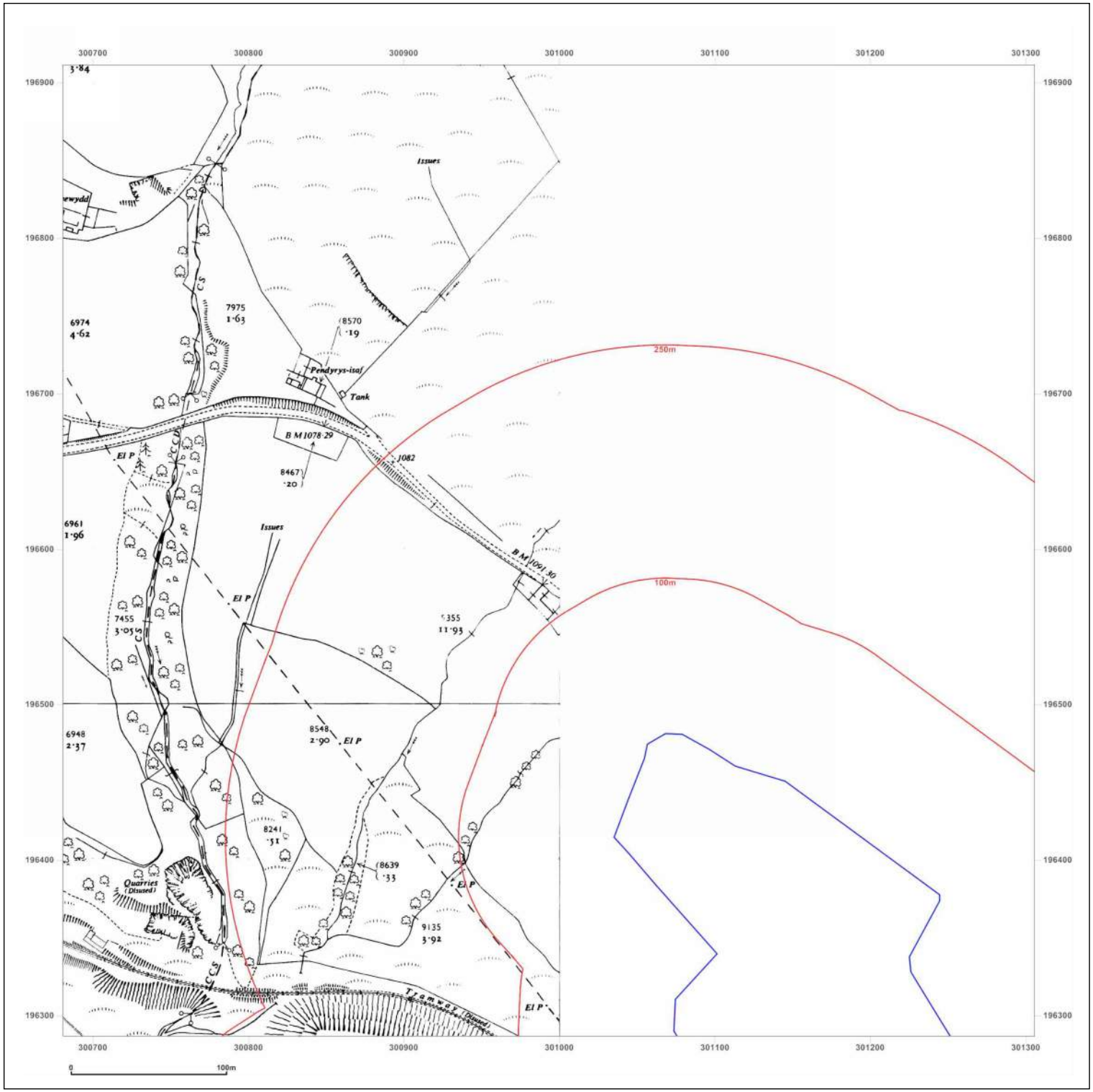

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_3
Grid Ref: 300993, 196599

Map Name: National Grid
Map date: 1961
Scale: 1:2,500
Printed at: 1:2,500

N
W E
S

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

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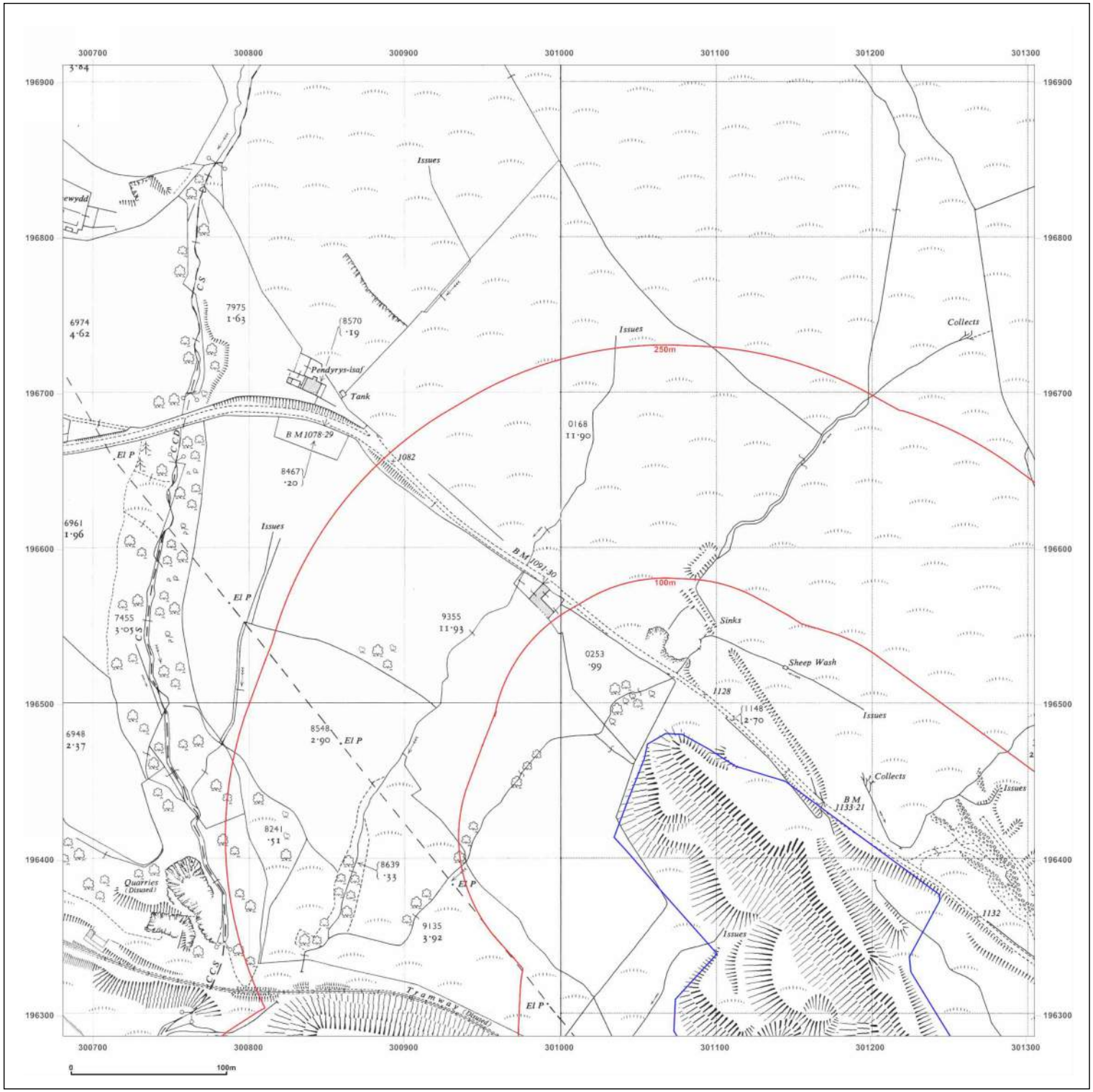

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_3
Grid Ref: 300993, 196599

Map Name: National Grid

Map date: **1961**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1961
Revised 1961
Edition 1962
Copyright 1962
Levelled 1957

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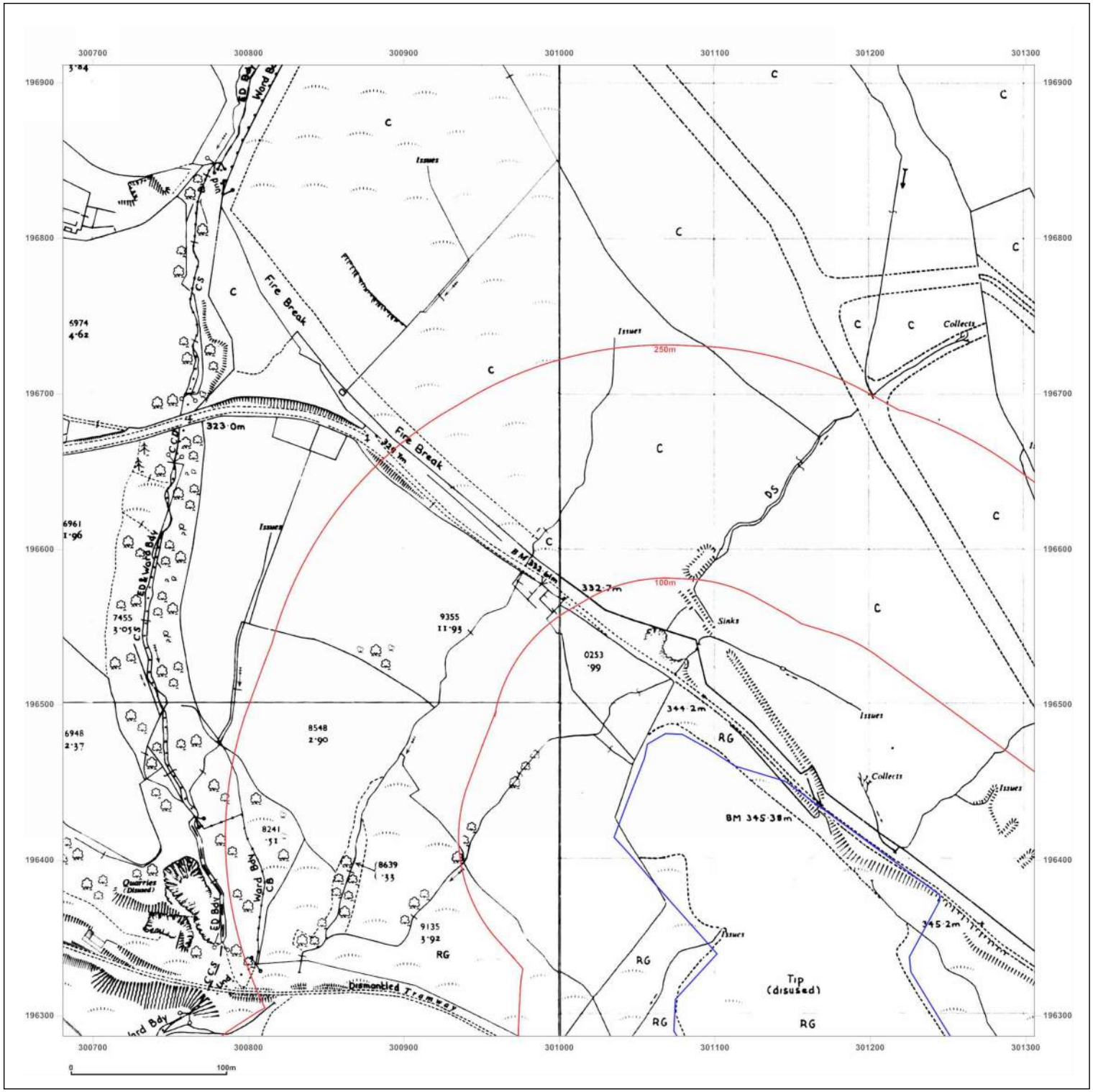

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_3
Grid Ref: 300993, 196599

Map Name: National Grid
Map date: 1986
Scale: 1:2,500
Printed at: 1:2,500

N
W E
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Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1965
Revised 1986
Edition N/A
Copyright 1986
Levelled 1965

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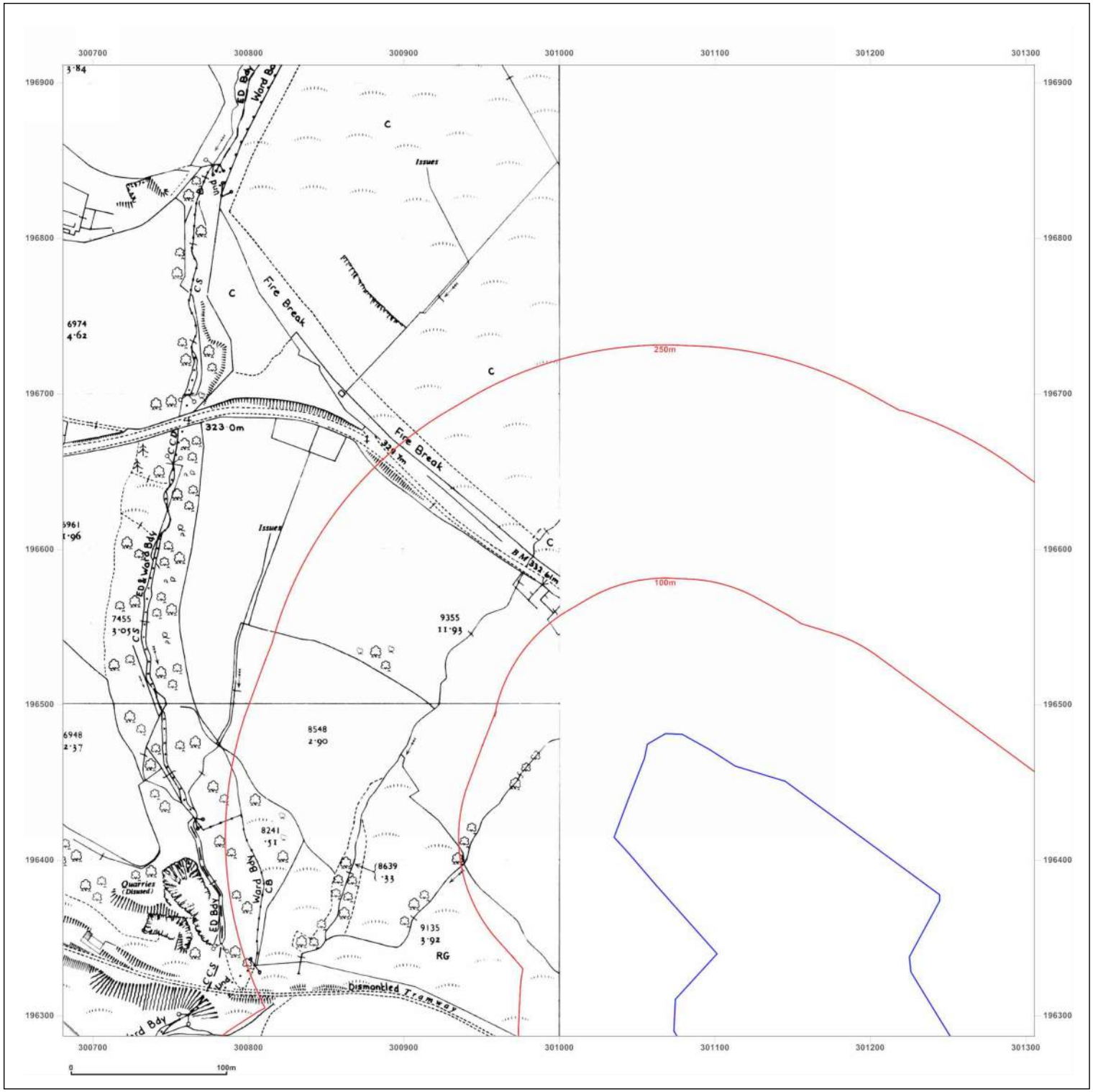

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_3
Grid Ref: 300993, 196599

Map Name: National Grid
Map date: 1986
Scale: 1:2,500
Printed at: 1:2,500

N
W E
S

Surveyed 1968
Revised 1986
Edition N/A
Copyright 1986
Levelled 1968

Powered by OS

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Production date: 22 September 2020

Map legend available at:
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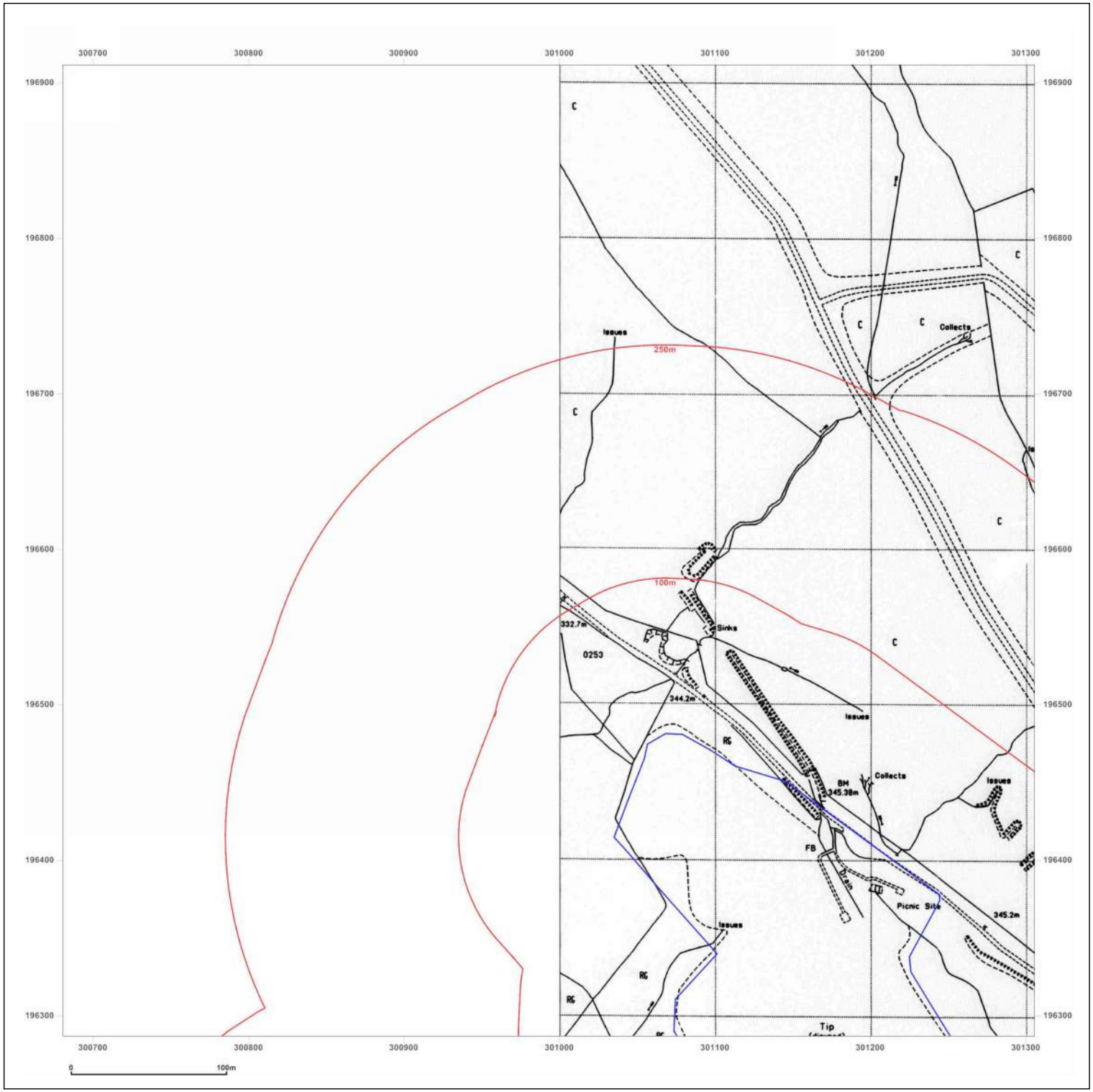

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_1_3
Grid Ref: 300993, 196599

Map Name: National Grid
Map date: 1993
Scale: 1:2,500
Printed at: 1:2,500

N
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Surveyed N/A
Revised N/A
Edition N/A
Copyright 1993
Levelled N/A

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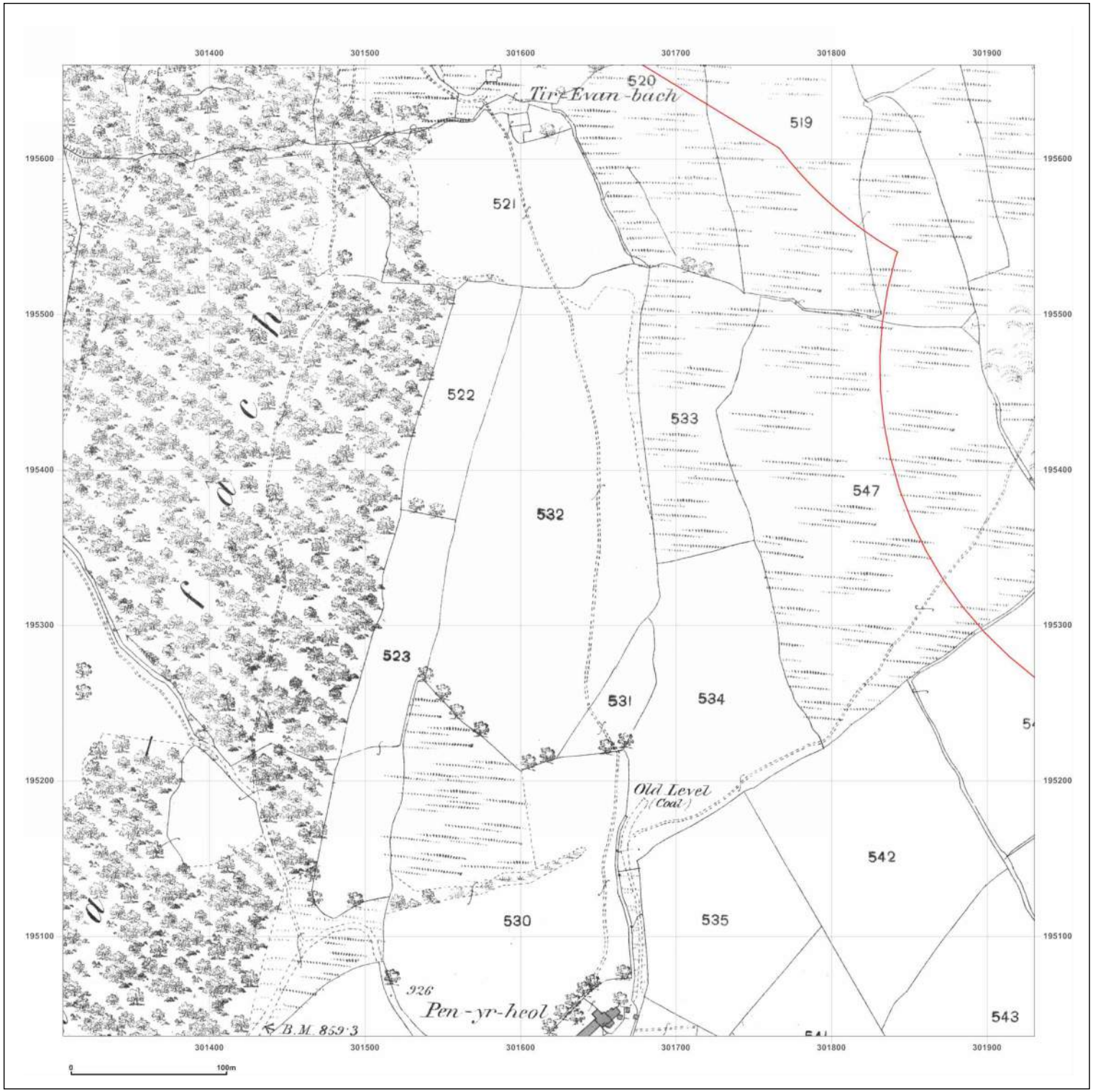

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_1
Grid Ref: 301618, 195348

Map Name: County Series
Map date: **1873**
Scale: 1:2,500
Printed at: 1:2,500

N
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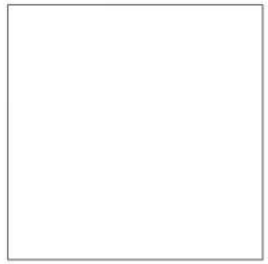
Surveyed 1873
Revised 1873
Edition N/A
Copyright N/A
Levelled N/A



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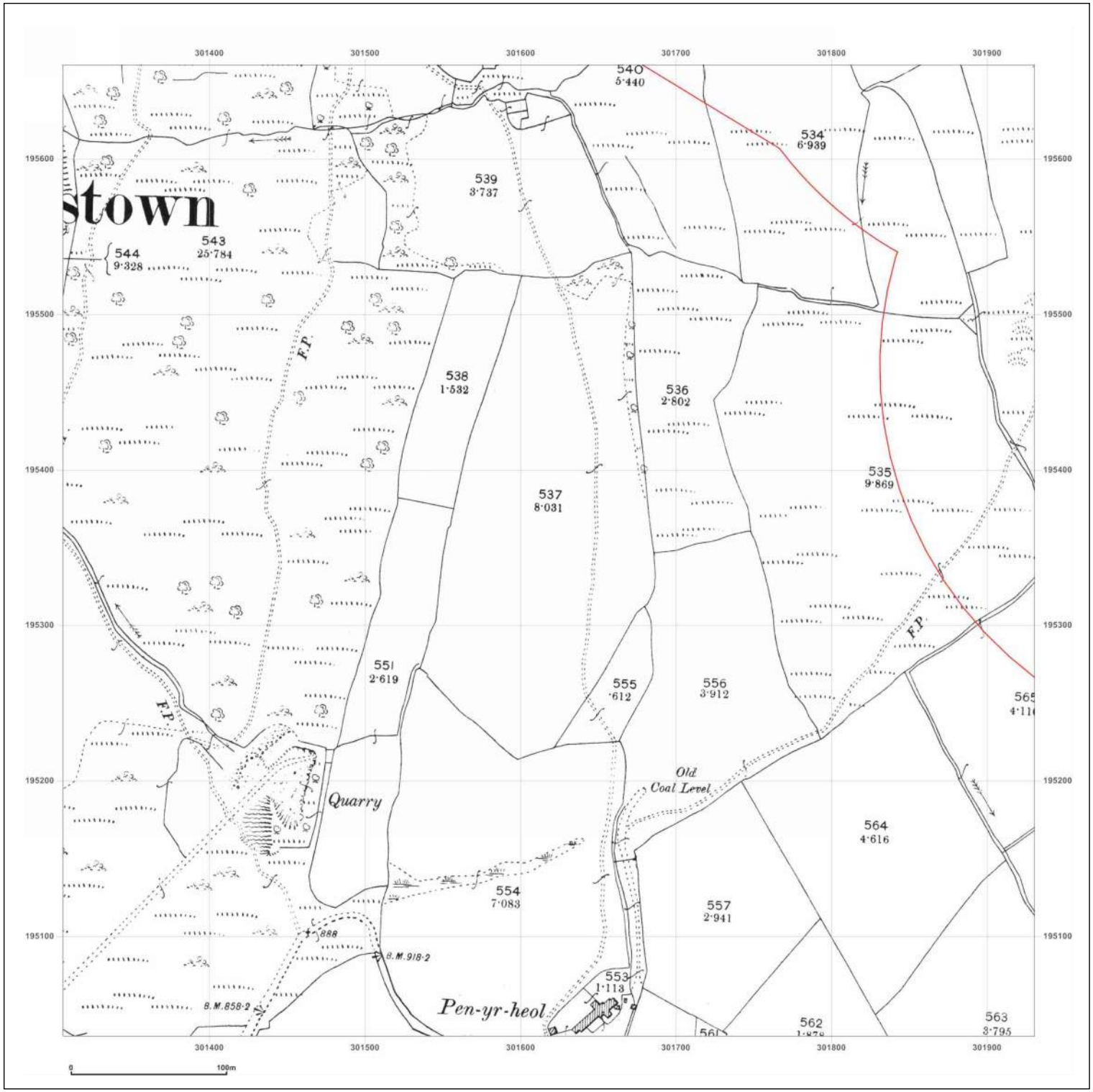

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_1
Grid Ref: 301618, 195348

Map Name: County Series
Map date: 1900
Scale: 1:2,500
Printed at: 1:2,500

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

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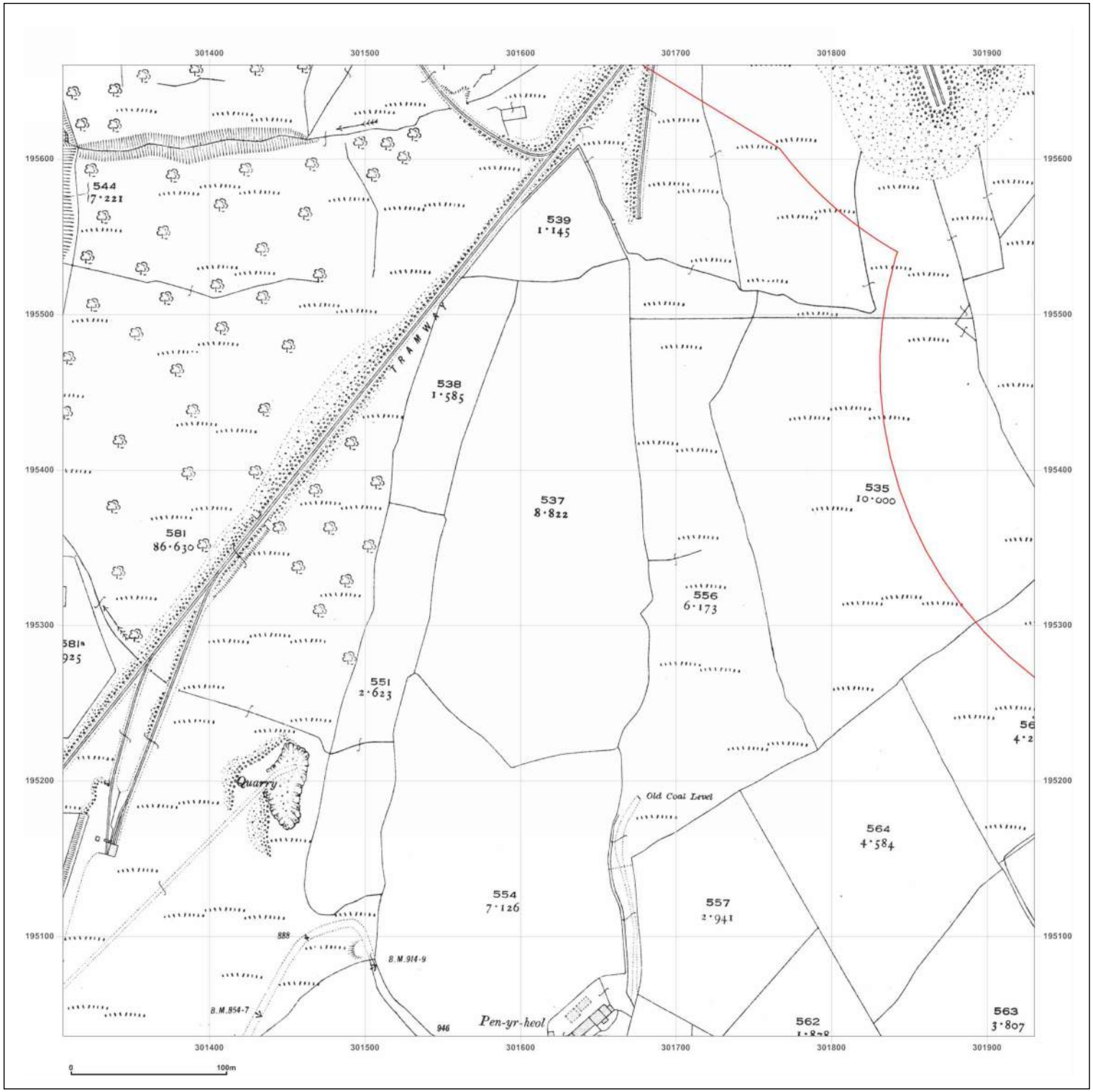

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_1
Grid Ref: 301618, 195348

Map Name: County Series
Map date: **1920**
Scale: 1:2,500
Printed at: 1:2,500

N
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Surveyed 1920
Revised 1920
Edition N/A
Copyright N/A
Levelled N/A

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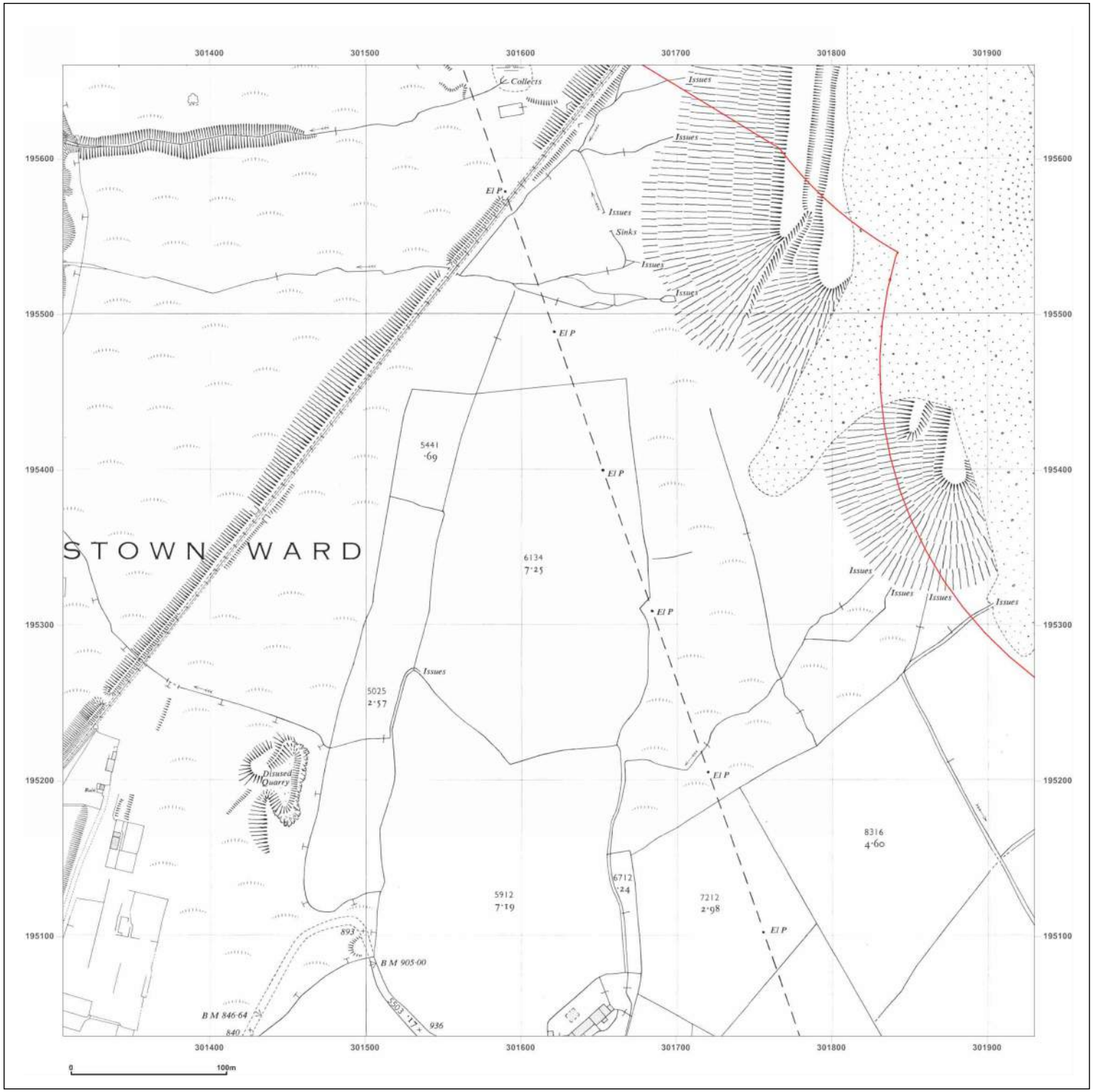

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_1
Grid Ref: 301618, 195348

Map Name: National Grid
Map date: **1958**
Scale: 1:2,500
Printed at: 1:2,500

N
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Surveyed 1958
Revised 1958
Edition 1959
Copyright 1959
Levelled 1948

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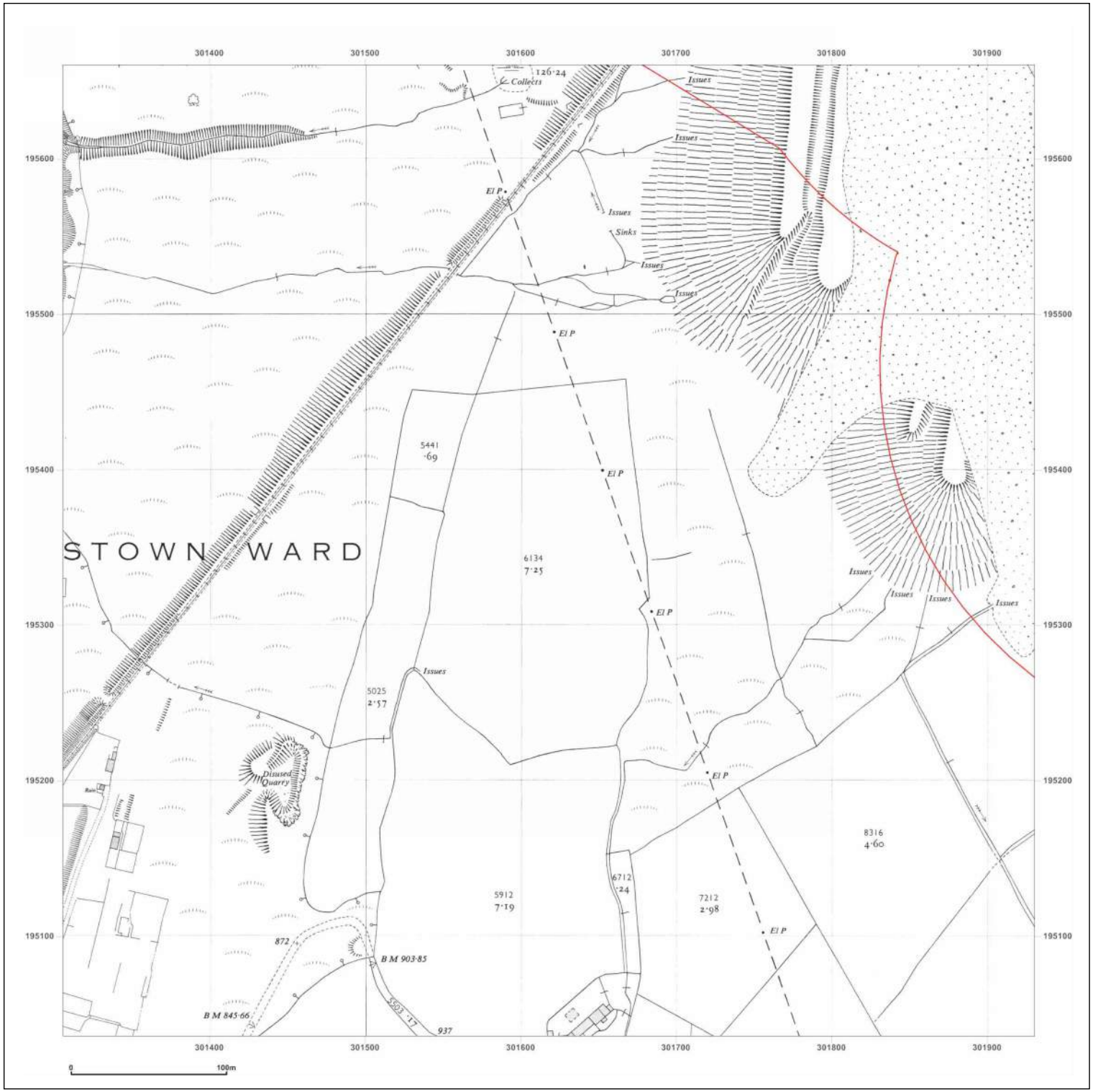

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_1
Grid Ref: 301618, 195348

Map Name: National Grid
Map date: **1961**
Scale: 1:2,500
Printed at: 1:2,500

N
W E
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Surveyed 1961
Revised 1961
Edition 1962
Copyright 1962
Levelled 1957

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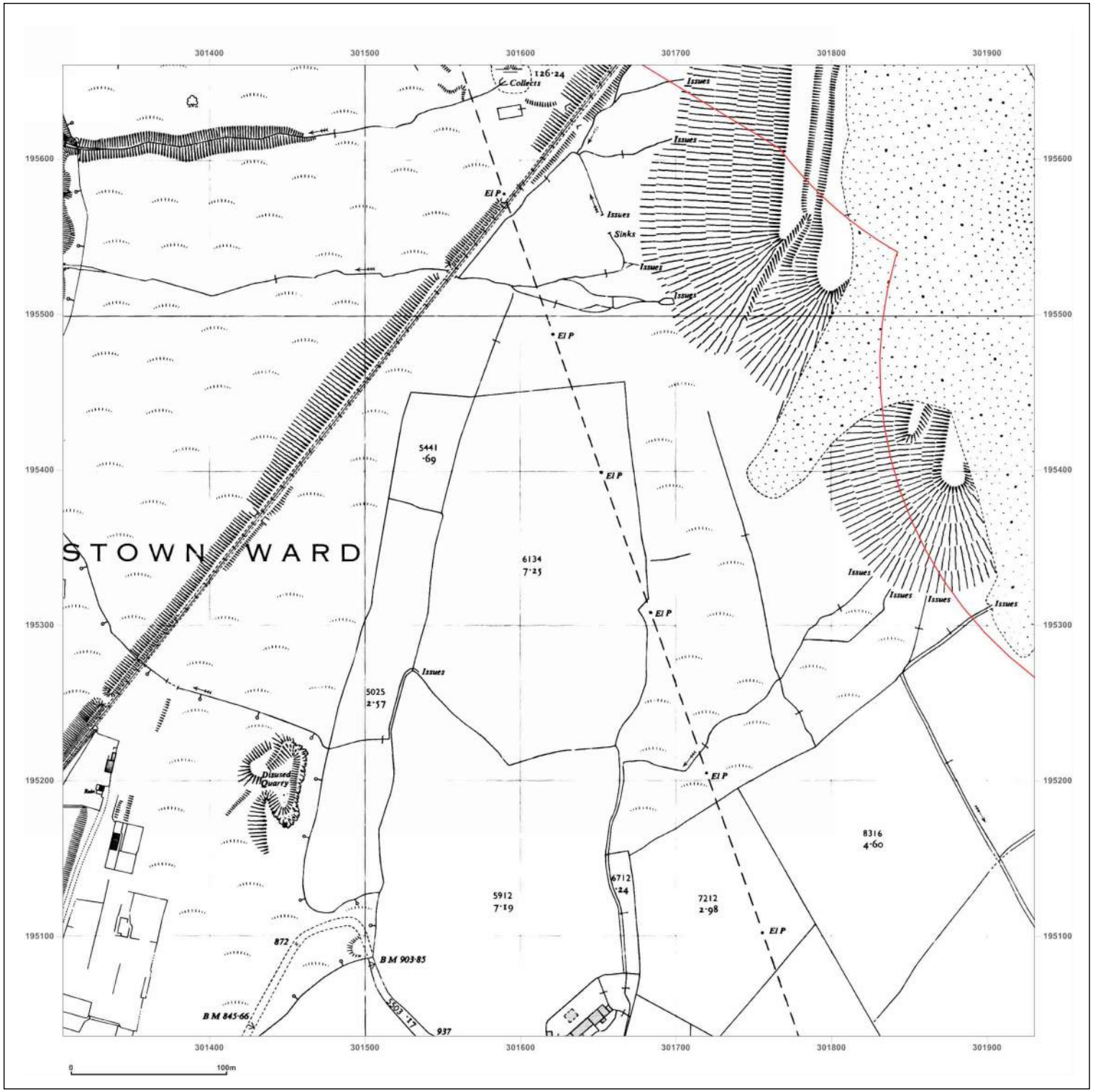

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_1
Grid Ref: 301618, 195348

Map Name: National Grid
Map date: 1962
Scale: 1:2,500
Printed at: 1:2,500

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

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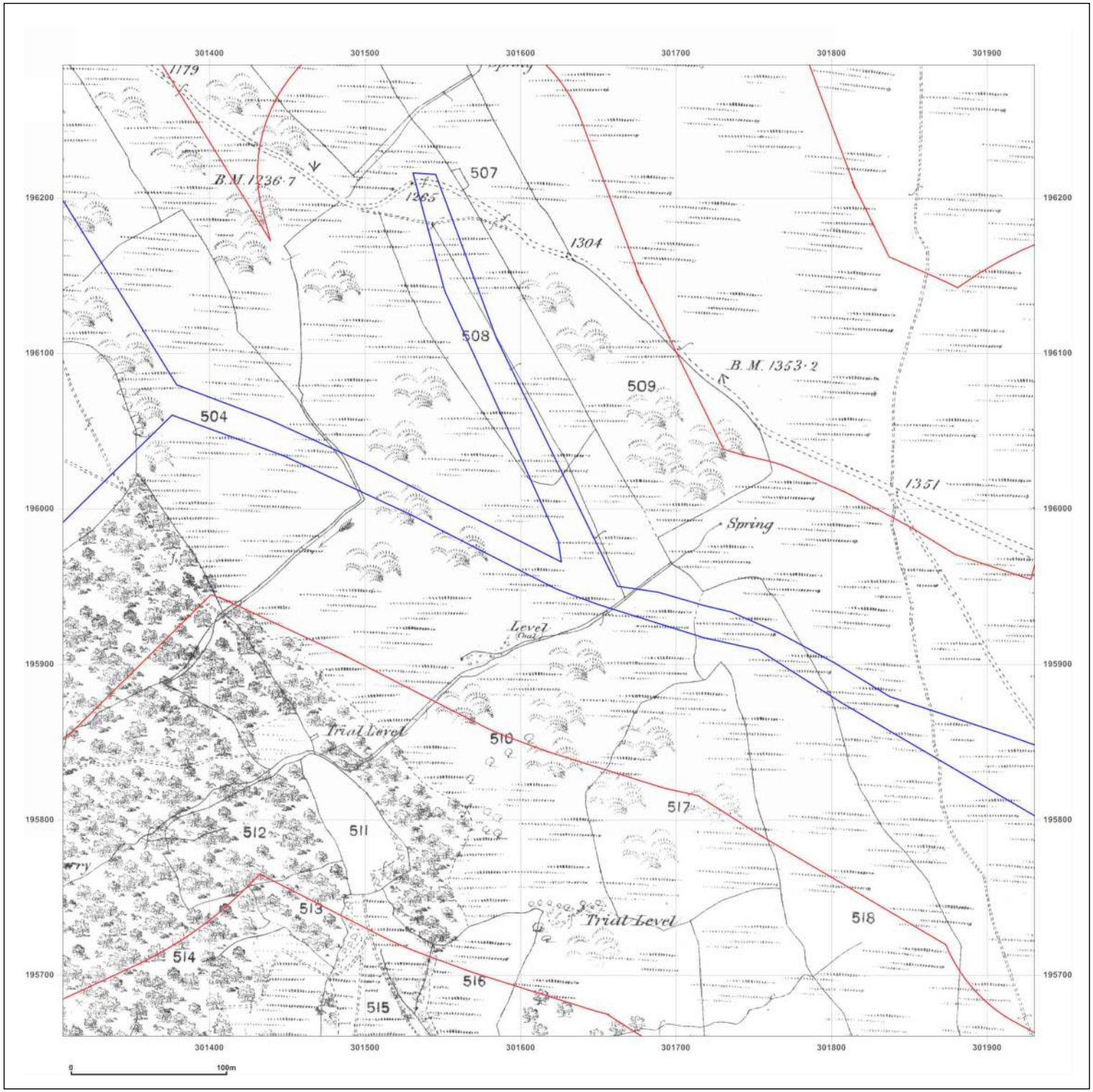

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_2
Grid Ref: 301618, 195973

Map Name: County Series
Map date: **1873**
Scale: 1:2,500
Printed at: 1:2,500

N
W E
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Surveyed 1873
Revised 1873
Edition N/A
Copyright N/A
Levelled N/A

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Production date: 22 September 2020

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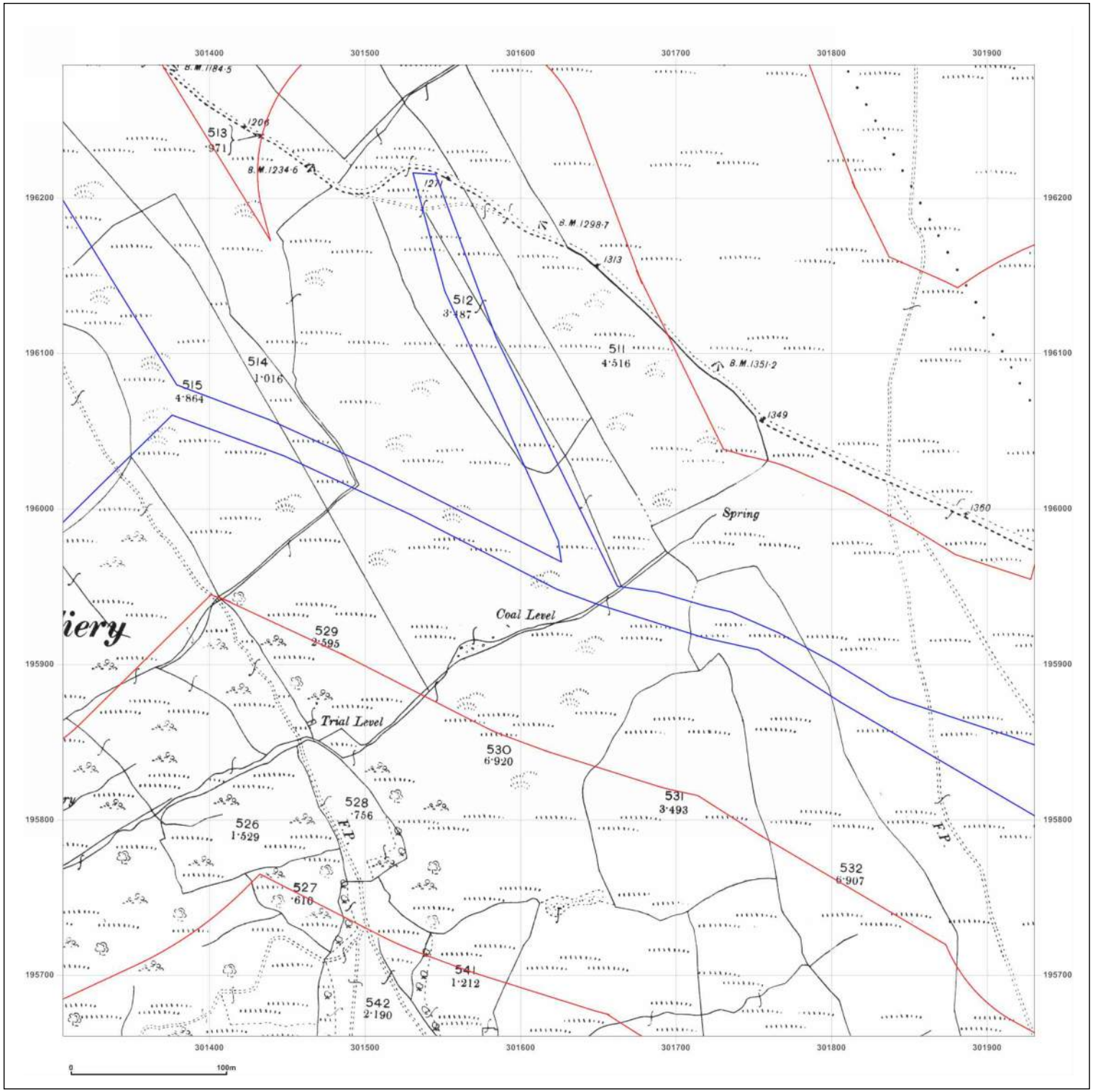

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_2
Grid Ref: 301618, 195973

Map Name: County Series
Map date: 1900
Scale: 1:2,500
Printed at: 1:2,500

N
W E
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Surveyed 1900
Revised 1900
Edition N/A
Copyright N/A
Levelled N/A

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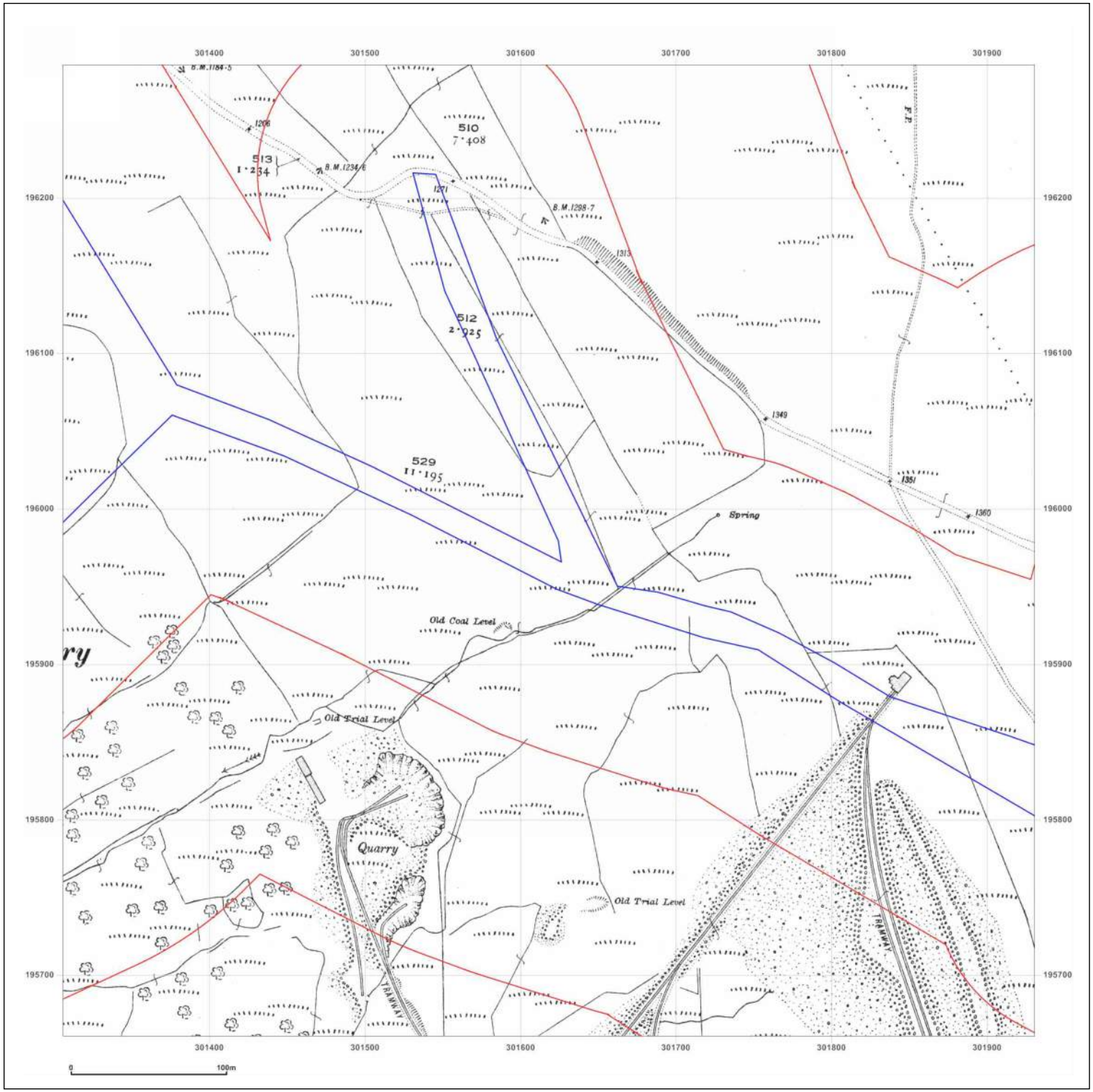

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_2
Grid Ref: 301618, 195973

Map Name: County Series
Map date: **1920**
Scale: 1:2,500
Printed at: 1:2,500

N
W E
S

Surveyed 1920
Revised 1920
Edition N/A
Copyright N/A
Levelled N/A

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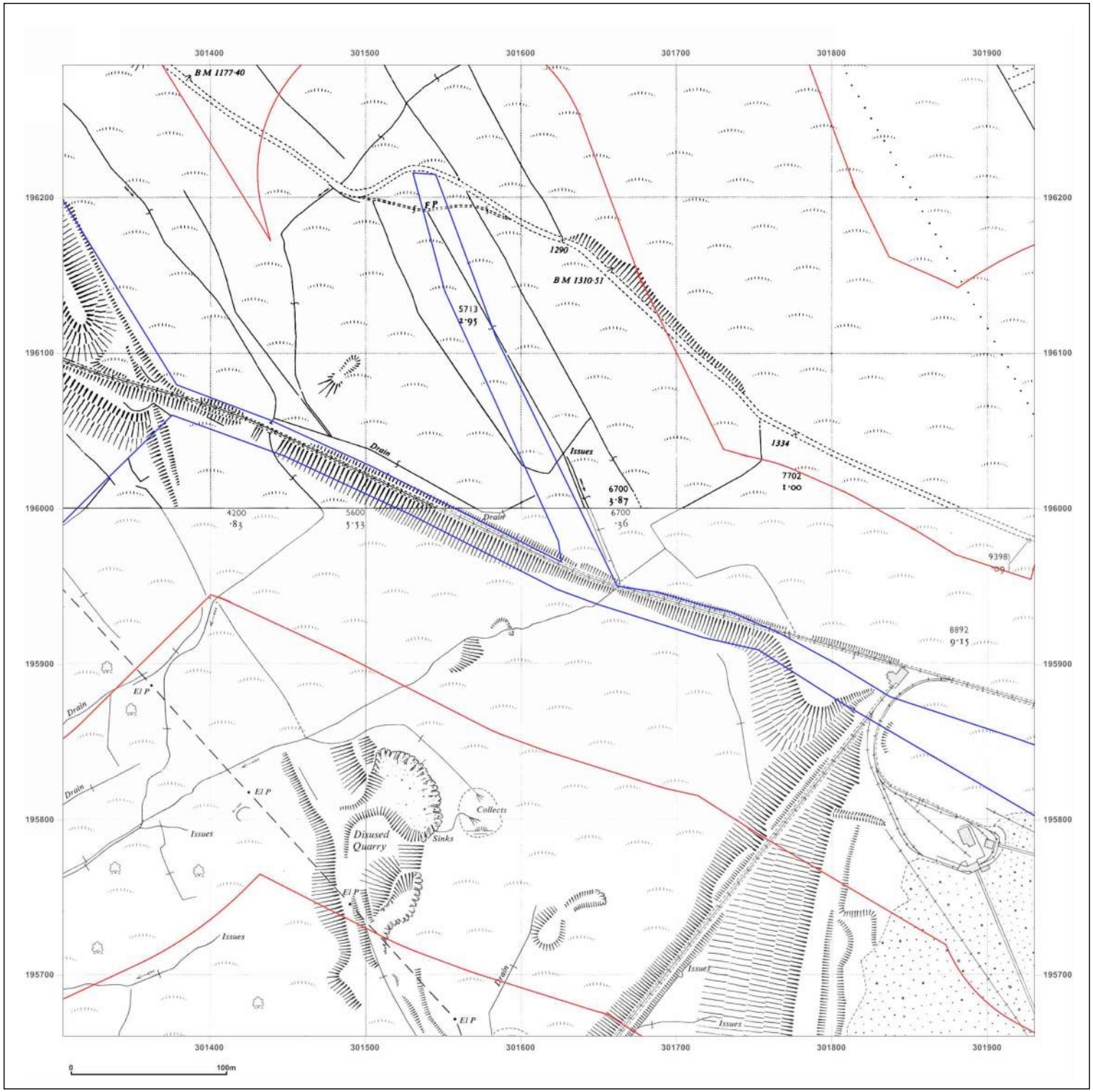

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_2
Grid Ref: 301618, 195973

Map Name: National Grid
Map date: **1958-1961**
Scale: 1:2,500
Printed at: 1:2,500

N
W E
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Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1958
Revised 1958
Edition 1959
Copyright 1959
Levelled 1948

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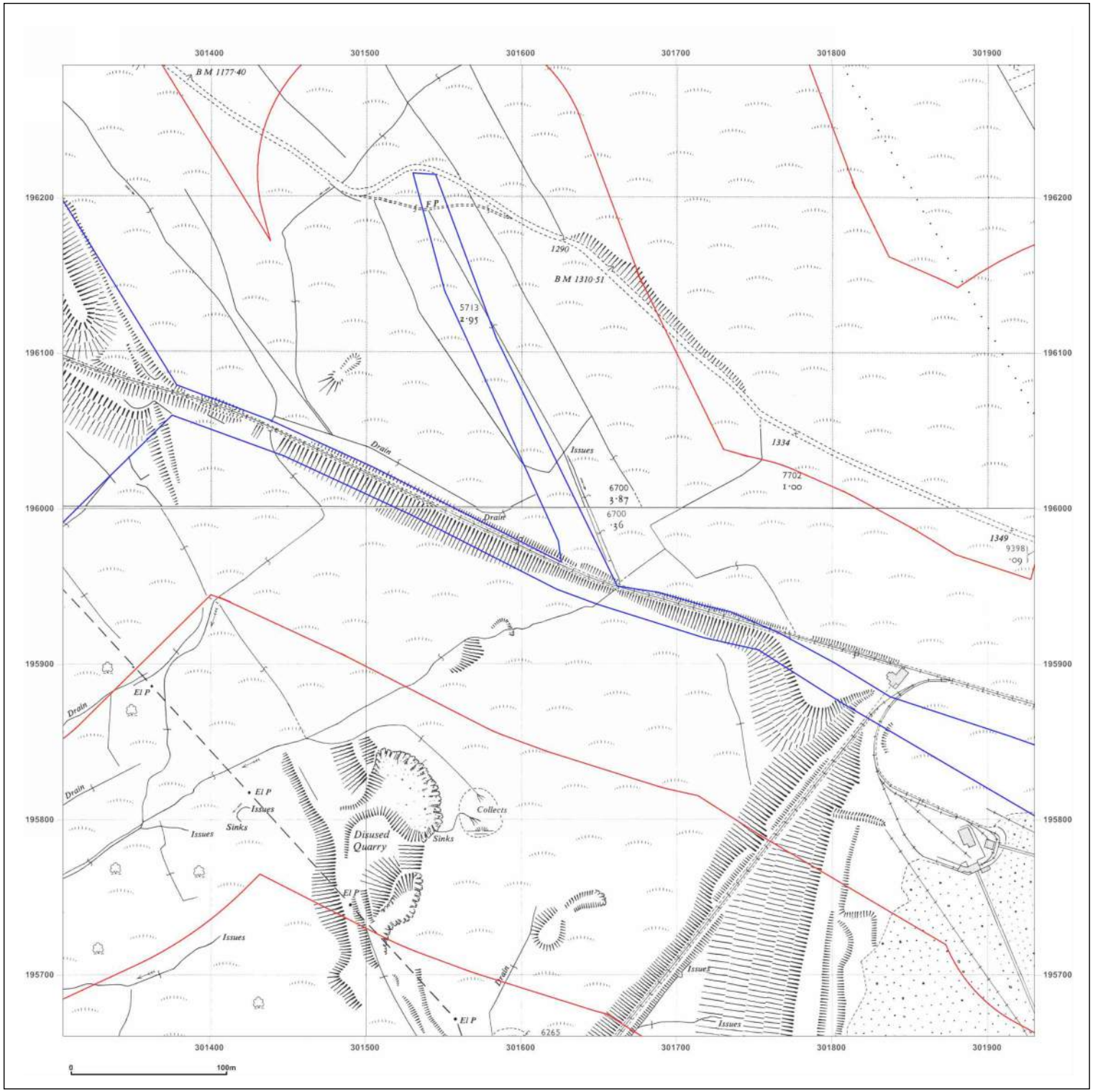

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_2
Grid Ref: 301618, 195973

Map Name: National Grid

Map date: **1961**

Scale: 1:2,500

Printed at: 1:2,500

N
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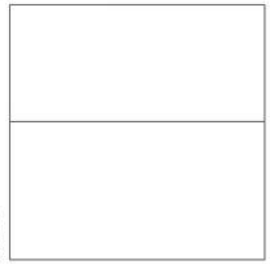
Surveyed 1961
Revised 1961
Edition 1962
Copyright 1962
Levelled 1957



Surveyed 1961
Revised 1961
Edition 1962
Copyright 1962
Levelled 1957

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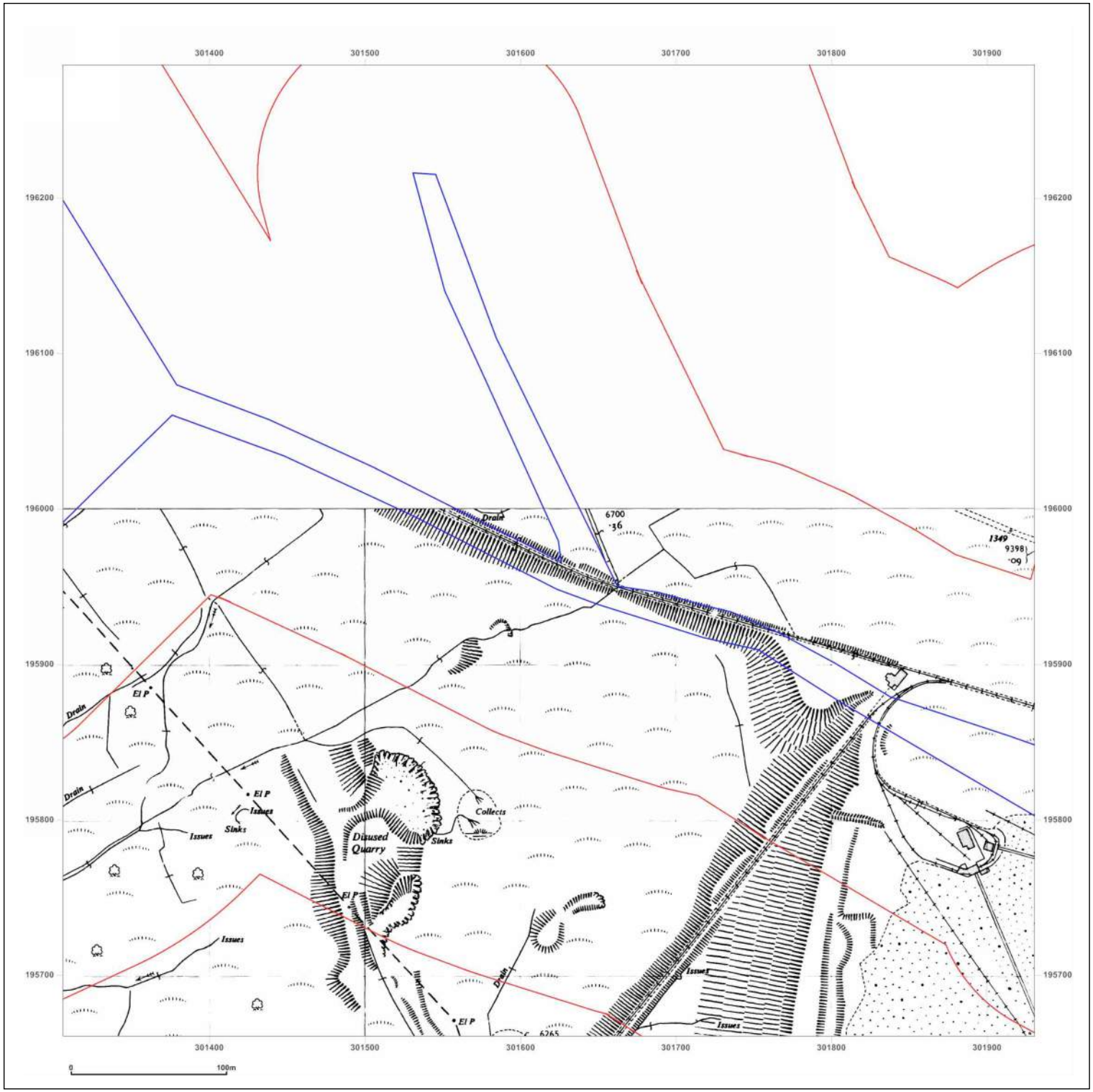

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_2
Grid Ref: 301618, 195973

Map Name: National Grid
Map date: **1962**
Scale: 1:2,500
Printed at: 1:2,500

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

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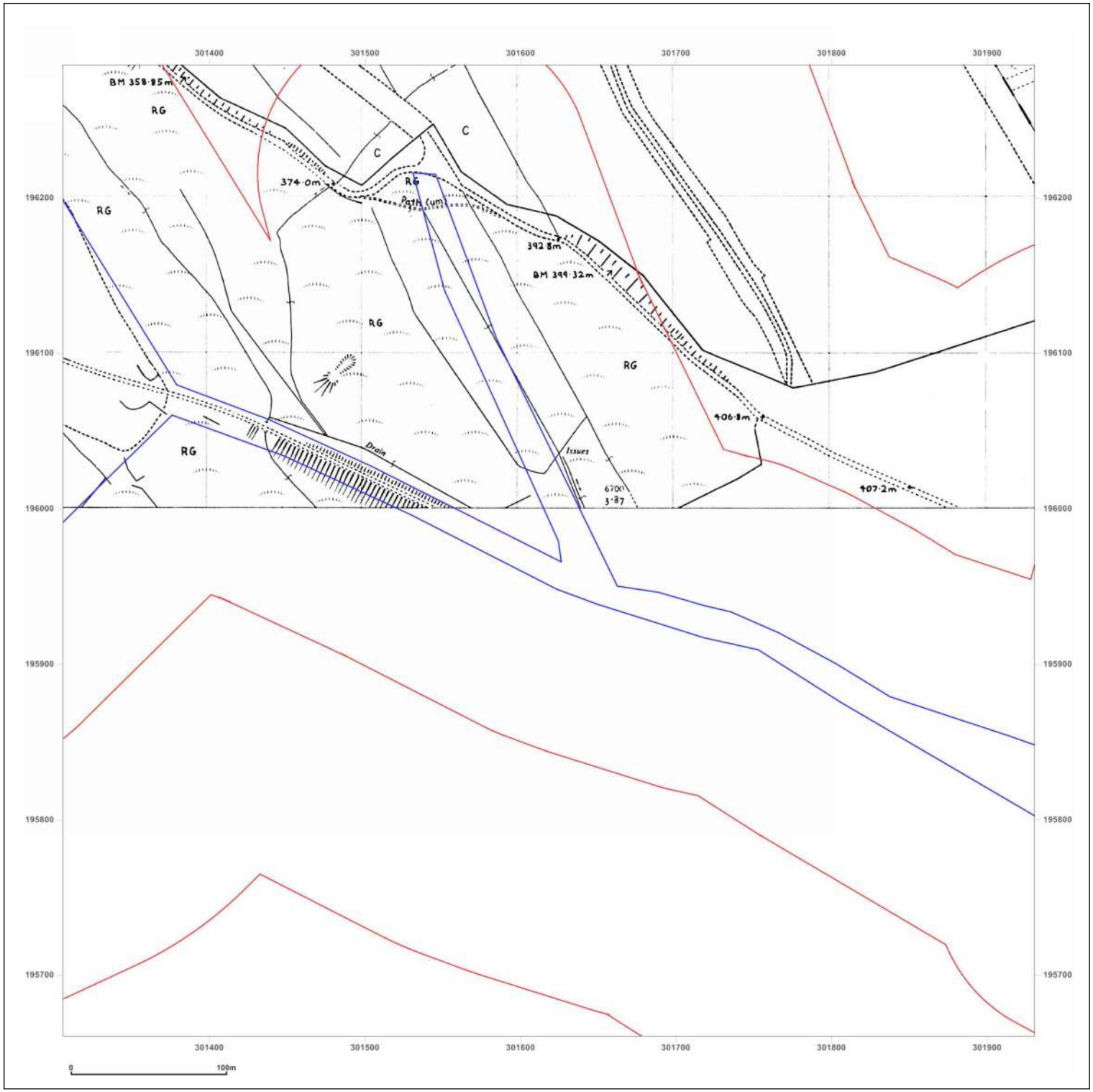

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_2
Grid Ref: 301618, 195973

Map Name: National Grid
Map date: **1986**
Scale: 1:2,500
Printed at: 1:2,500

N
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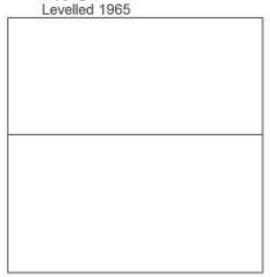
Surveyed 1965
Revised 1986
Edition N/A
Copyright 1986
Levelled 1965



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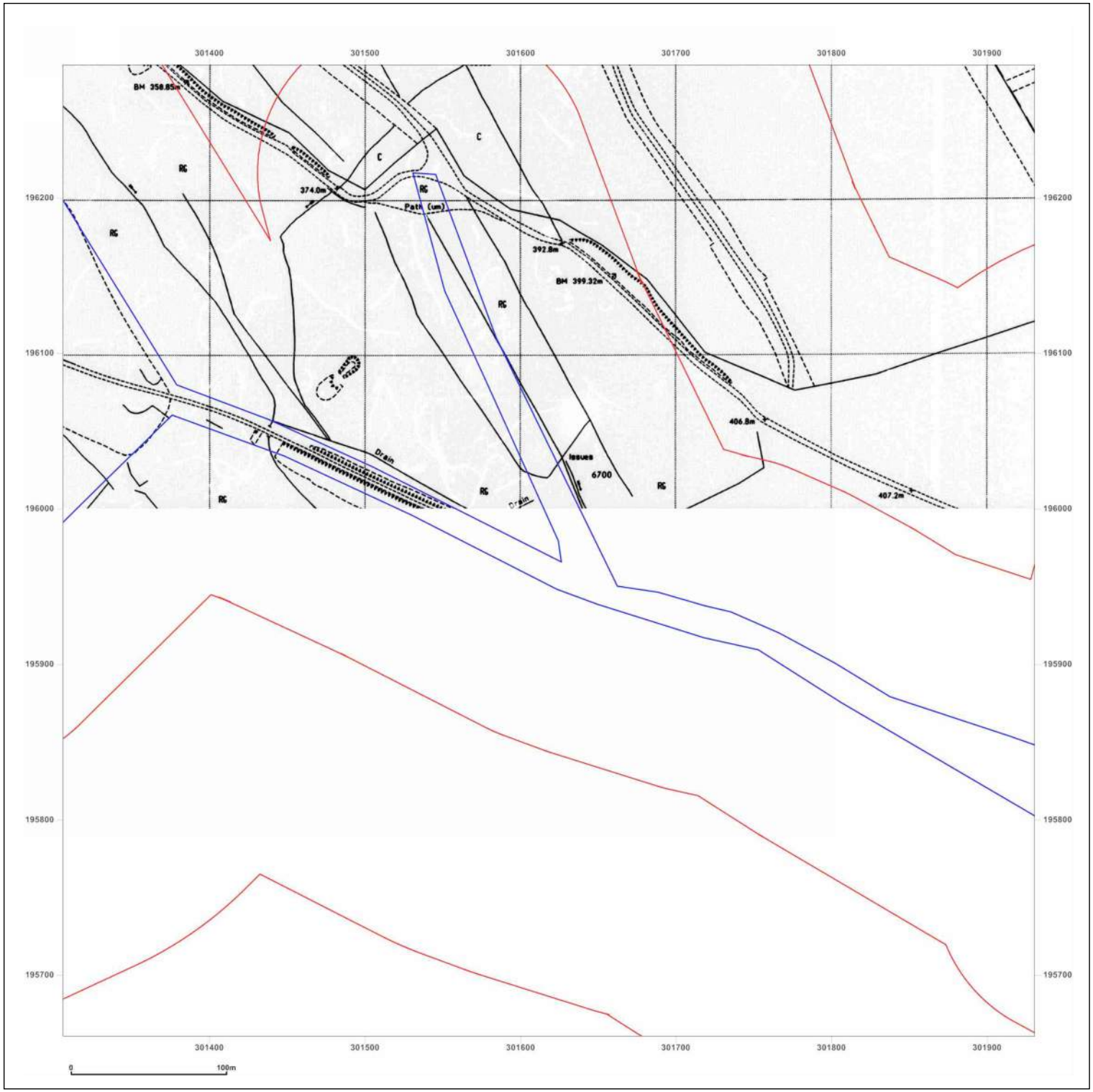

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_2
Grid Ref: 301618, 195973

Map Name: National Grid
Map date: 1993
Scale: 1:2,500
Printed at: 1:2,500

N
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Surveyed N/A
Revised N/A
Edition N/A
Copyright 1993
Levelled N/A

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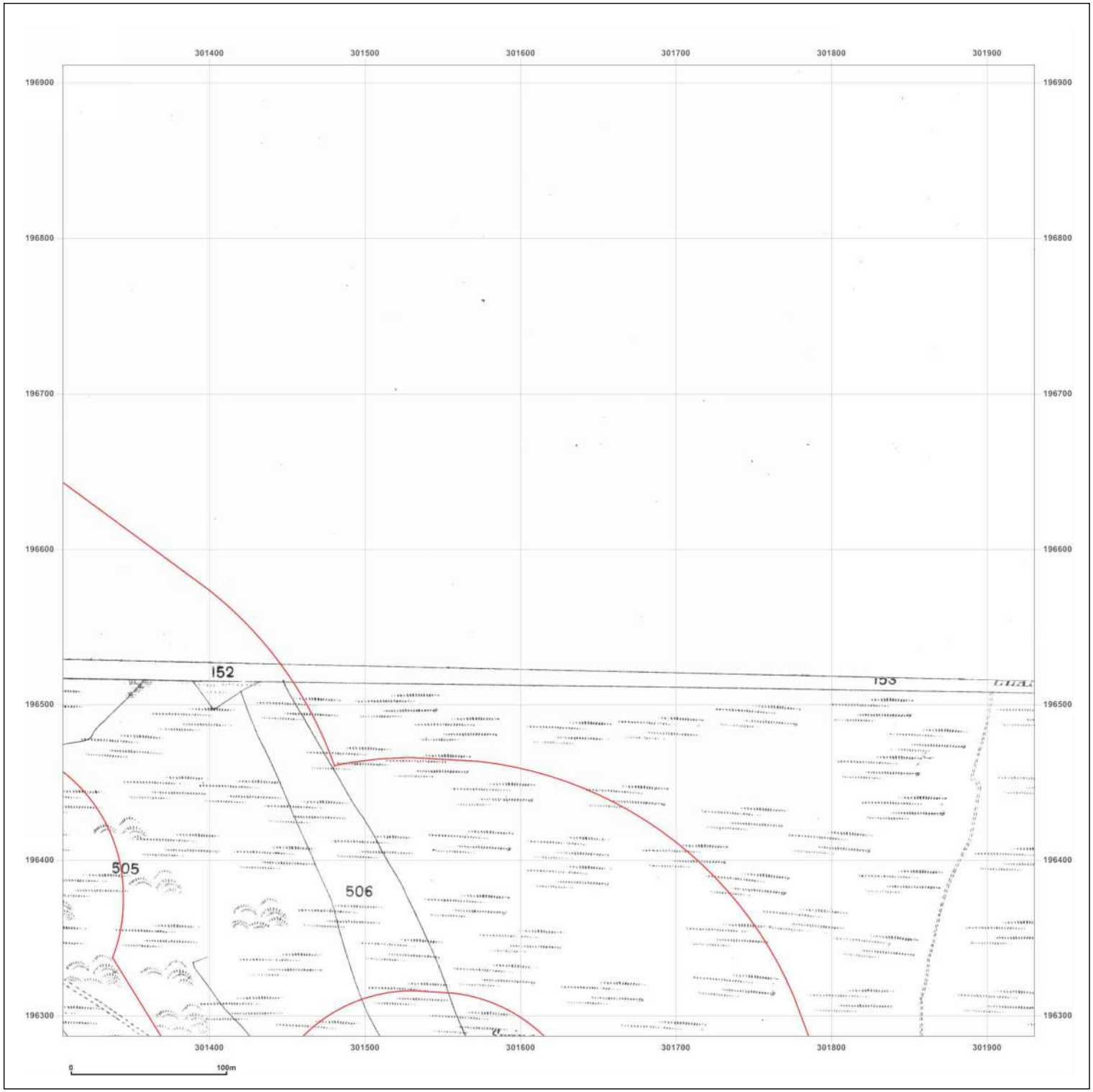

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_3
Grid Ref: 301618, 196599

Map Name: County Series
Map date: **1869-1873**
Scale: 1:2,500
Printed at: 1:2,500

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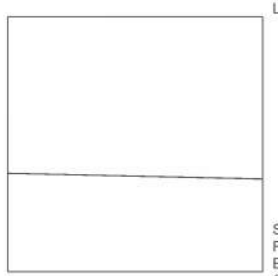

Surveyed 1869
Revised 1869
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1873
Revised 1873
Edition N/A
Copyright N/A
Levelled N/A

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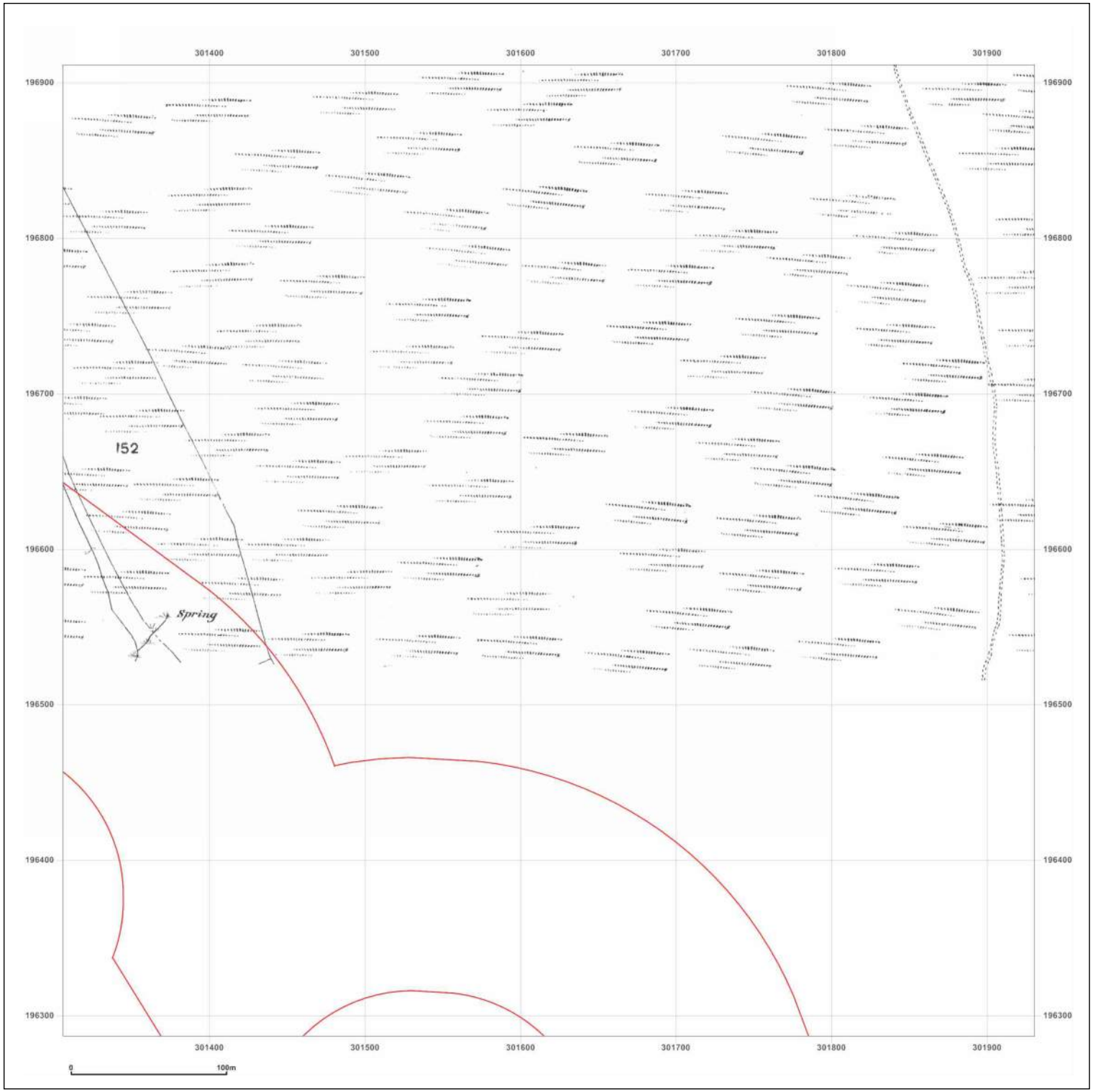

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_3
Grid Ref: 301618, 196599

Map Name: County Series
Map date: **1877**
Scale: 1:2,500
Printed at: 1:2,500

N
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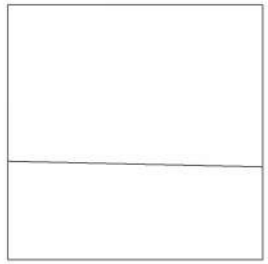
Surveyed 1877
Revised 1877
Edition N/A
Copyright N/A
Levelled N/A



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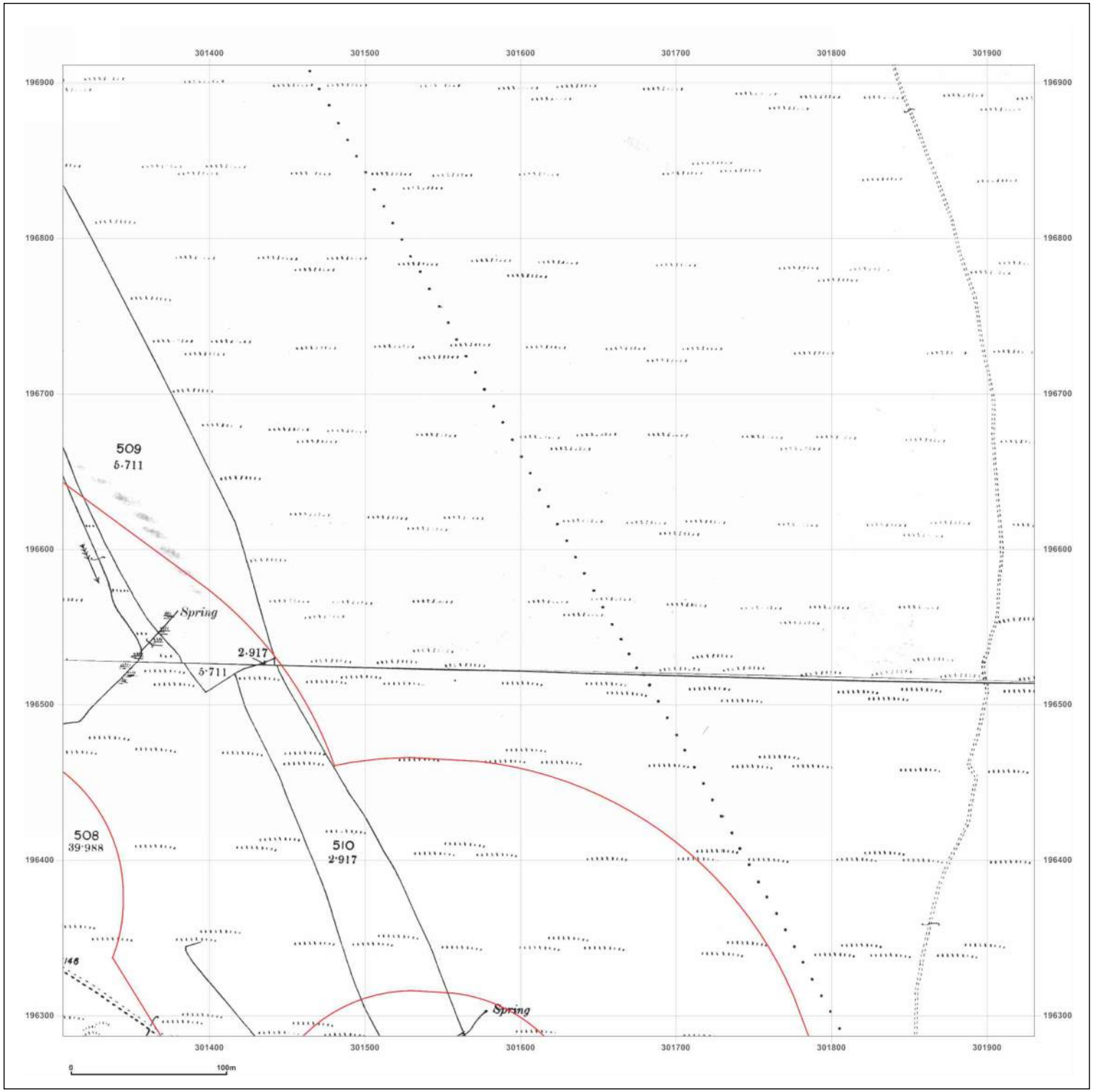

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_3
Grid Ref: 301618, 196599

Map Name: County Series
Map date: 1900
Scale: 1:2,500
Printed at: 1:2,500

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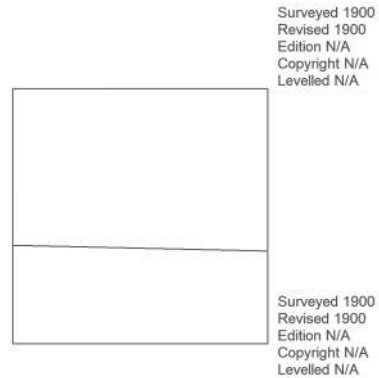

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Production date: 22 September 2020

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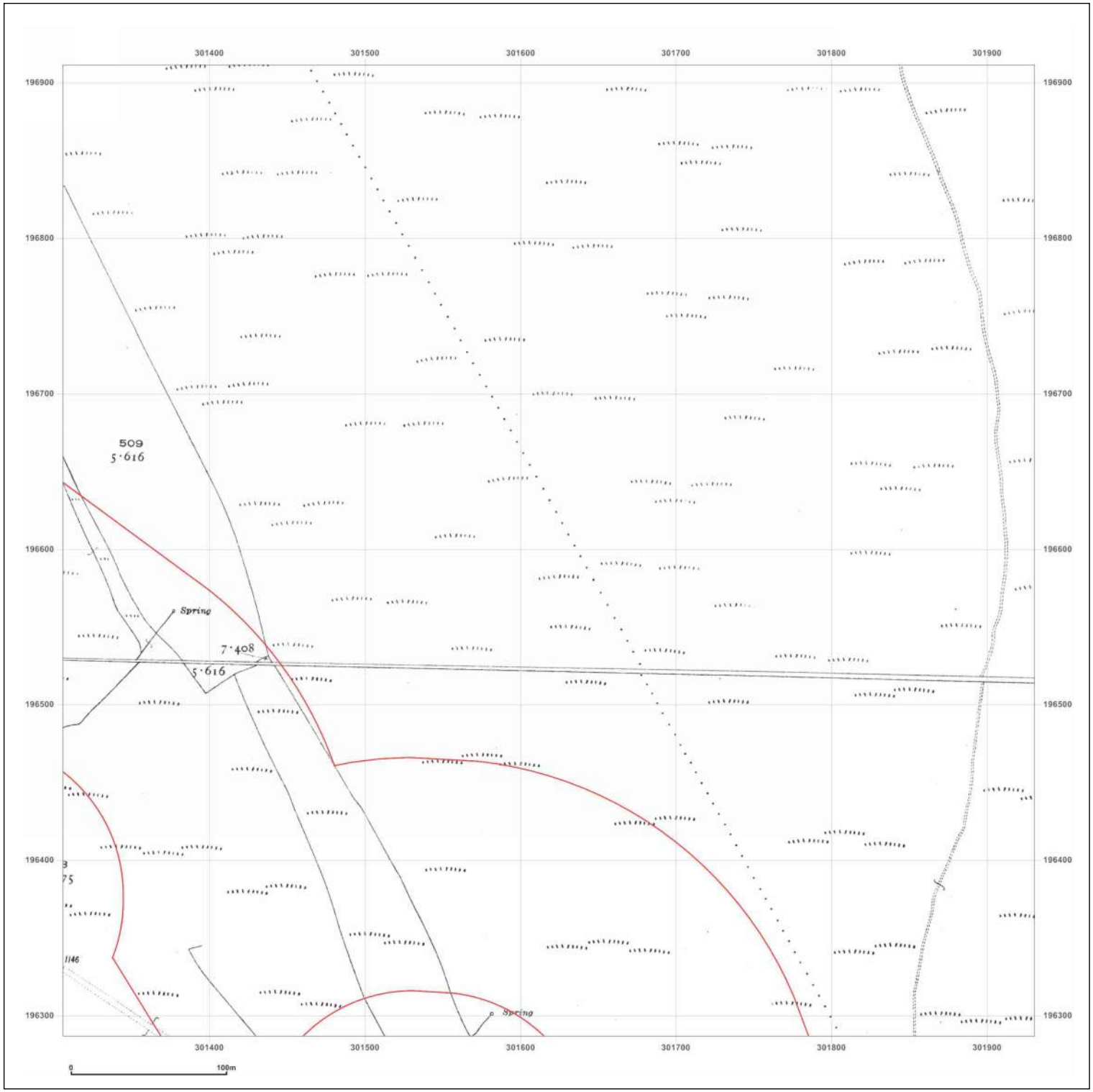

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_3
Grid Ref: 301618, 196599

Map Name: County Series
Map date: **1919-1920**
Scale: 1:2,500
Printed at: 1:2,500

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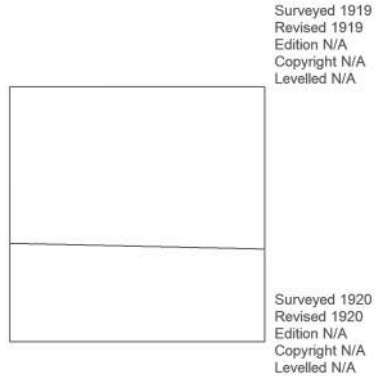

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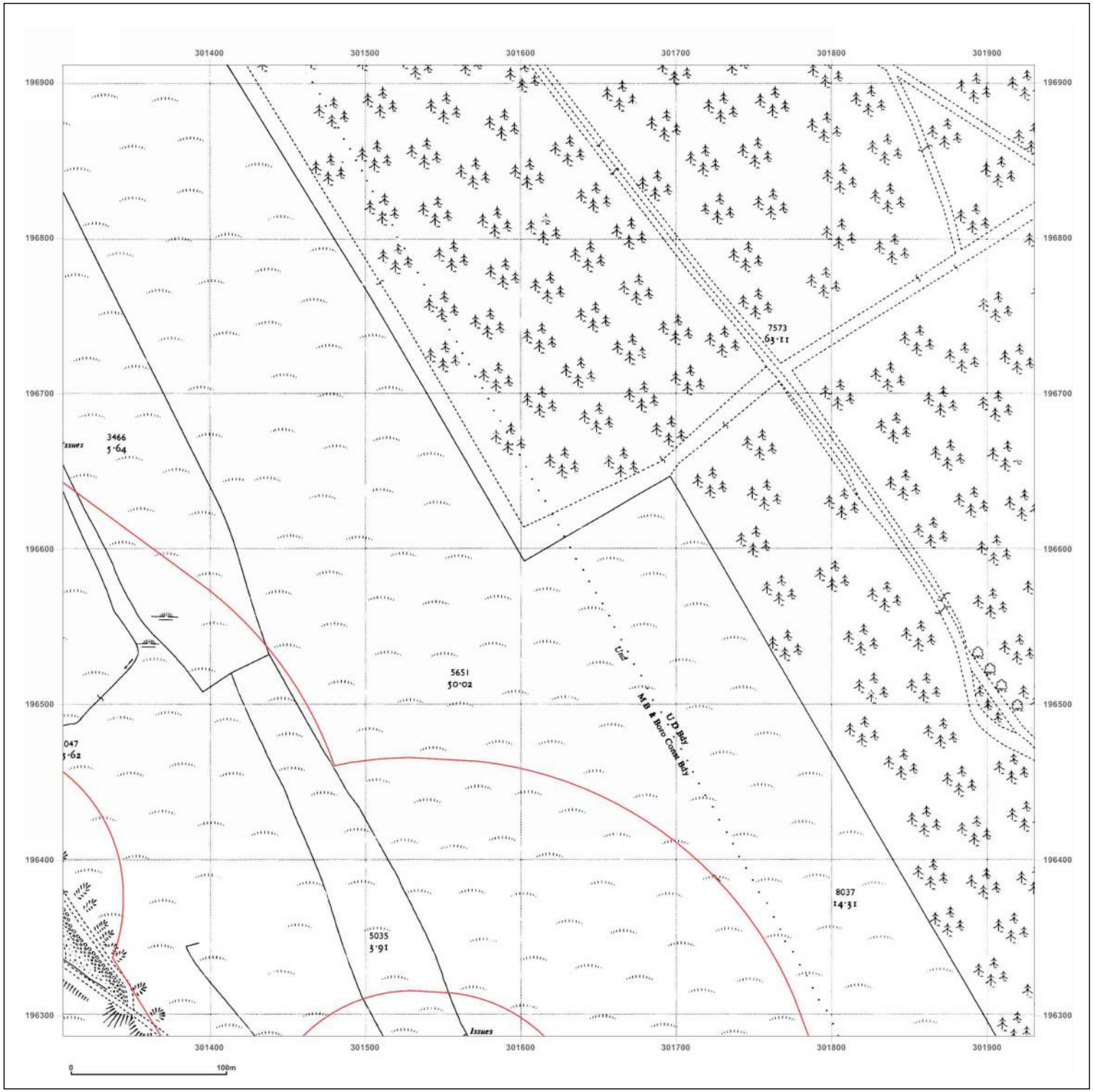

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_3
Grid Ref: 301618, 196599

Map Name: National Grid
Map date: 1961
Scale: 1:2,500
Printed at: 1:2,500

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

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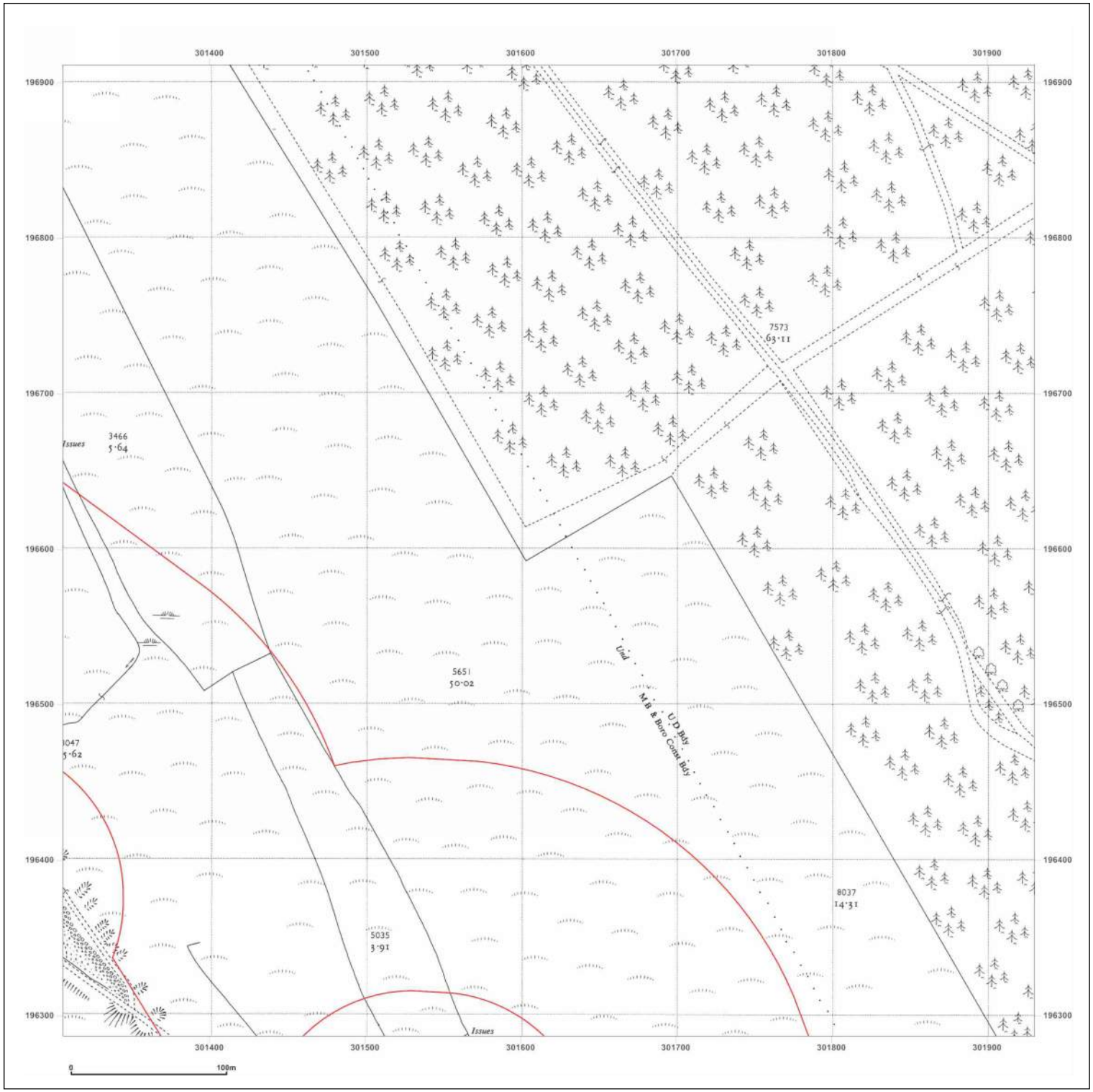

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_3
Grid Ref: 301618, 196599

Map Name: National Grid

Map date: **1961**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
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Surveyed 1961
Revised 1961
Edition 1962
Copyright 1962
Levelled 1957

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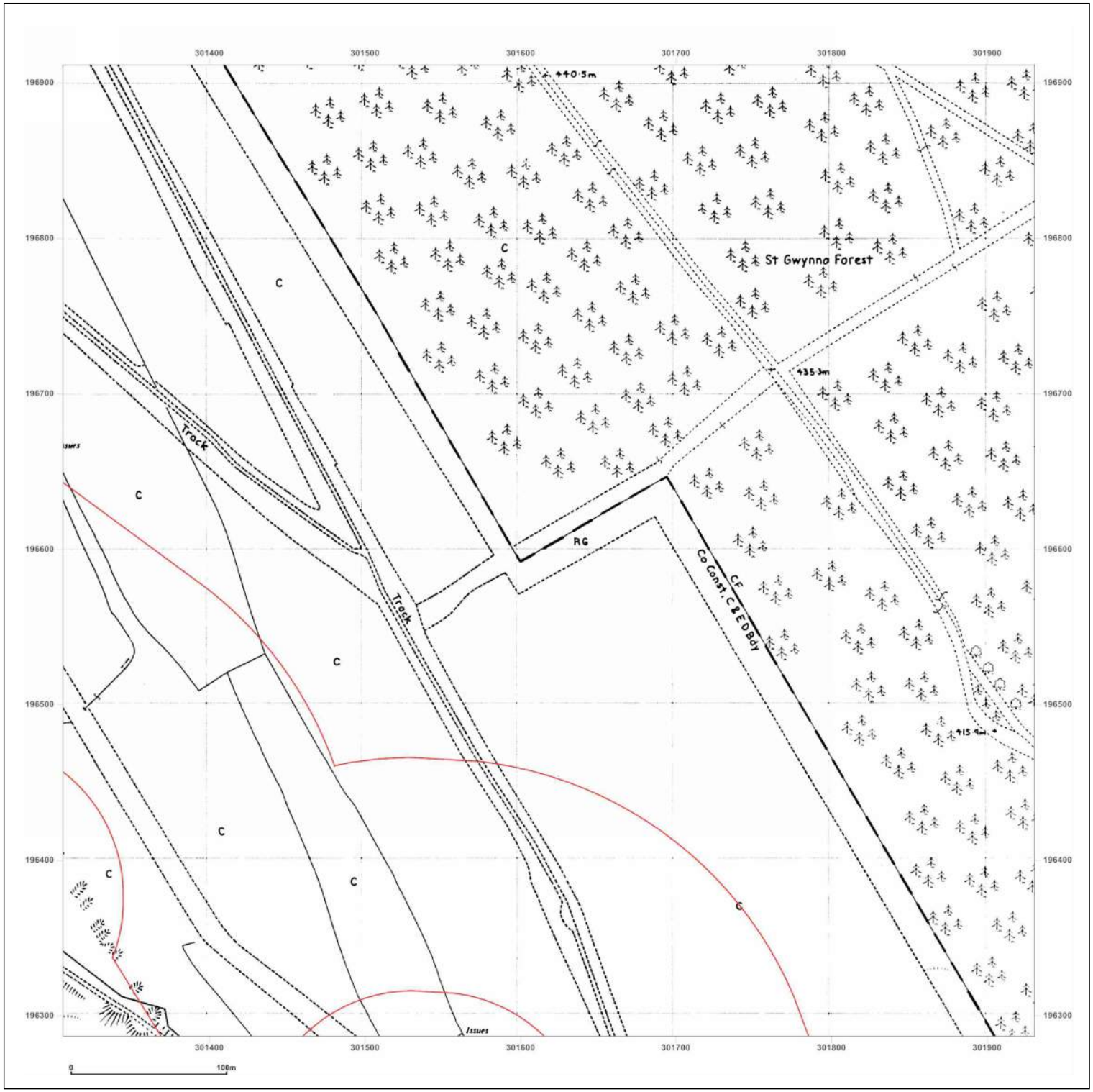

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_3
Grid Ref: 301618, 196599

Map Name: National Grid
Map date: **1986**
Scale: 1:2,500
Printed at: 1:2,500

N
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Surveyed 1965
Revised 1986
Edition N/A
Copyright 1986
Levelled 1965

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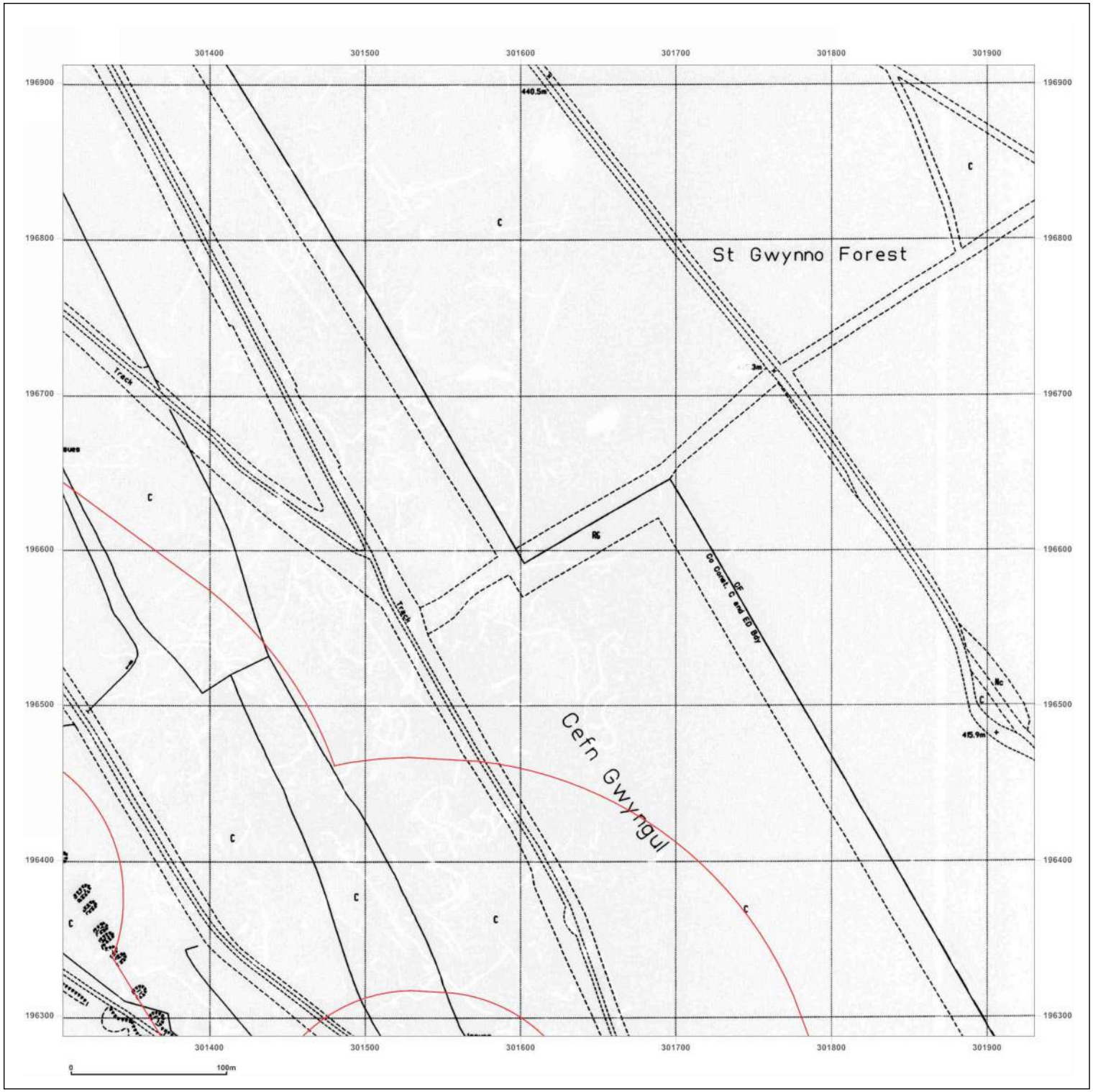

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_2_3
Grid Ref: 301618, 196599

Map Name: National Grid

Map date: **1993**

Scale: 1:2,500

Printed at: 1:2,500

N
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Surveyed N/A
Revised N/A
Edition N/A
Copyright 1993
Levelled N/A

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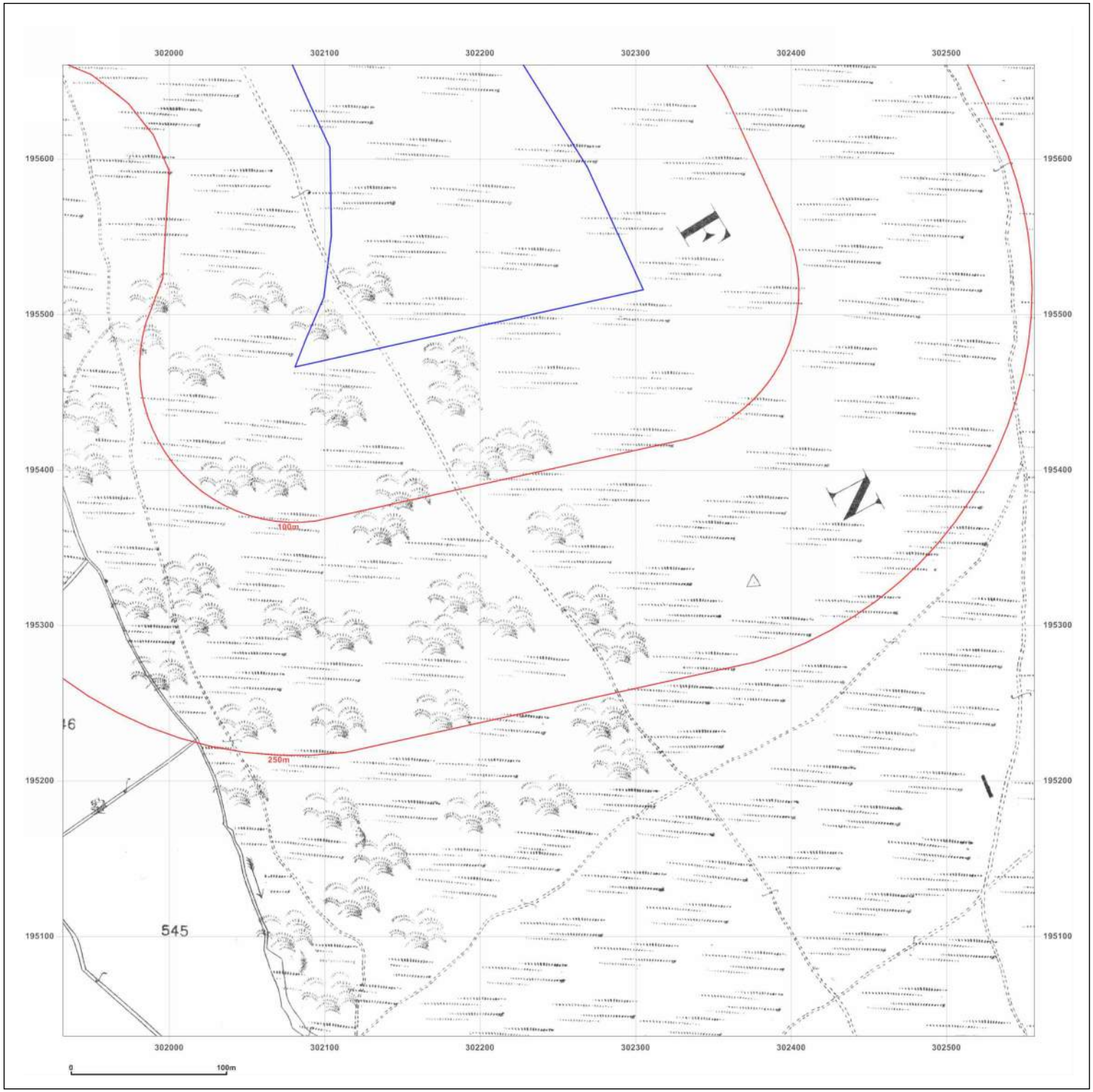

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_3_1
Grid Ref: 302244, 195348

Map Name: County Series

Map date: **1873**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1873
Revised 1873
Edition N/A
Copyright N/A
Levelled N/A

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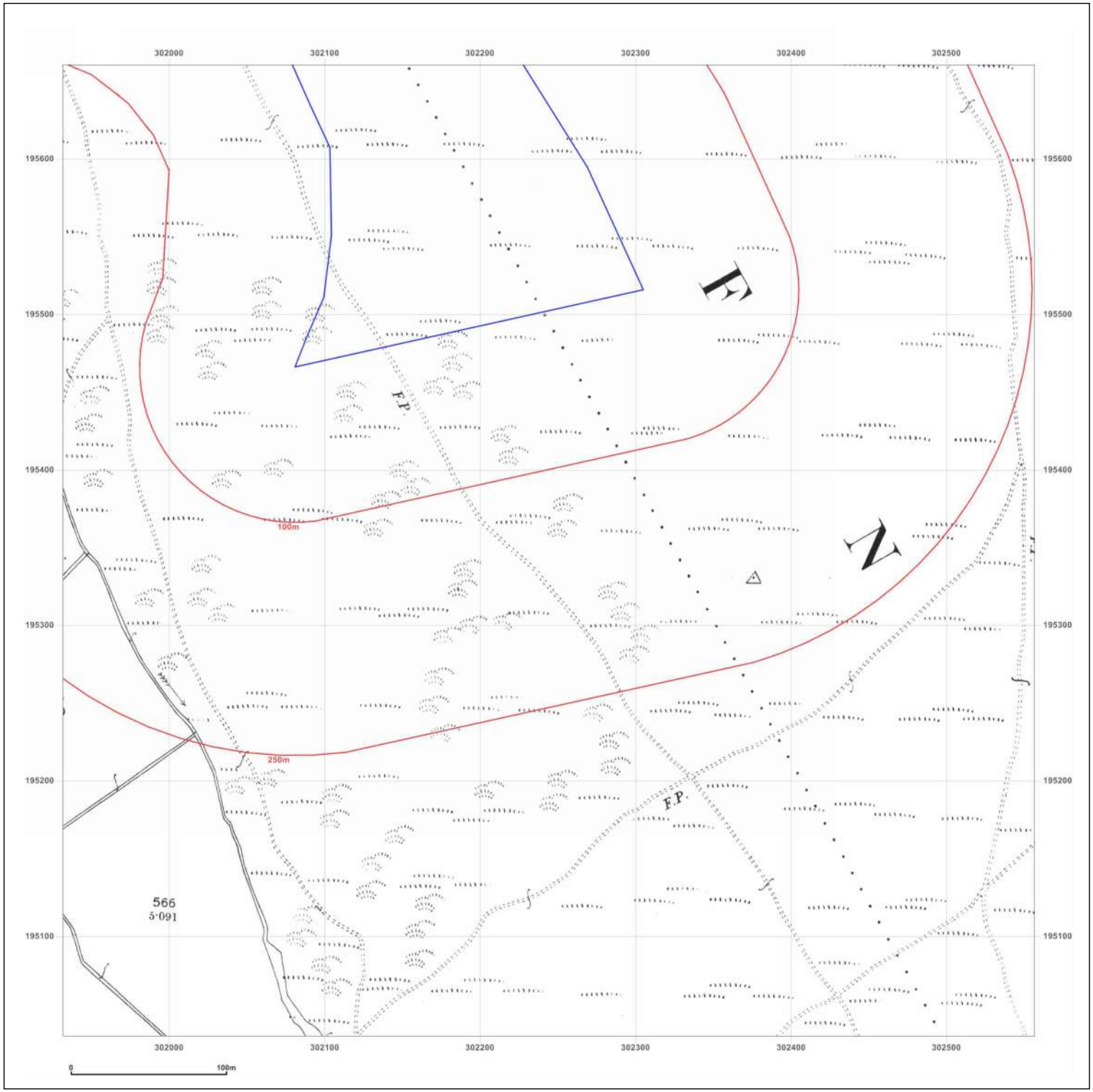

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_3_1
Grid Ref: 302244, 195348

Map Name: County Series
Map date: 1900
Scale: 1:2,500
Printed at: 1:2,500

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

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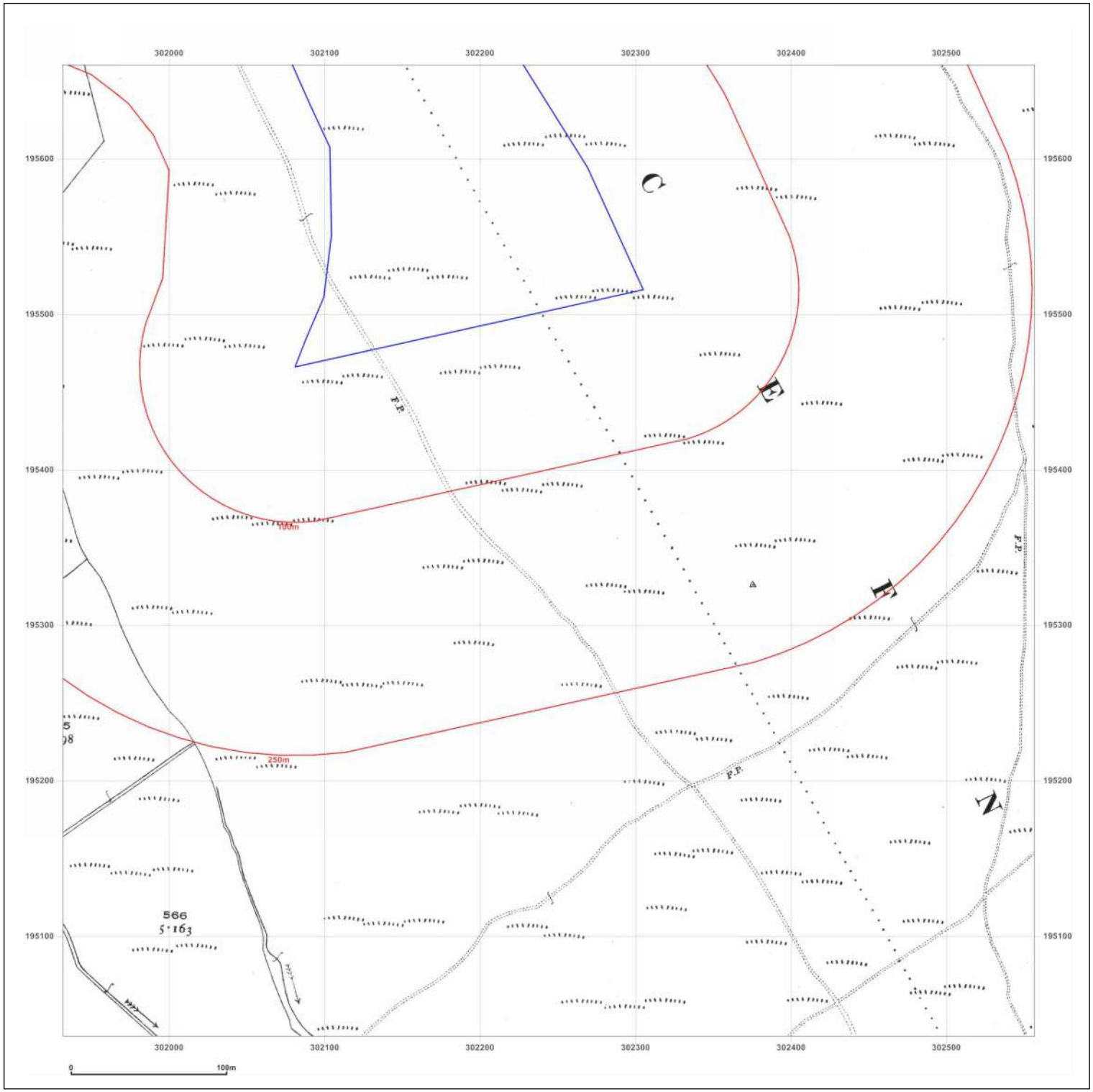

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_3_1
Grid Ref: 302244, 195348

Map Name: County Series
Map date: **1920**
Scale: 1:2,500
Printed at: 1:2,500

N
W E
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Surveyed 1920
Revised 1920
Edition N/A
Copyright N/A
Levelled N/A

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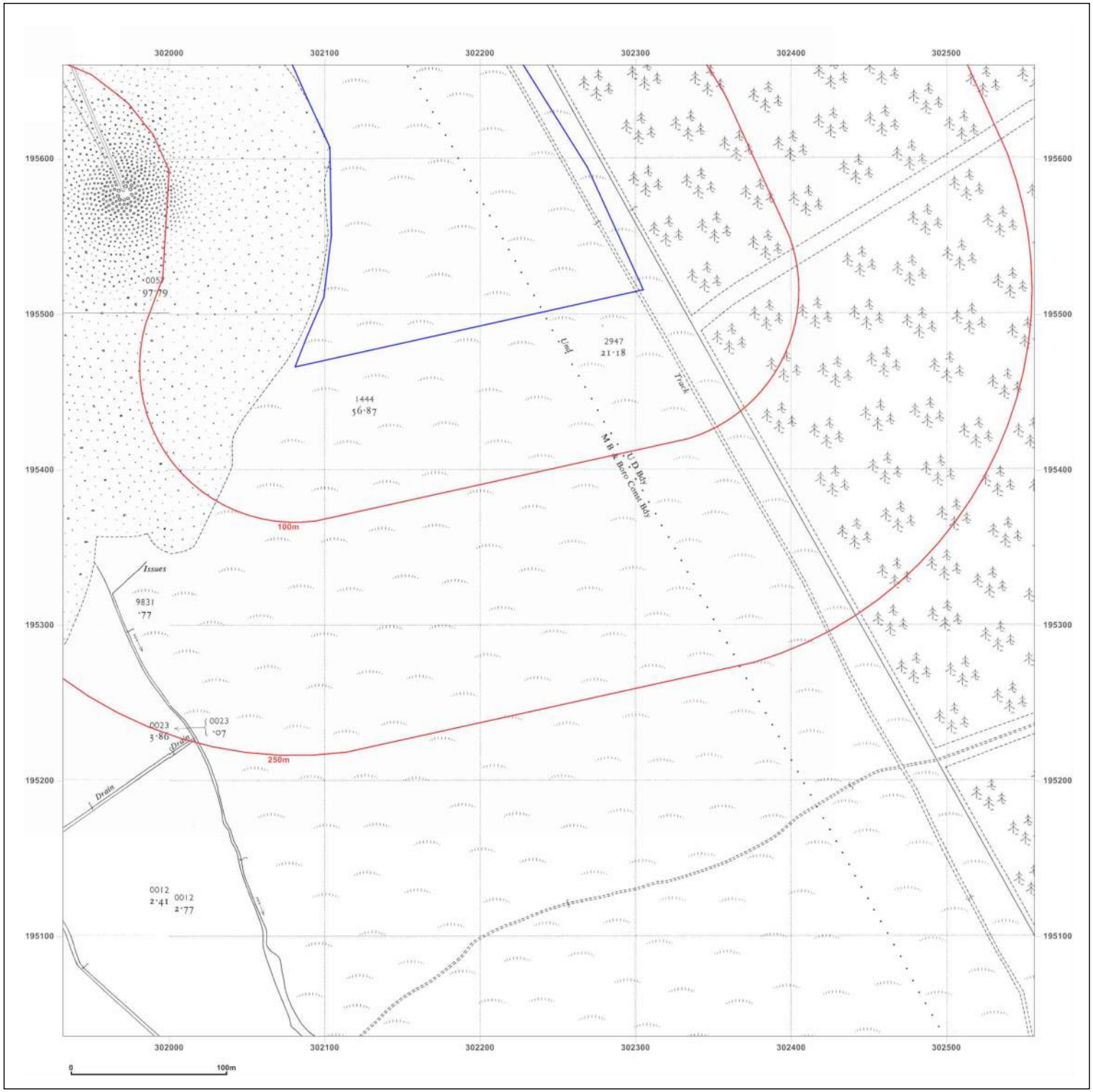

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_3_1
Grid Ref: 302244, 195348

Map Name: National Grid
Map date: **1958-1960**
Scale: 1:2,500
Printed at: 1:2,500

N
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Surveyed 1958
Revised 1958
Edition 1959
Copyright 1959
Levelled 1948

Surveyed 1960
Revised 1960
Edition N/A
Copyright 1962
Levelled 1957

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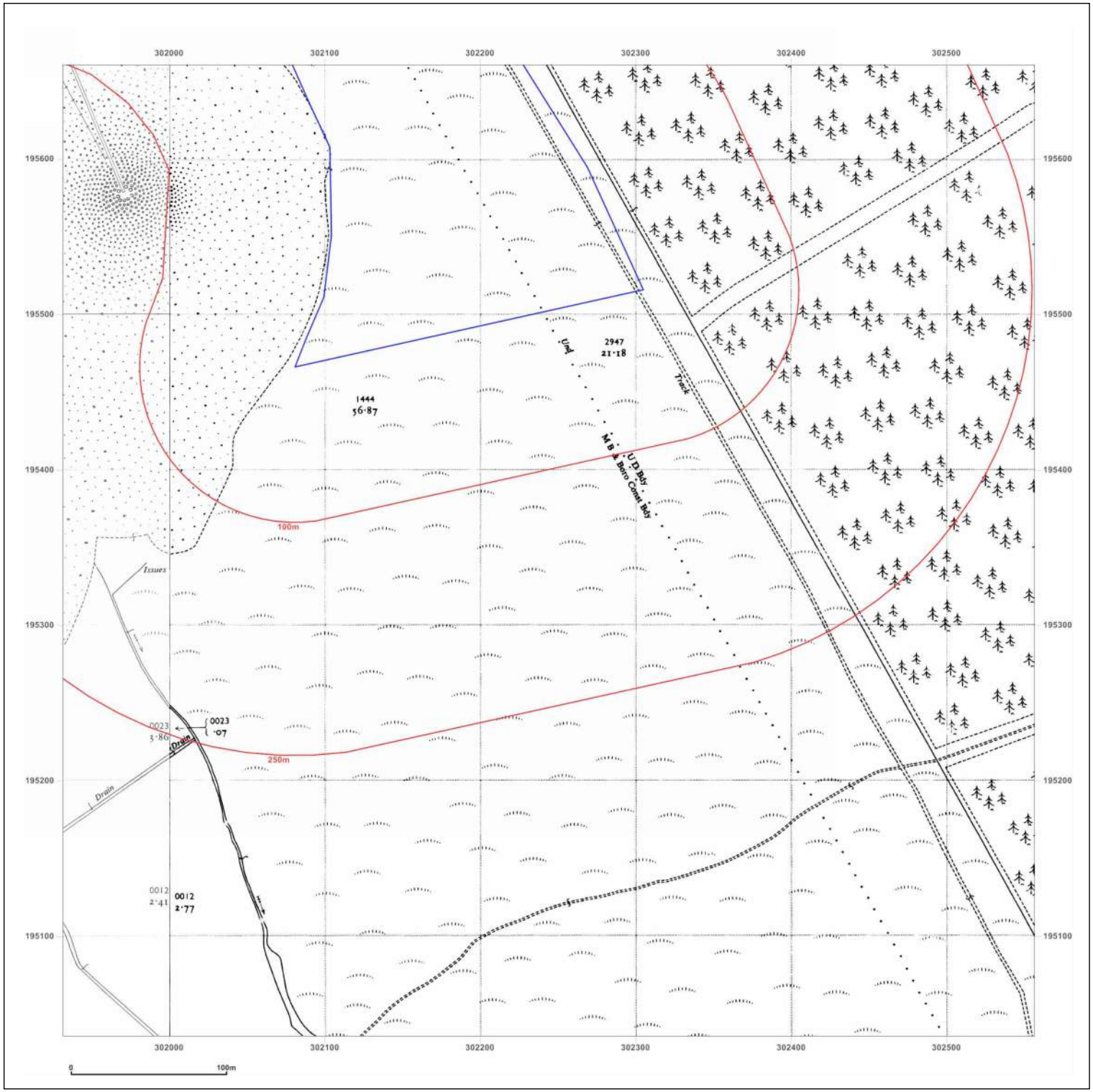

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_3_1
Grid Ref: 302244, 195348

Map Name: National Grid

Map date: **1961-1962**

Scale: 1:2,500

Printed at: 1:2,500

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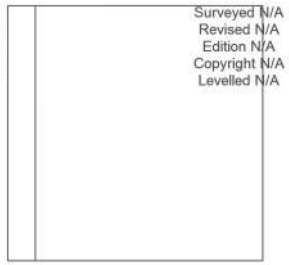
Surveyed 1961	Surveyed N/A
Revised 1961	Revised N/A
Edition 1962	Edition N/A
Copyright 1962	Copyright N/A
Levelled 1957	Levelled N/A



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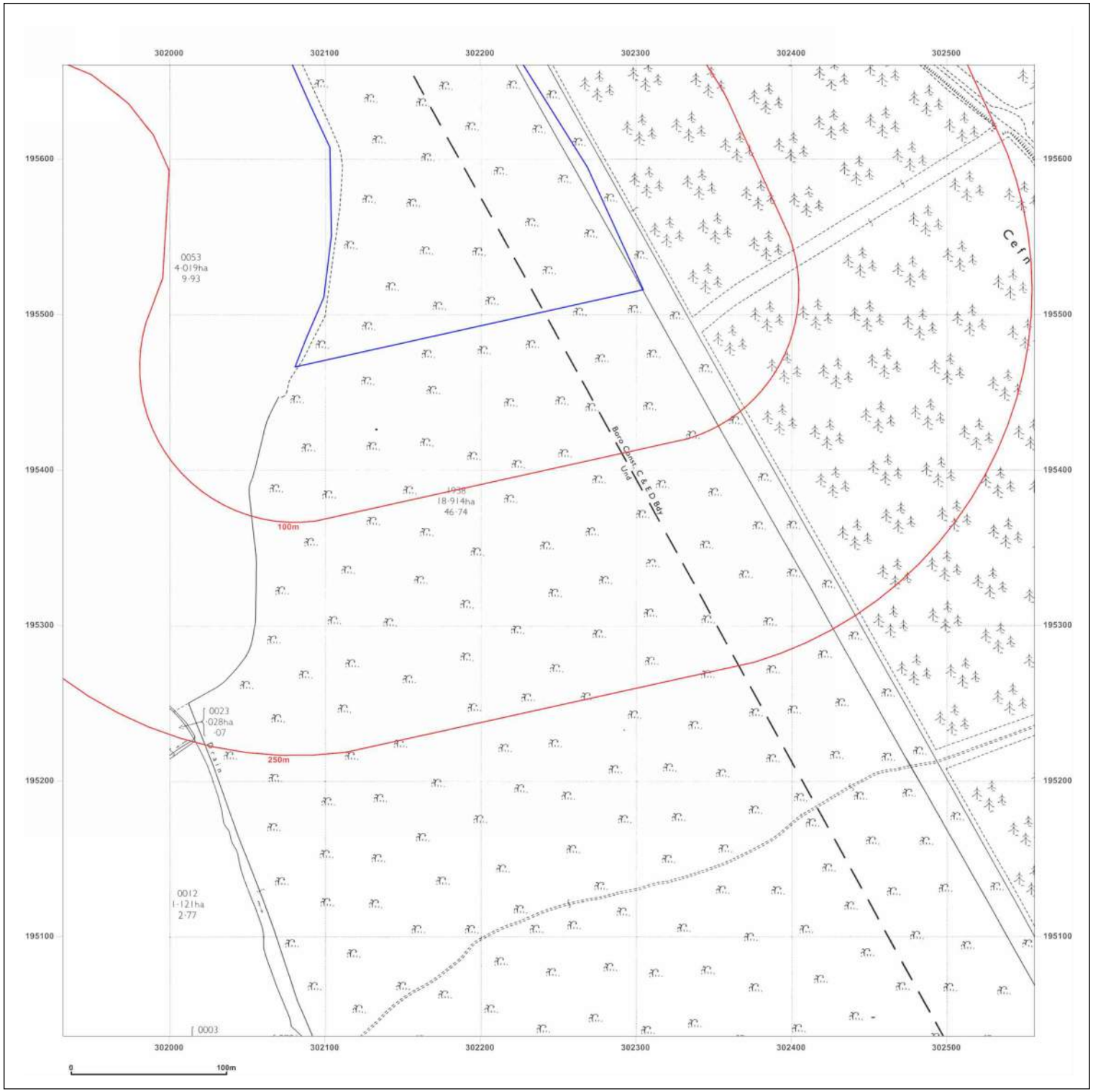

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_3_1
Grid Ref: 302244, 195348

Map Name: National Grid
Map date: 1975
Scale: 1:2,500
Printed at: 1:2,500

N
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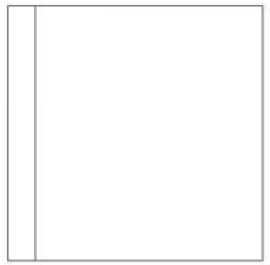

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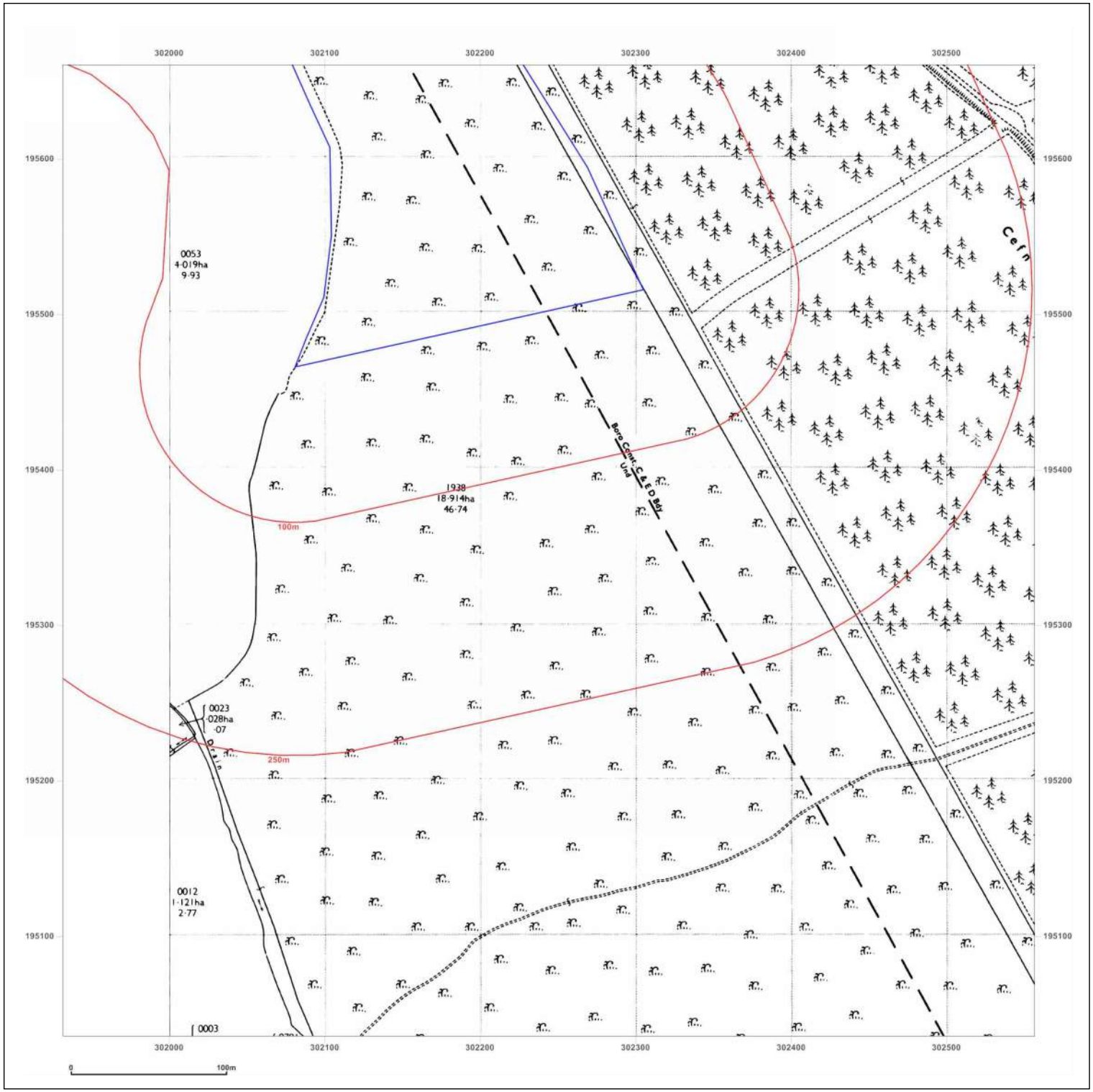

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_3_1
Grid Ref: 302244, 195348

Map Name: National Grid
Map date: **1976**
Scale: 1:2,500
Printed at: 1:2,500

N
W E
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Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

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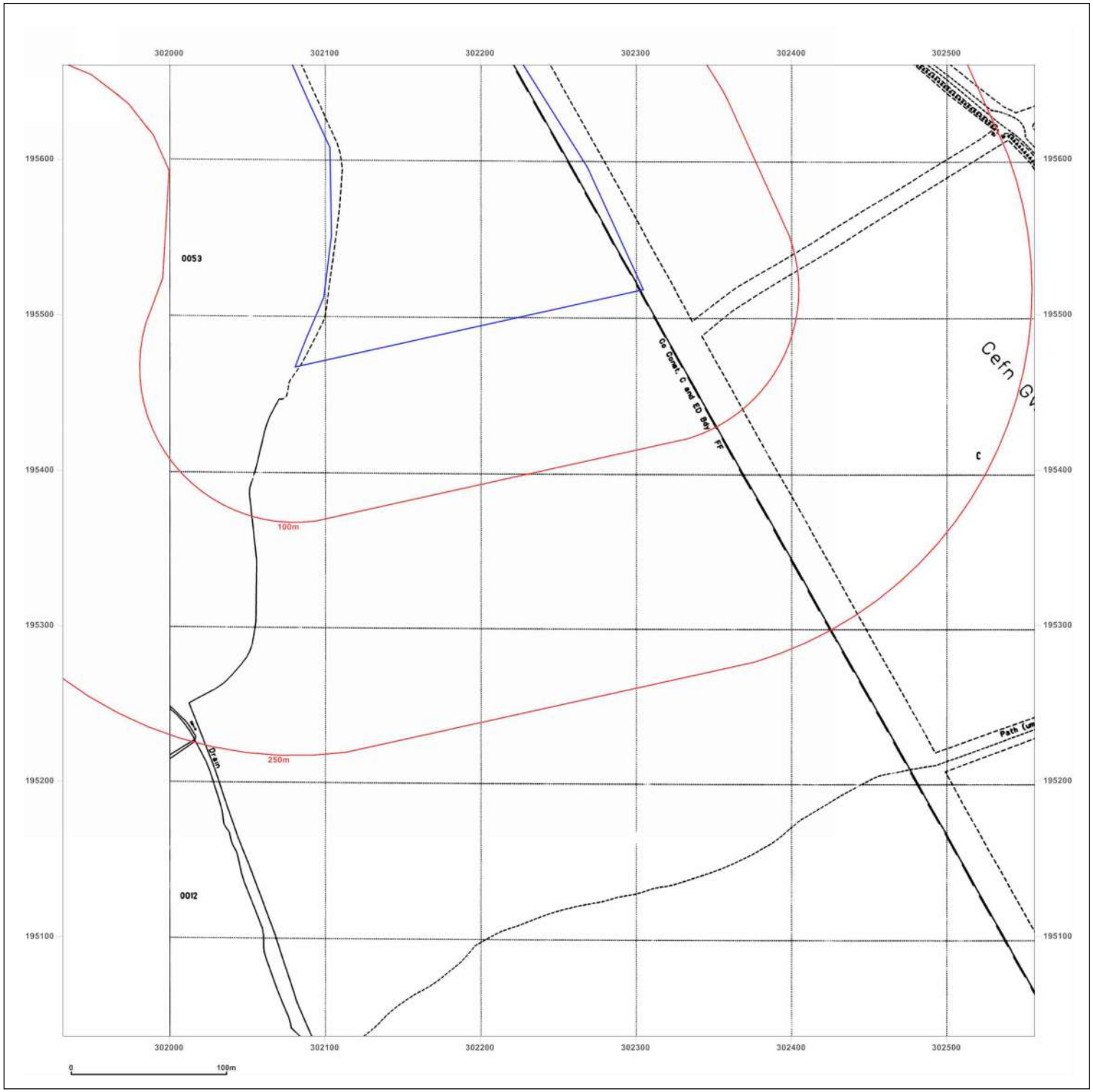

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_3_1
Grid Ref: 302244, 195348

Map Name: National Grid
Map date: 1993
Scale: 1:2,500
Printed at: 1:2,500

N
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Surveyed N/A
Revised N/A
Edition N/A
Copyright 1993
Levelled N/A

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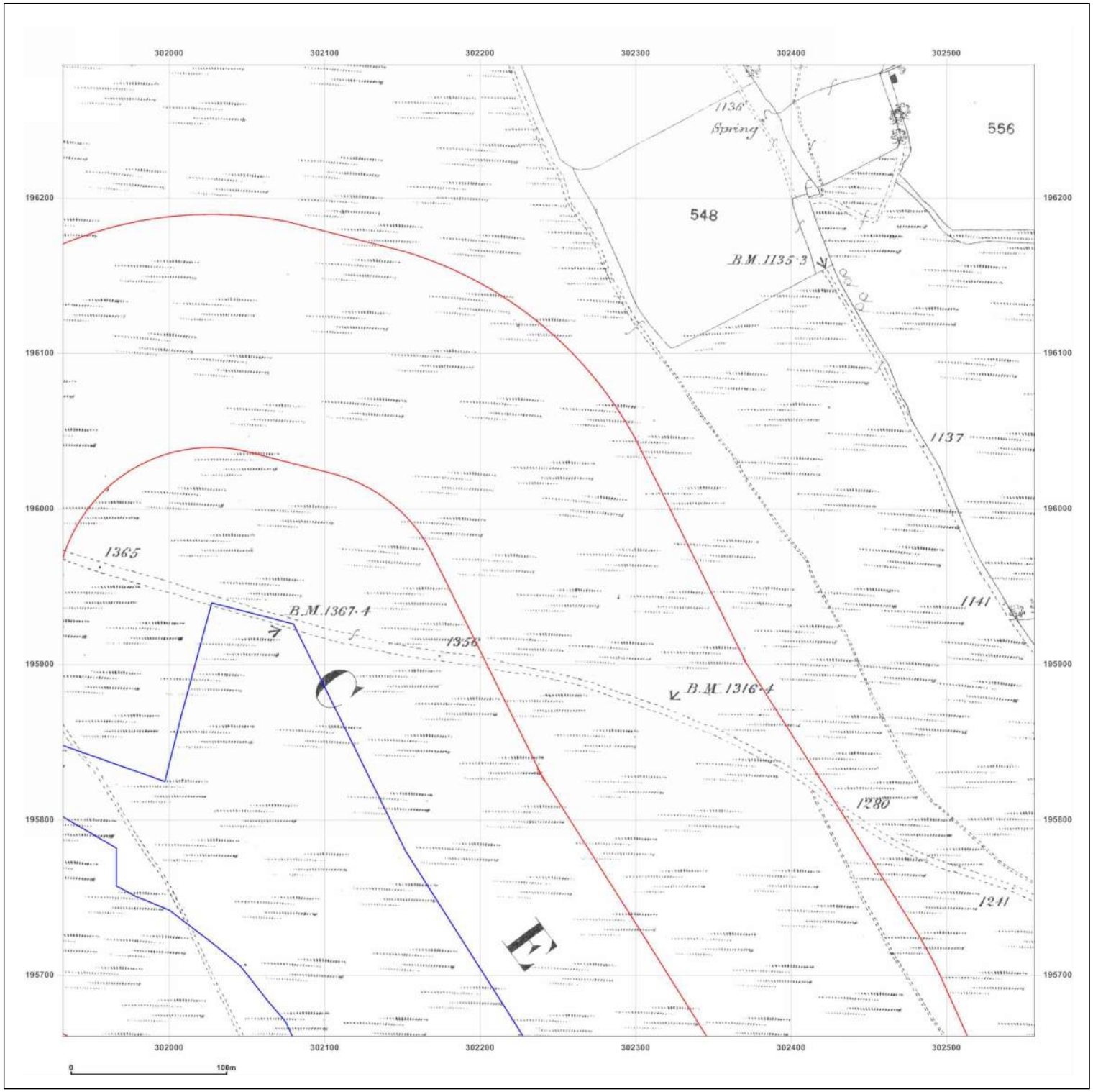

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_3_2
Grid Ref: 302244, 195973

Map Name: County Series
Map date: **1873**
Scale: 1:2,500
Printed at: 1:2,500

N
W E
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Surveyed 1873
Revised 1873
Edition N/A
Copyright N/A
Levelled N/A

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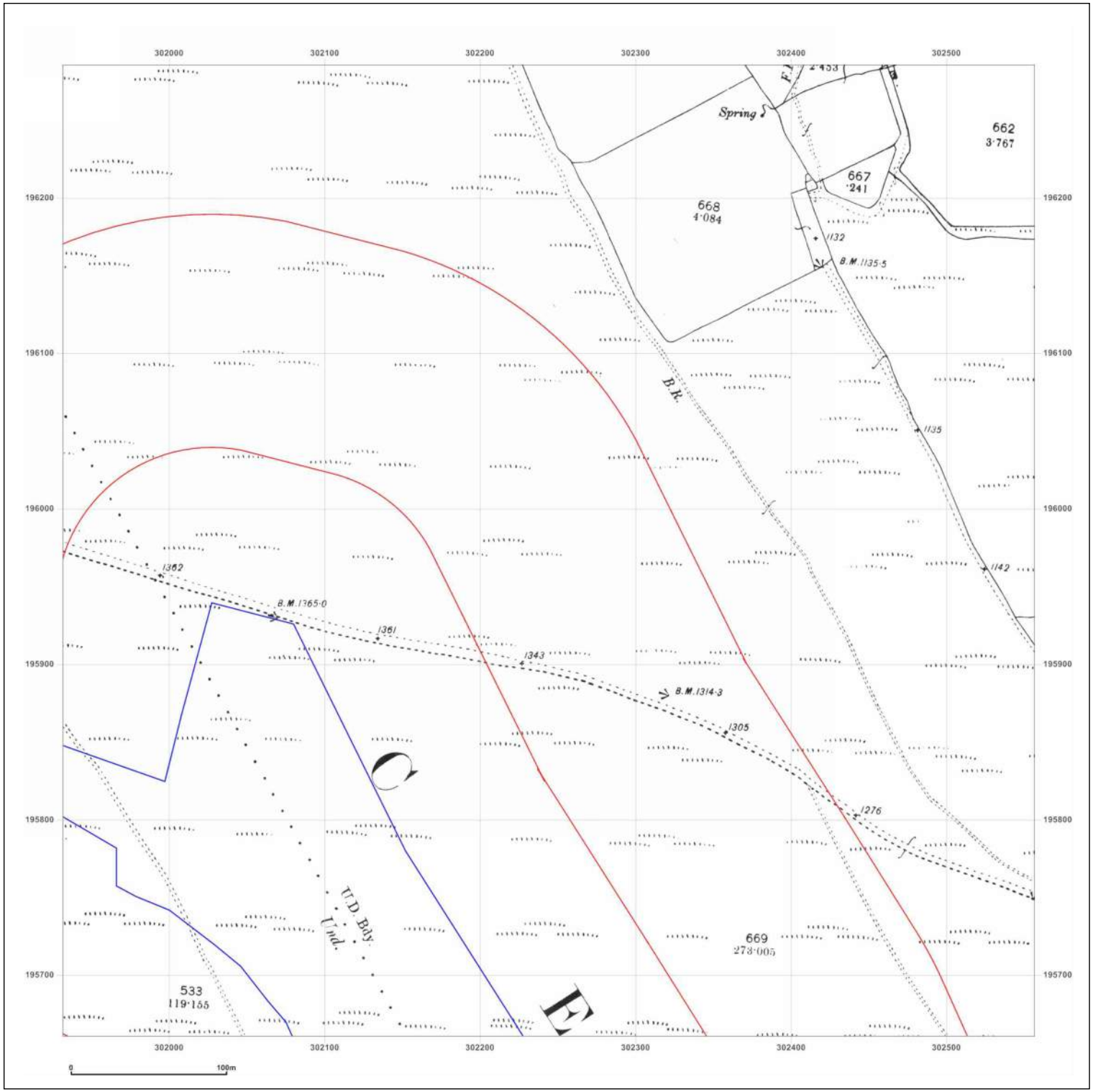

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_3_2
Grid Ref: 302244, 195973

Map Name: County Series
Map date: 1900
Scale: 1:2,500
Printed at: 1:2,500

N
W E
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Surveyed 1900
Revised 1900
Edition N/A
Copyright N/A
Levelled N/A

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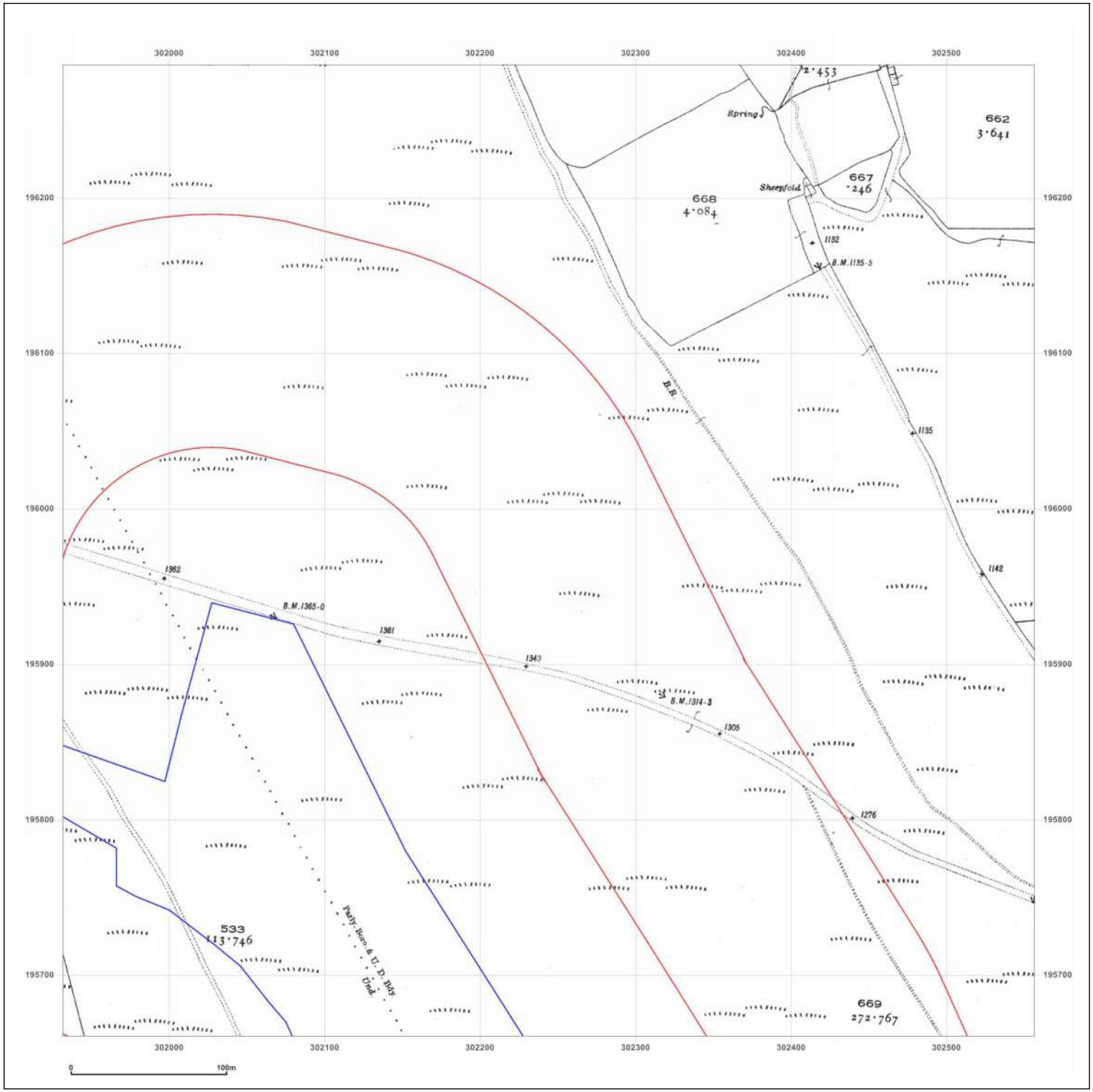

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_3_2
Grid Ref: 302244, 195973

Map Name: County Series

Map date: **1920**

Scale: 1:2,500

Printed at: 1:2,500

N
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Surveyed 1920
Revised 1920
Edition N/A
Copyright N/A
Levelled N/A

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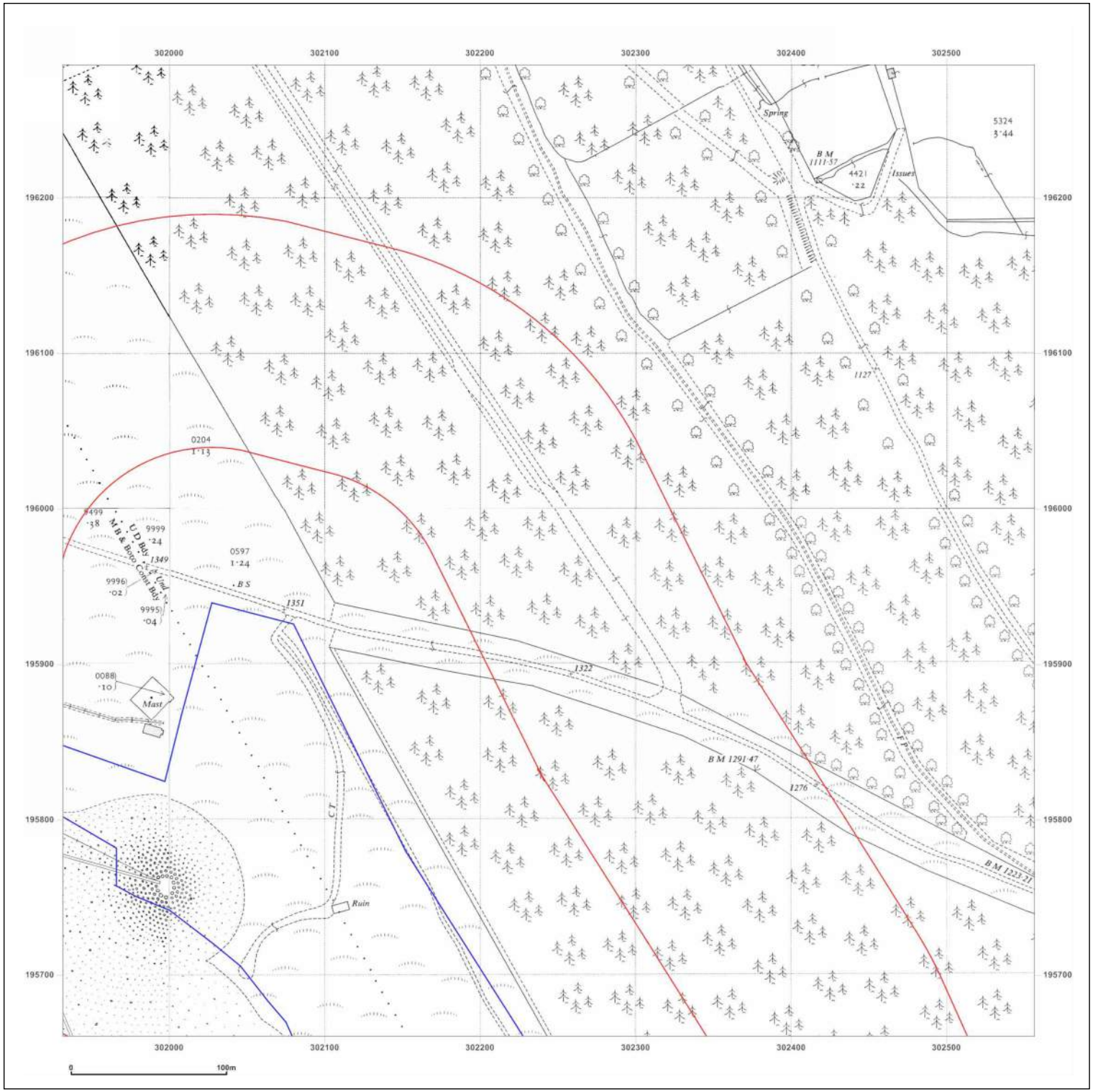

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_3_2
Grid Ref: 302244, 195973

Map Name: National Grid
Map date: **1958-1961**
Scale: 1:2,500
Printed at: 1:2,500

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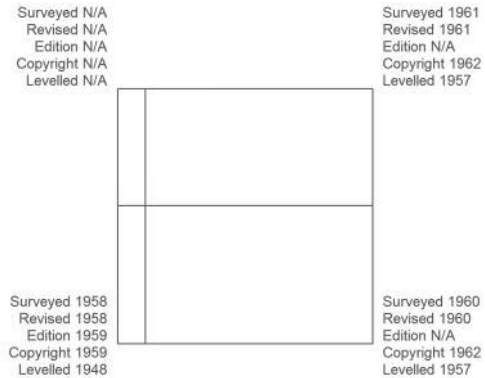

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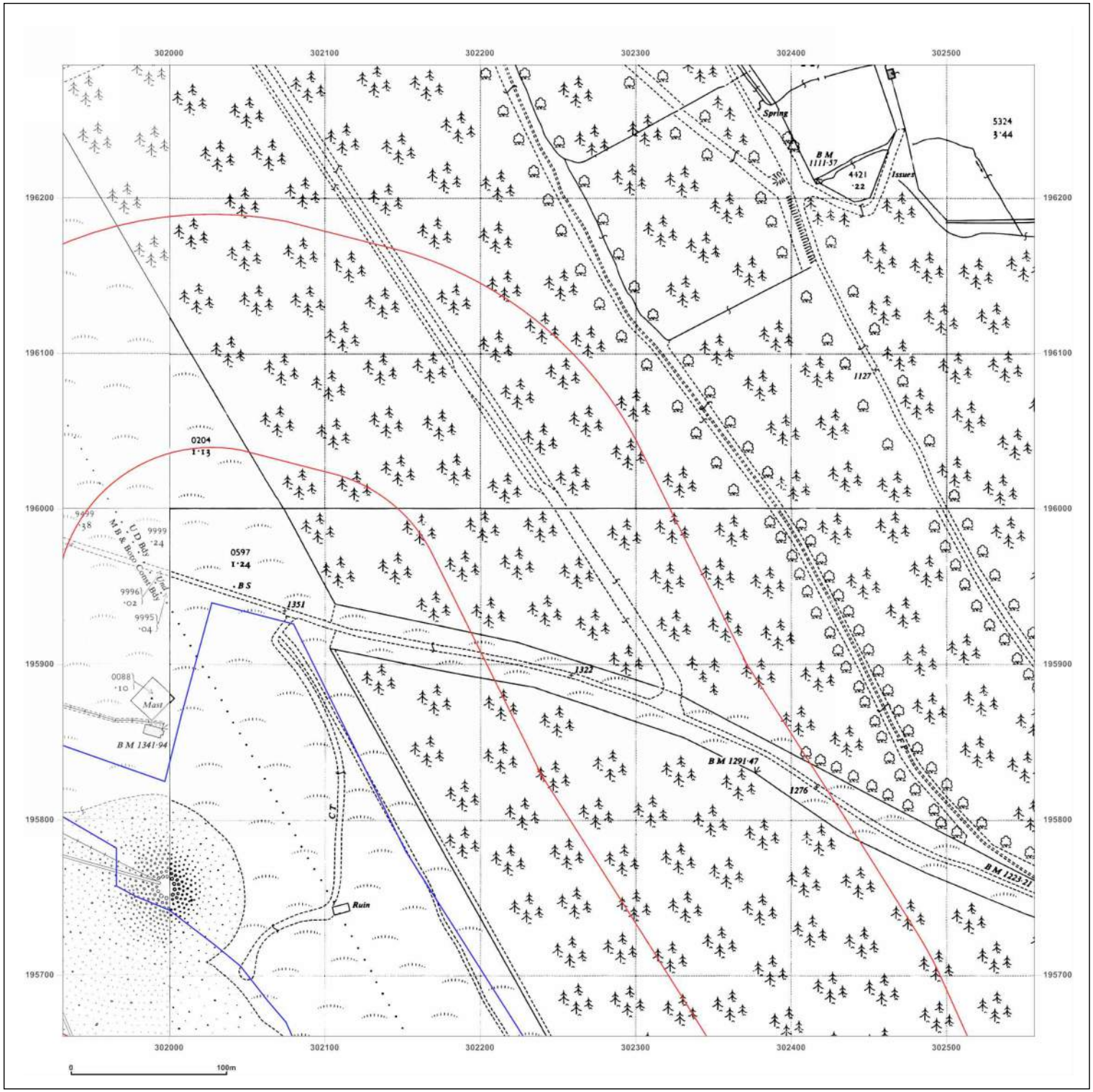

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_3_2
Grid Ref: 302244, 195973

Map Name: National Grid
Map date: **1961-1962**
Scale: 1:2,500
Printed at: 1:2,500

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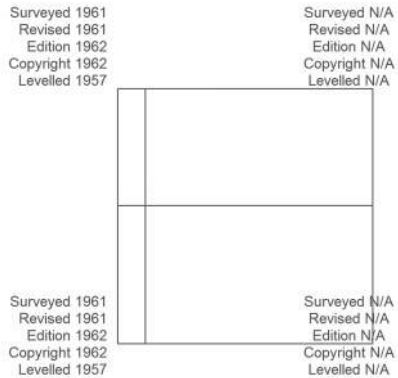

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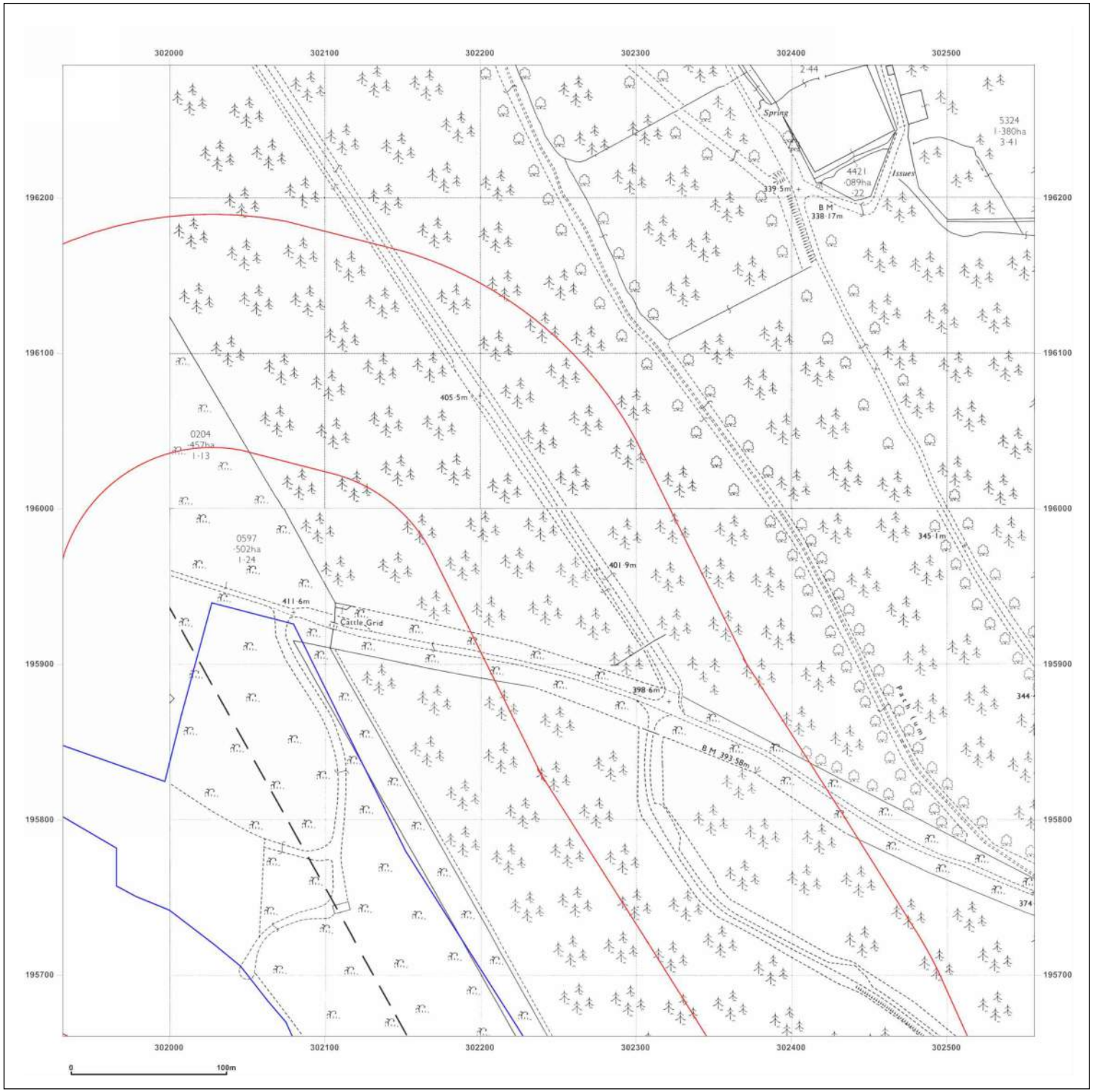

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_3_2
Grid Ref: 302244, 195973

Map Name: National Grid
Map date: 1975
Scale: 1:2,500
Printed at: 1:2,500

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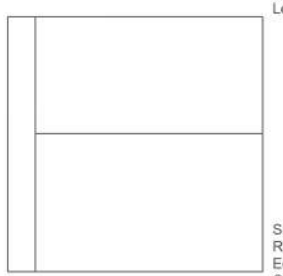

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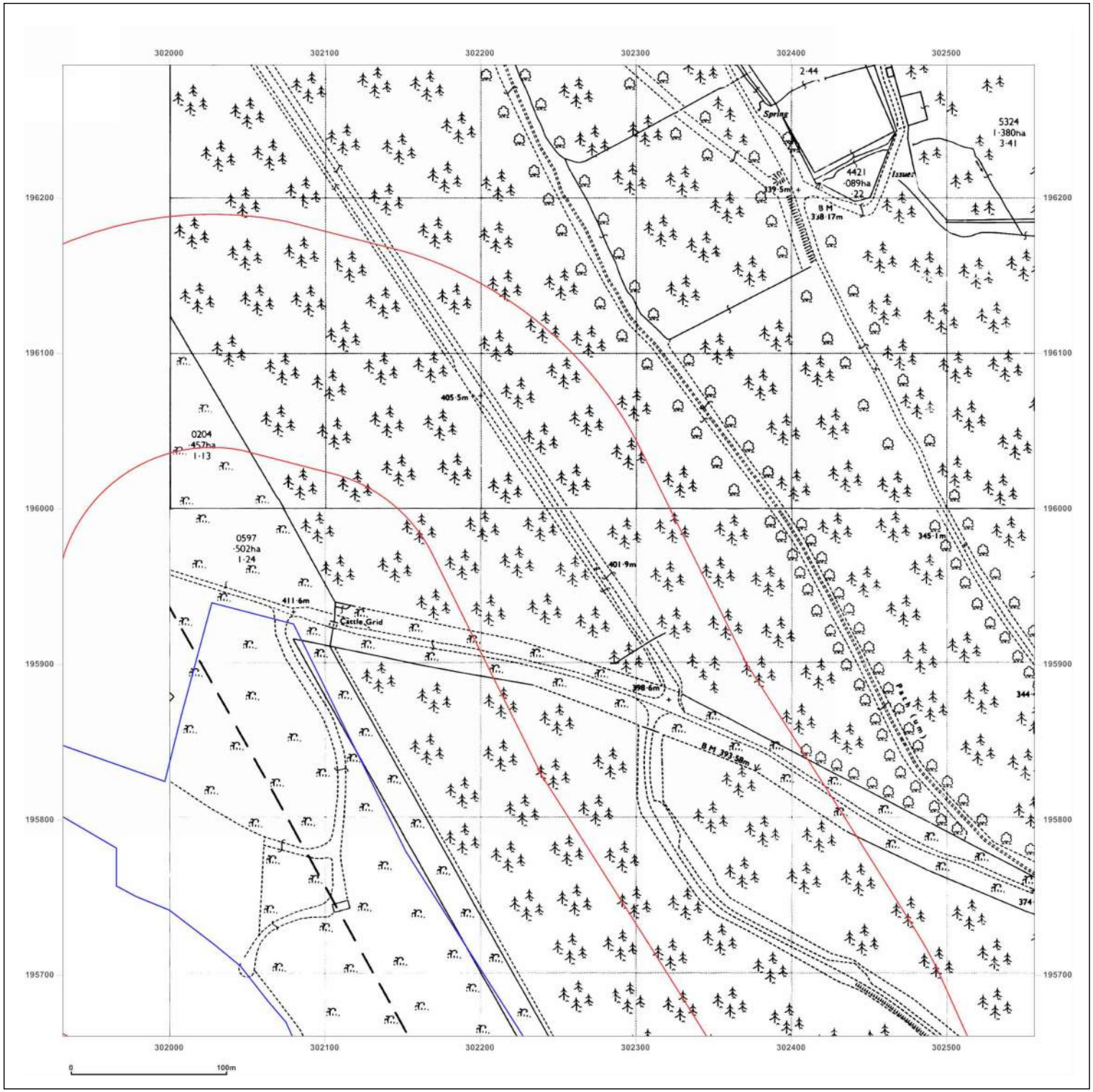

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_3_2
Grid Ref: 302244, 195973

Map Name: National Grid

Map date: **1976-1977**

Scale: 1:2,500

Printed at: 1:2,500

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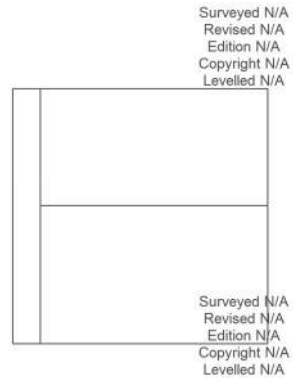

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Production date: 22 September 2020

Map legend available at:
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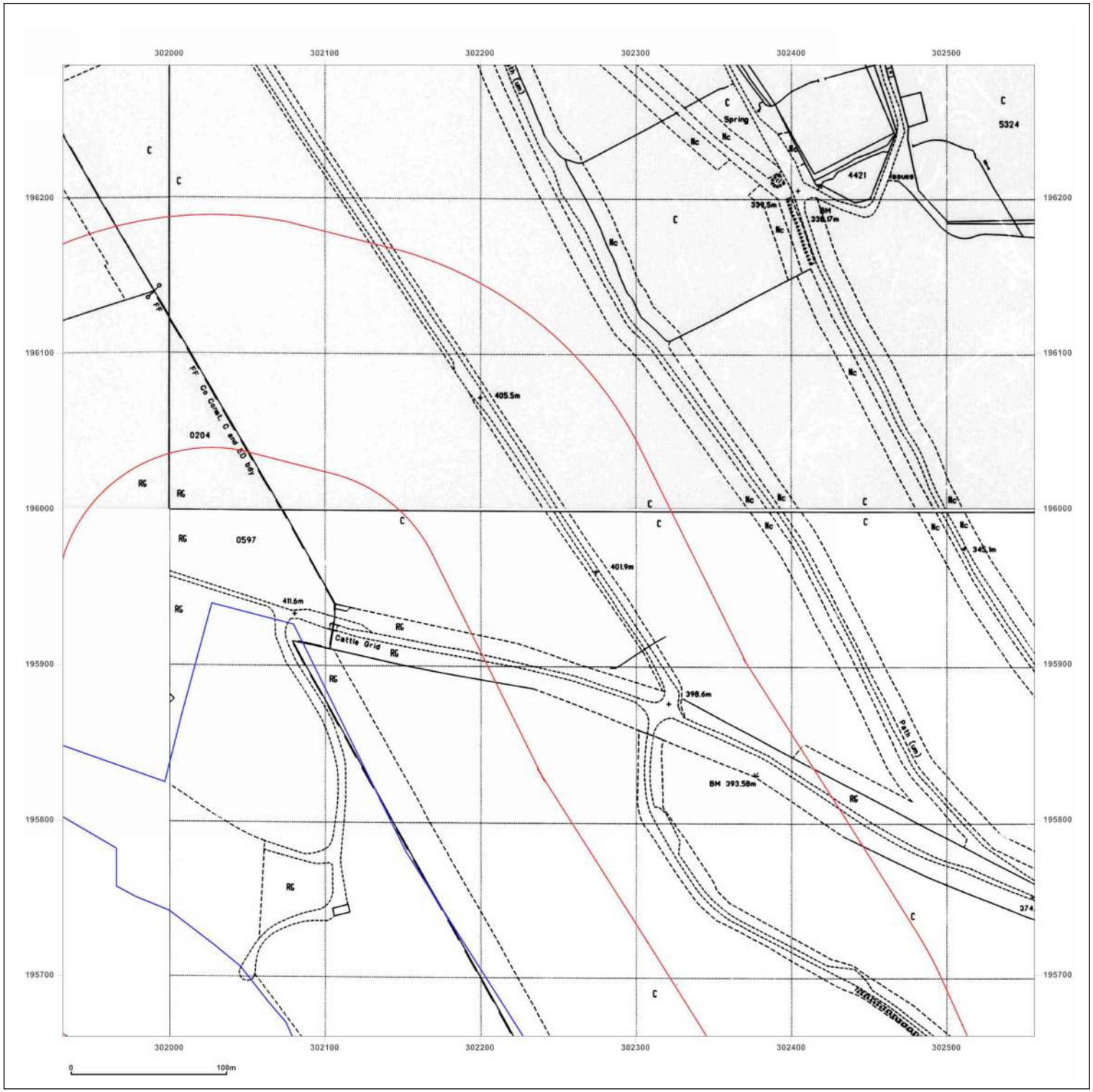

Groundsure INSIGHTS

Site Details:

Tylorstown, Pontypridd, CF37 3PH

Client Ref: PO_4800455895
Report Ref: GS-7076728_LS_3_2
Grid Ref: 302244, 195973

Map Name: National Grid
Map date: 1993
Scale: 1:2,500
Printed at: 1:2,500

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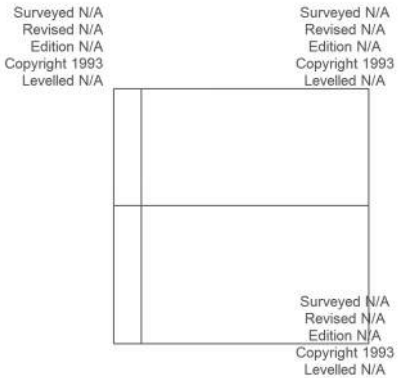

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Production date: 22 September 2020

Map legend available at:
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Groundsure LOCATION INTELLIGENCE

Enviro+Geo Insight

Tylorstown, Pontypridd, CF37 3PH

Order Details

Date: 22/09/2020

Your ref: PO_4800455895

Our Ref: GS-7076729

Client: Capita Property and Infrastructure Limited

Site Details

Location: 301646 195956

Area: 20.69 ha

Authority: Rhondda Cynon Taf County Borough Council

Contact us with any questions at:
info@groundsure.com
08444 159 000

Summary of findings

Page	Section	Past land use	On site	0-50m	50-250m	250-500m	500-2000m
13	1.1	Historical industrial land uses	20	24	55	58	-
19	1.2	Historical tanks	0	0	0	3	-
20	1.3	Historical energy features	0	0	3	3	-
20	1.4	Historical petrol stations	0	0	0	0	-
21	1.5	Historical garages	0	0	0	4	-
21	1.6	Historical military land	0	0	0	0	-
Page	Section	Past land use - un-grouped	On site	0-50m	50-250m	250-500m	500-2000m
22	2.1	Historical industrial land uses	27	30	69	77	-
30	2.2	Historical tanks	0	0	0	5	-
30	2.3	Historical energy features	0	0	5	8	-
31	2.4	Historical petrol stations	0	0	0	0	-
31	2.5	Historical garages	0	0	0	5	-
Page	Section	Waste and landfill	On site	0-50m	50-250m	250-500m	500-2000m
33	3.1	Active or recent landfill	0	0	0	0	-
33	3.2	Historical landfill (BGS records)	0	0	0	0	-
34	3.3	Historical landfill (LA/mapping records)	0	0	0	0	-
34	3.4	Historical landfill (EA/NRW records)	0	0	0	0	-
34	3.5	Historical waste sites	0	0	0	0	-
34	3.6	Licensed waste sites	0	0	0	0	-
34	3.7	Waste exemptions	0	0	1	0	-
Page	Section	Current industrial land use	On site	0-50m	50-250m	250-500m	500-2000m
36	4.1	Recent industrial land uses	0	0	3	-	-
37	4.2	Current or recent petrol stations	0	0	0	1	-
37	4.3	Electricity cables	0	0	0	0	-
37	4.4	Gas pipelines	0	0	0	0	-
37	4.5	Sites determined as Contaminated Land	0	0	0	0	-

37	4.6	Control of Major Accident Hazards (COMAH)	0	0	0	0	-
38	4.7	Regulated explosive sites	0	0	0	0	-
38	4.8	Hazardous substance storage/usage	0	0	0	0	-
38	4.9	Historical licensed industrial activities (IPC)	0	0	0	0	-
38	4.10	Licensed industrial activities (Part A(1))	0	0	0	0	-
38	**4.11**	**Licensed pollutant release (Part A(2)/B)**	0	0	0	1	-
39	4.12	Radioactive Substance Authorisations	0	0	0	0	-
39	**4.13**	**Licensed Discharges to controlled waters**	0	0	0	7	-
40	4.14	Pollutant release to surface waters (Red List)	0	0	0	0	-
40	4.15	Pollutant release to public sewer	0	0	0	0	-
41	4.16	List 1 Dangerous Substances	0	0	0	0	-
41	4.17	List 2 Dangerous Substances	0	0	0	0	-
41	**4.18**	**Pollution Incidents (EA/NRW)**	0	1	1	2	-
42	4.19	Pollution inventory substances	0	0	0	0	-
42	4.20	Pollution inventory waste transfers	0	0	0	0	-
42	4.21	Pollution inventory radioactive waste	0	0	0	0	-

Page	Section	Hydrogeology	On site	0-50m	50-250m	250-500m	500-2000m
43	**5.1**	**Superficial aquifer**	Identified (within 500m)				
45	**5.2**	**Bedrock aquifer**	Identified (within 500m)				
47	**5.3**	**Groundwater vulnerability**	Identified (within 50m)				
49	5.4	Groundwater vulnerability- soluble rock risk	None (within 0m)				
50	5.5	Groundwater vulnerability- local information	None (within 0m)				
51	5.6	Groundwater abstractions	0	0	0	0	0
52	**5.7**	**Surface water abstractions**	0	0	0	0	11
54	**5.8**	**Potable abstractions**	0	0	0	0	8
56	5.9	Source Protection Zones	0	0	0	0	-
56	5.10	Source Protection Zones (confined aquifer)	0	0	0	0	-

Page	Section	Hydrology	On site	0-50m	50-250m	250-500m	500-2000m
57	**6.1**	**Water Network (OS MasterMap)**	27	20	54	-	-

65	6.2	Surface water features	1	14	35	-	-
66	6.3	WFD Surface water body catchments	2	-	-	-	-
66	6.4	WFD Surface water bodies	0	1	0	-	-
67	6.5	WFD Groundwater bodies	1	-	-	-	-

Page	Section	River and coastal flooding	On site	0-50m	50-250m	250-500m	500-2000m
68	7.1	Risk of Flooding from Rivers and Sea (RoFRaS)	High (within 50m)				
69	7.2	Historical Flood Events	0	0	0	-	-
69	7.3	Flood Defences	0	0	0	-	-
69	7.4	Areas Benefiting from Flood Defences	0	0	0	-	-
69	7.5	Flood Storage Areas	0	0	0	-	-
70	7.6	Flood Zone 2	Identified (within 50m)				
71	7.7	Flood Zone 3	Identified (within 50m)				

Page	Section	Surface water flooding	
72	8.1	Surface water flooding	1 in 30 year, Greater than 1.0m (within 50m)

Page	Section	Groundwater flooding	
74	9.1	Groundwater flooding	Low (within 50m)

Page	Section	Environmental designations	On site	0-50m	50-250m	250-500m	500-2000m
75	10.1	Sites of Special Scientific Interest (SSSI)	0	0	0	0	0
76	10.2	Conserved wetland sites (Ramsar sites)	0	0	0	0	0
76	10.3	Special Areas of Conservation (SAC)	0	0	0	0	0
76	10.4	Special Protection Areas (SPA)	0	0	0	0	0
76	10.5	National Nature Reserves (NNR)	0	0	0	0	0
77	10.6	Local Nature Reserves (LNR)	0	0	0	0	0
77	10.7	Designated Ancient Woodland	1	2	1	3	41
79	10.8	Biosphere Reserves	0	0	0	0	0
79	10.9	Forest Parks	0	0	0	0	0
79	10.10	Marine Conservation Zones	0	0	0	0	0
79	10.11	Green Belt	0	0	0	0	0
80	10.12	Proposed Ramsar sites	0	0	0	0	0

80	10.13	Possible Special Areas of Conservation (pSAC)	0	0	0	0	0
80	10.14	Potential Special Protection Areas (pSPA)	0	0	0	0	0
80	10.15	Nitrate Sensitive Areas	0	0	0	0	0
81	10.16	Nitrate Vulnerable Zones	0	0	0	0	0
82	10.17	SSSI Impact Risk Zones	0	-	-	-	-
82	10.18	SSSI Units	0	0	0	0	0
Page	Section	Visual and cultural designations	On site	0-50m	50-250m	250-500m	500-2000m
83	11.1	World Heritage Sites	0	0	0	-	-
83	11.2	Area of Outstanding Natural Beauty	0	0	0	-	-
83	11.3	National Parks	0	0	0	-	-
83	11.4	Listed Buildings	0	0	0	-	-
84	11.5	Conservation Areas	0	0	0	-	-
84	11.6	Scheduled Ancient Monuments	0	0	0	-	-
84	11.7	Registered Parks and Gardens	0	0	0	-	-
Page	Section	Agricultural designations	On site	0-50m	50-250m	250-500m	500-2000m
85	**12.1**	**Agricultural Land Classification**	Grade 4 (within 250m)				
86	**12.2**	**Open Access Land**	2	2	0	-	-
87	12.3	Tree Felling Licences	0	0	0	-	-
87	12.4	Environmental Stewardship Schemes	0	0	0	-	-
87	12.5	Countryside Stewardship Schemes	0	0	0	-	-
Page	Section	Habitat designations	On site	0-50m	50-250m	250-500m	500-2000m
88	13.1	Priority Habitat Inventory	0	0	0	-	-
88	13.2	Habitat Networks	0	0	0	-	-
88	13.3	Open Mosaic Habitat	0	0	0	-	-
88	13.4	Limestone Pavement Orders	0	0	0	-	-
Page	Section	Geology 1:10,000 scale	On site	0-50m	50-250m	250-500m	500-2000m
89	**14.1**	**10k Availability**	Identified (within 500m)				
90	14.2	Artificial and made ground (10k)	0	0	0	0	-
91	14.3	Superficial geology (10k)	0	0	0	0	-

91	14.4	Landslip (10k)	0	0	0	0	-
92	14.5	Bedrock geology (10k)	0	0	0	0	-
92	14.6	Bedrock faults and other linear features (10k)	0	0	0	0	-
Page	Section	Geology 1:50,000 scale	On site	0-50m	50-250m	250-500m	500-2000m
93	**15.1**	**50k Availability**	Identified (within 500m)				
94	15.2	Artificial and made ground (50k)	0	0	0	0	-
94	15.3	Artificial ground permeability (50k)	0	0	-	-	-
95	**15.4**	**Superficial geology (50k)**	2	0	2	1	-
96	**15.5**	**Superficial permeability (50k)**	Identified (within 50m)				
96	15.6	Landslip (50k)	0	0	0	0	-
96	15.7	Landslip permeability (50k)	None (within 50m)				
97	**15.8**	**Bedrock geology (50k)**	5	0	1	1	-
98	**15.9**	**Bedrock permeability (50k)**	Identified (within 50m)				
98	**15.10**	**Bedrock faults and other linear features (50k)**	5	1	2	3	-
Page	Section	Boreholes	On site	0-50m	50-250m	250-500m	500-2000m
100	**16.1**	**BGS Boreholes**	0	1	5	-	-
Page	Section	Natural ground subsidence					
102	**17.1**	**Shrink swell clays**	Very low (within 50m)				
103	**17.2**	**Running sands**	Very low (within 50m)				
105	**17.3**	**Compressible deposits**	Negligible (within 50m)				
106	**17.4**	**Collapsible deposits**	Very low (within 50m)				
107	**17.5**	**Landslides**	Moderate (within 50m)				
109	**17.6**	**Ground dissolution of soluble rocks**	Negligible (within 50m)				
Page	Section	Mining, ground workings and natural cavities	On site	0-50m	50-250m	250-500m	500-2000m
111	18.1	Natural cavities	0	0	0	0	-
112	**18.2**	**BritPits**	0	1	7	5	-
114	**18.3**	**Surface ground workings**	21	19	61	-	-
118	**18.4**	**Underground workings**	2	5	9	9	19
120	18.5	Historical Mineral Planning Areas	0	0	0	0	-

120	**18.6**	**Non-coal mining**	0	0	1	0	0
120	18.7	Mining cavities	0	0	0	0	0
120	**18.8**	**JPB mining areas**	Identified (within 0m)				
121	**18.9**	**Coal mining**	Identified (within 0m)				
121	18.10	Brine areas	None (within 0m)				
121	18.11	Gypsum areas	None (within 0m)				
122	18.12	Tin mining	None (within 0m)				
122	18.13	Clay mining	None (within 0m)				

Page	Section	Radon	
123	**19.1**	**Radon**	Between 3% and 5% (within 0m)

Page	Section	Soil chemistry	On site	0-50m	50-250m	250-500m	500-2000m
125	**20.1**	**BGS Estimated Background Soil Chemistry**	25	19	-	-	-
127	20.2	BGS Estimated Urban Soil Chemistry	0	0	-	-	-
128	20.3	BGS Measured Urban Soil Chemistry	0	0	-	-	-

Page	Section	Railway infrastructure and projects	On site	0-50m	50-250m	250-500m	500-2000m
129	21.1	Underground railways (London)	0	0	0	-	-
129	21.2	Underground railways (Non-London)	0	0	0	-	-
130	21.3	Railway tunnels	0	0	0	-	-
130	**21.4**	**Historical railway and tunnel features**	11	16	19	-	-
132	21.5	Royal Mail tunnels	0	0	0	-	-
132	**21.6**	**Historical railways**	1	0	0	-	-
132	21.7	Railways	0	0	0	-	-
132	21.8	Crossrail 1	0	0	0	0	-
133	21.9	Crossrail 2	0	0	0	0	-
133	21.10	HS2	0	0	0	0	-

Recent aerial photograph

Capture Date: 26/05/2017

Site Area: 20.69ha

Recent site history - 2014 aerial photograph

Capture Date: 23/07/2014

Site Area: 20.69ha

Recent site history - 2010 aerial photograph

Capture Date: 23/05/2010

Site Area: 20.69ha

Recent site history - 2009 aerial photograph

Capture Date: 12/10/2009

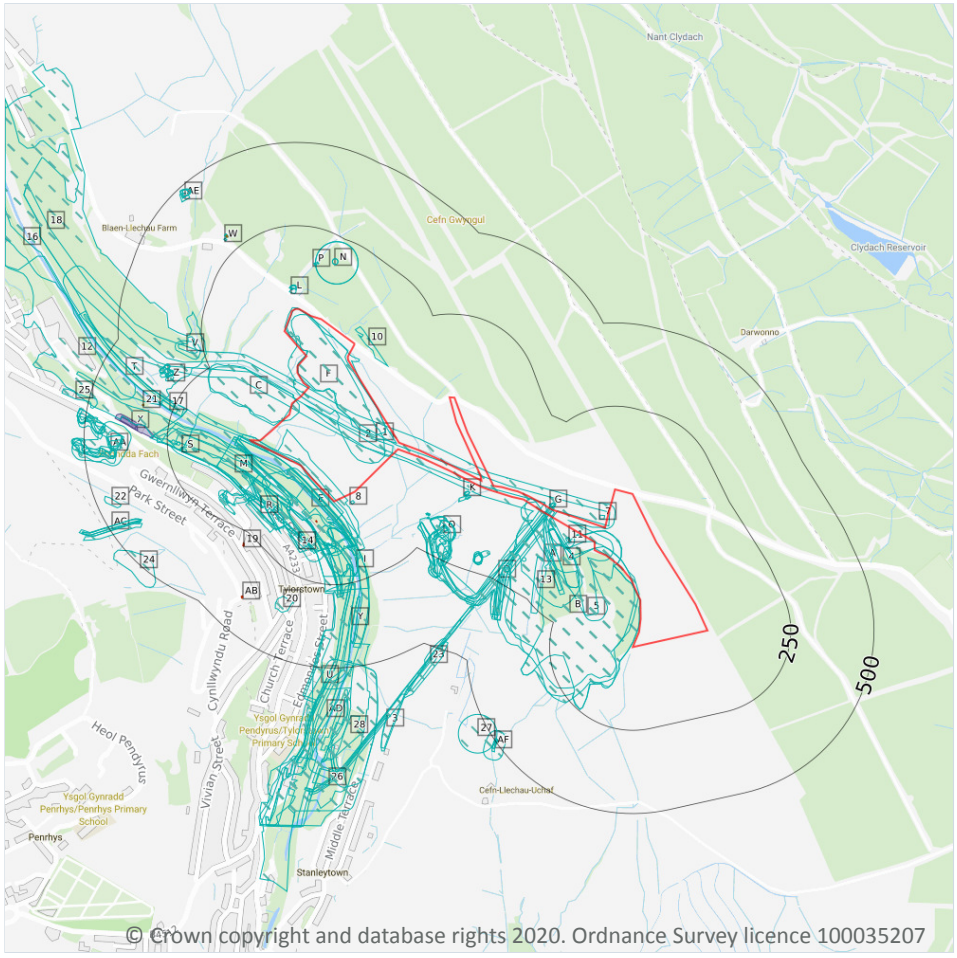
Site Area: 20.69ha

Recent site history - 2000 aerial photograph

Capture Date: 18/06/2000

Site Area: 20.69ha

1 Past land use



Site Outline

Search buffers in metres (m)

Historical industrial land uses

Historical tanks

Historical energy features

Historical garages

1.1 Historical industrial land uses

Records within 500m	157

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

Features are displayed on the Past land use map on **page 13**

ID	Location	Land use	Dates present	Group ID
1	**On site**	**Disused Tramway Sidings**	**1965**	**1174630**

ID	Location	Land use	Dates present	Group ID
2	**On site**	**Refuse Heap**	**1992**	**1178134**
3	**On site**	**Tramway Sidings**	**1915**	**1199817**
4	**On site**	**Tramway Sidings**	**1948**	**1257118**
5	**On site**	**Refuse Heap**	**1965**	**1191174**
A	**On site**	**Refuse Heap**	**1921**	**1195474**
A	**On site**	**Tramway Sidings**	**1921**	**1217738**
B	**On site**	**Unspecified Disused Tip**	**1974 - 1992**	**1197331**
B	**On site**	**Refuse Heap**	**1945**	**1221538**
B	**On site**	**Old Trial Level**	**1948**	**1269188**
C	**On site**	**Unspecified Disused Tip**	**1974 - 1992**	**1210261**
C	**On site**	**Unspecified Heap**	**1948 - 1965**	**1224543**
D	**On site**	**Tramway Sidings**	**1945**	**1216354**
E	**On site**	**Railway Sidings**	**1898**	**1193633**
E	**On site**	**Railway Sidings**	**1965**	**1216702**
E	**On site**	**Colliery**	**1898**	**1227289**
E	**On site**	**Railway Sidings**	**1948**	**1247861**
F	**On site**	**Unspecified Heap**	**1948 - 1965**	**1223422**
F	**On site**	**Unspecified Disused Tip**	**1974 - 1992**	**1230373**
F	**On site**	**Unspecified Ground Workings**	**1948 - 1965**	**1267998**
G	4m NE	Railway Building	1915	1246500
E	4m SW	Colliery	1948	1262170
G	5m N	Railway Building	1965	1204524
H	7m SW	Colliery	1921	1217347
6	8m SW	Railway Sidings	1945	1236936
E	8m SW	Colliery	1945	1208408
7	9m W	Railway Building	1965	1172166
I	21m SW	Railway Sidings	1992	1269450
8	22m SE	Magazine	1898	1177448

ID	Location	Land use	Dates present	Group ID
9	25m SW	Tramway Sidings	1915	1192016
10	26m NE	Refuse Heap	1965	1178142
11	27m SW	Railway Building	1965	1172165
J	28m SW	Refuse Heap	1915	1202807
J	28m SW	Refuse Heap	1915	1229671
E	29m SW	Colliery	1915	1210298
H	29m SW	Railway Sidings	1921	1251054
K	29m SW	Old Coal Level	1915	1234138
K	30m SW	Old Coal Level	1945	1261036
K	30m SW	Old Coal Level	1948	1242853
H	30m SW	Unspecified Mine	1965	1187486
12	34m SW	Unspecified Disused Tip	1974	1165252
K	40m SW	Old Coal Level	1921	1187871
K	43m SW	Coal Level	1898	1166747
L	46m N	Unspecified Quarry	1915 - 1921	1238253
M	54m SW	Refuse Heap	1921	1208190
L	58m N	Unspecified Disused Quarry	1948	1183074
H	60m SW	Unspecified Disused Tip	1974	1165251
L	61m N	Unspecified Quarry	1945	1247532
M	66m SW	Refuse Heap	1948	1249721
I	79m S	Refuse Heap	1948	1206598
I	79m S	Refuse Heap	1921	1208344
M	87m SW	Engine House	1898	1177825
N	112m N	Old Coal Level	1921	1225196
N	112m N	Old Coal Level	1948	1242714
13	122m SW	Unspecified Pit	1965	1185685
O	131m SW	Unspecified Disused Quarry	1921	1246849
O	131m SW	Unspecified Disused Quarry	1948	1266305

ID	Location	Land use	Dates present	Group ID
O	131m SW	Unspecified Quarry	1915	1223771
O	137m SW	Unspecified Quarry	1945	1210442
O	139m SW	Unspecified Quarry	1965	1270968
P	139m N	Old Coal Level	1915	1228689
P	139m N	Old Coal Level	1915	1243914
Q	142m SW	Trial Level	1898	1202249
Q	142m SW	Trial Level	1948	1225400
Q	143m SW	Old Trial Level	1915	1216575
O	143m SW	Unspecified Disused Quarry	1974 - 1992	1245526
Q	143m SW	Old Trial Level	1945	1223033
A	147m SW	Old Trial Level	1921	1256367
P	147m NE	Old Coal Level	1898	1226948
Q	152m SW	Old Trial Level	1921	1167863
R	154m SW	Railway Sidings	1915	1216733
R	154m SW	Railway Sidings	1915	1232023
M	158m SW	Cuttings	1898	1158366
O	159m SW	Tramway Sidings	1921	1232963
14	165m SW	Refuse Heap	1921	1200646
N	169m NE	Old Coal Level	1945	1201700
N	169m NE	Old Coal Level	1945	1211424
M	169m SW	Unspecified Quarry	1945 - 1948	1210321
O	175m SW	Unspecified Ground Workings	1965	1160467
D	176m S	Unspecified Disused Level	1974 - 1992	1259574
O	177m SW	Refuse Heap	1921	1193945
O	177m SW	Refuse Heap	1948	1202872
M	179m SW	Unspecified Quarry	1921	1223274
D	187m S	Refuse Heap	1915	1263165
D	190m S	Old Trial Level	1945	1271560

ID	Location	Land use	Dates present	Group ID
D	191m S	Refuse Heap	1948	1238800
D	191m S	Refuse Heap	1921	1261858
S	194m W	Unspecified Quarry	1898	1169637
D	195m S	Unspecified Disused Level	1992	1165644
D	195m S	Unspecified Heap	1965 - 1974	1264268
15	196m SW	Old Trial Level	1915	1246884
O	202m SW	Unspecified Quarry	1945	1169670
16	210m NW	Railway Sidings	1948	1237157
S	212m W	Unspecified Quarry	1898	1169638
T	220m W	Railway Sidings	1945	1261312
17	236m NW	Railway Sidings	1921	1204224
18	242m W	Colliery	1898	1268218
T	250m NW	Railway Sidings	1915	1222328
U	250m S	Refuse Heap	1948	1267996
U	254m S	Refuse Heap	1921	1252189
V	258m W	Unspecified Old Quarry	1948	1180799
V	268m W	Unspecified Disused Quarry	1974 - 1992	1232302
W	290m NW	Unspecified Tank	1921	1175761
Y	296m S	Refuse Heap	1921	1259659
Y	296m S	Refuse Heap	1948	1263296
W	296m NW	Unspecified Tank	1948	1268733
Z	296m NW	Old Trial Level	1921	1167862
W	297m NW	Unspecified Tank	1915	1245337
W	298m NW	Unspecified Tank	1945	1207674
Z	304m NW	Unspecified Ground Workings	1948	1160429
Z	306m NW	Old Trial Levels	1915	1238820
Z	307m NW	Old Trial Levels	1945	1254334
Z	307m NW	Old Trial Levels	1945	1265223

ID	Location	Land use	Dates present	Group ID
Z	312m NW	Old Trial Levels	1915	1209792
Z	317m NW	Old Trial Level	1921	1167861
20	324m SW	Unspecified Quarry	1898	1169636
Z	327m NW	Old Trial Levels	1915	1266785
Z	330m NW	Old Trial Levels	1915	1241001
AA	359m W	Unspecified Ground Workings	1965	1160430
AA	380m W	Unspecified Disused Quarry	1974 - 1992	1214886
AA	383m W	Unspecified Old Quarries	1921	1194112
AA	385m W	Unspecified Old Quarries	1948	1255122
AA	385m W	Unspecified Old Quarries	1915	1263416
AA	387m W	Unspecified Old Quarries	1945	1230730
AC	404m SW	Tramway Sidings	1915	1230815
AA	405m W	Unspecified Old Quarries	1898	1271782
AD	405m S	Tramway Sidings	1898	1198334
AC	406m SW	Tramway Sidings	1945	1236367
AA	406m W	Unspecified Old Quarries	1915	1226318
AC	407m SW	Tramway Sidings	1948	1207051
AA	408m W	Unspecified Old Quarries	1921	1218770
AC	410m SW	Tramway Sidings	1921	1248619
AD	428m S	Colliery	1915	1217674
22	434m SW	Unspecified Disused Levels	1965 - 1992	1214480
AA	436m W	Unspecified Old Quarries	1921	1232829
AA	438m W	Unspecified Old Quarries	1915	1193267
AA	439m W	Unspecified Old Quarries	1948	1269521
AA	439m W	Unspecified Old Quarries	1898	1226250
AE	458m NW	Unspecified Quarry	1921	1203656
23	465m S	Refuse Heap	1948	1235470
AE	467m NW	Unspecified Quarry	1915	1215583

ID	Location	Land use	Dates present	Group ID
AE	467m NW	Unspecified Quarry	1948	1215962
AE	467m NW	Unspecified Quarry	1898	1224505
AE	468m NW	Unspecified Quarry	1945	1191353
AF	468m SW	Old Coal Level	1921	1231926
24	468m SW	Unspecified Disused Levels	1965 - 1992	1244687
25	473m W	Unspecified Ground Workings	1915	1226627
26	474m S	Refuse Heap	1921	1244932
AD	474m S	Railway Sidings	1965	1272192
27	476m SW	Old Coal Level	1898	1253393
AD	489m S	Railway Sidings	1948	1260459
AF	493m SW	Old Coal Level	1948	1220551
AF	493m SW	Old Coal Level	1945	1192201
AF	493m SW	Old Coal Level	1945	1238233
AF	494m SW	Old Coal Level	1915	1226824
AA	494m W	Unspecified Pit	1992	1185678
28	495m S	Unspecified Mine	1965	1187487

This data is sourced from Ordnance Survey / Groundsure.

1.2 Historical tanks

Records within 500m	**3**

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

Features are displayed on the Past land use map on **page 13**

ID	Location	Land use	Dates present	Group ID
W	293m NW	Unspecified Tank	1920	186064
W	297m NW	Unspecified Tank	1957 - 1961	178405

ID	Location	Land use	Dates present	Group ID
21	337m W	Unspecified Tank	1993 - 1996	179837

This data is sourced from Ordnance Survey / Groundsure.

1.3 Historical energy features

Records within 500m	**6**

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

Features are displayed on the Past land use map on **page 13**

ID	Location	Land use	Dates present	Group ID
H	78m SW	Electricity Substation	1996	97322
M	135m SW	Electricity Substation	1972	103937
M	136m SW	Electricity Substation	1993 - 1994	104583
19	282m SW	Electricity Substation	1972 - 1994	103805
AB	395m SW	Electricity Substation	1972	108212
AB	397m SW	Electricity Substation	1993 - 1994	109962

This data is sourced from Ordnance Survey / Groundsure.

1.4 Historical petrol stations

Records within 500m	**0**

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

This data is sourced from Ordnance Survey / Groundsure.

1.5 Historical garages

Records within 500m	4

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

Features are displayed on the Past land use map on **page 13**

ID	Location	Land use	Dates present	Group ID
X	292m W	Garage	1996	34007
X	340m W	Garage	1957 - 1961	35614
X	342m W	Garage	1993	33352
X	346m W	Garage	1957	34340

This data is sourced from Ordnance Survey / Groundsure.

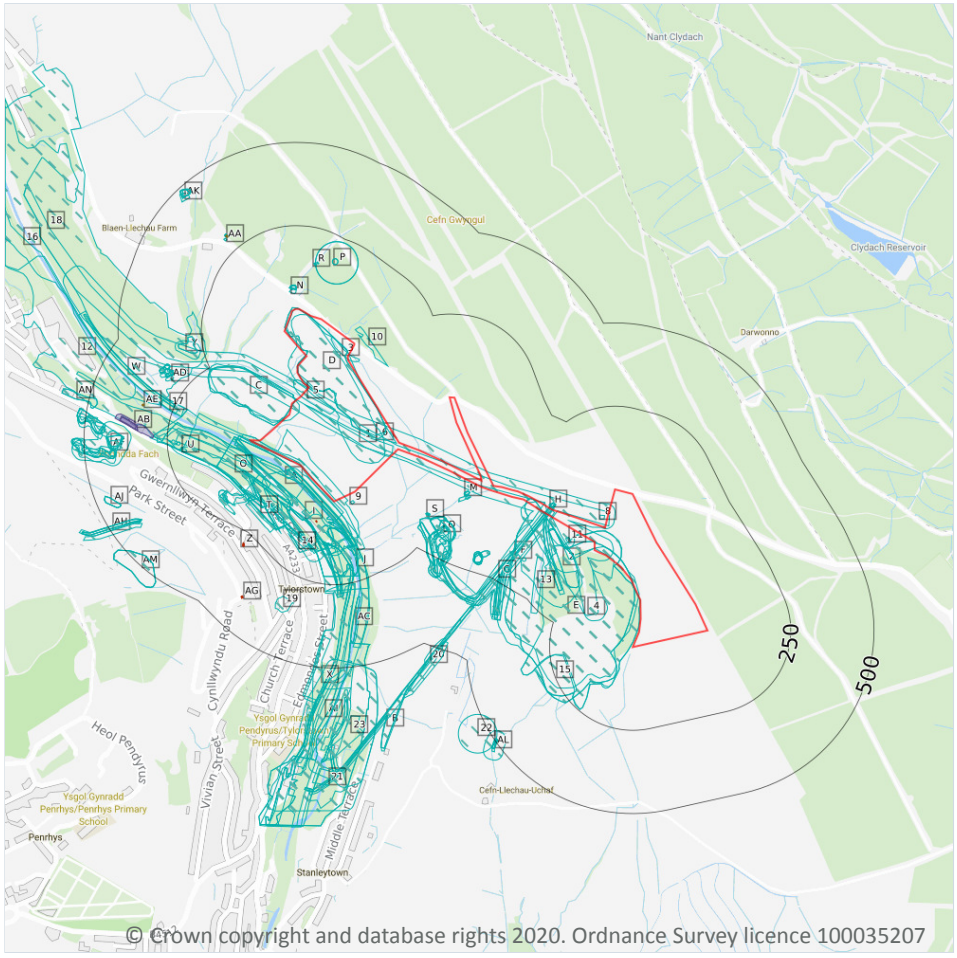
1.6 Historical military land

Records within 500m	0

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

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

2 Past land use - un-grouped



Site Outline

Search buffers in metres (m)

Historical industrial land uses

Historical tanks

Historical energy features

Historical garages

2.1 Historical industrial land uses

Records within 500m	203

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

Features are displayed on the Past land use - un-grouped map on **page 22**

ID	Location	Land Use	Date	Group ID
1	**On site**	**Refuse Heap**	**1992**	**1178134**
2	**On site**	**Tramway Sidings**	**1948**	**1257118**
3	**On site**	**Unspecified Ground Workings**	**1948**	**1267998**

ID	Location	Land Use	Date	Group ID
4	**On site**	**Refuse Heap**	**1965**	**1191174**
5	**On site**	**Unspecified Heap**	**1965**	**1223422**
6	**On site**	**Disused Tramway Sidings**	**1965**	**1174630**
A	**On site**	**Colliery**	**1898**	**1227289**
A	**On site**	**Railway Sidings**	**1898**	**1193633**
A	**On site**	**Railway Sidings**	**1948**	**1247861**
A	**On site**	**Railway Sidings**	**1965**	**1216702**
B	**On site**	**Tramway Sidings**	**1915**	**1199817**
B	**On site**	**Tramway Sidings**	**1915**	**1199817**
C	**On site**	**Unspecified Disused Tip**	**1992**	**1210261**
C	**On site**	**Unspecified Heap**	**1948**	**1224543**
C	**On site**	**Unspecified Disused Tip**	**1974**	**1210261**
C	**On site**	**Unspecified Heap**	**1965**	**1224543**
D	**On site**	**Unspecified Disused Tip**	**1992**	**1230373**
D	**On site**	**Unspecified Heap**	**1948**	**1223422**
D	**On site**	**Unspecified Disused Tip**	**1974**	**1230373**
D	**On site**	**Unspecified Ground Workings**	**1965**	**1267998**
E	**On site**	**Old Trial Level**	**1948**	**1269188**
E	**On site**	**Unspecified Disused Tip**	**1974**	**1197331**
E	**On site**	**Refuse Heap**	**1945**	**1221538**
E	**On site**	**Refuse Heap**	**1945**	**1221538**
F	**On site**	**Tramway Sidings**	**1921**	**1217738**
F	**On site**	**Refuse Heap**	**1921**	**1195474**
G	**On site**	**Tramway Sidings**	**1945**	**1216354**
H	4m NE	Railway Building	1915	1246500
H	4m NE	Railway Building	1915	1246500
A	4m SW	Colliery	1948	1262170
H	5m N	Railway Building	1965	1204524

ID	Location	Land Use	Date	Group ID
I	7m SW	Colliery	1921	1217347
7	8m SW	Railway Sidings	1945	1236936
A	8m SW	Colliery	1945	1208408
A	8m SW	Colliery	1945	1208408
8	9m W	Railway Building	1965	1172166
J	21m SW	Railway Sidings	1992	1269450
9	22m SE	Magazine	1898	1177448
K	25m SW	Tramway Sidings	1915	1192016
K	25m SW	Tramway Sidings	1915	1192016
10	26m NE	Refuse Heap	1965	1178142
11	27m SW	Railway Building	1965	1172165
L	28m SW	Refuse Heap	1915	1229671
L	28m SW	Refuse Heap	1915	1202807
A	29m SW	Colliery	1915	1210298
A	29m SW	Colliery	1915	1210298
I	29m SW	Railway Sidings	1921	1251054
M	29m SW	Old Coal Level	1915	1234138
M	29m SW	Old Coal Level	1915	1234138
M	30m SW	Old Coal Level	1945	1261036
M	30m SW	Old Coal Level	1945	1261036
M	30m SW	Old Coal Level	1948	1242853
I	30m SW	Unspecified Mine	1965	1187486
12	34m SW	Unspecified Disused Tip	1974	1165252
M	40m SW	Old Coal Level	1921	1187871
M	43m SW	Coal Level	1898	1166747
N	46m N	Unspecified Quarry	1921	1238253
O	54m SW	Refuse Heap	1921	1208190
N	58m N	Unspecified Quarry	1915	1238253

ID	Location	Land Use	Date	Group ID
N	58m N	Unspecified Quarry	1915	1238253
N	58m N	Unspecified Disused Quarry	1948	1183074
I	60m SW	Unspecified Disused Tip	1974	1165251
N	61m N	Unspecified Quarry	1945	1247532
O	66m SW	Refuse Heap	1948	1249721
J	79m S	Refuse Heap	1948	1206598
J	79m S	Refuse Heap	1921	1208344
O	87m SW	Engine House	1898	1177825
P	112m N	Old Coal Level	1948	1242714
P	112m N	Old Coal Level	1921	1225196
13	122m SW	Unspecified Pit	1965	1185685
Q	131m SW	Unspecified Disused Quarry	1948	1266305
Q	131m SW	Unspecified Disused Quarry	1921	1246849
Q	131m SW	Unspecified Quarry	1915	1223771
Q	131m SW	Unspecified Quarry	1915	1223771
Q	137m SW	Unspecified Quarry	1945	1210442
Q	139m SW	Unspecified Quarry	1965	1270968
R	139m N	Old Coal Level	1915	1243914
R	139m N	Old Coal Level	1915	1228689
S	142m SW	Trial Level	1948	1225400
S	142m SW	Trial Level	1898	1202249
S	143m SW	Old Trial Level	1915	1216575
S	143m SW	Old Trial Level	1915	1216575
Q	143m SW	Unspecified Disused Quarry	1992	1245526
Q	143m SW	Unspecified Disused Quarry	1974	1245526
S	143m SW	Old Trial Level	1945	1223033
S	143m SW	Old Trial Level	1945	1223033
F	147m SW	Old Trial Level	1921	1256367

ID	Location	Land Use	Date	Group ID
R	147m NE	Old Coal Level	1898	1226948
S	152m SW	Old Trial Level	1921	1167863
T	154m SW	Railway Sidings	1915	1216733
T	154m SW	Railway Sidings	1915	1232023
O	158m SW	Cuttings	1898	1158366
Q	159m SW	Tramway Sidings	1921	1232963
14	165m SW	Refuse Heap	1921	1200646
P	169m NE	Old Coal Level	1945	1201700
P	169m NE	Old Coal Level	1945	1211424
O	169m SW	Unspecified Quarry	1948	1210321
O	169m SW	Unspecified Quarry	1945	1210321
Q	175m SW	Unspecified Ground Workings	1965	1160467
G	176m S	Unspecified Disused Level	1992	1259574
G	176m S	Unspecified Disused Level	1974	1259574
Q	177m SW	Refuse Heap	1948	1202872
Q	177m SW	Refuse Heap	1921	1193945
O	179m SW	Unspecified Quarry	1921	1223274
G	187m S	Refuse Heap	1915	1263165
G	187m S	Refuse Heap	1915	1263165
G	190m S	Old Trial Level	1945	1271560
G	190m S	Old Trial Level	1945	1271560
G	191m S	Refuse Heap	1948	1238800
G	191m S	Refuse Heap	1921	1261858
U	194m W	Unspecified Quarry	1898	1169637
G	195m S	Unspecified Disused Level	1992	1165644
G	195m S	Unspecified Heap	1974	1264268
G	195m S	Unspecified Heap	1965	1264268
V	196m SW	Old Trial Level	1915	1246884

ID	Location	Land Use	Date	Group ID
V	196m SW	Old Trial Level	1915	1246884
15	201m W	Unspecified Disused Tip	1992	1197331
Q	202m SW	Unspecified Quarry	1945	1169670
16	210m NW	Railway Sidings	1948	1237157
U	212m W	Unspecified Quarry	1898	1169638
W	220m W	Railway Sidings	1945	1261312
17	236m NW	Railway Sidings	1921	1204224
18	242m W	Colliery	1898	1268218
W	250m NW	Railway Sidings	1915	1222328
W	250m NW	Railway Sidings	1915	1222328
X	250m S	Refuse Heap	1948	1267996
X	254m S	Refuse Heap	1921	1252189
Y	258m W	Unspecified Old Quarry	1948	1180799
Y	268m W	Unspecified Disused Quarry	1992	1232302
Y	268m W	Unspecified Disused Quarry	1974	1232302
AA	290m NW	Unspecified Tank	1921	1175761
AC	296m S	Refuse Heap	1948	1263296
AC	296m S	Refuse Heap	1921	1259659
AA	296m NW	Unspecified Tank	1948	1268733
AD	296m NW	Old Trial Level	1921	1167862
AA	297m NW	Unspecified Tank	1915	1245337
AA	297m NW	Unspecified Tank	1915	1245337
AA	298m NW	Unspecified Tank	1945	1207674
AD	304m NW	Unspecified Ground Workings	1948	1160429
AD	306m NW	Old Trial Levels	1915	1238820
AD	306m NW	Old Trial Levels	1915	1238820
AD	307m NW	Old Trial Levels	1945	1254334
AD	307m NW	Old Trial Levels	1945	1265223

ID	Location	Land Use	Date	Group ID
AD	312m NW	Old Trial Levels	1915	1209792
AD	312m NW	Old Trial Levels	1915	1209792
AD	317m NW	Old Trial Level	1921	1167861
19	324m SW	Unspecified Quarry	1898	1169636
AD	327m NW	Old Trial Levels	1915	1266785
AD	327m NW	Old Trial Levels	1915	1266785
AD	330m NW	Old Trial Levels	1915	1241001
AD	330m NW	Old Trial Levels	1915	1241001
AF	359m W	Unspecified Ground Workings	1965	1160430
AF	380m W	Unspecified Disused Quarry	1992	1214886
AF	380m W	Unspecified Disused Quarry	1974	1214886
AF	383m W	Unspecified Old Quarries	1921	1194112
AF	385m W	Unspecified Old Quarries	1948	1255122
AF	385m W	Unspecified Old Quarries	1915	1263416
AF	385m W	Unspecified Old Quarries	1915	1263416
AF	387m W	Unspecified Old Quarries	1945	1230730
AH	404m SW	Tramway Sidings	1915	1230815
AH	404m SW	Tramway Sidings	1915	1230815
AF	405m W	Unspecified Old Quarries	1898	1271782
AI	405m S	Tramway Sidings	1898	1198334
AH	406m SW	Tramway Sidings	1945	1236367
AF	406m W	Unspecified Old Quarries	1915	1226318
AF	406m W	Unspecified Old Quarries	1915	1226318
AH	407m SW	Tramway Sidings	1948	1207051
AF	408m W	Unspecified Old Quarries	1921	1218770
AH	410m SW	Tramway Sidings	1921	1248619
AI	428m S	Colliery	1915	1217674
AI	428m S	Colliery	1915	1217674

ID	Location	Land Use	Date	Group ID
AJ	434m SW	Unspecified Disused Levels	1992	1214480
AJ	434m SW	Unspecified Disused Levels	1974	1214480
AJ	434m SW	Unspecified Disused Levels	1965	1214480
AF	436m W	Unspecified Old Quarries	1921	1232829
AF	438m W	Unspecified Old Quarries	1915	1193267
AF	438m W	Unspecified Old Quarries	1915	1193267
AF	439m W	Unspecified Old Quarries	1948	1269521
AF	439m W	Unspecified Old Quarries	1898	1226250
AK	458m NW	Unspecified Quarry	1921	1203656
20	465m S	Refuse Heap	1948	1235470
AK	467m NW	Unspecified Quarry	1915	1215583
AK	467m NW	Unspecified Quarry	1915	1215583
AK	467m NW	Unspecified Quarry	1948	1215962
AK	467m NW	Unspecified Quarry	1898	1224505
AK	468m NW	Unspecified Quarry	1945	1191353
AL	468m SW	Old Coal Level	1921	1231926
AM	468m SW	Unspecified Disused Levels	1992	1244687
AM	468m SW	Unspecified Disused Levels	1974	1244687
AM	468m SW	Unspecified Disused Levels	1965	1244687
AN	473m W	Unspecified Ground Workings	1915	1226627
AN	473m W	Unspecified Ground Workings	1915	1226627
21	474m S	Refuse Heap	1921	1244932
AI	474m S	Railway Sidings	1965	1272192
22	476m SW	Old Coal Level	1898	1253393
AI	489m S	Railway Sidings	1948	1260459
AL	493m SW	Old Coal Level	1948	1220551
AL	493m SW	Old Coal Level	1945	1192201
AL	493m SW	Old Coal Level	1945	1238233

ID	Location	Land Use	Date	Group ID
AL	494m SW	Old Coal Level	1915	1226824
AL	494m SW	Old Coal Level	1915	1226824
AF	494m W	Unspecified Pit	1992	1185678
23	495m S	Unspecified Mine	1965	1187487

This data is sourced from Ordnance Survey / Groundsure.

2.2 Historical tanks

Records within 500m **5**

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

Features are displayed on the Past land use - un-grouped map on **page 22**

ID	Location	Land Use	Date	Group ID
AA	293m NW	Unspecified Tank	1920	186064
AA	297m NW	Unspecified Tank	1957	178405
AA	297m NW	Unspecified Tank	1961	178405
AE	337m W	Unspecified Tank	1996	179837
AE	337m W	Unspecified Tank	1993	179837

This data is sourced from Ordnance Survey / Groundsure.

2.3 Historical energy features

Records within 500m **13**

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

Features are displayed on the Past land use - un-grouped map on **page 22**

ID	Location	Land Use	Date	Group ID
I	78m SW	Electricity Substation	1996	97322
O	135m SW	Electricity Substation	1972	103937

ID	Location	Land Use	Date	Group ID
O	136m SW	Electricity Substation	1994	104583
O	136m SW	Electricity Substation	1993	104583
O	136m SW	Electricity Substation	1994	104583
Z	282m SW	Electricity Substation	1972	103805
Z	284m SW	Electricity Substation	1994	103805
Z	284m SW	Electricity Substation	1993	103805
Z	284m SW	Electricity Substation	1994	103805
AG	395m SW	Electricity Substation	1972	108212
AG	397m SW	Electricity Substation	1994	109962
AG	397m SW	Electricity Substation	1993	109962
AG	397m SW	Electricity Substation	1994	109962

This data is sourced from Ordnance Survey / Groundsure.

2.4 Historical petrol stations

Records within 500m	**0**

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

This data is sourced from Ordnance Survey / Groundsure.

2.5 Historical garages

Records within 500m	**5**

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

Features are displayed on the Past land use - un-grouped map on **page 22**

ID	Location	Land Use	Date	Group ID
AB	292m W	Garage	1996	34007
AB	340m W	Garage	1957	35614

ID	Location	Land Use	Date	Group ID
AB	340m W	Garage	1961	35614
AB	342m W	Garage	1993	33352
AB	346m W	Garage	1957	34340

This data is sourced from Ordnance Survey / Groundsure.

3 Waste and landfill

Site Outline

Search buffers in metres (m)

Waste exemptions

3.1 Active or recent landfill

Records within 500m	0

Active or recently closed landfill sites under Environment Agency/Natural Resources Wales regulation.

This data is sourced from the Environment Agency and Natural Resources Wales.

3.2 Historical landfill (BGS records)

Records within 500m	0

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

This data is sourced from the British Geological Survey.

3.3 Historical landfill (LA/mapping records)

Records within 500m	0

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

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

3.4 Historical landfill (EA/NRW records)

Records within 500m	0

Known historical (closed) landfill sites (e.g. sites where there is no PPC permit or waste management licence currently in force). This includes sites that existed before the waste licensing regime and sites that have been licensed in the past but where a licence has been revoked, ceased to exist or surrendered and a certificate of completion has been issued.

This data is sourced from the Environment Agency and Natural Resources Wales.

3.5 Historical waste sites

Records within 500m	0

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

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

3.6 Licensed waste sites

Records within 500m	0

Active or recently closed waste sites under Environment Agency/Natural Resources Wales regulation.

This data is sourced from the Environment Agency and Natural Resources Wales.

3.7 Waste exemptions

Records within 500m	1

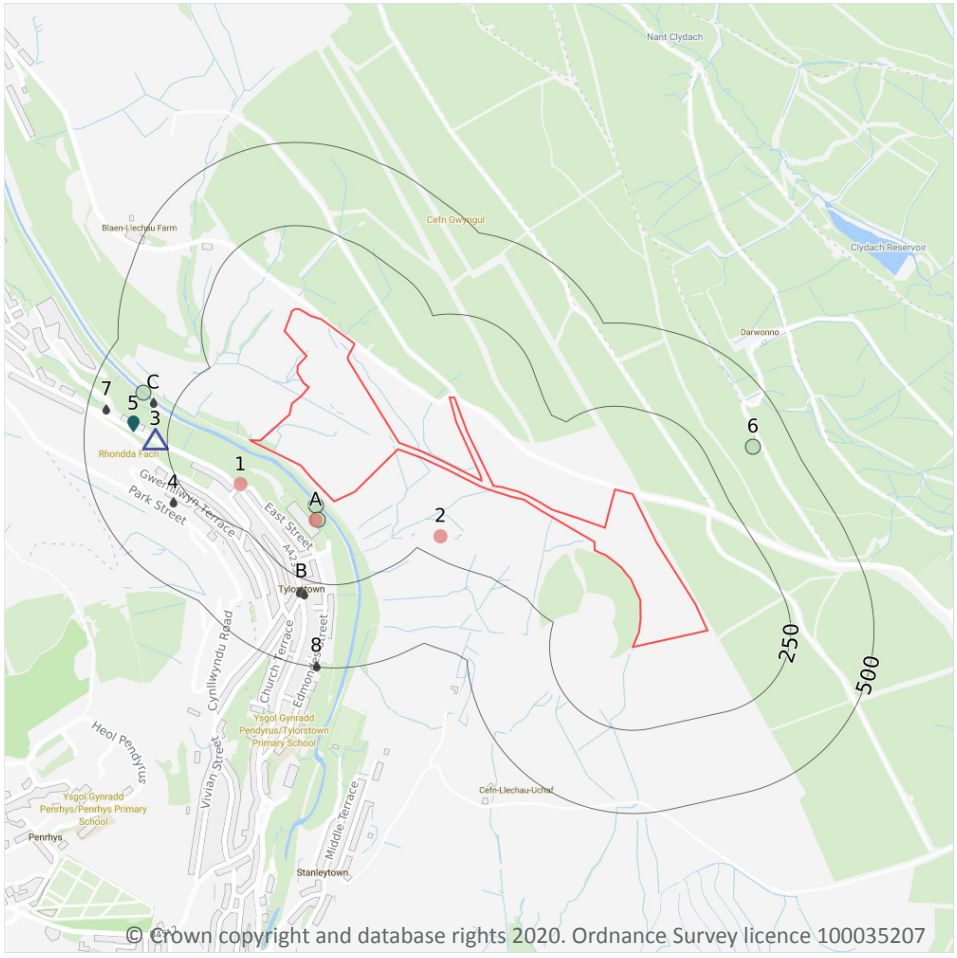
Activities involving the storage, treatment, use or disposal of waste that are exempt from needing a permit. Exemptions have specific limits and conditions that must be adhered to.

Features are displayed on the Waste and landfill map on **page 33**

ID	Location	Site	Reference	Category	Sub-Category	Description
1	202m S	Rhondda Fach Sports Centre, East Street, Tylorstown, Ferndale , Rhondda Cynon Taff, CF433HR	NRW-WME023478	Using waste exemption	Not on a farm	Use of waste in construction

This data is sourced from the Environment Agency and Natural Resources Wales.

4 Current industrial land use



Site Outline

Search buffers in metres (m)

Recent industrial land uses

Current or recent petrol stations

Licensed pollutant release (Part A(2)/B)

Licensed Discharges to controlled waters

Pollution Incidents (EA/NRW)

4.1 Recent industrial land uses

Records within 250m	3

Current potentially contaminative industrial sites.

Features are displayed on the Current industrial land use map on **page 36**

ID	Location	Company	Address	Activity	Category
A	79m SW	Electricity Sub Station	Mid Glamorgan, CF43	Electrical Features	Infrastructure and Facilities
1	132m SW	Electricity Sub Station	Mid Glamorgan, CF43	Electrical Features	Infrastructure and Facilities
2	187m SW	Quarry (Disused)	Mid Glamorgan, CF43	Unspecified Quarries Or Mines	Extractive Industries

This data is sourced from Ordnance Survey.

4.2 Current or recent petrol stations

Records within 500m	1

Open, closed, under development and obsolete petrol stations.

Features are displayed on the Current industrial land use map on **page 36**

ID	Location	Company	Address	LPG	Status
3	287m W	OBSOLETE	Dol Y Coed Terrace, Tylorstown, Ferndale, Rhondda Cynon Taf, CF43 3BW	Not Applicable	Obsolete

This data is sourced from Experian.

4.3 Electricity cables

Records within 500m	0

High voltage underground electricity transmission cables.

This data is sourced from National Grid.

4.4 Gas pipelines

Records within 500m	0

High pressure underground gas transmission pipelines.

This data is sourced from National Grid.

4.5 Sites determined as Contaminated Land

Records within 500m	0

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

This data is sourced from Local Authority records.

4.6 Control of Major Accident Hazards (COMAH)

Records within 500m	0

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

This data is sourced from the Health and Safety Executive.

4.7 Regulated explosive sites

Records within 500m	0

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

This data is sourced from the Health and Safety Executive.

4.8 Hazardous substance storage/usage

Records within 500m	0

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

This data is sourced from Local Authority records.

4.9 Historical licensed industrial activities (IPC)

Records within 500m	0

Integrated Pollution Control (IPC) records of substance releases to air, land and water. This data represents a historical archive as the IPC regime has been superseded.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.10 Licensed industrial activities (Part A(1))

Records within 500m	0

Records of Part A(1) installations regulated under the Environmental Permitting (England and Wales) Regulations 2016 for the release of substances to the environment.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.11 Licensed pollutant release (Part A(2)/B)

Records within 500m	1

Records of Part A(2) and Part B installations regulated under the Environmental Permitting (England and Wales) Regulations 2016 for the release of substances to the environment.

Features are displayed on the Current industrial land use map on **page 36**

ID	Location	Address	Details	
5	356m W	Pitstop Tyre & Exhaust Centre Ltd, Dolycoed Terrace, Ferndale, CF43 3BW	Process: Waste Oil Burner 0.4 MW Status: New Legislation Applies Permit Type: Part B	Enforcement: No Enforcements Notified Date of enforcement: No Enforcements Notified Comment: No Enforcements Notified

This data is sourced from Local Authority records.

4.12 Radioactive Substance Authorisations

Records within 500m	**0**

Records of the storage, use, accumulation and disposal of radioactive substances regulated under the Radioactive Substances Act 1993.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.13 Licensed Discharges to controlled waters

Records within 500m	**7**

Discharges of treated or untreated effluent to controlled waters under the Water Resources Act 1991.

Features are displayed on the Current industrial land use map on **page 36**

ID	Location	Address	Details	
B	288m S	East Rd Cso Tylorstown, Nr 75 East Rd, Tylorstown, Ferndale, CF43 3DE	Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: AN0119001 Permit Version: 0 Receiving Water: RHONDDA FACH RIVER	Status: Effective Issue date: 21/08/2019 Effective Date: 21/08/2019 Revocation Date: -
B	292m S	TYLORSTOWN - EAST ROAD	Effluent Type: UNSPECIFIED Permit Number: AN0119001 Permit Version: 1 Receiving Water: RHONDDA FACH	Status: NEW CONSENT, BY APPLICATION (WRA 91, SECTION 88) Issue date: 20/10/1989 Effective Date: 20/10/1989 Revocation Date: 30/03/2004
B	294m S	EAST ROAD CSO TYLORSTOWN RHONDDA, EAST ROAD CSO, ASSET NUMBER 32365, TYLORSTOWN, RHONDDA CYNON TAFF	Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: AN0119001 Permit Version: 2 Receiving Water: RHONDDA FACH	Status: Effective Issue date: 31/10/2003 Effective Date: 31/03/2004 Revocation Date: -

ID	Location	Address	Details	
4	298m SW	TYLORSTOWN BPT	Effluent Type: UNSPECIFIED Permit Number: AM0012801 Permit Version: 1 Receiving Water: SOAKAWAY	Status: CONSENT EXPIRED - TIME LIMIT Issue date: 02/10/1989 Effective Date: 02/10/1989 Revocation Date: 14/03/1994
C	313m W	Ferndale - Banana Tip Surface, Banana Tip Surface, Ferndale, Rhondda Cynon Taff, Wales	Effluent Type: TRADE DISCHARGES - SITE DRAINAGE Permit Number: AF4029004 Permit Version: 0 Receiving Water: RHONDDA FACH	Status: Effective Issue date: 02/02/1979 Effective Date: 02/02/1979 Revocation Date: -
7	442m W	MALTBY SERVICE STATION EAST ROAD T, MALTBY SERVICE STATION EAST ROAD, EAST ROAD TYLORSTOWN, TYLORSTOWN	Effluent Type: UNSPECIFIED Permit Number: AN0136601 Permit Version: 1 Receiving Water: SOAKAWAY	Status: CONSENT EXPIRED - TIME LIMIT Issue date: 28/04/1989 Effective Date: 28/04/1989 Revocation Date: 20/11/1992
8	496m S	TYLORSTOWN EDMONDES STREET SSO, EDMONDES STREET SSO	Effluent Type: UNSPECIFIED Permit Number: AE2018418 Permit Version: 1 Receiving Water: RHONDDA FACH	Status: REVOKED (WRA 91, S88 & SCHED 10 AS AMENDED BY ENV Issue date: 14/11/1963 Effective Date: 14/11/1963 Revocation Date: 31/03/2004

This data is sourced from the Environment Agency and Natural Resources Wales.

4.14 Pollutant release to surface waters (Red List)

Records within 500m	**0**

Discharges of specified substances under the Environmental Protection (Prescribed Processes and Substances) Regulations 1991.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.15 Pollutant release to public sewer

Records within 500m	**0**

Discharges of Special Category Effluents to the public sewer.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.16 List 1 Dangerous Substances

Records within 500m	0

Discharges of substances identified on List I of European Directive E 2006/11/EC, and regulated under the Environmental Damage (Prevention and Remediation) Regulations 2015.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.17 List 2 Dangerous Substances

Records within 500m	0

Discharges of substances identified on List II of European Directive E 2006/11/EC, and regulated under the Environmental Damage (Prevention and Remediation) Regulations 2015.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.18 Pollution Incidents (EA/NRW)

Records within 500m	4

Records of substantiated pollution incidents. Since 2006 this data has only included category 1 (major) and 2 (significant) pollution incidents.

Features are displayed on the Current industrial land use map on **page 36**

ID	Location	Details	
A	47m SW	Incident Date: 18/06/2001 Incident Identification: 9865 Pollutant: Sewage Materials Pollutant Description: Other Sewage Material	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
A	74m SW	Incident Date: 04/11/2002 Incident Identification: 118545 Pollutant: Inert Materials and Wastes Pollutant Description: Other Inert Material or Waste	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
C	352m NW	Incident Date: 01/06/2001 Incident Identification: 7256 Pollutant: Sewage Materials Pollutant Description: Crude Sewage	Water Impact: Category 3 (Minor) Land Impact: Category 3 (Minor) Air Impact: Category 3 (Minor)
6	386m NE	Incident Date: 09/06/2013 Incident Identification: 1120557 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Smoke	Water Impact: - Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)

This data is sourced from the Environment Agency and Natural Resources Wales.

4.19 Pollution inventory substances

Records within 500m	0

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

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

4.20 Pollution inventory waste transfers

Records within 500m	0

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

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

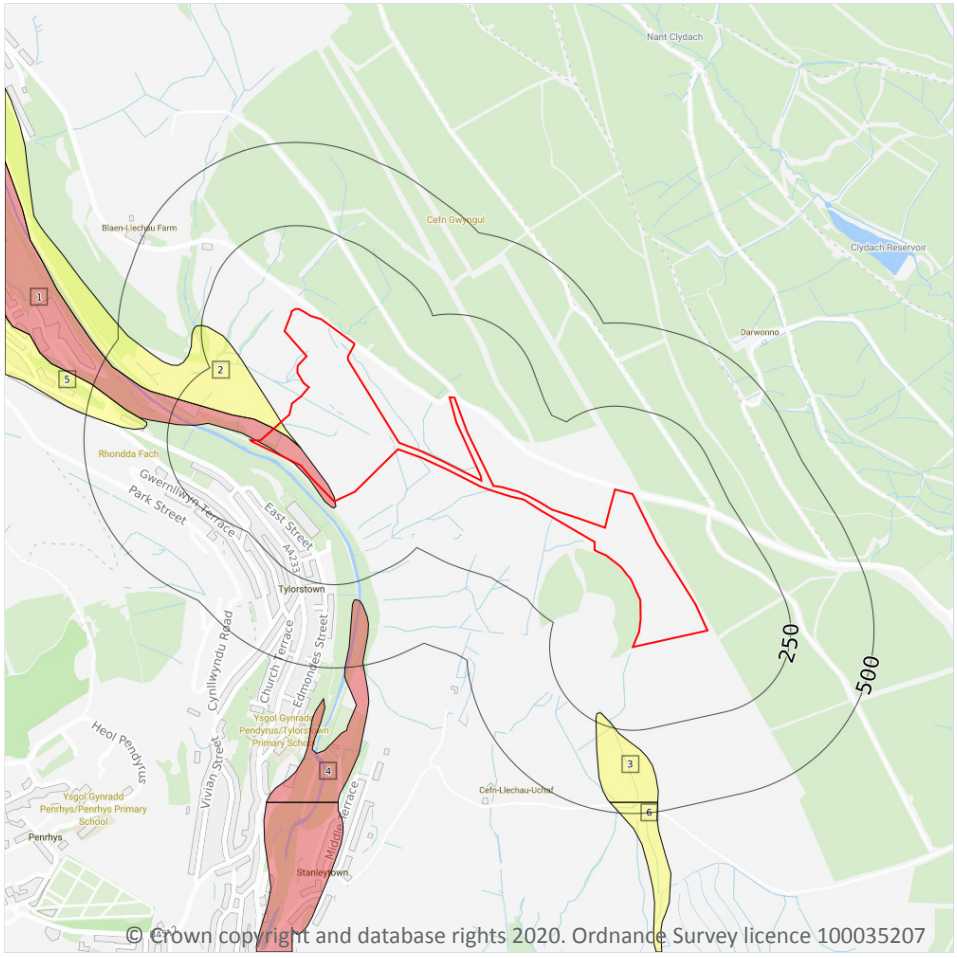
4.21 Pollution inventory radioactive waste

Records within 500m	0

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

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

5 Hydrogeology - Superficial aquifer



Site Outline

Search buffers in metres (m)

- Principal
- Secondary A
- Secondary B
- Secondary Undifferentiated
- Unproductive
- Unknown

5.1 Superficial aquifer

Records within 500m	6

Aquifer status of groundwater held within superficial geology.

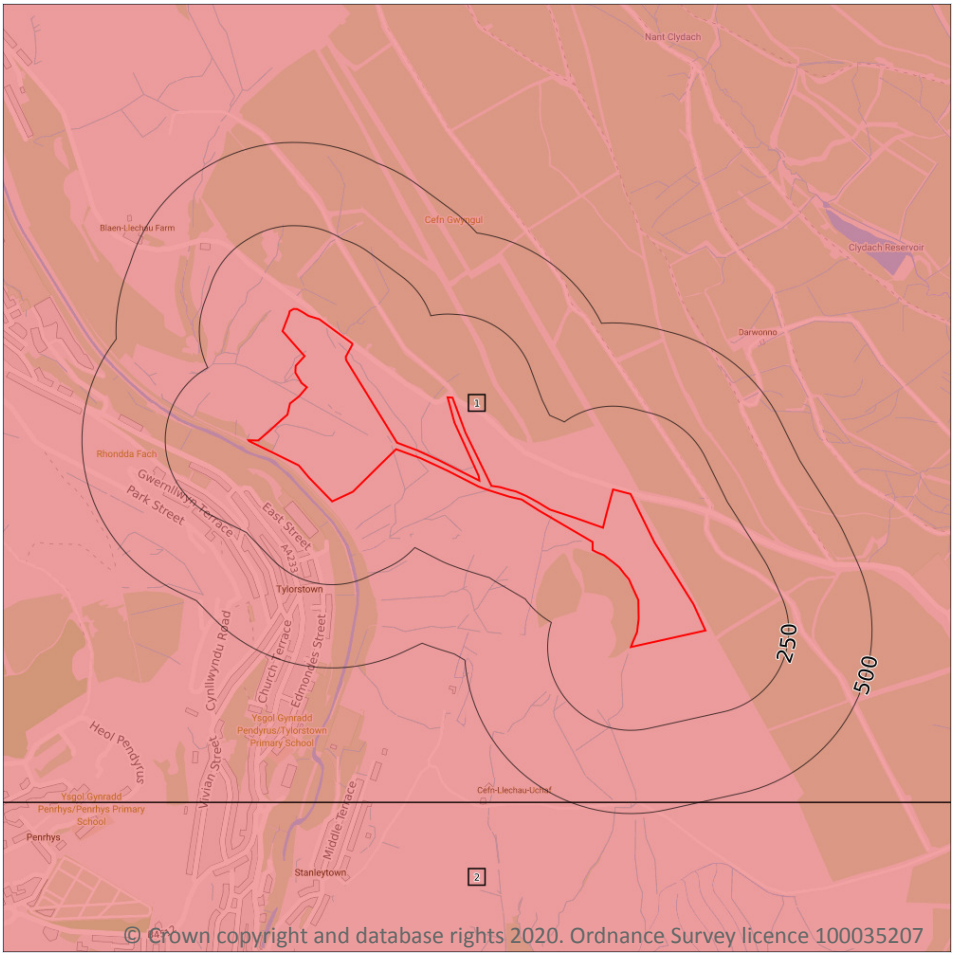
Features are displayed on the Hydrogeology map on **page 43**

ID	Location	Designation	Description
1	On site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
2	On site	Secondary Undifferentiated	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type

ID	Location	Designation	Description
3	221m SW	Secondary Undifferentiated	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
4	302m S	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
5	315m W	Secondary Undifferentiated	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
6	466m S	Secondary Undifferentiated	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.

Bedrock aquifer



Site Outline

Search buffers in metres (m)

- Principal
- Secondary A
- Secondary B
- Secondary Undifferentiated
- Unproductive

5.2 Bedrock aquifer

Records within 500m	2

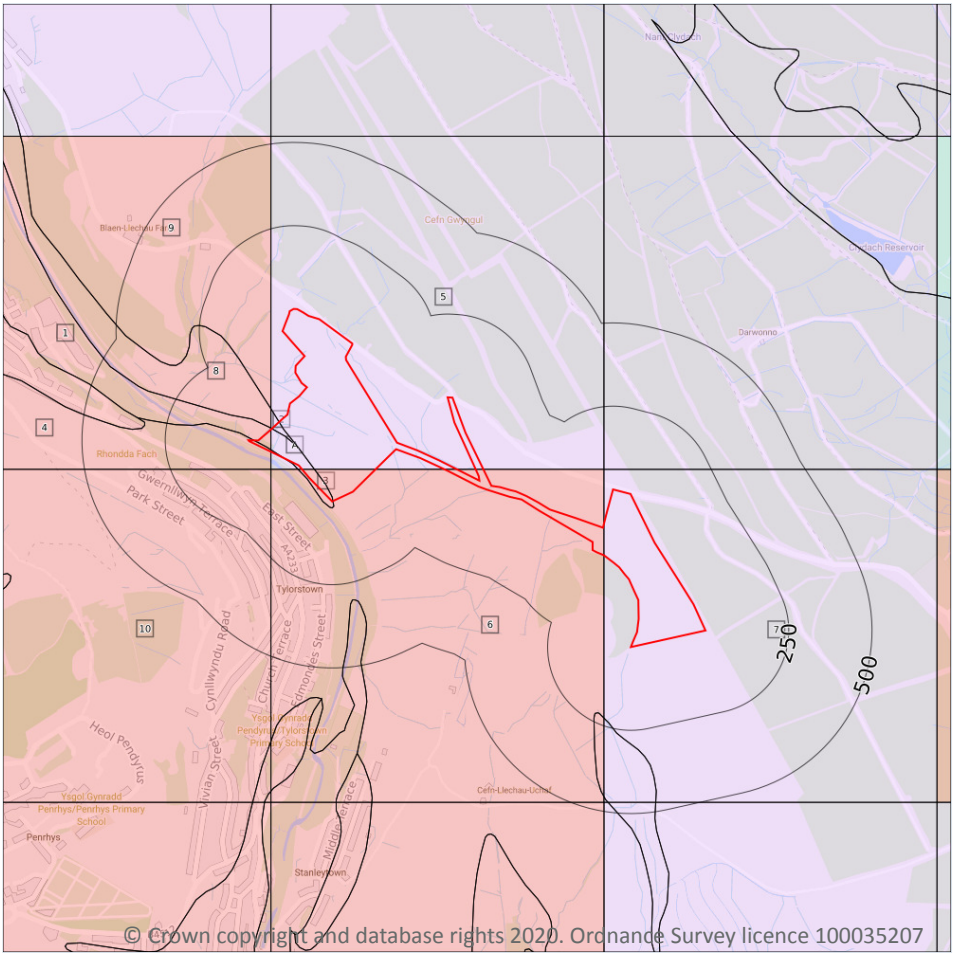
Aquifer status of groundwater held within bedrock geology.

Features are displayed on the Bedrock aquifer map on **page 45**

ID	Location	Designation	Description
1	**On site**	**Secondary A**	**Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers**
2	466m S	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.

Groundwater vulnerability



Site Outline

Search buffers in metres (m)

Superficial vulnerability

- Principal superficial aquifer, high vulnerability
- Secondary superficial aquifer, high vulnerability
- Principal superficial aquifer, medium vulnerability
- Secondary superficial aquifer, medium vulnerability
- Principal superficial aquifer, low vulnerability
- Secondary superficial aquifer, low vulnerability

Bedrock vulnerability

- Principal bedrock aquifer, high vulnerability
- Secondary bedrock aquifer, high vulnerability
- Principal bedrock aquifer, medium vulnerability
- Secondary bedrock aquifer, medium vulnerability
- Principal bedrock aquifer, low vulnerability
- Secondary bedrock aquifer, low vulnerability

Other information

- Unproductive aquifer
- Soluble rock risk
- Local information

5.3 Groundwater vulnerability

Records within 50m	12

An assessment of the vulnerability of groundwater to a pollutant discharged at ground level based on the hydrological, geological, hydrogeological and soil properties within a one kilometre square grid. Groundwater vulnerability is described as High, Medium or Low as follows:

- High - Areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.
- Medium - Intermediate between high and low vulnerability.
- Low - Areas that provide the greatest protection from pollution. They are likely to be characterised by low leaching soils and/or the presence of superficial deposits characterised by a low permeability.

Features are displayed on the Groundwater vulnerability map on **page 47**

ID	Location	Summary	Soil / surface	Superficial geology	Bedrock geology
1	On site	Summary Classification: Secondary bedrock aquifer - High Vulnerability Combined classification: Productive Bedrock Aquifer, Productive Superficial Aquifer	Leaching class: High Infiltration value: <40% Dilution value: >550mm/year	Vulnerability: Medium Aquifer type: Secondary Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: High Aquifer type: Secondary Flow mechanism: Well connected fractures
2	On site	Summary Classification: Secondary bedrock aquifer - Medium Vulnerability Combined classification: Productive Bedrock Aquifer, Productive Superficial Aquifer	Leaching class: Low Infiltration value: <40% Dilution value: >550mm/year	Vulnerability: Low Aquifer type: Secondary Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: Medium Aquifer type: Secondary Flow mechanism: Well connected fractures
3	On site	Summary Classification: Secondary bedrock aquifer - High Vulnerability Combined classification: Productive Bedrock Aquifer, Productive Superficial Aquifer	Leaching class: High Infiltration value: <40% Dilution value: >550mm/year	Vulnerability: Medium Aquifer type: Secondary Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: High Aquifer type: Secondary Flow mechanism: Well connected fractures
4	On site	Summary Classification: Secondary bedrock aquifer - High Vulnerability Combined classification: Productive Bedrock Aquifer, No Superficial Aquifer	Leaching class: High Infiltration value: <40% Dilution value: >550mm/year	Vulnerability: - Aquifer type: - Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: High Aquifer type: Secondary Flow mechanism: Well connected fractures
5	On site	Summary Classification: Secondary bedrock aquifer - Medium Vulnerability Combined classification: Productive Bedrock Aquifer, No Superficial Aquifer	Leaching class: Low Infiltration value: <40% Dilution value: >550mm/year	Vulnerability: - Aquifer type: - Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: Medium Aquifer type: Secondary Flow mechanism: Well connected fractures
6	On site	Summary Classification: Secondary bedrock aquifer - High Vulnerability Combined classification: Productive Bedrock Aquifer, No Superficial Aquifer	Leaching class: High Infiltration value: <40% Dilution value: >550mm/year	Vulnerability: - Aquifer type: - Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: High Aquifer type: Secondary Flow mechanism: Well connected fractures
7	On site	Summary Classification: Secondary bedrock aquifer - Medium Vulnerability Combined classification: Productive Bedrock Aquifer, No Superficial Aquifer	Leaching class: Low Infiltration value: <40% Dilution value: >550mm/year	Vulnerability: - Aquifer type: - Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: Medium Aquifer type: Secondary Flow mechanism: Well connected fractures

ID	Location	Summary	Soil / surface	Superficial geology	Bedrock geology
A	**On site**	**Summary Classification: Secondary bedrock aquifer - Medium Vulnerability Combined classification: Productive Bedrock Aquifer, Productive Superficial Aquifer**	**Leaching class: Low Infiltration value: <40% Dilution value: >550mm/year**	**Vulnerability: Low Aquifer type: Secondary Thickness: <3m Patchiness value: <90% Recharge potential: No Data**	**Vulnerability: Medium Aquifer type: Secondary Flow mechanism: Well connected fractures**
A	**On site**	**Summary Classification: Secondary bedrock aquifer - Medium Vulnerability Combined classification: Productive Bedrock Aquifer, No Superficial Aquifer**	**Leaching class: Low Infiltration value: <40% Dilution value: >550mm/year**	**Vulnerability: - Aquifer type: - Thickness: <3m Patchiness value: <90% Recharge potential: No Data**	**Vulnerability: Medium Aquifer type: Secondary Flow mechanism: Well connected fractures**
8	3m NW	Summary Classification: Secondary bedrock aquifer - High Vulnerability Combined classification: Productive Bedrock Aquifer, Productive Superficial Aquifer	Leaching class: High Infiltration value: <40% Dilution value: >550mm/year	Vulnerability: Medium Aquifer type: Secondary Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: High Aquifer type: Secondary Flow mechanism: Well connected fractures
9	34m W	Summary Classification: Secondary bedrock aquifer - High Vulnerability Combined classification: Productive Bedrock Aquifer, No Superficial Aquifer	Leaching class: High Infiltration value: <40% Dilution value: >550mm/year	Vulnerability: - Aquifer type: - Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: High Aquifer type: Secondary Flow mechanism: Well connected fractures
10	47m SW	Summary Classification: Secondary bedrock aquifer - High Vulnerability Combined classification: Productive Bedrock Aquifer, No Superficial Aquifer	Leaching class: High Infiltration value: <40% Dilution value: >550mm/year	Vulnerability: - Aquifer type: - Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: High Aquifer type: Secondary Flow mechanism: Well connected fractures

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.

5.4 Groundwater vulnerability- soluble rock risk

Records on site	**0**

This dataset identifies areas where solution features that enable rapid movement of a pollutant may be present within a 1km grid square.

This data is sourced from the British Geological Survey and the Environment Agency.

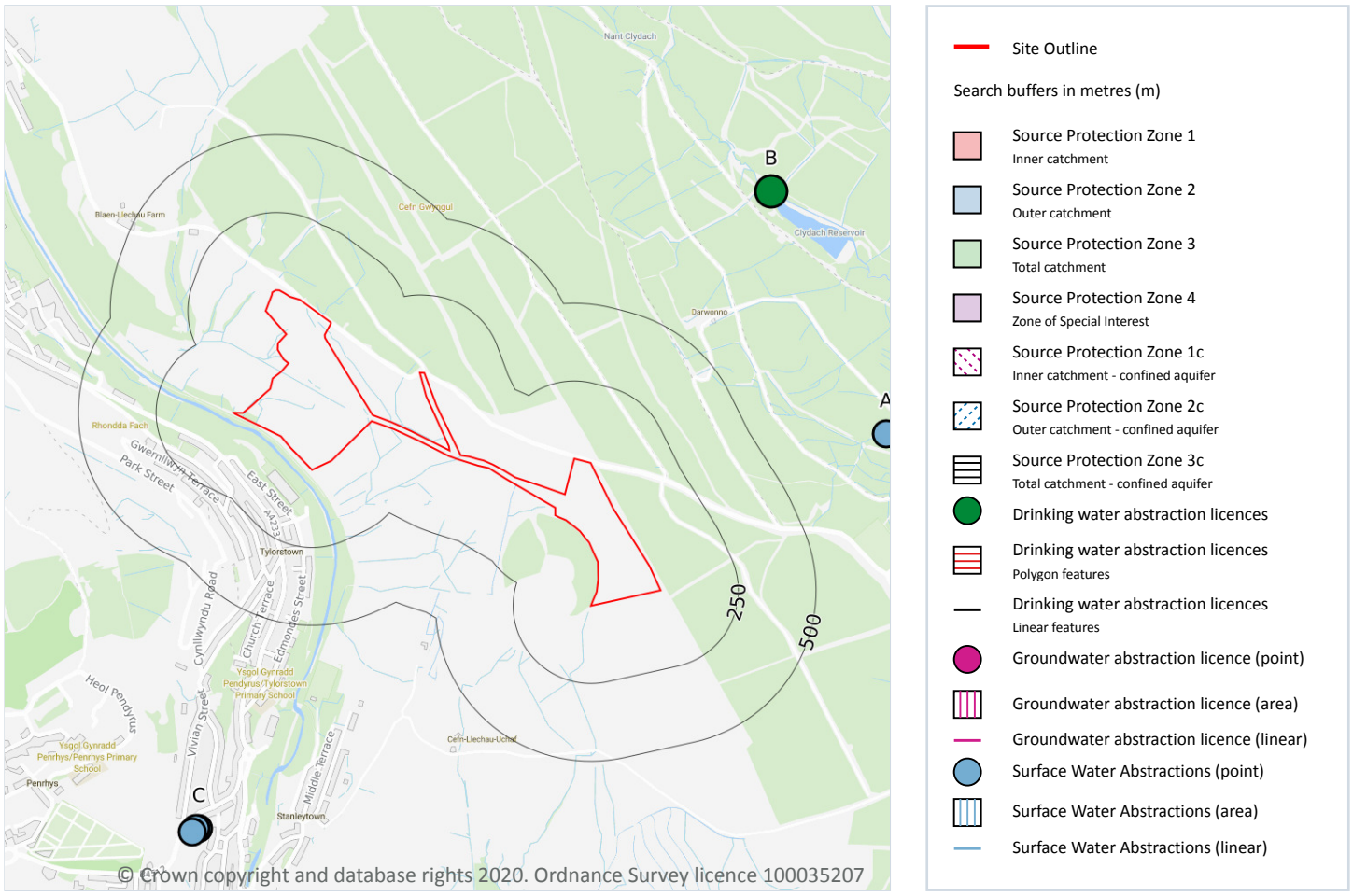
5.5 Groundwater vulnerability- local information

Records on site	0

This dataset identifies areas where additional local information affecting vulnerability is held by the Environment Agency. Further information can be obtained by contacting the Environment Agency local Area groundwater team through the Environment Agency National Customer Call Centre on 03798 506 506 or by email on enquiries@environment-agency.gov.uk.

This data is sourced from the British Geological Survey and the Environment Agency.

Abstractions and Source Protection Zones



5.6 Groundwater abstractions

Records within 2000m	0

Licensed groundwater abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, between two points (line data) or a larger area.

This data is sourced from the Environment Agency and Natural Resources Wales.

5.7 Surface water abstractions

Records within 2000m	11

Licensed surface water abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, a stretch of watercourse or a larger area.

Features are displayed on the Abstractions and Source Protection Zones map on **page 51**

ID	Location	Details	
A	871m NE	Status: Historical Licence No: 21/57/25/0001 Details: Potable Water Supply - Direct Direct Source: EAW Surface Water Point: SYCHNANT STREAM (POINT 3) Data Type: Point Name: Dwr Cymru Cyfyngedig Easting: 303030 Northing: 196020	Annual Volume (m^3): 1,725,000 Max Daily Volume (m^3): 4726.03 Original Application No: - Original Start Date: 25/03/1966 Expiry Date: - Issue No: 100 Version Start Date: 19/10/2006 Version End Date: -
B	1049m NE	Status: Historical Licence No: 21/57/25/0001 Details: Potable Water Supply - Direct Direct Source: EAW Surface Water Point: CLYDACH STREAM (POINT 1) Data Type: Point Name: Dwr Cymru Cyfyngedig Easting: 302660 Northing: 196800	Annual Volume (m^3): 1,725,000 Max Daily Volume (m^3): 4726.03 Original Application No: - Original Start Date: 25/03/1966 Expiry Date: - Issue No: 100 Version Start Date: 19/10/2006 Version End Date: -
B	1049m NE	Status: Active Licence No: 21/57/25/0001 Details: Pottable Water Supply - Direct - Medium Direct Source: - Point: - Data Type: Point Name: - Easting: 302660 Northing: 196800	Annual Volume (m^3): 1,725,000 Max Daily Volume (m^3): - Original Application No: - Original Start Date: Oct 19 2006 12:00AM Expiry Date: - Issue No: - Version Start Date: - Version End Date: -
C	1209m S	Status: Historical Licence No: 21/57/24/0054 Details: Lake & Pond Throughflow Direct Source: EAW Surface Water Point: UN-NAMED SPRING AT MAERDY AND FERNDALE ANGLING CLUB Data Type: Point Name: Maerdy and Ferndale Angling Club Easting: 300820 Northing: 194750	Annual Volume (m^3): 365000 Max Daily Volume (m^3): 1000 Original Application No: - Original Start Date: 16/03/2007 Expiry Date: 31/03/2017 Issue No: 1 Version Start Date: 16/03/2007 Version End Date: -

ID	Location	Details	
C	1212m S	Status: Historical Licence No: 21/57/24/0054 Details: Lake & Pond Throughflow Direct Source: EAW Surface Water Point: UN-NAMED SPRING AT MAERDY AND FERNDALE ANGLING CLUB Data Type: Point Name: Maerdy and Ferndale Angling Club Easting: 300810 Northing: 194750	Annual Volume (m^3): 365000 Max Daily Volume (m^3): 1000 Original Application No: - Original Start Date: 16/03/2007 Expiry Date: 31/03/2017 Issue No: 1 Version Start Date: 16/03/2007 Version End Date: -
C	1225m S	Status: Historical Licence No: 21/57/24/0054 Details: Lake & Pond Throughflow Direct Source: EAW Surface Water Point: UN-NAMED SPRING AT MAERDY AND FERNDALE ANGLING CLUB Data Type: Point Name: Maerdy and Ferndale Angling Club Easting: 300800 Northing: 194740	Annual Volume (m^3): 365000 Max Daily Volume (m^3): 1000 Original Application No: - Original Start Date: 16/03/2007 Expiry Date: 31/03/2017 Issue No: 1 Version Start Date: 16/03/2007 Version End Date: -
-	1425m NE	Status: Historical Licence No: 21/57/25/0001 Details: Potable Water Supply - Direct Direct Source: EAW Surface Water Point: CACHWNT STREAM (POINT 4) Data Type: Point Name: Dwr Cymru Cyfyngedig Easting: 303250 Northing: 196740	Annual Volume (m^3): 1,725,000 Max Daily Volume (m^3): 4726.03 Original Application No: - Original Start Date: 25/03/1966 Expiry Date: - Issue No: 100 Version Start Date: 19/10/2006 Version End Date: -
-	1823m N	Status: Historical Licence No: 21/57/23/0022 Details: Potable Water Supply - Direct Direct Source: EAW Surface Water Point: FFYRNANT STREAM Data Type: Point Name: Dwr Cymru Cyf Easting: 301200 Northing: 198300	Annual Volume (m^3): 438200 Max Daily Volume (m^3): 1200 Original Application No: - Original Start Date: 10/02/1966 Expiry Date: - Issue No: 100 Version Start Date: 21/06/1967 Version End Date: -
-	1930m N	Status: Historical Licence No: 21/57/23/0022 Details: Potable Water Supply - Direct Direct Source: EAW Surface Water Point: SPRING AT CRAIG PWLLFA Data Type: Point Name: Dwr Cymru Cyf Easting: 300850 Northing: 198400	Annual Volume (m^3): 438200 Max Daily Volume (m^3): 1200 Original Application No: - Original Start Date: 10/02/1966 Expiry Date: - Issue No: 100 Version Start Date: 21/06/1967 Version End Date: -

ID	Location	Details	
-	1932m NE	Status: Historical Licence No: 21/57/25/0001 Details: Potable Water Supply - Direct Direct Source: EAW Surface Water Point: NANT YR YSFA - LOWER REACHES (POINT 5) Data Type: Point Name: Dwr Cymru Cyfyngedig Easting: 303850 Northing: 196710	Annual Volume (m^3): 1,725,000 Max Daily Volume (m^3): 4726.03 Original Application No: - Original Start Date: 25/03/1966 Expiry Date: - Issue No: 100 Version Start Date: 19/10/2006 Version End Date: -
-	1992m N	Status: Historical Licence No: 21/57/23/0022 Details: Potable Water Supply - Direct Direct Source: EAW Surface Water Point: SPRING NEAR CRAIG PWLLFA Data Type: Point Name: Dwr Cymru Cyf Easting: 300950 Northing: 198470	Annual Volume (m^3): 438200 Max Daily Volume (m^3): 1200 Original Application No: - Original Start Date: 10/02/1966 Expiry Date: - Issue No: 100 Version Start Date: 21/06/1967 Version End Date: -

This data is sourced from the Environment Agency and Natural Resources Wales.

5.8 Potable abstractions

Records within 2000m	**8**

Licensed potable water abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, a stretch of watercourse or a larger area.

Features are displayed on the Abstractions and Source Protection Zones map on **page 51**

ID	Location	Details	
A	871m NE	Status: Historical Licence No: 21/57/25/0001 Details: Potable Water Supply - Direct Direct Source: EAW Surface Water Point: SYCHNANT STREAM (POINT 3) Data Type: Point Name: Dwr Cymru Cyfyngedig Easting: 303030 Northing: 196020	Annual Volume (m^3): 1,725,000 Max Daily Volume (m^3): 4726.03 Original Application No: - Original Start Date: 25/03/1966 Expiry Date: - Issue No: 100 Version Start Date: 19/10/2006 Version End Date: -

ID	Location	Details	
B	1049m NE	Status: Historical Licence No: 21/57/25/0001 Details: Potable Water Supply - Direct Direct Source: EAW Surface Water Point: CLYDACH STREAM (POINT 1) Data Type: Point Name: Dwr Cymru Cyfyngedig Easting: 302660 Northing: 196800	Annual Volume (m^3): 1,725,000 Max Daily Volume (m^3): 4726.03 Original Application No: - Original Start Date: 25/03/1966 Expiry Date: - Issue No: 100 Version Start Date: 19/10/2006 Version End Date: -
B	1049m NE	Status: Active Licence No: 21/57/25/0001 Details: Pottable Water Supply - Direct - Medium Direct Source: - Point: - Data Type: Point Name: - Easting: 302660 Northing: 196800	Annual Volume (m^3): 1,725,000 Max Daily Volume (m^3): - Original Application No: - Original Start Date: Oct 19 2006 12:00AM Expiry Date: - Issue No: - Version Start Date: - Version End Date: -
-	1425m NE	Status: Historical Licence No: 21/57/25/0001 Details: Potable Water Supply - Direct Direct Source: EAW Surface Water Point: CACHWNT STREAM (POINT 4) Data Type: Point Name: Dwr Cymru Cyfyngedig Easting: 303250 Northing: 196740	Annual Volume (m^3): 1,725,000 Max Daily Volume (m^3): 4726.03 Original Application No: - Original Start Date: 25/03/1966 Expiry Date: - Issue No: 100 Version Start Date: 19/10/2006 Version End Date: -
-	1823m N	Status: Historical Licence No: 21/57/23/0022 Details: Potable Water Supply - Direct Direct Source: EAW Surface Water Point: FFYRNANT STREAM Data Type: Point Name: Dwr Cymru Cyf Easting: 301200 Northing: 198300	Annual Volume (m^3): 438200 Max Daily Volume (m^3): 1200 Original Application No: - Original Start Date: 10/02/1966 Expiry Date: - Issue No: 100 Version Start Date: 21/06/1967 Version End Date: -
-	1930m N	Status: Historical Licence No: 21/57/23/0022 Details: Potable Water Supply - Direct Direct Source: EAW Surface Water Point: SPRING AT CRAIG PWLLFA Data Type: Point Name: Dwr Cymru Cyf Easting: 300850 Northing: 198400	Annual Volume (m^3): 438200 Max Daily Volume (m^3): 1200 Original Application No: - Original Start Date: 10/02/1966 Expiry Date: - Issue No: 100 Version Start Date: 21/06/1967 Version End Date: -

ID	Location	Details	
-	1932m NE	Status: Historical Licence No: 21/57/25/0001 Details: Potable Water Supply - Direct Direct Source: EAW Surface Water Point: NANT YR YSFA - LOWER REACHES (POINT 5) Data Type: Point Name: Dwr Cymru Cyfyngedig Easting: 303850 Northing: 196710	Annual Volume (m^3): 1,725,000 Max Daily Volume (m^3): 4726.03 Original Application No: - Original Start Date: 25/03/1966 Expiry Date: - Issue No: 100 Version Start Date: 19/10/2006 Version End Date: -
-	1992m N	Status: Historical Licence No: 21/57/23/0022 Details: Potable Water Supply - Direct Direct Source: EAW Surface Water Point: SPRING NEAR CRAIG PWLLFA Data Type: Point Name: Dwr Cymru Cyf Easting: 300950 Northing: 198470	Annual Volume (m^3): 438200 Max Daily Volume (m^3): 1200 Original Application No: - Original Start Date: 10/02/1966 Expiry Date: - Issue No: 100 Version Start Date: 21/06/1967 Version End Date: -

This data is sourced from the Environment Agency and Natural Resources Wales.

5.9 Source Protection Zones

Records within 500m	**0**

Source Protection Zones define the sensitivity of an area around a potable abstraction site to contamination.

This data is sourced from the Environment Agency and Natural Resources Wales.

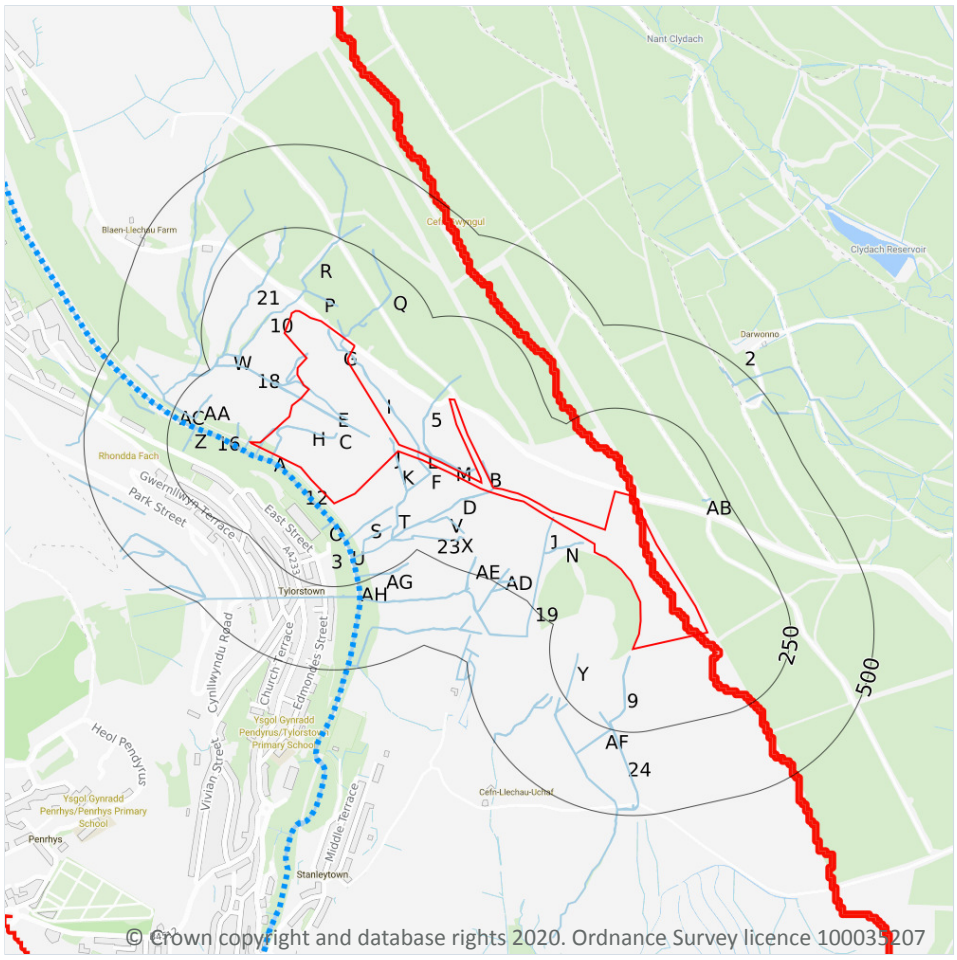
5.10 Source Protection Zones (confined aquifer)

Records within 500m	**0**

Source Protection Zones in the confined aquifer define the sensitivity around a deep groundwater abstraction to contamination. A confined aquifer would normally be protected from contamination by overlying geology and is only considered a sensitive resource if deep excavation/drilling is taking place.

This data is sourced from the Environment Agency and Natural Resources Wales.

6 Hydrology



Site Outline

Search buffers in metres (m)

Water Network (OS MasterMap)

Surface water features (wider than 5m)

Surface water features (narrower than 5m)

WFD River, canal and surface water transfer water bodies

WFD Lake water bodies

WFD Transitional and coastal water bodies

WFD Surface water body catchments boundaries

WFD Groundwater body boundaries

6.1 Water Network (OS MasterMap)

Records within 250m	101

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

Features are displayed on the Hydrology map on **page 57**

ID	Location	Type of water feature	Ground level	Permanence	Name
1	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

ID	Location	Type of water feature	Ground level	Permanence	Name
A	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
A	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
A	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
C	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
C	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
C	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
D	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
E	On site	Lake, loch or reservoir.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
E	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
E	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
E	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
E	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
E	On site	Lake, loch or reservoir.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

ID	Location	Type of water feature	Ground level	Permanence	Name
E	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
E	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
F	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
G	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
G	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
G	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
G	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
G	On site	Inland river not influenced by normal tidal action.	Underground	Watercourse contains water year round (in normal circumstances)	-
H	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
I	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
J	On site	Inland river not influenced by normal tidal action.	Underground	Watercourse contains water year round (in normal circumstances)	-
J	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
K	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

ID	Location	Type of water feature	Ground level	Permanence	Name
E	1m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
L	1m N	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
B	1m NE	Inland river not influenced by normal tidal action.	Not provided	Watercourse contains water year round (in normal circumstances)	-
M	3m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
G	4m NE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
G	5m NE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
A	5m NW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
G	6m NE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
5	6m NE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
E	6m W	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
N	14m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
9	23m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
10	23m NW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

ID	Location	Type of water feature	Ground level	Permanence	Name
12	23m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Afon Rhondda Fach
A	23m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Afon Rhondda Fach
A	30m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Afon Rhondda Fach
A	31m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Afon Rhondda Fach
E	38m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
E	42m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
A	42m NW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
16	51m W	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Afon Rhondda Fach
O	54m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
O	54m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Afon Rhondda Fach
G	58m NE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
Q	58m NE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
P	63m NE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

ID	Location	Type of water feature	Ground level	Permanence	Name
R	64m N	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
18	82m W	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
S	93m SE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
19	99m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
T	104m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
U	119m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Afon Rhondda Fach
V	122m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
21	124m NW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
S	136m SE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
W	151m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
W	151m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
X	157m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
S	159m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

ID	Location	Type of water feature	Ground level	Permanence	Name
Y	165m W	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
W	171m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
Z	172m W	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
Z	172m W	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Afon Rhondda Fach
S	173m SE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
U	173m SE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
U	174m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Afon Rhondda Fach
23	174m SW	Inland river not influenced by normal tidal action.	Not provided	Watercourse contains water year round (in normal circumstances)	-
S	174m SE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
S	175m SE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
S	176m SE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
Z	176m W	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
AA	177m NW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

ID	Location	Type of water feature	Ground level	Permanence	Name
AB	180m NE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
Z	181m NW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
AC	181m NW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
AC	183m W	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Afon Rhondda Fach
Z	183m W	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
AD	193m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
AB	193m NE	Inland river not influenced by normal tidal action.	Underground	Watercourse contains water year round (in normal circumstances)	-
W	195m W	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
AE	197m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
AB	199m NE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
Y	201m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
Y	204m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
AF	213m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

ID	Location	Type of water feature	Ground level	Permanence	Name
AD	214m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
W	231m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
24	231m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
AG	231m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
AH	231m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Afon Rhondda Fach
AD	244m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
AE	246m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
AD	247m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
Y	249m SW	Lake, loch or reservoir.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

This data is sourced from the Ordnance Survey.

6.2 Surface water features

Records within 250m	**50**

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

Features are displayed on the Hydrology map on **page 57**

This data is sourced from the Ordnance Survey.

6.3 WFD Surface water body catchments

Records on site	2

The Water Framework Directive is an EU-led framework for the protection of inland surface waters, estuaries, coastal waters and groundwater through river basin-level management planning. In terms of surface water, these basins are broken down into smaller units known as management, operational and water body catchments.

Features are displayed on the Hydrology map on **page 57**

ID	Location	Type	Water body catchment	Water body ID	Operational catchment	Management catchment
2	**On site**	**River WB catchment**	**Nant Clydach - source to conf R Taff**	**GB109057027250**	**Cynon**	**South East Valleys**
3	**On site**	**River WB catchment**	**Afon Rhondda Fach - source to conf Rhondda R**	**GB109057027210**	**Rhondda**	**South East Valleys**

This data is sourced from the Environment Agency and Natural Resources Wales.

6.4 WFD Surface water bodies

Records identified	2

Surface water bodies under the Directive may be rivers, lakes, estuary or coastal. To achieve the purpose of the Directive, environmental objectives have been set and are reported on for each water body. The progress towards delivery of the objectives is then reported on by the relevant competent authorities at the end of each six-year cycle. The river water body directly associated with the catchment listed in the previous section is detailed below, along with any lake, canal, coastal or artificial water body within 250m of the site.

Features are displayed on the Hydrology map on **page 57**

ID	Location	Type	Name	Water body ID	Overall rating	Chemical rating	Ecological rating	Year
11	24m SW	River	Afon Rhondda Fach - source to conf Rhondda R	GB109057027210	Poor	Good	Poor	2016
-	788m NE	River	Nant Clydach - source to conf R Taff	GB109057027250	Poor	Good	Poor	2016

This data is sourced from the Environment Agency and Natural Resources Wales.

6.5 WFD Groundwater bodies

Records on site	1

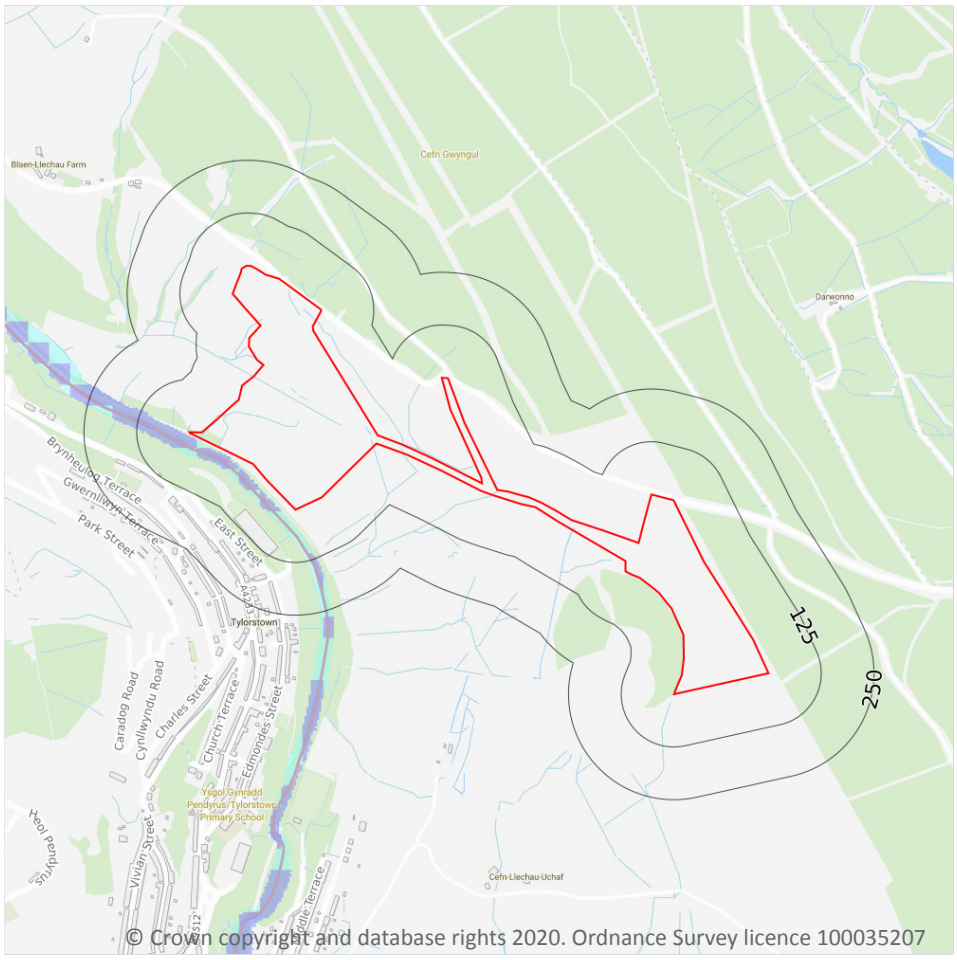
Groundwater bodies are also covered by the Directive and the same regime of objectives and reporting detailed in the previous section is in place.

Features are displayed on the Hydrology map on **page 57**

ID	Location	Name	Water body ID	Overall rating	Chemical rating	Quantitative	Year
B	**On site**	**SE Valleys Carboniferous Coal Measures**	**GB40902G201900**	**Poor**	**Poor**	**Good**	**2016**

This data is sourced from the Environment Agency and Natural Resources Wales.

7 River and coastal flooding



7.1 Risk of Flooding from Rivers and Sea (RoFRaS)

Records within 50m	22

The chance of flooding from rivers and/or the sea in any given year, based on cells of 50m. Each cell is allocated one of four flood risk categories, taking into account flood defences and their condition; Very low (less than 1 in 1000 chance in any given year), Low (less than 1 in 100 but greater than or equal to 1 in 1000 chance), Medium (less than 1 in 30 but greater than or equal to 1 in 100 chance) or High (greater than or equal to 1 in 30 chance).

Features are displayed on the River and coastal flooding map on **page 68**

Distance	RoFRaS flood risk
On site	**Low**
0 - 50m	High

This data is sourced from the Environment Agency and Natural Resources Wales.

7.2 Historical Flood Events

Records within 250m	0

Records of historic flooding from rivers, the sea, groundwater and surface water. Records began in 1946 when predecessor bodies started collecting detailed information about flooding incidents, although limited details may be included on flooding incidents prior to this date. Takes into account the presence of defences, structures, and other infrastructure where they existed at the time of flooding, and includes flood extents that may have been affected by overtopping, breaches or blockages.

This data is sourced from the Environment Agency and Natural Resources Wales.

7.3 Flood Defences

Records within 250m	0

Records of flood defences owned, managed or inspected by the Environment Agency and Natural Resources Wales. Flood defences can be structures, buildings or parts of buildings. Typically these are earth banks, stone and concrete walls, or sheet-piling that is used to prevent or control the extent of flooding.

This data is sourced from the Environment Agency and Natural Resources Wales.

7.4 Areas Benefiting from Flood Defences

Records within 250m	0

Areas that would benefit from the presence of flood defences in a 1 in 100 (1%) chance of flooding each year from rivers or 1 in 200 (0.5%) chance of flooding each year from the sea.

This data is sourced from the Environment Agency and Natural Resources Wales.

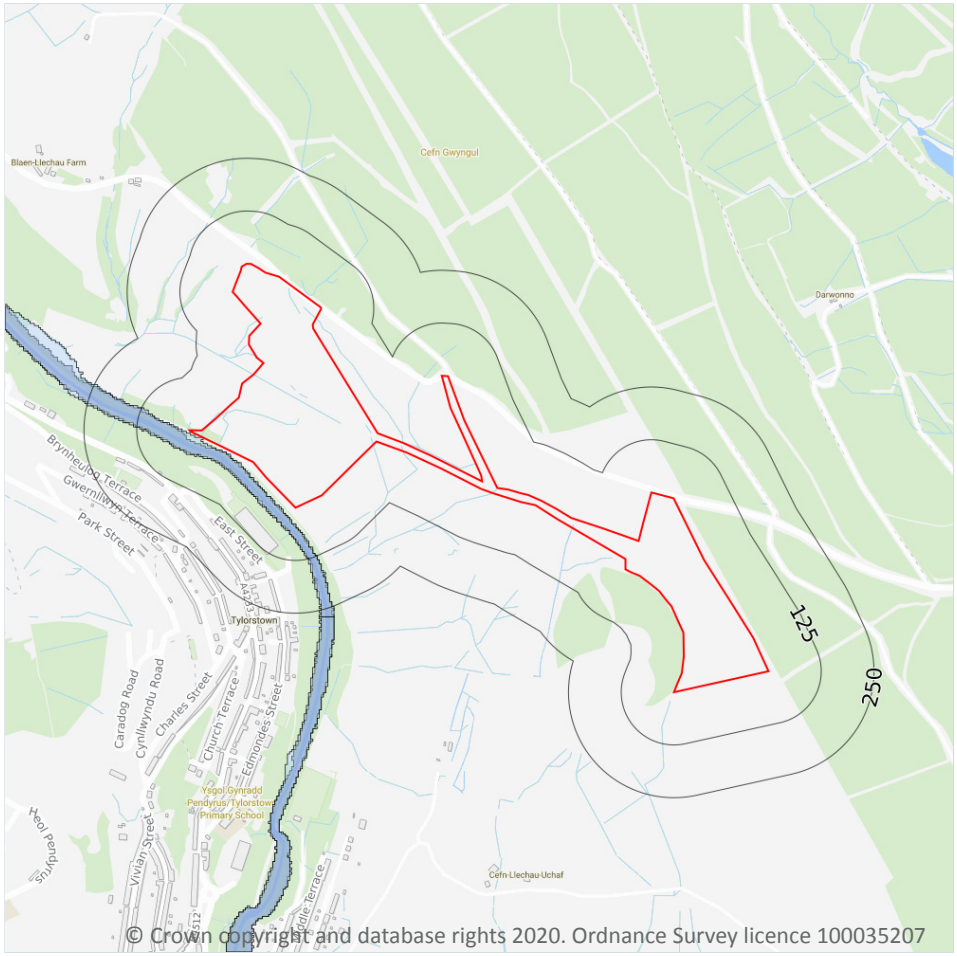
7.5 Flood Storage Areas

Records within 250m	0

Areas that act as a balancing reservoir, storage basin or balancing pond to attenuate an incoming flood peak to a flow level that can be accepted by the downstream channel or to delay the timing of a flood peak so that its volume is discharged over a longer period.

This data is sourced from the Environment Agency and Natural Resources Wales.

River and coastal flooding - Flood Zones



Site Outline

Search buffers in metres (m)

Flood zone 2

Flood zone 3

7.6 Flood Zone 2

Records within 50m	1

Areas of land at risk of flooding, when the presence of flood defences are ignored. Covering land between Flood Zone 3 (see next section) and the extent of the flooding from rivers or the sea with a 1 in 1000 (0.1%) chance of flooding each year.

Features are displayed on the River and coastal flooding map on **page 68**

Location	Type
On site	**Zone 2 - (Fluvial /Tidal Models)**

This data is sourced from the Environment Agency and Natural Resources Wales.

7.7 Flood Zone 3

Records within 50m	1

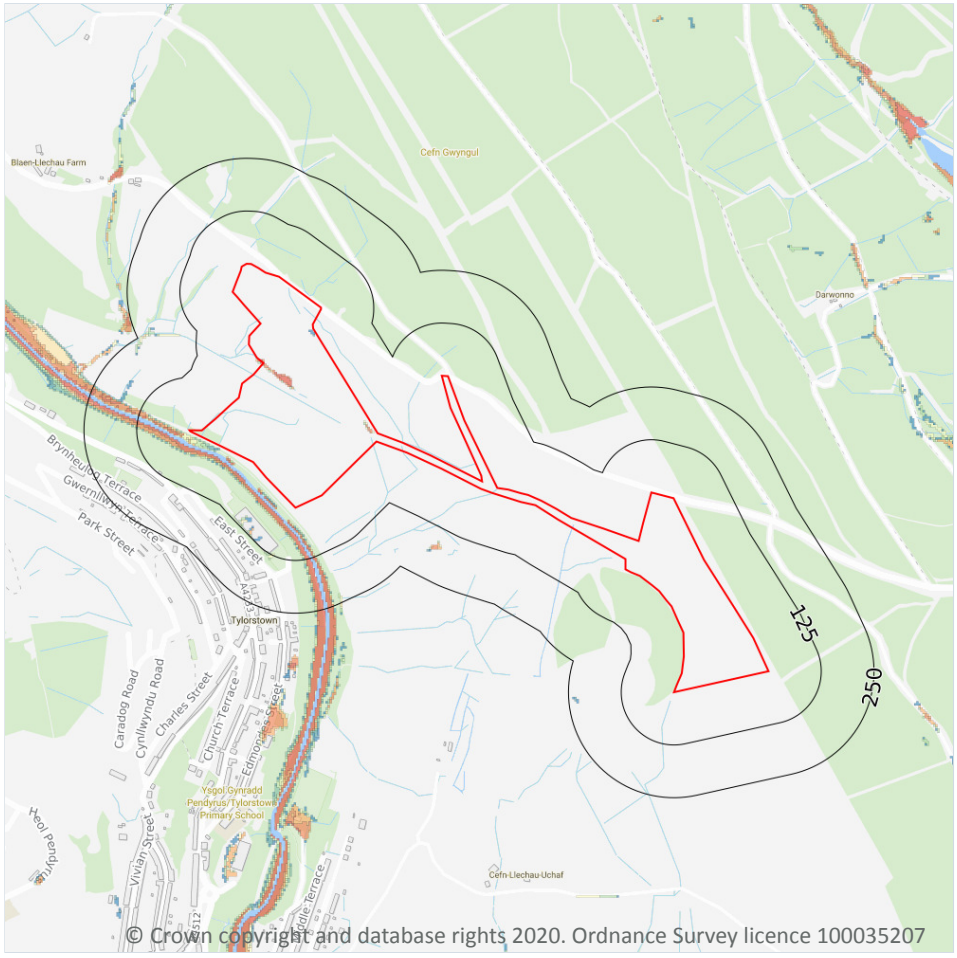
Areas of land at risk of flooding, when the presence of flood defences are ignored. Covering land with a 1 in 100 (1%) or greater chance of flooding each year from rivers or a 1 in 200 (0.5%) or greater chance of flooding each year from the sea.

Features are displayed on the River and coastal flooding map on **page 68**

Location	Type
7m SW	Zone 3 - (Fluvial Models)

This data is sourced from the Environment Agency and Natural Resources Wales.

8 Surface water flooding



Site Outline

Search buffers in metres (m)

1 in 1000 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 250 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 100 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 30 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

8.1 Surface water flooding

Highest risk on site	**1 in 30 year, Greater than 1.0m**
Highest risk within 50m	**1 in 30 year, Greater than 1.0m**

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

Features are displayed on the Surface water flooding map on **page 72**

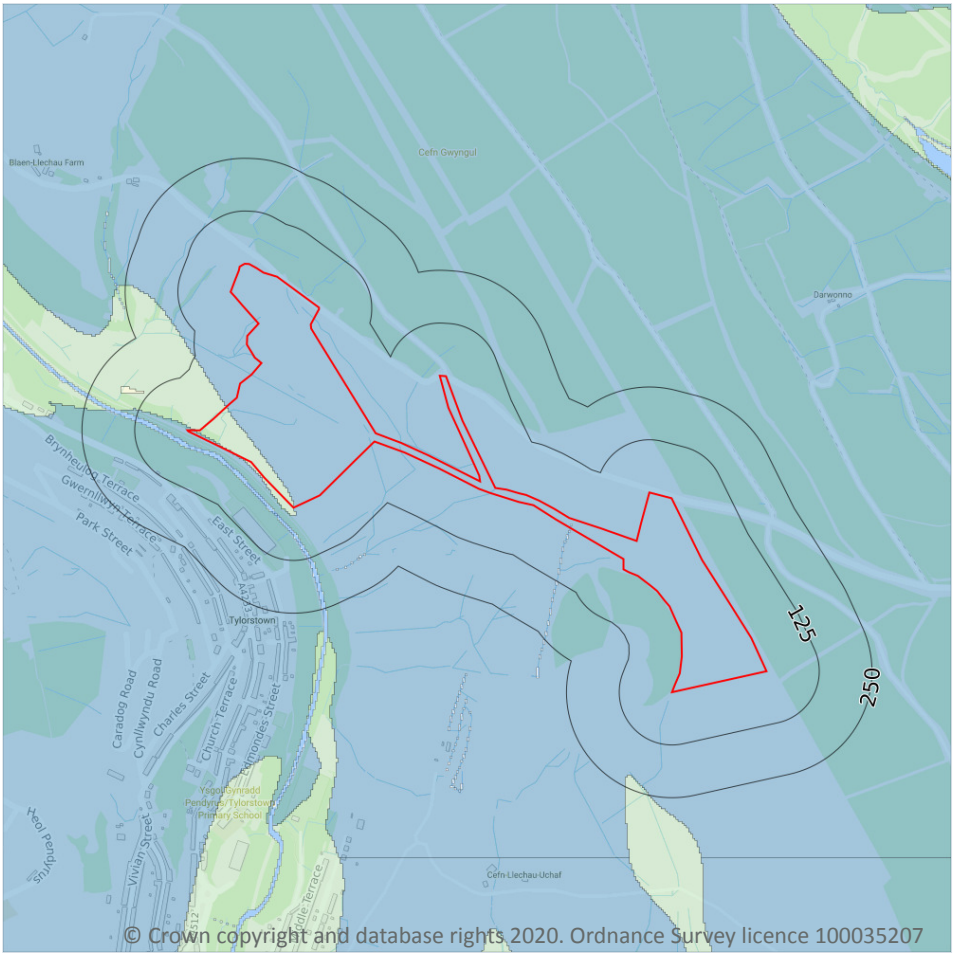
The data shown on the map and in the table above shows the highest likelihood of flood events happening at the site. Lower likelihood events may have greater flood depths and hence a greater potential impact on a site.

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

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

This data is sourced from Ambiental Risk Analytics.

9 Groundwater flooding



9.1 Groundwater flooding

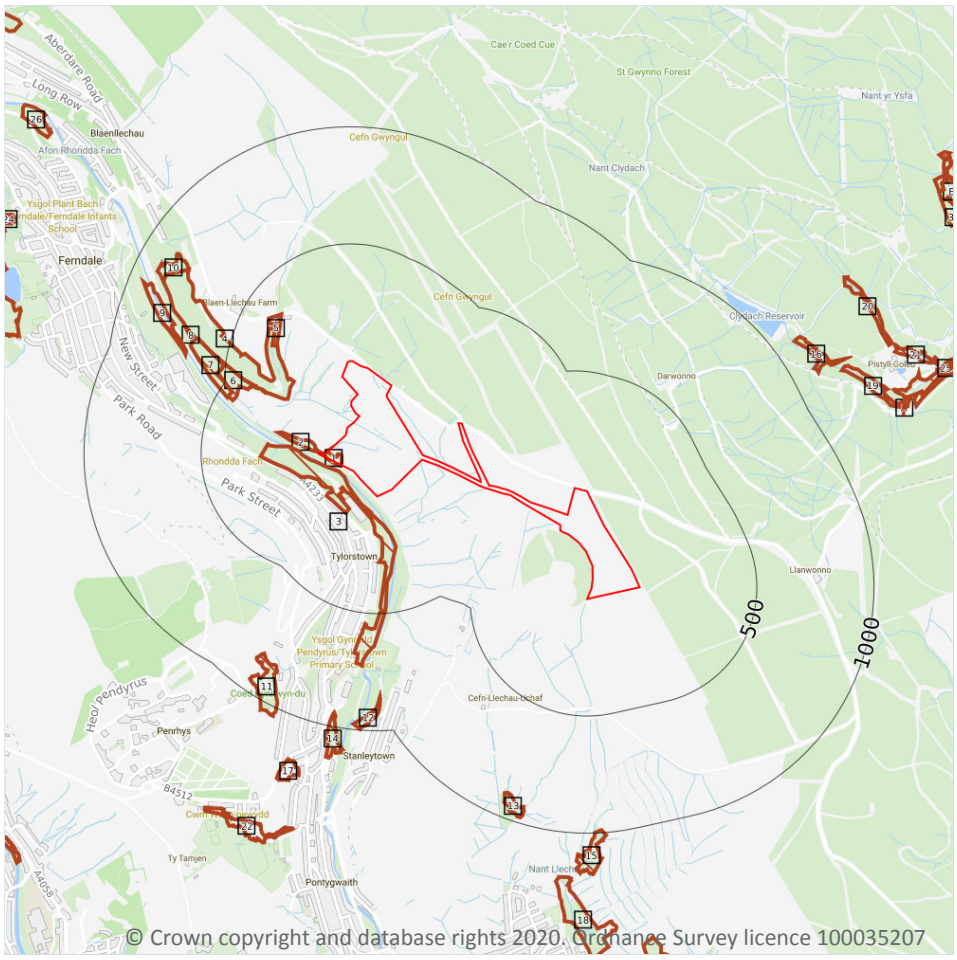
Highest risk on site	**Low**
Highest risk within 50m	**Low**

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

Features are displayed on the Groundwater flooding map on **page 74**

This data is sourced from Ambiental Risk Analytics.

10 Environmental designations



10.1 Sites of Special Scientific Interest (SSSI)

Records within 2000m	0

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

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

10.2 Conserved wetland sites (Ramsar sites)

Records within 2000m	0

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

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

10.3 Special Areas of Conservation (SAC)

Records within 2000m	0

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

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

10.4 Special Protection Areas (SPA)

Records within 2000m	0

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

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

10.5 National Nature Reserves (NNR)

Records within 2000m	0

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

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

10.6 Local Nature Reserves (LNR)

Records within 2000m	0

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

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

10.7 Designated Ancient Woodland

Records within 2000m	48

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

Features are displayed on the Environmental designations map on **page 75**

ID	Location	Name	Woodland Type
1	**On site**	**Unknown**	**Ancient Semi Natural Woodland**
2	6m N	Unknown	Ancient Semi Natural Woodland
3	29m SW	Unknown	Ancient Semi Natural Woodland
4	207m W	Unknown	Ancient Semi Natural Woodland
5	306m W	Unknown	Restored Ancient Woodland Site
6	365m W	Unknown	Ancient Semi Natural Woodland
7	453m NW	Unknown	Plantation on Ancient Woodland Site
8	645m W	Unknown	Ancient Semi Natural Woodland
9	675m W	Unknown	Ancient Semi Natural Woodland
10	783m NW	Unknown	Ancient Semi Natural Woodland
11	825m SW	Unknown	Ancient Semi Natural Woodland
12	856m S	Unknown	Ancient Semi Natural Woodland
13	894m S	Unknown	Ancient Woodland Site of Unknown Category
14	940m S	Unknown	Ancient Semi Natural Woodland
15	988m S	Unknown	Ancient Semi Natural Woodland
16	1093m NE	Unknown	Ancient Semi Natural Woodland

ID	Location	Name	Woodland Type
17	1183m S	Unknown	Ancient Semi Natural Woodland
18	1191m S	Unknown	Ancient Semi Natural Woodland
19	1203m NE	Unknown	Ancient Semi Natural Woodland
A	1352m NE	Unknown	Ancient Semi Natural Woodland
A	1352m NE	Unknown	Plantation on Ancient Woodland Site
A	1356m NE	Unknown	Ancient Semi Natural Woodland
B	1373m W	Unknown	Ancient Semi Natural Woodland
A	1401m NE	Unknown	Plantation on Ancient Woodland Site
20	1408m NE	Unknown	Plantation on Ancient Woodland Site
B	1420m W	Unknown	Ancient Semi Natural Woodland
21	1442m NE	Unknown	Ancient Semi Natural Woodland
22	1462m S	Unknown	Ancient Semi Natural Woodland
23	1470m S	Unknown	Ancient Semi Natural Woodland
C	1507m NE	Unknown	Plantation on Ancient Woodland Site
24	1543m NW	Unknown	Ancient Semi Natural Woodland
25	1553m NE	Unknown	Plantation on Ancient Woodland Site
26	1600m NW	Unknown	Ancient Semi Natural Woodland
C	1613m NE	Unknown	Plantation on Ancient Woodland Site
-	1778m NE	Unknown	Ancient Semi Natural Woodland
-	1799m NE	Unknown	Ancient Woodland Site of Unknown Category
-	1880m SW	Unknown	Ancient Semi Natural Woodland
-	1882m NE	Unknown	Plantation on Ancient Woodland Site
-	1884m NE	Unknown	Ancient Semi Natural Woodland
-	1887m NE	Unknown	Ancient Semi Natural Woodland
-	1888m NE	Unknown	Plantation on Ancient Woodland Site
-	1898m W	Unknown	Ancient Semi Natural Woodland
-	1905m W	Unknown	Ancient Semi Natural Woodland
-	1913m S	Unknown	Ancient Semi Natural Woodland

ID	Location	Name	Woodland Type
34	1922m NE	Unknown	Ancient Semi Natural Woodland
-	1951m W	Unknown	Ancient Semi Natural Woodland
E	1959m NE	Unknown	Ancient Semi Natural Woodland
E	1974m NE	Unknown	Plantation on Ancient Woodland Site

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

10.8 Biosphere Reserves

Records within 2000m	0

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

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

10.9 Forest Parks

Records within 2000m	0

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

This data is sourced from the Forestry Commission.

10.10 Marine Conservation Zones

Records within 2000m	0

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

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

10.11 Green Belt

Records within 2000m	0

Areas designated to prevent urban sprawl by keeping land permanently open.

This data is sourced from the Ministry of Housing, Communities and Local Government.

10.12 Proposed Ramsar sites

Records within 2000m	0

Ramsar sites are areas listed as a Wetland of International Importance under the Convention on Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention) 1971. The sites here supplied have a status of 'Proposed' having been identified for potential adoption under the framework.

This data is sourced from Natural England.

10.13 Possible Special Areas of Conservation (pSAC)

Records within 2000m	0

Special Areas of Conservation are areas which have been identified as best representing the range and variety within the European Union of habitats and (non-bird) species listed on Annexes I and II to the Directive. SACs are designated under the EC Habitats Directive. Those sites supplied here are those with a status of 'Possible' having been identified for potential adoption under the framework.

This data is sourced from Natural England and Natural Resources Wales.

10.14 Potential Special Protection Areas (pSPA)

Records within 2000m	0

Special Protection Areas (SPAs) are areas designated (or ‘classified’) under the European Union Wild Birds Directive for the protection of nationally and internationally important populations of wild birds. Those sites supplied here are those with a status of 'Potential' having been identified for potential adoption under the framework.

This data is sourced from Natural England.

10.15 Nitrate Sensitive Areas

Records within 2000m	0

Areas where nitrate concentrations in drinking water sources exceeded or was at risk of exceeding the limit of 50 mg/l set by the 1980 EC Drinking Water Directive. Voluntary agricultural measures as a means of reducing the levels of nitrate were introduced by DEFRA as MAFF, with payments being made to farmers who complied. The scheme was started as a pilot in 1990 in ten areas, later implemented within 32 areas. The scheme was closed to further new entrants in 1998, although existing agreements continued for their full term. All Nitrate Sensitive Areas fell within the areas designated as Nitrate Vulnerable Zones (NVZs) in 1996 under the EC Nitrate Directive (91/676/EEC).

This data is sourced from Natural England.

10.16 Nitrate Vulnerable Zones

Records within 2000m	0

Areas at risk from agricultural nitrate pollution designated under the EC Nitrate Directive (91/676/EEC). These are areas of land that drain into waters polluted by nitrates. Farmers operating within these areas have to follow mandatory rules to tackle nitrate loss from agriculture.

This data is sourced from Natural England and Natural Resources Wales.

SSSI Impact Zones and Units

10.17 SSSI Impact Risk Zones

Records on site	0

Developed to allow rapid initial assessment of the potential risks to SSSIs posed by development proposals. They define zones around each SSSI which reflect the particular sensitivities of the features for which it is notified and indicate the types of development proposal which could potentially have adverse impacts.

This data is sourced from Natural England.

10.18 SSSI Units

Records within 2000m	0

Divisions of SSSIs used to record management and condition details. Units are the smallest areas for which Natural England gives a condition assessment, however, the size of units varies greatly depending on the types of management and the conservation interest.

This data is sourced from Natural England and Natural Resources Wales.

11 Visual and cultural designations

11.1 World Heritage Sites

Records within 250m	0

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

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

11.2 Area of Outstanding Natural Beauty

Records within 250m	0

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

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

11.3 National Parks

Records within 250m	0

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

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

11.4 Listed Buildings

Records within 250m	0

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

This data is sourced from English Heritage, Cadw and Historic Environment Scotland.

11.5 Conservation Areas

Records within 250m	0

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

This data is sourced from English Heritage, Cadw and Historic Environment Scotland.

11.6 Scheduled Ancient Monuments

Records within 250m	0

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

This data is sourced from English Heritage, Cadw and Historic Environment Scotland.

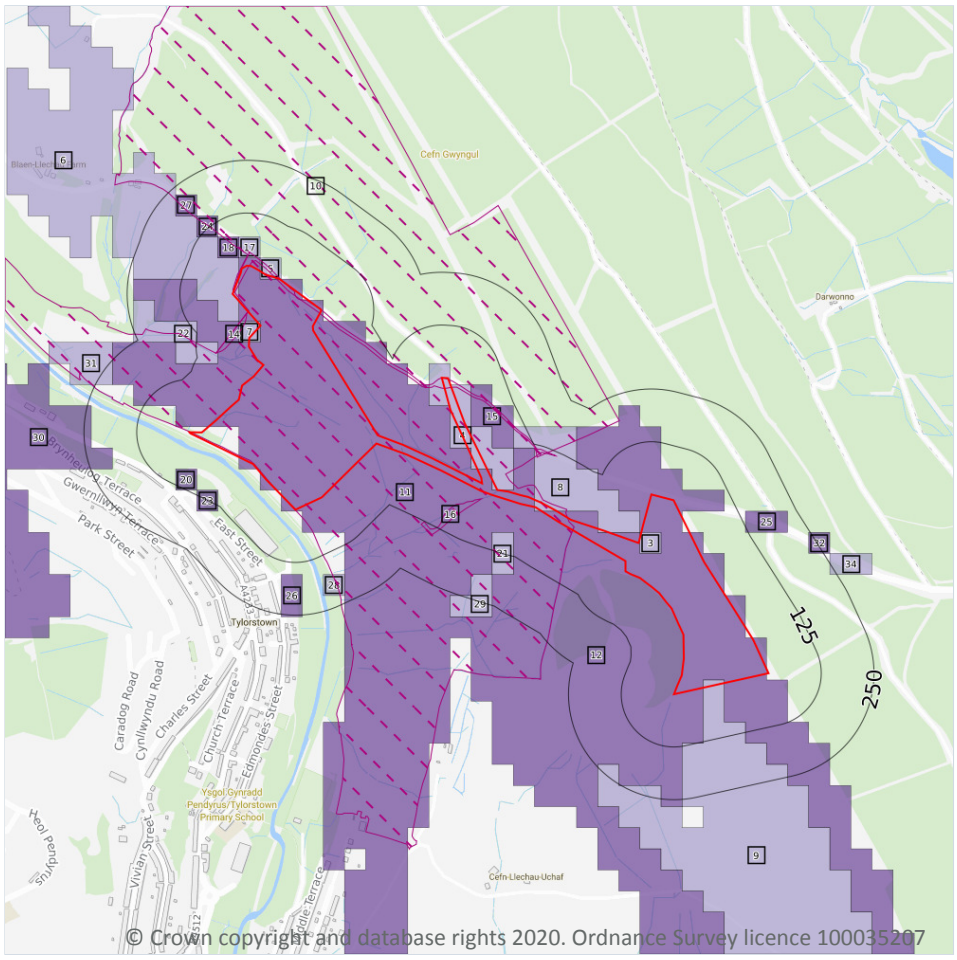
11.7 Registered Parks and Gardens

Records within 250m	0

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

This data is sourced from English Heritage, Cadw and Historic Environment Scotland.

12 Agricultural designations



Site Outline

Search buffers in metres (m)

- Grade 1 - excellent quality
- Grade 2 - very good quality
- Grade 3a - good quality
- Grade 3b - moderate quality
- Grade 4 - poor quality
- Grade 5 - very poor quality
- Timber felling licences
- Open Access land

12.1 Agricultural Land Classification

Records within 250m	25

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

Features are displayed on the Agricultural designations map on **page 85**

ID	Location	Classification	Description
3	**On site**	**Grade 4**	**Poor quality agricultural land**
4	**On site**	**Grade 4**	**Poor quality agricultural land**
5	**On site**	**Grade 4**	**Poor quality agricultural land**

ID	Location	Classification	Description
6	**On site**	**Grade 4**	**Poor quality agricultural land**
7	**On site**	**Grade 4**	**Poor quality agricultural land**
8	**On site**	**Grade 4**	**Poor quality agricultural land**
9	**On site**	**Grade 4**	**Poor quality agricultural land**
12	**On site**	**Grade 5**	**Very poor quality agricultural land**
15	10m NE	Grade 5	Very poor quality agricultural land
17	19m N	Grade 4	Poor quality agricultural land
18	25m NW	Grade 5	Very poor quality agricultural land
20	69m SW	Grade 5	Very poor quality agricultural land
21	70m S	Grade 4	Poor quality agricultural land
22	73m W	Grade 4	Poor quality agricultural land
23	92m SW	Grade 5	Very poor quality agricultural land
24	94m NW	Grade 5	Very poor quality agricultural land
25	119m NE	Grade 5	Very poor quality agricultural land
26	154m S	Grade 5	Very poor quality agricultural land
27	164m NW	Grade 5	Very poor quality agricultural land
28	167m SE	Grade 4	Poor quality agricultural land
29	180m S	Grade 4	Poor quality agricultural land
30	186m W	Grade 5	Very poor quality agricultural land
31	215m NW	Grade 4	Poor quality agricultural land
32	220m NE	Grade 5	Very poor quality agricultural land
34	236m NE	Grade 4	Poor quality agricultural land

This data is sourced from Natural Resources Wales.

12.2 Open Access Land

Records within 250m	**4**

The Countryside and Rights of Way Act 2000 (CROW Act) gives a public right of access to land without having to use paths. Access land includes mountains, moors, heaths and downs that are privately owned. It also includes common land registered with the local council and some land around the England Coast Path.

Generally permitted activities on access land are walking, running, watching wildlife and climbing.

Features are displayed on the Agricultural designations map on **page 85**

ID	Location	Name	Classification	Other relevant legislation
10	**On site**	**-**	**NRW Public Forest 2014**	**-**
11	**On site**	**-**	**Open Access Open Country**	**-**
14	4m SW	-	NRW Public Forest 2014	-
16	18m S	-	NRW Public Forest 2014	-

This data is sourced from Natural England and Natural Resources Wales.

12.3 Tree Felling Licences

Records within 250m	**0**

Felling Licence Application (FLA) areas approved by Forestry Commission England. Anyone wishing to fell trees must ensure that a licence or permission under a grant scheme has been issued by the Forestry Commission before any felling is carried out or that one of the exceptions apply.

This data is sourced from the Forestry Commission.

12.4 Environmental Stewardship Schemes

Records within 250m	**0**

Environmental Stewardship covers a range of schemes that provide financial incentives to farmers, foresters and land managers to look after and improve the environment.

This data is sourced from Natural England.

12.5 Countryside Stewardship Schemes

Records within 250m	**0**

Countryside Stewardship covers a range of schemes that provide financial incentives to farmers, foresters and land managers to look after and improve the environment. Main objectives are to improve the farmed environment for wildlife and to reduce diffuse water pollution.

This data is sourced from Natural England.

13 Habitat designations

13.1 Priority Habitat Inventory

Records within 250m	0

Habitats of principal importance as named under Natural Environment and Rural Communities Act (2006) Section 41.

This data is sourced from Natural England.

13.2 Habitat Networks

Records within 250m	0

Habitat networks for 18 priority habitat networks (based primarily, but not exclusively, on the priority habitat inventory) and areas suitable for the expansion of networks through restoration and habitat creation.

This data is sourced from Natural England.

13.3 Open Mosaic Habitat

Records within 250m	0

Sites verified as Open Mosaic Habitat. Mosaic habitats are brownfield sites that are identified under the UK Biodiversity Action Plan as a priority habitat due to the habitat variation within a single site, supporting an array of invertebrates.

This data is sourced from Natural England.

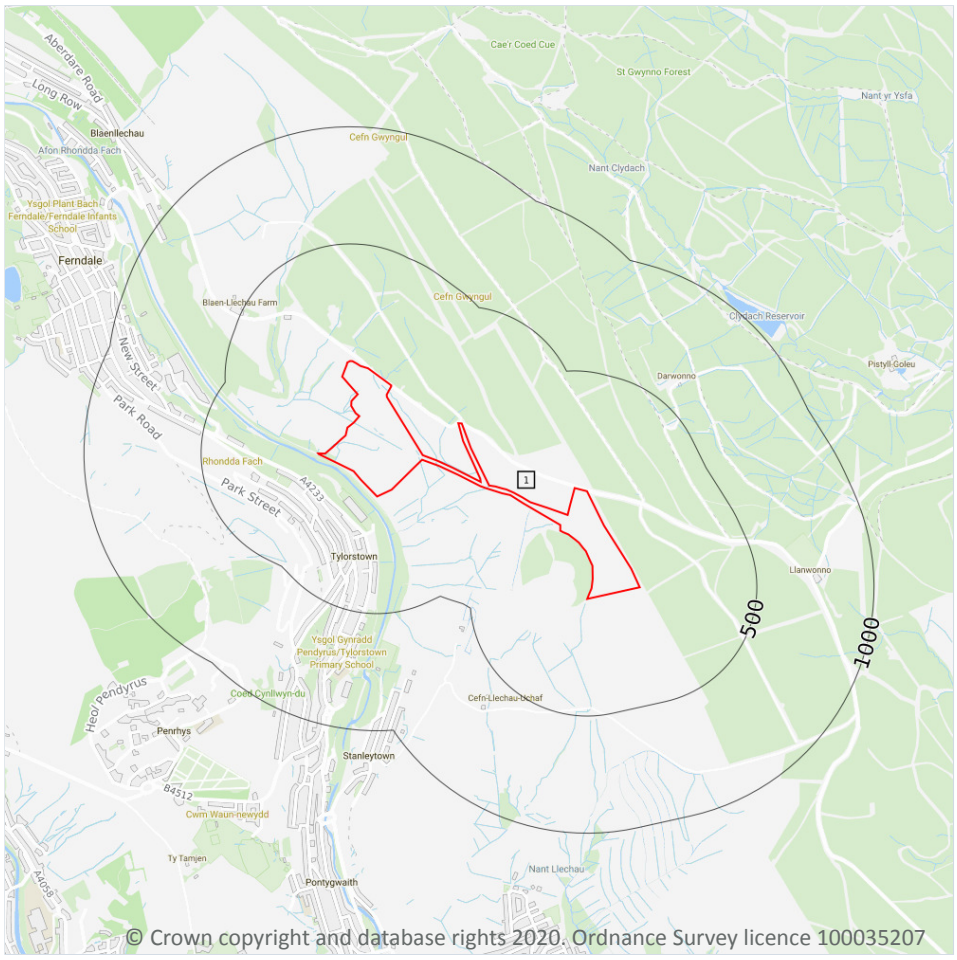
13.4 Limestone Pavement Orders

Records within 250m	0

Limestone pavements are outcrops of limestone where the surface has been worn away by natural means over millennia. These rocks have the appearance of paving blocks, hence their name. Not only do they have geological interest, they also provide valuable habitats for wildlife. These habitats are threatened due to their removal for use in gardens and water features. Many limestone pavements have been designated as SSSIs which affords them some protection. In addition, Section 34 of the Wildlife and Countryside Act 1981 gave them additional protection via the creation of Limestone Pavement Orders, which made it a criminal offence to remove any part of the outcrop. The associated Limestone Pavement Priority Habitat is part of the UK Biodiversity Action Plan priority habitat in England.

This data is sourced from Natural England.

14 Geology 1:10,000 scale - Availability



Site Outline

Search buffers in metres (m)

Full coverage

Partial coverage

No coverage

14.1 10k Availability

Records within 500m	1

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

Features are displayed on the Geology 1:10,000 scale - Availability map on **page 89**

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

This data is sourced from the British Geological Survey.

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

14.2 Artificial and made ground (10k)

Records within 500m	0

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

This data is sourced from the British Geological Survey.

Geology 1:10,000 scale - Superficial

14.3 Superficial geology (10k)

Records within 500m	0

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

This data is sourced from the British Geological Survey.

14.4 Landslip (10k)

Records within 500m	0

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

This data is sourced from the British Geological Survey.

Geology 1:10,000 scale - Bedrock

14.5 Bedrock geology (10k)

Records within 500m	0

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

This data is sourced from the British Geological Survey.

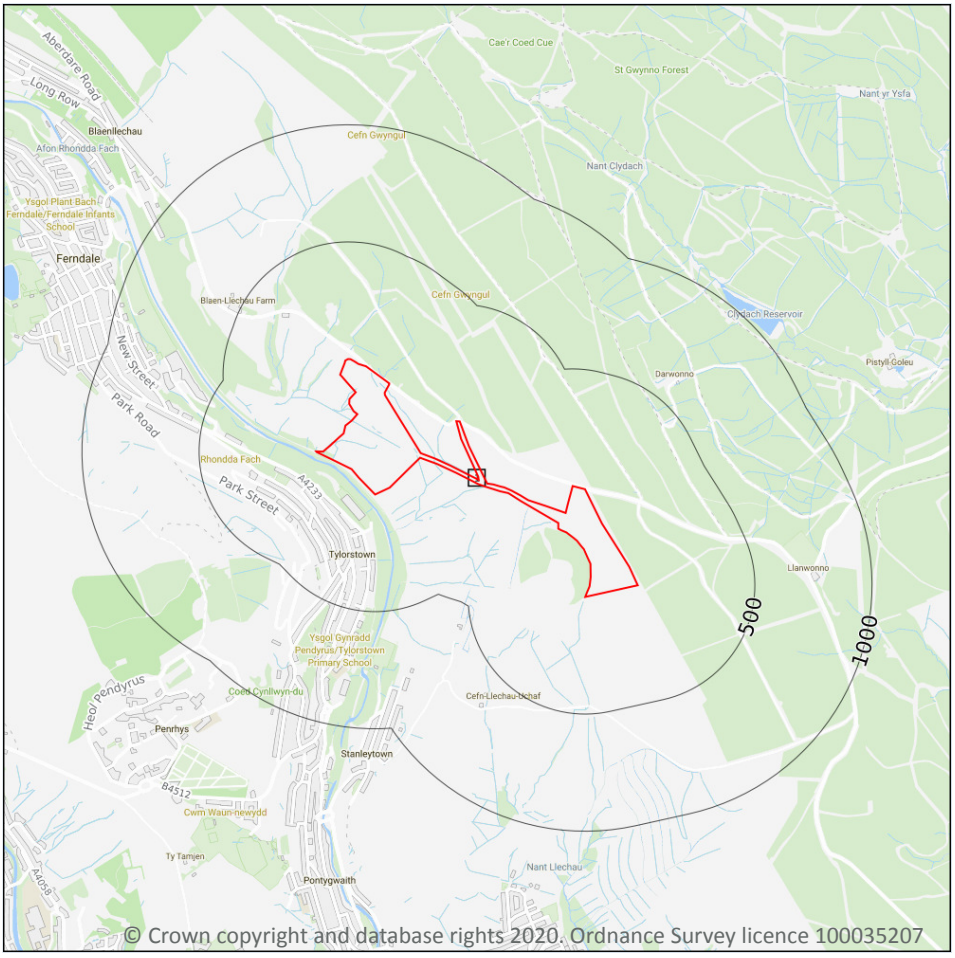
14.6 Bedrock faults and other linear features (10k)

Records within 500m	0

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

This data is sourced from the British Geological Survey.

15 Geology 1:50,000 scale - Availability



Site Outline

Search buffers in metres (m)

Geological map tile

15.1 50k Availability

Records within 500m	1

An indication on the coverage of 1:50,000 scale geology data for the site. Either 'Full' or 'No coverage' for each geological theme. Where 50k data is not available, this area has been filled in with 625k scale data.

Features are displayed on the Geology 1:50,000 scale - Availability map on **page 93**

ID	Location	Artificial	Superficial	Bedrock	Mass movement	Sheet No.
1	**On site**	**No coverage**	**Full**	**Full**	**Full**	**EW248_pontypridd_v4**

This data is sourced from the British Geological Survey.

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

15.2 Artificial and made ground (50k)

Records within 500m	0

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

This data is sourced from the British Geological Survey.

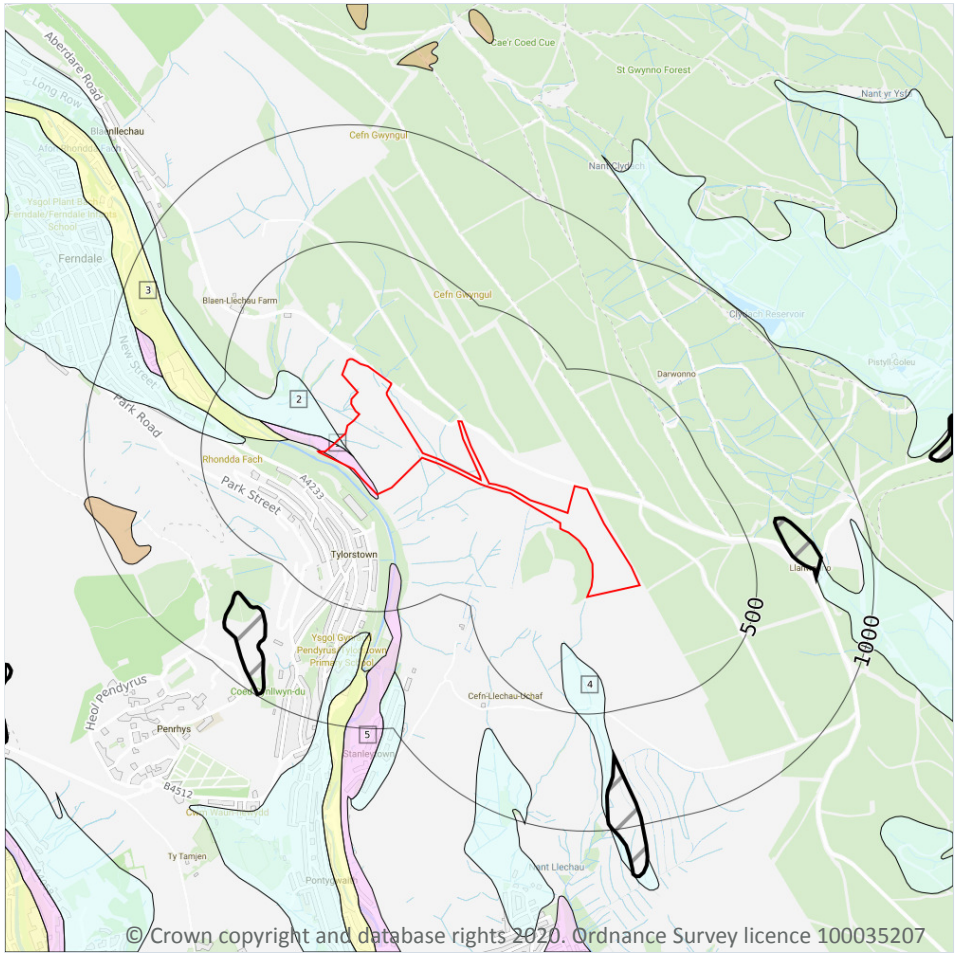
15.3 Artificial ground permeability (50k)

Records within 50m	0

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

This data is sourced from the British Geological Survey.

Geology 1:50,000 scale - Superficial



Site Outline

Search buffers in metres (m)

Landslip (50k)

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

15.4 Superficial geology (50k)

Records within 500m	5

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

Features are displayed on the Geology 1:50,000 scale - Superficial map on **page 95**

ID	Location	LEX Code	Description	Rock description
1	**On site**	**GFDUD-XSV**	**GLACIOFLUVIAL DEPOSITS, DEVENSIAN**	**SAND AND GRAVEL**
2	**On site**	**TILLD-DMTN**	**TILL, DEVENSIAN**	**DIAMICTON**
3	137m W	ALV-XCZSV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL

ID	Location	LEX Code	Description	Rock description
4	221m SW	TILLD-DMTN	TILL, DEVENSIAN	DIAMICTON
5	302m S	GFDUD-XSV	GLACIOFLUVIAL DEPOSITS, DEVENSIAN	SAND AND GRAVEL

This data is sourced from the British Geological Survey.

15.5 Superficial permeability (50k)

Records within 50m	**2**

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

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

This data is sourced from the British Geological Survey.

15.6 Landslip (50k)

Records within 500m	**0**

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

This data is sourced from the British Geological Survey.

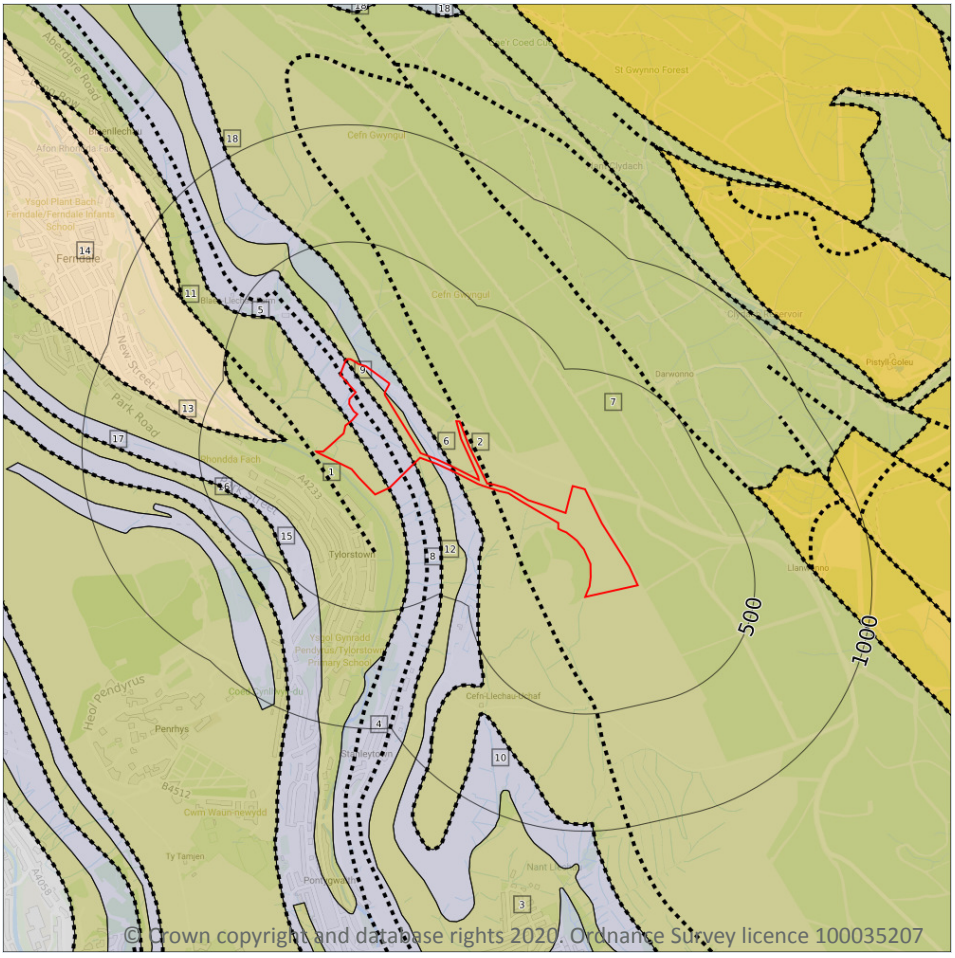
15.7 Landslip permeability (50k)

Records within 50m	**0**

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

This data is sourced from the British Geological Survey.

Geology 1:50,000 scale - Bedrock



Site Outline

Search buffers in metres (m)

Bedrock faults and other linear features (50k)

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

15.8 Bedrock geology (50k)

Records within 500m **7**

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

Features are displayed on the Geology 1:50,000 scale - Bedrock map on **page 97**

ID	Location	LEX Code	Description	Rock age
1	On site	RA-SDST	RHONDDA MEMBER - SANDSTONE	WESTPHALIAN
3	On site	RA-SDST	RHONDDA MEMBER - SANDSTONE	WESTPHALIAN
4	On site	RA-MDSS	RHONDDA MEMBER - MUDSTONE, SILTSTONE AND SANDSTONE	WESTPHALIAN

ID	Location	LEX Code	Description	Rock age
7	**On site**	**BD-SDST**	**BRITHDIR MEMBER - SANDSTONE**	**WESTPHALIAN**
10	**On site**	**RA-MDSS**	**RHONDDA MEMBER - MUDSTONE, SILTSTONE AND SANDSTONE**	**WESTPHALIAN**
14	137m W	SWUCM-MDSS	SOUTH WALES UPPER COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE	WESTPHALIAN
16	354m SW	RA-SDST	RHONDDA MEMBER - SANDSTONE	WESTPHALIAN

This data is sourced from the British Geological Survey.

15.9 Bedrock permeability (50k)

Records within 50m	**5**

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

Location	Flow type	Maximum permeability	Minimum permeability
On site	**Fracture**	**High**	**Moderate**
On site	**Fracture**	**Moderate**	**Low**
On site	**Fracture**	**High**	**Moderate**
On site	**Fracture**	**Moderate**	**Low**
On site	**Fracture**	**High**	**Moderate**

This data is sourced from the British Geological Survey.

15.10 Bedrock faults and other linear features (50k)

Records within 500m	**11**

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

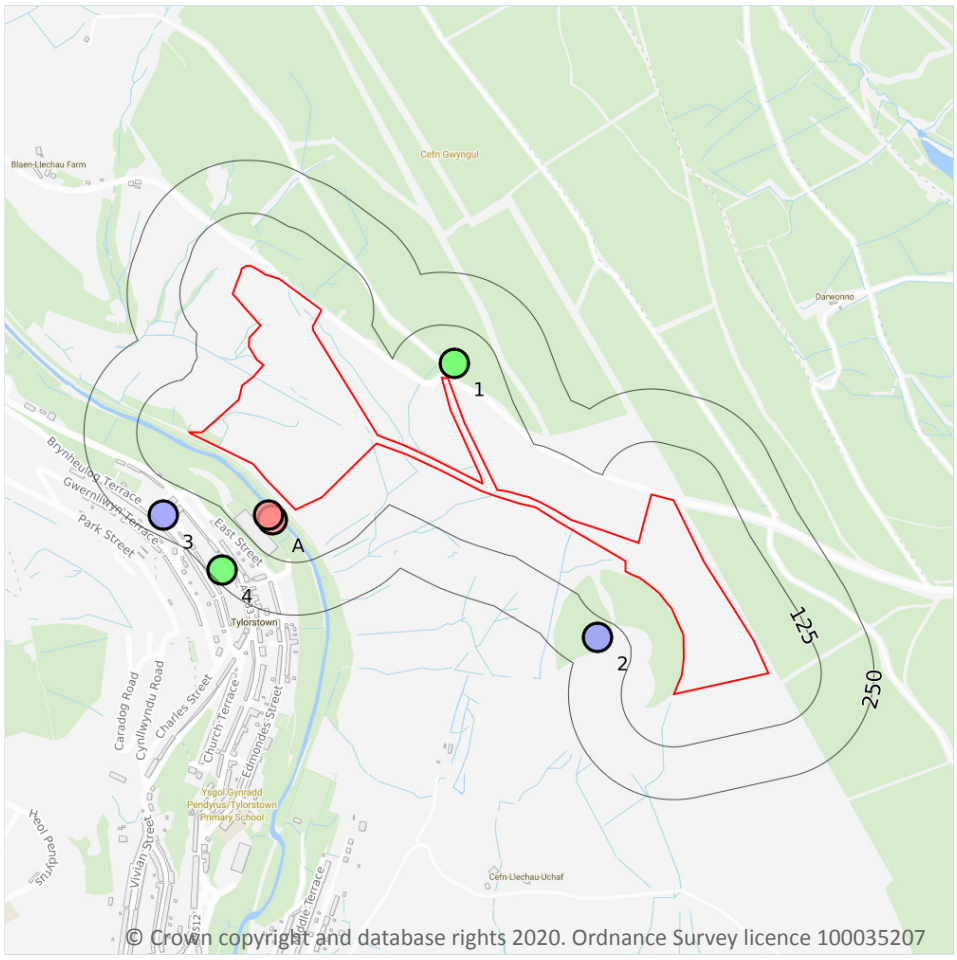
Features are displayed on the Geology 1:50,000 scale - Bedrock map on **page 97**

ID	Location	Category	Description
2	**On site**	**ROCK**	**Coal seam, inferred**
5	**On site**	**ROCK**	**Coal seam, inferred**

ID	Location	Category	Description
6	**On site**	**ROCK**	**Coal seam, observed**
8	**On site**	**ROCK**	**Coal seam, inferred**
9	**On site**	**ROCK**	**Coal seam, inferred**
11	19m SW	FAULT	Fault, inferred, displacement unknown
12	83m SE	ROCK	Coal seam, observed
13	137m W	ROCK	Coal seam, inferred
15	354m SW	ROCK	Coal seam, inferred
17	406m SW	ROCK	Coal seam, observed
18	460m N	ROCK	Coal seam, inferred

This data is sourced from the British Geological Survey.

16 Boreholes



16.1 BGS Boreholes

Records within 250m	6

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

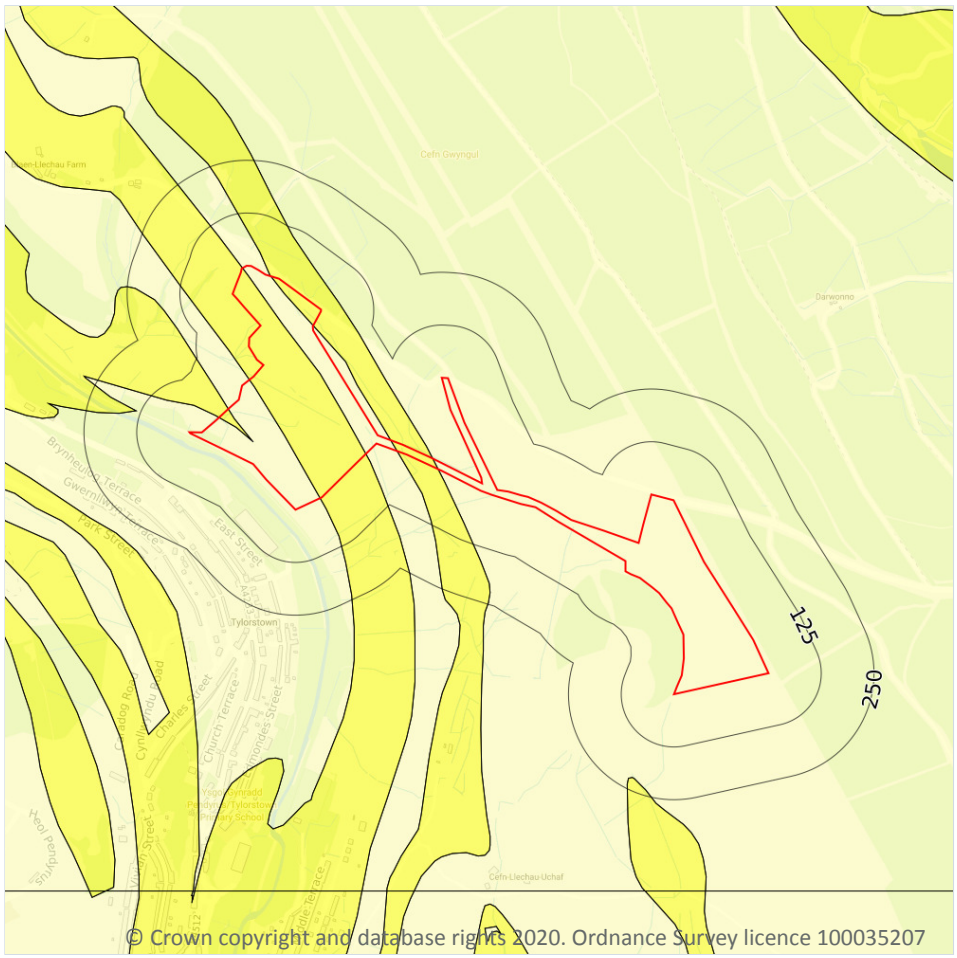
Features are displayed on the Boreholes map on **page 100**

ID	Location	Grid reference	Name	Length	Confidential	Web link
1	38m NE	301560 196250	FERNDALE NO.6 PIT EAST SIDE	21.46	N	377152
A	55m SW	301130 195880	PENDYRIS COLLIERY	335.31	N	377220
A	55m SW	301120 195890	FERNDALE COLLIERY PENDENYS NORTH NO.6 PIT	424.28	N	377144

ID	Location	Grid reference	Name	Length	Confidential	Web link
2	170m SW	301900 195600	TYLEROTOWN TIP	-2.0	N	377206
3	203m SW	300870 195890	FERNDALE NO.6 PIT 'A' CONVEYOR FACE	3.3	N	377148
4	225m SW	301010 195760	FERNDALE NO.6 PIT NO.2 DIP WEST SIDE	16.64	N	377149

This data is sourced from the British Geological Survey.

17 Natural ground subsidence - Shrink swell clays



Site Outline

Search buffers in metres (m)

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

17.1 Shrink swell clays

Records within 50m	2

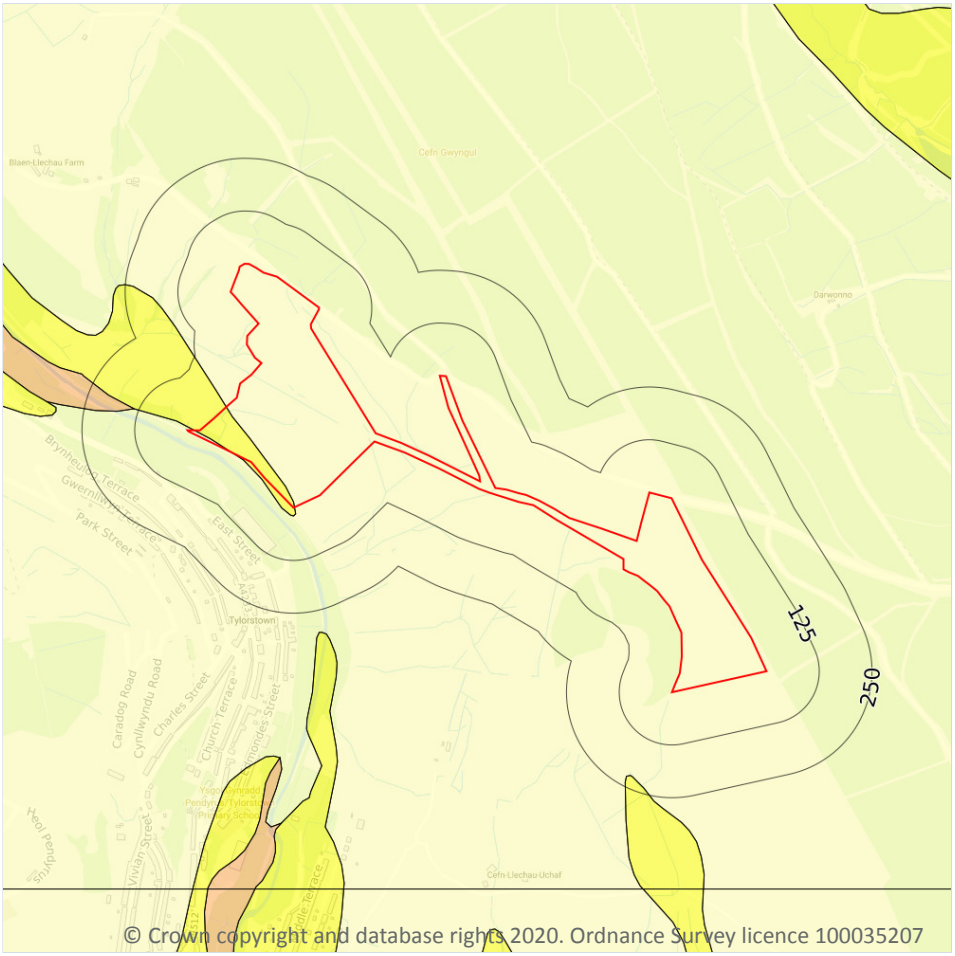
The potential hazard presented by soils that absorb water when wet (making them swell), and lose water as they dry (making them shrink). This shrink-swell behaviour is controlled by the type and amount of clay in the soil, and by seasonal changes in the soil moisture content (related to rainfall and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

Features are displayed on the Natural ground subsidence - Shrink swell clays map on **page 102**

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

This data is sourced from the British Geological Survey.

Natural ground subsidence - Running sands



Site Outline

Search buffers in metres (m)

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

17.2 Running sands

Records within 50m	2

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

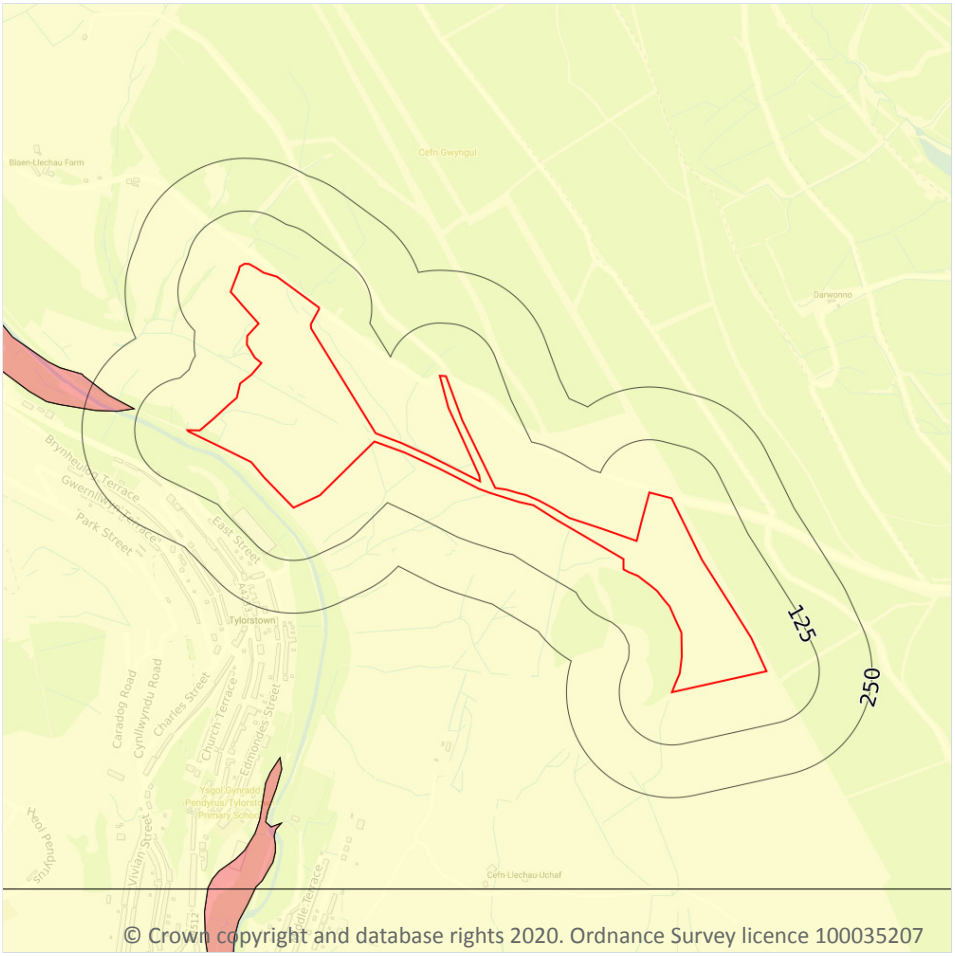
Features are displayed on the Natural ground subsidence - Running sands map on **page 103**

Location	Hazard rating	Details
On site	**Negligible**	**Running sand conditions are not thought to occur whatever the position of the water table. No identified constraints on lands use due to running conditions.**

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

This data is sourced from the British Geological Survey.

Natural ground subsidence - Compressible deposits



Site Outline

Search buffers in metres (m)

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

17.3 Compressible deposits

Records within 50m	1

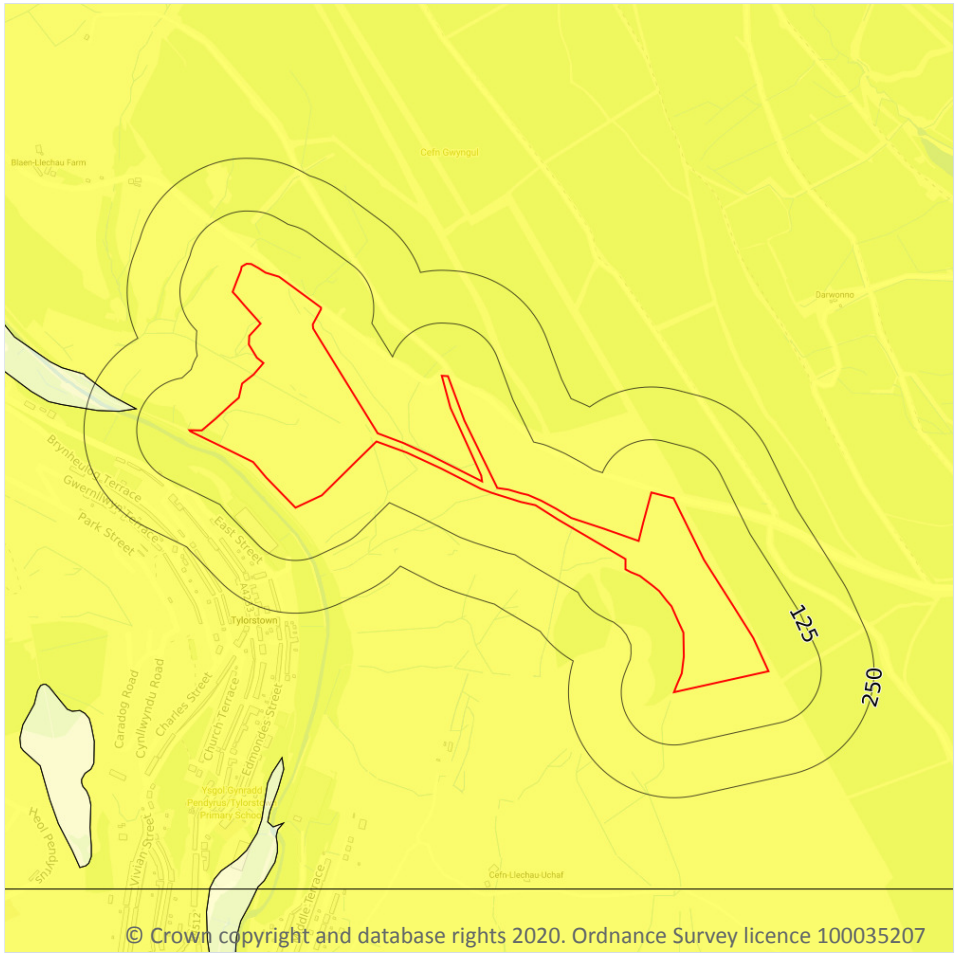
The potential hazard presented by types of ground that may contain layers of very soft materials like clay or peat and may compress if loaded by overlying structures, or if the groundwater level changes, potentially resulting in depression of the ground and disturbance of foundations.

Features are displayed on the Natural ground subsidence - Compressible deposits map on **page 105**

Location	Hazard rating	Details
On site	**Negligible**	**Compressible strata are not thought to occur.**

This data is sourced from the British Geological Survey.

Natural ground subsidence - Collapsible deposits



Site Outline

Search buffers in metres (m)

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

17.4 Collapsible deposits

Records within 50m	1

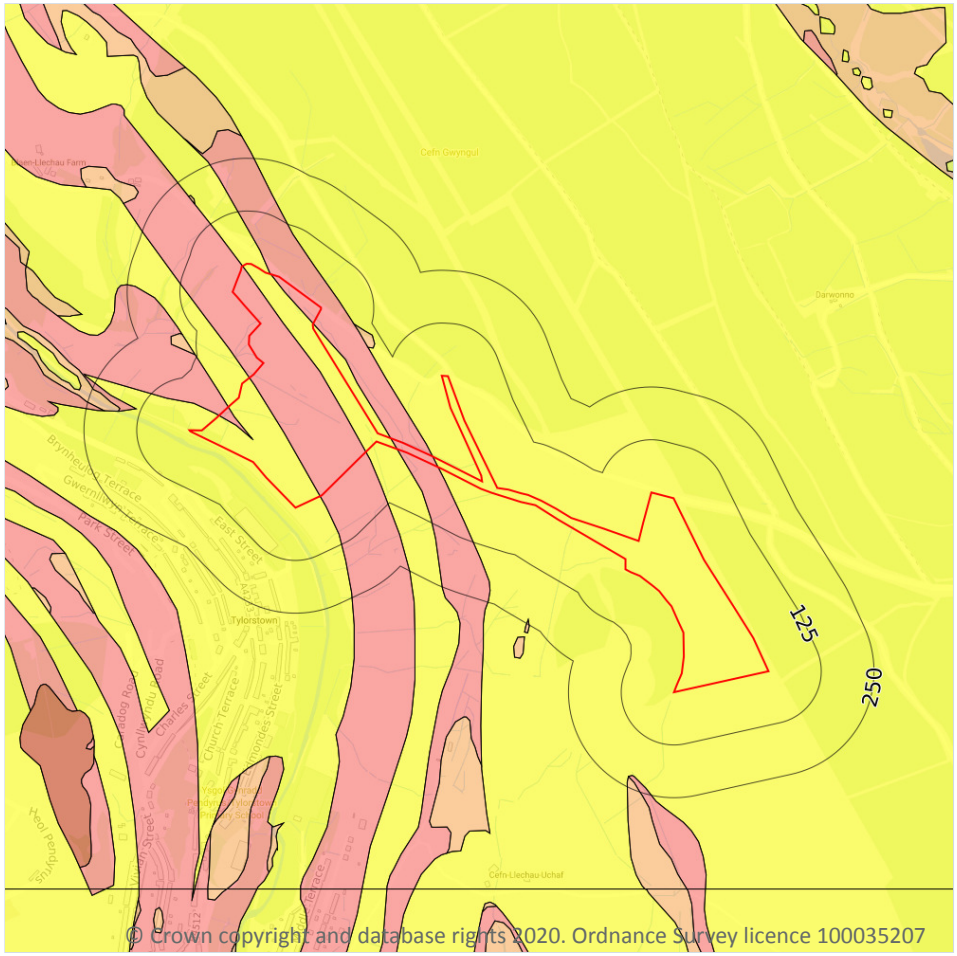
The potential hazard presented by natural deposits that could collapse when a load (such as a building) is placed on them or they become saturated with water.

Features are displayed on the Natural ground subsidence - Collapsible deposits map on **page 106**

Location	Hazard rating	Details
On site	**Very low**	**Deposits with potential to collapse when loaded and saturated are unlikely to be present.**

This data is sourced from the British Geological Survey.

Natural ground subsidence - Landslides



Site Outline

Search buffers in metres (m)

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

17.5 Landslides

Records within 50m	2

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

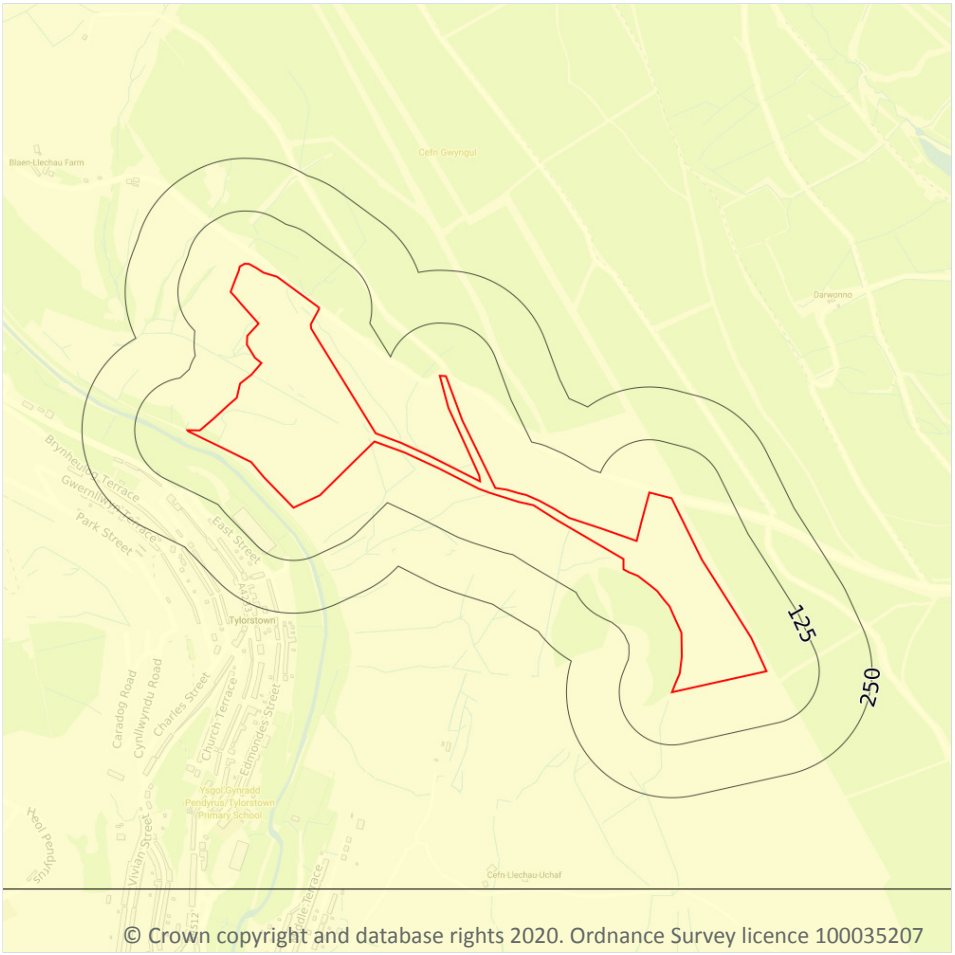
Features are displayed on the Natural ground subsidence - Landslides map on **page 107**

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

Location	Hazard rating	Details
On site	**Moderate**	**Slope instability problems are probably present or have occurred in the past. Land use should consider specifically the stability of the site.**

This data is sourced from the British Geological Survey.

Natural ground subsidence - Ground dissolution of soluble rocks



Site Outline

Search buffers in metres (m)

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

17.6 Ground dissolution of soluble rocks

Records within 50m	1

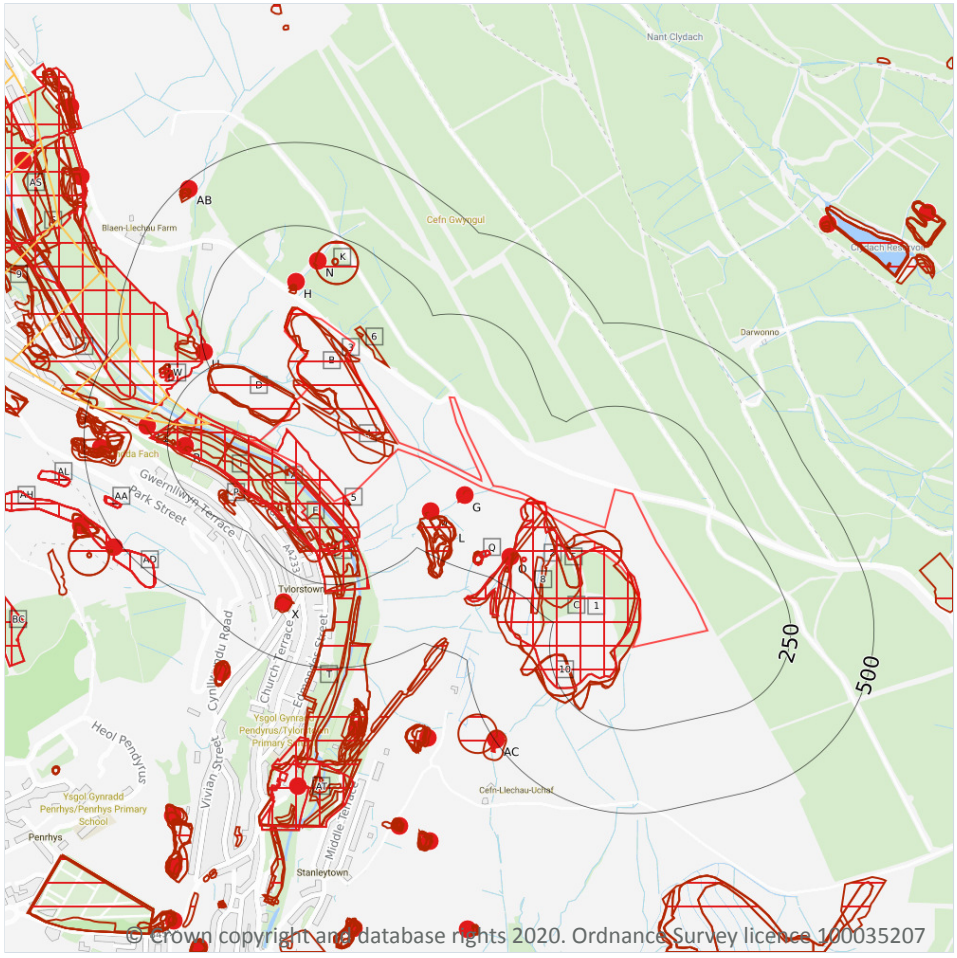
The potential hazard presented by ground dissolution, which occurs when water passing through soluble rocks produces underground cavities and cave systems. These cavities reduce support to the ground above and can cause localised collapse of the overlying rocks and deposits.

Features are displayed on the Natural ground subsidence - Ground dissolution of soluble rocks map on **page 109**

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

This data is sourced from the British Geological Survey.

18 Mining, ground workings and natural cavities



Site Outline

Search buffers in metres (m)

Natural cavities (Area)

Natural cavities (Point)

BritPits

Surface ground workings

Underground workings

Historical Mineral Planning Areas

Mining Cavities

Non Coal Mining

Sporadic underground mining of restricted extent possible

Localised small scale underground mining possible

Small scale mining possible

Underground mining known or likely within or in close proximity

Underground mining known within or in very close proximity

18.1 Natural cavities

Records within 500m	0

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

This data is sourced from Peter Brett Associates (PBA).

18.2 BritPits

Records within 500m	13

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

Features are displayed on the Mining, ground workings and natural cavities map on **page 111**

ID	Location	Details	Description
G	44m SW	Name: Pendyrys Colliery Address: Tylorstown, Ferndale, RHONDDA, Mid Glamorgan Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
H	80m N	Name: Pendyrys-isaf Address: Ferndale, RHONDDA, Mid Glamorgan Commodity: Sandstone Status: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
M	135m SW	Name: Pendyrys Colliery Address: Tylorstown, Ferndale, RHONDDA, Mid Glamorgan Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
L	146m SW	Name: Ferndale Colliery Address: Tylorstown, Ferndale, RHONDDA, Mid Glamorgan Commodity: Sandstone Status: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
N	155m N	Name: Pendyrys-isaf Address: Ferndale, RHONDDA, Mid Glamorgan Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority

ID	Location	Details	Description
O	166m SW	Name: Ferndale Colliery Address: Tylorstown, Ferndale, RHONDDA, Mid Glamorgan Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
R	196m W	Name: Preswylfa Address: Tylorstown, Ferndale, RHONDDA, Mid Glamorgan Commodity: Sandstone Status: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
U	250m W	Name: Pendyrys-isaf Address: Ferndale, RHONDDA, Mid Glamorgan Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
11	313m W	Name: Preswylfa Address: Tylorstown, Ferndale, RHONDDA, Mid Glamorgan Commodity: Sandstone Status: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
X	339m SW	Name: Coed Cynllwyn-du Address: Tylorstown, Ferndale, RHONDDA, Mid Glamorgan Commodity: Sandstone Status: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
Y	450m W	Name: Preswylfa Address: Tylorstown, Ferndale, RHONDDA, Mid Glamorgan Commodity: Sandstone Status: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
AB	480m NW	Name: Tynewydd Address: Ferndale, RHONDDA, Mid Glamorgan Commodity: Sandstone Status: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority

ID	Location	Details	Description
AC	496m SW	Name: Pen-yr-heol Address: Tylorstown, Ferndale, RHONDDA, Mid Glamorgan Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority

This data is sourced from the British Geological Survey.

18.3 Surface ground workings

Records within 250m **101**

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

Features are displayed on the Mining, ground workings and natural cavities map on **page 111**

ID	Location	Land Use	Year of mapping	Mapping scale
1	**On site**	**Refuse Heap**	**1965**	**1:10560**
2	**On site**	**Refuse Heap**	**1921**	**1:10560**
3	**On site**	**Unspecified Ground Workings**	**1948**	**1:10560**
4	**On site**	**Refuse Heap**	**1992**	**1:10000**
A	**On site**	**Colliery**	**1898**	**1:10560**
B	**On site**	**Unspecified Disused Tip**	**1992**	**1:10000**
B	**On site**	**Unspecified Heap**	**1948**	**1:10560**
B	**On site**	**Unspecified Disused Tip**	**1974**	**1:10000**
B	**On site**	**Unspecified Ground Workings**	**1965**	**1:10560**
B	**On site**	**Unspecified Heap**	**1965**	**1:10560**
B	**On site**	**Pond**	**1992**	**1:10000**
B	**On site**	**Pond**	**1974**	**1:10000**
B	**On site**	**Pond**	**1965**	**1:10560**
C	**On site**	**Old Trial Level**	**1948**	**1:10560**
C	**On site**	**Unspecified Disused Tip**	**1974**	**1:10000**

ID	Location	Land Use	Year of mapping	Mapping scale
C	**On site**	**Refuse Heap**	**1945**	**1:10560**
C	**On site**	**Refuse Heap**	**1945**	**1:10560**
D	**On site**	**Unspecified Disused Tip**	**1992**	**1:10000**
D	**On site**	**Unspecified Heap**	**1948**	**1:10560**
D	**On site**	**Unspecified Disused Tip**	**1974**	**1:10000**
D	**On site**	**Unspecified Heap**	**1965**	**1:10560**
A	4m SW	Colliery	1948	1:10560
E	7m SW	Colliery	1921	1:10560
A	8m SW	Colliery	1945	1:10560
A	8m SW	Colliery	1945	1:10560
5	15m SE	Reservoir	1898	1:10560
6	26m NE	Refuse Heap	1965	1:10560
F	28m SW	Refuse Heap	1915	1:10560
F	28m SW	Refuse Heap	1915	1:10560
A	29m SW	Colliery	1915	1:10560
A	29m SW	Colliery	1915	1:10560
G	29m SW	Old Coal Level	1915	1:10560
G	29m SW	Old Coal Level	1915	1:10560
G	30m SW	Old Coal Level	1945	1:10560
G	30m SW	Old Coal Level	1945	1:10560
G	30m SW	Old Coal Level	1948	1:10560
7	34m SW	Unspecified Disused Tip	1974	1:10000
G	40m SW	Old Coal Level	1921	1:10560
G	43m SW	Coal Level	1898	1:10560
H	46m N	Unspecified Quarry	1921	1:10560
I	54m SW	Refuse Heap	1921	1:10560
H	58m N	Unspecified Quarry	1915	1:10560
H	58m N	Unspecified Quarry	1915	1:10560

ID	Location	Land Use	Year of mapping	Mapping scale
H	58m N	Unspecified Disused Quarry	1948	1:10560
E	60m SW	Unspecified Disused Tip	1974	1:10000
H	61m N	Unspecified Quarry	1945	1:10560
I	66m SW	Refuse Heap	1948	1:10560
J	79m S	Refuse Heap	1948	1:10560
J	79m S	Refuse Heap	1921	1:10560
K	112m N	Old Coal Level	1948	1:10560
K	112m N	Old Coal Level	1921	1:10560
E	116m SW	Reservoir	1898	1:10560
8	122m SW	Unspecified Pit	1965	1:10560
L	131m SW	Unspecified Disused Quarry	1948	1:10560
L	131m SW	Unspecified Disused Quarry	1921	1:10560
L	131m SW	Unspecified Quarry	1915	1:10560
L	131m SW	Unspecified Quarry	1915	1:10560
L	137m SW	Unspecified Quarry	1945	1:10560
L	139m SW	Unspecified Quarry	1965	1:10560
N	139m N	Old Coal Level	1915	1:10560
N	139m N	Old Coal Level	1915	1:10560
M	142m SW	Trial Level	1898	1:10560
M	142m SW	Trial Level	1948	1:10560
M	143m SW	Old Trial Level	1915	1:10560
M	143m SW	Old Trial Level	1915	1:10560
L	143m SW	Unspecified Disused Quarry	1992	1:10000
L	143m SW	Unspecified Disused Quarry	1974	1:10000
M	143m SW	Old Trial Level	1945	1:10560
M	143m SW	Old Trial Level	1945	1:10560
N	147m NE	Old Coal Level	1898	1:10560
O	147m SW	Old Trial Level	1921	1:10560

ID	Location	Land Use	Year of mapping	Mapping scale
M	152m SW	Old Trial Level	1921	1:10560
P	158m SW	Cuttings	1898	1:10560
E	165m SW	Refuse Heap	1921	1:10560
K	169m NE	Old Coal Level	1945	1:10560
K	169m NE	Old Coal Level	1945	1:10560
P	169m SW	Unspecified Quarry	1948	1:10560
P	169m SW	Unspecified Quarry	1945	1:10560
L	175m SW	Unspecified Ground Workings	1965	1:10560
Q	176m S	Unspecified Disused Level	1992	1:10000
Q	176m S	Unspecified Disused Level	1974	1:10000
L	177m SW	Refuse Heap	1948	1:10560
L	177m SW	Refuse Heap	1921	1:10560
P	179m SW	Unspecified Quarry	1921	1:10560
Q	187m S	Refuse Heap	1915	1:10560
Q	187m S	Refuse Heap	1915	1:10560
Q	190m S	Old Trial Level	1945	1:10560
Q	190m S	Old Trial Level	1945	1:10560
Q	191m S	Refuse Heap	1948	1:10560
Q	191m S	Refuse Heap	1921	1:10560
R	194m W	Unspecified Quarry	1898	1:10560
Q	195m S	Unspecified Disused Level	1992	1:10000
Q	195m S	Unspecified Heap	1974	1:10000
Q	195m S	Unspecified Heap	1965	1:10560
O	196m SW	Old Trial Level	1915	1:10560
O	196m SW	Old Trial Level	1915	1:10560
10	201m W	Unspecified Disused Tip	1992	1:10000
L	202m SW	Unspecified Quarry	1945	1:10560
R	212m W	Unspecified Quarry	1898	1:10560

ID	Location	Land Use	Year of mapping	Mapping scale
S	242m W	Colliery	1898	1:10560
T	250m S	Refuse Heap	1948	1:10560

This is data is sourced from Ordnance Survey/Groundsure.

18.4 Underground workings

Records within 1000m	**44**

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

Features are displayed on the Mining, ground workings and natural cavities map on **page 111**

ID	Location	Land Use	Year of mapping	Mapping scale
A	**On site**	**Colliery**	**1898**	**1:10560**
C	**On site**	**Old Trial Level**	**1948**	**1:10560**
A	4m SW	Colliery	1948	1:10560
G	30m SW	Old Coal Level	1948	1:10560
E	30m SW	Unspecified Mine	1965	1:10560
G	40m SW	Old Coal Level	1921	1:10560
G	43m SW	Coal Level	1898	1:10560
M	142m SW	Trial Level	1898	1:10560
M	142m SW	Trial Level	1948	1:10560
N	147m NE	Old Coal Level	1898	1:10560
O	147m SW	Old Trial Level	1921	1:10560
M	152m SW	Old Trial Level	1921	1:10560
Q	176m S	Unspecified Disused Level	1992	1:10000
Q	176m S	Unspecified Disused Level	1974	1:10000
Q	195m S	Unspecified Disused Level	1992	1:10000
S	242m W	Colliery	1898	1:10560
W	296m NW	Old Trial Level	1921	1:10560
W	317m NW	Old Trial Level	1921	1:10560

ID	Location	Land Use	Year of mapping	Mapping scale
AA	434m SW	Unspecified Disused Levels	1992	1:10000
AA	434m SW	Unspecified Disused Levels	1974	1:10000
AA	434m SW	Unspecified Disused Levels	1965	1:10560
AD	468m SW	Unspecified Disused Levels	1992	1:10000
AD	468m SW	Unspecified Disused Levels	1974	1:10000
AD	468m SW	Unspecified Disused Levels	1965	1:10560
AC	493m SW	Old Coal Level	1948	1:10560
AH	516m SW	Unspecified Disused Levels	1992	1:10000
AH	516m SW	Unspecified Disused Levels	1974	1:10000
AH	516m SW	Unspecified Disused Levels	1965	1:10560
AL	556m W	Unspecified Disused Levels	1992	1:10000
AL	556m W	Unspecified Disused Levels	1974	1:10000
AL	556m W	Unspecified Disused Levels	1965	1:10560
AS	701m NW	Colliery	1948	1:10560
AT	715m S	Colliery	1898	1:10560
AY	786m S	Colliery	1921	1:10560
BC	868m SW	Colliery	1875	1:10560
BC	918m SW	Unspecified Shafts	1875	1:10560
-	934m W	Trial Level	1875	1:10560
-	939m W	Unspecified Disused Levels	1981	1:10000
-	939m W	Unspecified Disused Levels	1964	1:10560
BF	972m SW	Old Trial Level	1874	1:10560
BF	976m SW	Old Trial Level	1915	1:10560
BF	976m SW	Old Trial Level	1898	1:10560
BF	977m SW	Trial Level	1875	1:10560
BF	978m SW	Old Trial Level	1921	1:10560

This is data is sourced from Ordnance Survey/Groundsure.

18.5 Historical Mineral Planning Areas

Records within 500m	0

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

This data is sourced from the British Geological Survey.

18.6 Non-coal mining

Records within 1000m	1

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

Features are displayed on the Mining, ground workings and natural cavities map on **page 111**

ID	Location	Name	Commodity	Class	Likelihood
9	137m W	Not available	Iron Ore (Bedded)	B	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered

This data is sourced from the British Geological Survey.

18.7 Mining cavities

Records within 1000m	0

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

This data is sourced from Peter Brett Associates (PBA).

18.8 JPB mining areas

Records on site	1

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

Location	Details
On site	**In addition to being located inside an area where The Coal Authority have information on coal mining activities, Johnson Poole & Bloomer (JPB) have information such as mining plans and maps held within their archive of mining activities that have occurred within 1km of this property which may supplement this information. Further details and a quote for services can be obtained by emailing this report to enquiries.gs@jpb.co.uk.**

This data is sourced from Johnson Poole and Bloomer.

18.9 Coal mining

Records on site	**1**

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

Location	Details
On site	**The site is located within a coal mining area as defined by the Coal Authority. A Consultants Coal Mining Report is recommended to further assess coal mining issues at the site. This can be ordered directly through Groundsure or your preferred search provider.**

This data is sourced from the Coal Authority.

18.10 Brine areas

Records on site	**0**

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

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

18.11 Gypsum areas

Records on site	**0**

Generalised areas that may be affected by gypsum extraction.

This data is sourced from British Gypsum.

18.12 Tin mining

Records on site	0

Generalised areas that may be affected by historical tin mining.

This data is sourced from Mining Searches UK.

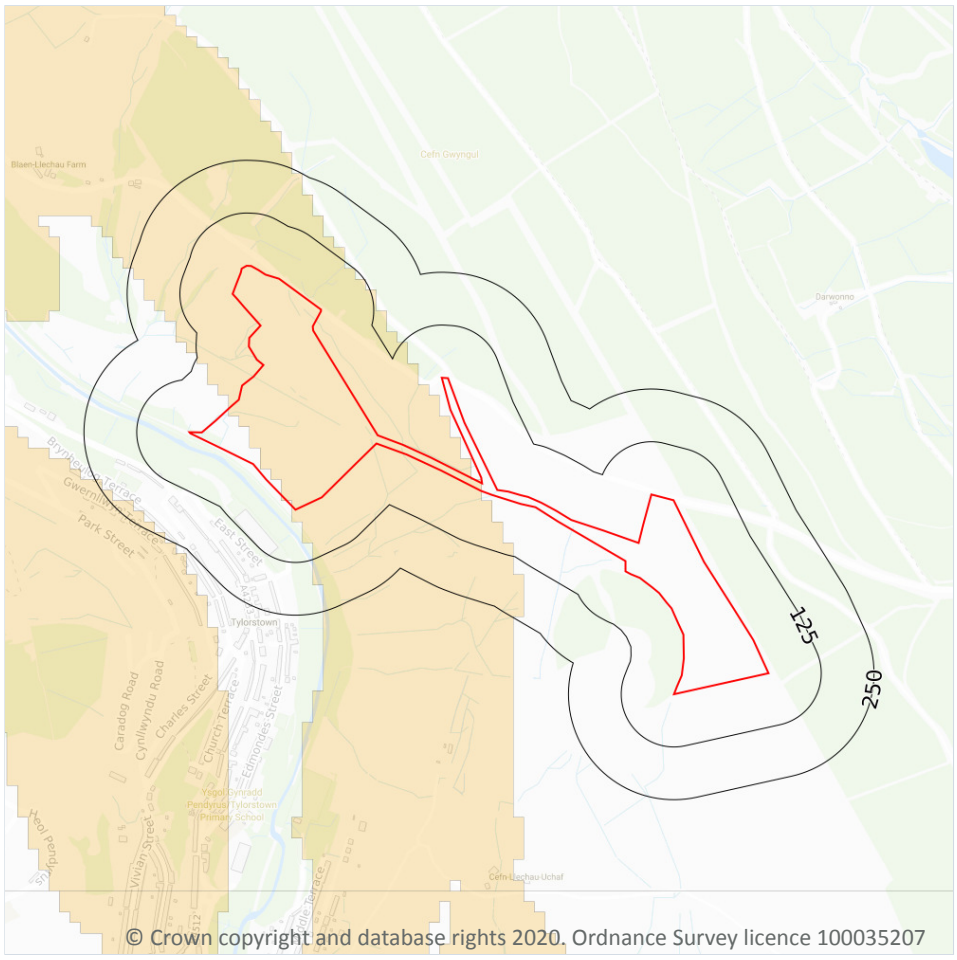
18.13 Clay mining

Records on site	0

Generalised areas that may be affected by kaolin and ball clay extraction.

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

19 Radon



Site Outline

Search buffers in metres (m)

- Greater than 30%
- Between 10% and 30%
- Between 5% and 10%
- Between 3% and 5%
- Between 1% and 3%
- Less than 1%

19.1 Radon

Records on site	2

Estimated percentage of dwellings exceeding the Radon Action Level. This data is the highest resolution radon dataset available for the UK and is produced to a 75m level of accuracy to allow for geological data accuracy and a 'residential property' buffer. The findings of this section should supersede any estimations derived from the Indicative Atlas of Radon in Great Britain. The data was derived from both geological assessments and long term measurements of radon in more than 479,000 households.

Features are displayed on the Radon map on **page 123**

Location	Estimated properties affected	Radon Protection Measures required
On site	**Between 3% and 5%**	**Basic**
On site	**Less than 1%**	**None****

This data is sourced from the British Geological Survey and Public Health England.

20 Soil chemistry

20.1 BGS Estimated Background Soil Chemistry

Records within 50m	44

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

Location	Arsenic	Bioaccessible Arsenic	Lead	Bioaccessible Lead	Cadmium	Chromium	Nickel
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 - 200 mg/kg**	**60 - 120 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 - 200 mg/kg**	**60 - 120 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**25 - 35 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**25 - 35 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**25 - 35 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**25 - 35 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**

Location	Arsenic	Bioaccessible Arsenic	Lead	Bioaccessible Lead	Cadmium	Chromium	Nickel
On site	**25 - 35 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**25 - 35 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**25 - 35 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**25 - 35 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**25 - 35 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**25 - 35 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
3m W	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
3m W	15 - 25 mg/kg	No data	100 - 200 mg/kg	60 - 120 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
9m W	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
9m W	15 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
9m SW	15 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg

Location	Arsenic	Bioaccessible Arsenic	Lead	Bioaccessible Lead	Cadmium	Chromium	Nickel
12m N	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
18m NW	25 - 35 mg/kg	No data	100 - 200 mg/kg	60 - 120 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
30m W	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
30m S	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
30m NW	15 mg/kg	No data	100 - 200 mg/kg	60 - 120 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
30m NW	15 mg/kg	No data	100 - 200 mg/kg	60 - 120 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
35m NW	15 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
35m NW	15 mg/kg	No data	100 - 200 mg/kg	60 - 120 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
46m NW	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
46m NW	15 - 25 mg/kg	No data	100 - 200 mg/kg	60 - 120 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
47m W	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
47m W	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
47m SW	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
47m W	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg

This data is sourced from the British Geological Survey.

20.2 BGS Estimated Urban Soil Chemistry

Records within 50m	**0**

Estimated topsoil chemistry of Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Tin and Zinc and bioaccessible Arsenic and Lead in 23 urban centres across Great Britain. These estimates are derived from interpolation of the measured urban topsoil data referred to above and provide information across each city

between the measured sample locations (4 per km^2).

This data is sourced from the British Geological Survey.

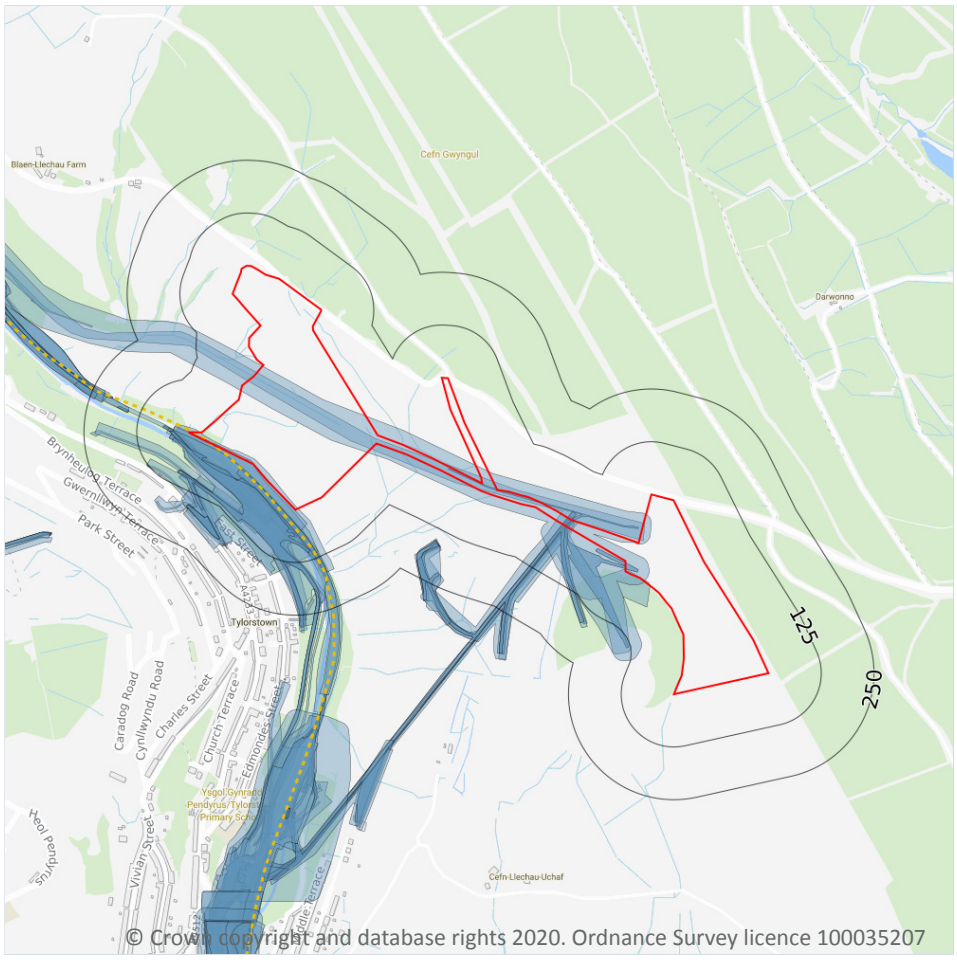
20.3 BGS Measured Urban Soil Chemistry

Records within 50m	0

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

This data is sourced from the British Geological Survey.

21 Railway infrastructure and projects



21.1 Underground railways (London)

Records within 250m	0

Details of all active London Underground lines, including approximate tunnel roof depth and operational hours.

This data is sourced from publicly available information by Groundsure.

21.2 Underground railways (Non-London)

Records within 250m	0

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

This data is sourced from publicly available information by Groundsure.

21.3 Railway tunnels

Records within 250m	0

Railway tunnels taken from contemporary Ordnance Survey mapping.

This data is sourced from the Ordnance Survey.

21.4 Historical railway and tunnel features

Records within 250m	46

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

Features are displayed on the Railway infrastructure and projects map on **page 129**

Location	Land Use	Year of mapping	Mapping scale
On site	**Railway Sidings**	**1961**	**2500**
On site	**Railway Sidings**	**1958**	**2500**
On site	**Tramway Sidings**	**1920**	**2500**
On site	**Railway Sidings**	**1898**	**10560**
On site	**Tramway Sidings**	**1948**	**10560**
On site	**Tramway Sidings**	**1945**	**10560**
On site	**Tramway Sidings**	**1915**	**10560**
On site	**Tramway Sidings**	**1921**	**10560**
On site	**Disused Tramway Sidings**	**1965**	**10560**
On site	**Railway Sidings**	**1948**	**10560**
On site	**Railway Sidings**	**1965**	**10560**
8m SW	Railway Sidings	1945	10560
17m SW	Railway Sidings	1900	2500
19m SW	Railway Sidings	1873	2500
20m SW	Railway Sidings	1961	2500
21m SW	Railway Sidings	1919	2500
21m SW	Railway Sidings	1992	10000

Location	Land Use	Year of mapping	Mapping scale
22m SW	Railway Sidings	1957	2500
25m SW	Tramway Sidings	1915	10560
26m SW	Tramway Sidings	1900	2500
29m SW	Railway Sidings	1921	10560
34m SW	Railway Sidings	1961	2500
34m SW	Railway Sidings	1958	2500
35m SW	Railway Sidings	1957	1250
40m SW	Disused Railway Sidings	1961	2500
40m SW	Disused Railway Sidings	1958	2500
40m SW	Railway Sidings	1957	1250
59m SW	Railway Sidings	1957	1250
79m SW	Tramway Sidings	1900	2500
87m SW	Railway Sidings	1919	2500
106m SW	Tramway Sidings	1900	2500
108m SW	Railway Sidings	1920	2500
112m SW	Tramway Sidings	1900	2500
150m SW	Railway Sidings	1919	2500
152m W	Railway Sidings	1961	2500
152m W	Railway Sidings	1957	2500
153m W	Railway Sidings	1957	1250
154m SW	Railway Sidings	1915	10560
156m SW	Railway Sidings	1920	2500
159m SW	Tramway Sidings	1921	10560
200m NW	Railway Sidings	1961	2500
200m NW	Railway Sidings	1957	2500
210m NW	Railway Sidings	1948	10560
220m W	Railway Sidings	1945	10560
236m NW	Railway Sidings	1921	10560

Location	Land Use	Year of mapping	Mapping scale
250m NW	Railway Sidings	1915	10560

This data is sourced from Ordnance Survey/Groundsure.

21.5 Royal Mail tunnels

Records within 250m	0

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

This data is sourced from Groundsure/the Postal Museum.

21.6 Historical railways

Records within 250m	1

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

Features are displayed on the Railway infrastructure and projects map on **page 129**

Location	Description
On site	**Abandoned**

This data is sourced from OpenStreetMap.

21.7 Railways

Records within 250m	0

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

This data is sourced from Ordnance Survey and OpenStreetMap.

21.8 Crossrail 1

Records within 500m	0

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

This data is sourced from publicly available information by Groundsure.

21.9 Crossrail 2

Records within 500m	0

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

This data is sourced from publicly available information by Groundsure.

21.10 HS2

Records within 500m	0

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

This data is sourced from HS2 ltd.

Data providers

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

Terms and conditions

Groundsure's Terms and Conditions can be accessed at this link: https://www.groundsure.com/terms-and-conditions-jan-2020/.

REDSTART

APPENDIX D

BGS BOREHOLE LOGS

1063 Wt. 22438/0384 10M 7/45 (51) F&S.

RECORD OF SHAFT OR BORE FOR MINERALS

(For Survey use only)
1-inch Map Registered No.
~~1 SE / 30~~
5T09NW/12

Name and Number of Shaft or Bore No 9 PIT. FERNDALE.
HARD HEADING 5-FT. TO 2FT-8.
OFF No 6 DIP. D. CONVEYOR.

For Messrs.

Town or Village

County Six-inch quarter sheet

6-inch Map Registered No.

Exact site SE. 21FT S 185E
0202 9512

Attach a tracing from a map, or a sketch-map, if possible.

Purpose for which made

Level at which shaft / bore commenced relative to O.D. State if shaft / bore is up, down, horizontal or inclined; in latter cases give angle of inclination and direction

Made by

Information from Date of Sinking

Specimens

Additional Notes in Space Overleaf

(For Survey use only) GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
	Cliff roof				
	COAL	1	4	1	4
	Stone		1	1	5
	COAL	2	8	4	1
	Clod		2	4	3
	COAL		1	4	4
	Rashes		2	4	6
	Hard fireclay	20	·	24	6
	COAL	1	10	26	4
	Fireclay	5	·	31	4
	Cliff	16	·	47	4
	COAL		4	47	8
	Cliff	28	·	75	8
	Rock	7	·	82	8
	Cliff	16	·	98	8
	5-FT.				
		98	8		

Continued Overleaf

GEOLOGICAL SURVEY AND MUSEUM, SOUTH KENSINGTON, LONDON, S.W.7.	Date received	Correspondence File No.	1" N.S. Map No.	1" O.S. Map No.	Site marked (use symbol) on 1" Map	on 6" Map

1063 Wt. 22438/0384 10m 7/45 (51) F.&S.

RECORD OF SHAFT OR BORE FOR MINERALS

(*For Survey use only*)
1-inch Map Registered No.
~~12 SE/30~~
ST09NW/13

Name and Number of Shaft or Bore No 6 Pit. FERNDALE.
EAST SIDE HARD HEADING 5-FT. TO 2FT-8.

For Messrs.

Town or Village

County Six-inch quarter sheet

6-inch Map Registered No.

Exact site on 5Ft. 1856 0156 9625

Attach a tracing from a map, or a sketch-map, if possible.

Purpose for which made

Level at which shaft / bore commenced relative to O.D. State if shaft / bore is up, down, horizontal or inclined; in latter cases give angle of inclination and direction

Made by

Information from Date of Sinking

Specimens

Additional Notes in Space Overleaf

(*For Survey use only*) GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
	COAL	3 .		3	
	F'clay	1 1		4	1
	Rock	3 9		7	10
	F'clay & shale	9		8	7
	Rock	1 1		9	8
	Cliff	10		10	6
	Rock	10		11	4
	Cliff	2 4		13	8
	COAL	1 4		15	.
	F'clay	7 6		23	6
	Cliff	20 .		43	6
	COAL	11		43	5
	F'clay	3 .		46	5
	Cliff with beds of rock	14 .		60	5
	5 FT. SEAM c.	5 .		65	5
	F'clay c.	2 .		67	5
	GELLIDEG. c.	3 .		70	5

Continued Overleaf

GEOLOGICAL SURVEY AND MUSEUM, SOUTH KENSINGTON, LONDON, S.W.7.	Date received	Correspondence File No.	1" N.S. Map No.	1" O.S. Map No.	Site marked (use symbol) on 1" Map	on 6" Map

REDSTART

APPENDIX E

COAL AUTHORITY CONSULTANTS COAL MINING REPORT

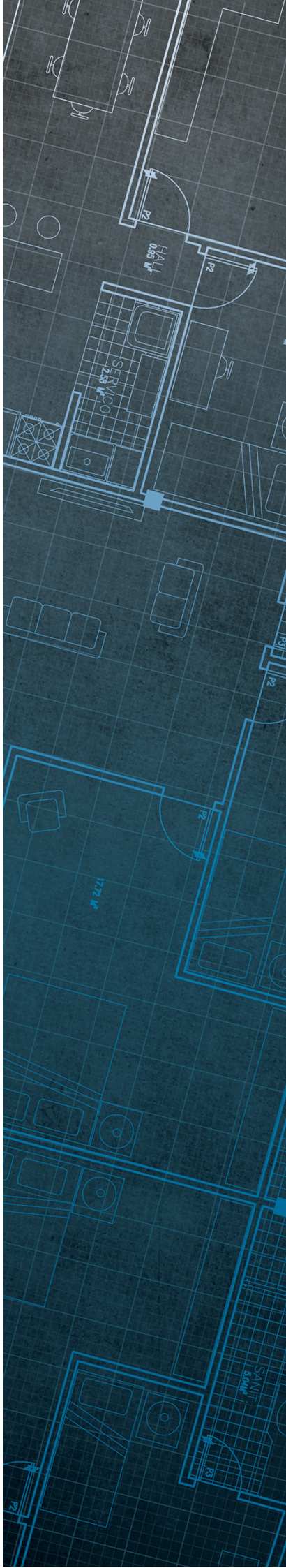
For Internal Use Only

Consultants

Coal Mining Report

Tylorstown
Rhondda Cynon Taff
South Wales

Date of enquiry:	**10 September 2020**
Date enquiry received:	**10 September 2020**
Issue date:	**10 September 2020**
Our reference:	**71006970622001**
Your reference:	



Consultants

Coal Mining Report

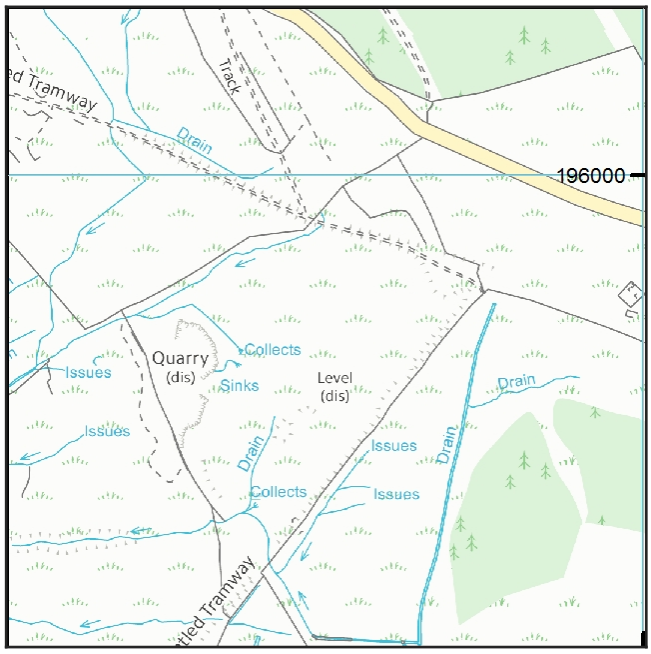
This report is based on and limited to the records held by the Coal Authority at the time the report was produced.

Client name

The Coal Authority

Enquiry address

Tylorstown
Rhondda Cynon Taff
South Wales



Approximate position of property

How to contact us

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+44 (0)1623 637 000 (International)

200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

www.groundstability.com

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

Section 1 – Mining activity and geology

Past underground mining

Colliery	Seam	Mineral	Coal Authority reference	Depth (m)	Direction to working	Dipping rate of seam worked (degrees)	Dipped direction of seam worked	Extraction thickness (cm)	Year last mined
unnamed	FOUR FOOT	Coal	44JE	278	South-West	9.1	South-East	269	1878
unnamed	UPPER SEVEN FOOT	Coal	40GB	358	West	3.2	North-West	109	1944
unnamed	TWO FOOT NINE	Coal	40NQ	390	North	4.2	East	147	1929
unnamed	TWO FOOT NINE	Coal	40NO	396	Beneath Property	3.7	South-East	147	1915
unnamed	FIVE FOOT	Coal	40F4	403	South-West	4.9	South	120	1893
unnamed	TWO FOOT NINE	Coal	44HM	405	Beneath Property	6.7	South-East	147	1904
unnamed	FOUR FOOT	Coal	40M1	408	Beneath Property	3.4	South-East	190	1907
unnamed	FIVE FOOT	Coal	412E	412	Beneath Property	45.7	South	120	1927
unnamed	TWO FOOT NINE	Coal	44HJ	417	Beneath Property	7.7	East	147	1912
FERNDALE	TWO FOOT NINE	Coal	40NO	426	Beneath Property	4.8	East	147	1915
unnamed	6FT BOTTOM LEAF	Coal	40K8	431	Beneath Property	7.4	East	196	1909
unnamed	TWO FOOT NINE	Coal	44HK	434	Beneath Property	5.4	South-East	147	1923
unnamed	6FT BOTTOM LEAF	Coal	40K8	435	Beneath Property	4.0	South	196	1909
unnamed	FOUR FOOT	Coal	44JD	442	Beneath Property	4.5	South-East	269	1936
unnamed	6FT BOTTOM LEAF	Coal	44JH	443	Beneath Property	4.6	South-East	195	1905
unnamed	BUTE	Coal	40ID	459	Beneath Property	5.4	East	93	1926
unnamed	6FT BOTTOM LEAF	Coal	44JG	466	Beneath Property	6.4	South-East	196	1907
unnamed	BUTE	Coal	40ID	467	Beneath Property	4.7	South-East	93	1926
unnamed	BUTE	Coal	44K2	477	Beneath Property	7.4	South-East	93	1916
unnamed	YARD	Coal	40H7	478	Beneath Property	6.1	East	90	1955

Colliery	Seam	Mineral	Coal Authority reference	Depth (m)	Direction to working	Dipping rate of seam worked (degrees)	Dipped direction of seam worked	Extraction thickness (cm)	Year last mined
unnamed	UPPER NINE FOOT	Coal	44JI	479	Beneath Property	8.1	South-East	198	1918
unnamed	BUTE	Coal	44K1	488	South-East	7.3	South	93	1925
unnamed	YARD	Coal	4163	498	Beneath Property	4.4	South-East	111	1952
unnamed	UPPER SEVEN FOOT	Coal	152	499	Beneath Property	7.0	South-East	152	1944
unnamed	YARD	Coal	40H9	508	North	4.1	East	110	1949
unnamed	FIVE FOOT GELLIDEG	Coal	40C1	515	Beneath Property	4.2	South-East	118	1960
unnamed	UPPER SEVEN FOOT	Coal	40GC	518	Beneath Property	5.2	East	120	1900
unnamed	FIVE FOOT	Coal	40F5	520	Beneath Property	5.9	East	120	1894
unnamed	FIVE FOOT	Coal	40F6	522	Beneath Property	6.5	East	120	1927
unnamed	FIVE FOOT GELLIDEG	Coal	44JX	524	Beneath Property	4.0	East	120	1957
unnamed	FOUR FOOT	Coal	44F5	524	South	5.1	South-East	240	1960
unnamed	FIVE FOOT	Coal	412F	528	Beneath Property	8.5	South-East	120	1912
unnamed	FIVE FOOT	Coal	412C	537	Beneath Property	7.0	North-East	120	1918
unnamed	TWO FOOT NINE	Coal	44HN	546	Beneath Property	5.7	South	155	1929
unnamed	BUTE	Coal	40IF	550	North-East	4.7	South-East	93	1937
unnamed	FOUR FOOT	Coal	44FW	555	Beneath Property	2.7	East	160	1898
unnamed	FOUR FOOT	Coal	40MM	558	North	2.6	North-East	210	1935
unnamed	UPPER SEVEN FOOT	Coal	40GD	564	East	4.7	North-East	119	1959
unnamed	YARD	Coal	415X	566	South	6.1	South-East	111	1941
unnamed	TWO FOOT NINE	Coal	44HH	568	West	4.9	South-East	147	1929
unnamed	6FT BOTTOM LEAF	Coal	44DM	569	Beneath Property	3.6	East	196	1926
unnamed	YARD	Coal	40HA	576	North-East	2.5	East	90	1946
unnamed	6FT BOTTOM LEAF	Coal	40KP	584	North	4.6	East	196	1922
unnamed	FOUR FOOT	Coal	44JC	587	West	5.8	South	269	1900

Colliery	Seam	Mineral	Coal Authority reference	Depth (m)	Direction to working	Dipping rate of seam worked (degrees)	Dipped direction of seam worked	Extraction thickness (cm)	Year last mined
unnamed	UPPER NINE FOOT	Coal	44JJ	588	West	7.1	South-East	198	1910
unnamed	FOUR FOOT	Coal	44FU	593	Beneath Property	1.2	South-East	160	1910
unnamed	FIVE FOOT GELLIDEG	Coal	44JZ	593	South-West	6.5	South-East	142	1952
FERNDALE	TWO FOOT NINE	Coal	44HO	602	North-East	2.8	East	155	1925
unnamed	FOUR FOOT	Coal	44FV	610	East	2.6	South-East	160	1934
unnamed	YARD	Coal	416L	612	South	8.1	South-East	110	1943
unnamed	6FT BOTTOM LEAF	Coal	44D6	615	South	4.8	South-East	200	1805
unnamed	UPPER NINE FOOT	Coal	41BB	616	South-West	6.5	South	240	1945
unnamed	FOUR FOOT	Coal	40MN	616	North-East	5.4	North-East	210	1922
unnamed	FOUR FOOT	Coal	44FS	618	South	0.8	South-East	240	1900
unnamed	6FT BOTTOM LEAF	Coal	44JF	619	West	4.8	South	196	1907
unnamed	UPPER SEVEN FOOT	Coal	40GE	622	North-East	4.9	East	106	1959
unnamed	6FT BOTTOM LEAF	Coal	44DI	624	South	3.4	South-East	270	1910
unnamed	YARD	Coal	40HR	636	North	2.4	East	90	1948
unnamed	BUTE	Coal	417H	636	South	3.0	South	190	1923
unnamed	UPPER NINE FOOT	Coal	41BS	641	South	5.8	North	180	1943
unnamed	LOWER NINE FOOT TOP LEAF	Coal	40JU	645	North	1.3	South-East	140	1929
unnamed	BUTE	Coal	40IQ	650	North-East	2.1	North-East	93	1937
unnamed	BUTE	Coal	417T	651	Beneath Property	3.2	South-East	93	1925
unnamed	BUTE	Coal	418M	652	South	2.5	West	200	1932
unnamed	YARD	Coal	4162	654	West	7.4	South	111	1941
unnamed	LOWER NINE FOOT	Coal	419G	656	South-West	3.0	North	110	1954
unnamed	UPPER SEVEN FOOT	Coal	414A	657	West	9.7	South-East	152	1941

Colliery	Seam	Mineral	Coal Authority reference	Depth (m)	Direction to working	Dipping rate of seam worked (degrees)	Dipped direction of seam worked	Extraction thickness (cm)	Year last mined
unnamed	BUTE	Coal	417U	658	Beneath Property	4.8	South-East	93	1932
unnamed	YARD	Coal	416M	658	South	2.6	South	110	1942
unnamed	FIVE FOOT	Coal	4130	659	Beneath Property	1.0	North-East	120	1935
unnamed	FIVE FOOT	Coal	40F7	661	North	0.0	East	120	1932
unnamed	YARD	Coal	415T	666	South	10.9	North-West	120	1947
NATIONAL	UPPER SEVEN FOOT	Coal	4143	669	South	3.9	West	140	1954
unnamed	YARD	Coal	416Q	671	Beneath Property	5.9	South-East	110	1946
unnamed	UPPER SEVEN FOOT	Coal	414S	679	Beneath Property	5.5	South	110	1940
unnamed	UPPER SEVEN FOOT	Coal	40H1	687	North-East	5.9	North-East	132	1957
unnamed	FIVE FOOT	Coal	412S	687	South	11.9	South-West	200	1938
unnamed	FIVE FOOT	Coal	412Q	689	South	0.8	South	200	1922
unnamed	FIVE FOOT	Coal	411Q	691	South-West	8.8	West	150	1926
unnamed	YARD	Coal	415W	698	West	7.2	South	111	1941
unnamed	SEVEN FOOT	Coal	4152	699	South	4.4	East	132	1951
unnamed	FIVE FOOT	Coal	411T	702	South-West	85.3	North-West	150	1927
unnamed	FIVE FOOT	Coal	411S	704	South-West	3.4	North	150	1922
unnamed	FIVE FOOT	Coal	4131	706	Beneath Property	5.6	South	120	1937
unnamed	YARD	Coal	416N	714	South-East	3.1	West	110	1952
FERNDALE	UPPER SEVEN FOOT	Coal	414R	717	South-East	5.0	South-East	132	1955
unnamed	FIVE FOOT	Coal	412D	750	West	11.6	South-East	120	1930
unnamed	FIVE FOOT	Coal	4132	752	South-East	0.0	East	180	1953

Probable unrecorded shallow workings

None.

Spine roadways at shallow depth

No spine roadway recorded at shallow depth.

Mine entries

Entry type	Reference	Grid reference	Treatment description	Mineral	Conveyancing details
Shaft	301195-069	301126 195900	Filled in 1961 with weathered shale and plugged with clay	Coal	Rhondda Borough Council 04/12/1980
Shaft	301195-070	301146 195877	Filled in 1961 with weathered shale and plugged with clay	Coal	Rhondda Borough Council 04/12/1980
Adit	301195-072	301583 195917		Coal	
Adit	301196-008	301276 196434		Coal	
Adit	301196-009	301284 196414		Coal	
Adit	301196-010	301294 196391		Coal	
Adit	301196-011	301313 196374		Coal	
Adit	301196-012	301318 196365		Coal	
Adit	301196-013	301324 196351		Coal	
Adit	301196-014	301325 196345		Coal	
Adit	301196-015	301329 196337		Coal	
Adit	301196-016	301334 196333		Coal	
Adit	301196-017	301346 196314		Coal	
Adit	301196-018	301358 196293	The entrance to this adit was excavated and secured with a concrete block wall prior to surface restoration 1n 2000 by Wardell Armstrong acting on behalf of the Coal Authority	Coal	

Abandoned mine plan catalogue numbers

The following abandoned mine plan catalogue numbers intersect with some, or all, of the enquiry boundary:

SWR832	SWR1263	SWR1085
SWR829	SWR1261	SWR1264
SWR3871	SWA818	SWR1256

Our records show we have more plans than those shown above which could affect the enquiry boundary.

Please contact us on 0345 762 6848 to determine the exact abandoned mine plans you require based on your needs.

Outcrops

Seam name	Mineral	Seam workable	Distance to outcrop (m)	Direction to outcrop	Bearing of outcrop
BRITHDIR RIDER	Coal	Yes	20.8	West	158
BRITHDIR RIDER	Coal	Yes	Within	N/A	166
NO.1 RHONDDA	Coal	Yes	Within	N/A	142
NO.1 RHONDDA	Coal	Yes	Within	N/A	324
TILLERY BRITHDIR	Coal	Yes	Within	N/A	140
TILLERY BRITHDIR	Coal	Yes	Within	N/A	318
TILLERY RIDER NO.1	Coal	Yes	Within	N/A	329
TILLERY RIDER NO.2	Coal	Yes	Within	N/A	158
TILLERY RIDER NO.2	Coal	Yes	Within	N/A	337

Geological faults, fissures and breaklines

No faults, fissures or breaklines recorded.

Opencast mines

None recorded within 500 metres of the enquiry boundary.

Coal Authority managed tips

None recorded within 500 metres of the enquiry boundary.

Section 2 – Investigative or remedial activity

Please refer to the 'Summary of findings' map (on separate sheet) for details of any activity within the area of the site boundary.

Site investigations

None recorded within 50 metres of the enquiry boundary.

Remediated sites

Distance to site remediation (m)	Direction
Within	N/A

See Section 4 for further information.

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 31 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.

Mine gas

None recorded within 500 metres of the enquiry boundary.

Mine water treatment schemes

None recorded within 500 metres of the enquiry boundary.

Section 3 – Licensing and future mining activity

Future underground mining
None recorded.

Coal mining licensing
None recorded within 200 metres of the enquiry boundary.

Court orders
None recorded.

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

Withdrawal of support notices
The property is not in an area where a notice to withdraw support has been given.

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.

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.

Section 4 – Further information

The following potential risks have been identified and as part of your risk assessment should be investigated further.

Development advice

The site is within an area of historical coal mining activity. Should you require advice and/or support on understanding the mining legacy, its risks to your development or what next steps you need to take, please contact us.

Remediated sites

The site is within an area of previous interest. It is close to where the Coal Authority has investigated and where necessary remediated mine entries and/or shallow coal mine workings following specific reported hazards.

The site requires further investigation and may influence your risk assessment. We recommend that you order the Coal Authority **Surface Hazards Incident Report**, which will include more information about the hazard.

For further information on specific site or ground investigations in relation to any issues raised in Section 4, please call us on 0345 762 6848 or email us at groundstability@coal.gov.uk.

Section 5 – Data definitions

The datasets used in this report have limitations and assumptions within their results. For more guidance on the data and the results specific to the enquiry boundary, please **call us on 0345 762 6848** or **email us at groundstability@coal.gov.uk.**

Past underground coal mining

Details of all recorded underground mining relative to the enquiry boundary. Only past underground workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination, will be included.

Probable unrecorded shallow workings

Areas where the Coal Authority believes there to be unrecorded coal workings that exist at or close to the surface (less than 30 metres deep).

Spine roadways at shallow depth

Connecting roadways either, working to working, or, surface to working, both in-seam and cross measures that exist at or close to the surface (less than 30 metres deep), either within or within 10 metres of the enquiry boundary.

Mine entries

Details of any shaft or adit either within, or within 100 metres of the enquiry boundary including approximate location, brief treatment details where known, the mineral worked from the mine entry and conveyance details where the mine entry has previously been sold by the Authority or its predecessors British Coal or the National Coal Board.

Abandoned mine plan catalogue numbers

Plan numbers extracted from the abandoned mines catalogue containing details of coal and other mineral abandonment plans deposited via the Mines Inspectorate in accordance with the Coal Mines Regulation Act and Metalliferous Mines Regulation Act 1872. A maximum of 9 plan extents that intersect with the enquiry boundary will be included. This does not infer that the workings and/or mine entries shown on the abandonment plan will be relevant to the site/property boundary.

Outcrops

Details of seam outcrops will be included where the enquiry boundary intersects with a conjectured or actual seam outcrop location (derived by either the British Geological Survey or the Coal Authority) or intersects with a defined 50 metres buffer on the coal (dip) side of the outcrop. An indication of whether the Coal Authority believes the seam to be of sufficient thickness and/or quality to have been worked will also be included.

Geological faults, fissures and breaklines

Geological disturbances or fractures in the bedrock. Surface fault lines (British Geological Survey derived data) and fissures and breaklines (Coal Authority derived data) intersecting with the enquiry boundary will be included. In some circumstances faults, fissures or breaklines have been known to contribute to surface subsidence damage as a consequence of underground coal mining.

Opencast mines
Opencast coal sites from which coal has been removed in the past by opencast (surface) methods and where the enquiry boundary is within 500 metres of either the licence area, site boundary, excavation area (high wall) or coaling area.

Coal Authority managed tips
Locations of disused colliery tip sites owned and managed by the Coal Authority, located within 500 metres of the enquiry boundary.

Site investigations
Details of site investigations within 50 metres of the enquiry boundary where the Coal Authority has received information relating to coal mining risk investigation and/or remediation by third parties.

Remediated sites
Sites where the Coal Authority has undertaken remedial works either within or within 50 metres of the enquiry boundary following report of a hazard relating to coal mining under the Coal Authority's Emergency Surface Hazard Call Out procedures.

Coal mining subsidence
Details of alleged coal mining subsidence claims made since 31 October 1994 either within or within 50 metres of the enquiry boundary. Where the claim relates to the enquiry boundary confirmation of whether the claim was accepted, rejected or whether liability is still being determined will be given. Where the claim has been discharged, whether this was by repair, payment of compensation or a combination of both, the value of the claim, where known, will also be given.

Details of any current 'Stop Notice' deferring remedial works or repairs affecting the property/site, and if so the date of the notice.

Details of any request made to execute preventative works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991. If yes, whether any person withheld consent or failed to comply with any request to execute preventative works.

Mine gas
Reports of alleged mine gas emissions received by the Coal Authority, either within or within 500 metres of the enquiry boundary that subsequently required investigation and action by the Coal Authority to mitigate the effects of the mine gas emission.

Mine water treatment schemes
Locations where the Coal Authority has constructed or operates assets that remove pollutants from mine water prior to the treated mine water being discharged into the receiving water body.

These schemes are part of the UK's strategy to meet the requirements of the Water Framework Directive. Schemes fall into 2 basic categories: Remedial – mitigating the impact of existing pollution or Preventative – preventing a future pollution incident.

Mine water treatment schemes generally consist of one or more primary settlement lagoons and one or more reed beds for secondary treatment. A small number are more specialised process treatment plants.

Future underground mining
Details of all planned underground mining relative to the enquiry boundary. Only those future workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination will be included.

Coal mining licensing
Details of all licenses issued by the Coal Authority either within or within 200 metres of the enquiry boundary in relation to the under taking of surface coal mining, underground coal mining or underground coal gasification.

Court orders
Orders in respect of the working of coal under the Mines (Working Facilities and Support) Acts of 1923 and 1966 or any statutory modification or amendment thereof.

Section 46 notices
Notice of proposals relating to underground coal mining operations that have been given under section 46 of the Coal Mining Subsidence Act 1991.

Withdrawal of support notices
Published notices of entitlement to withdraw support and the date of the notice. Details of any revocation notice withdrawing the entitlement to withdraw support given under Section 41 of the Coal Industry Act 1994.

Payment to owners of former copyhold land
Relevant notices which may affect the property and any subsequent notice of retained interests in coal and coal mines, acceptance or rejection notices and whether any compensation has been paid to a claimant.

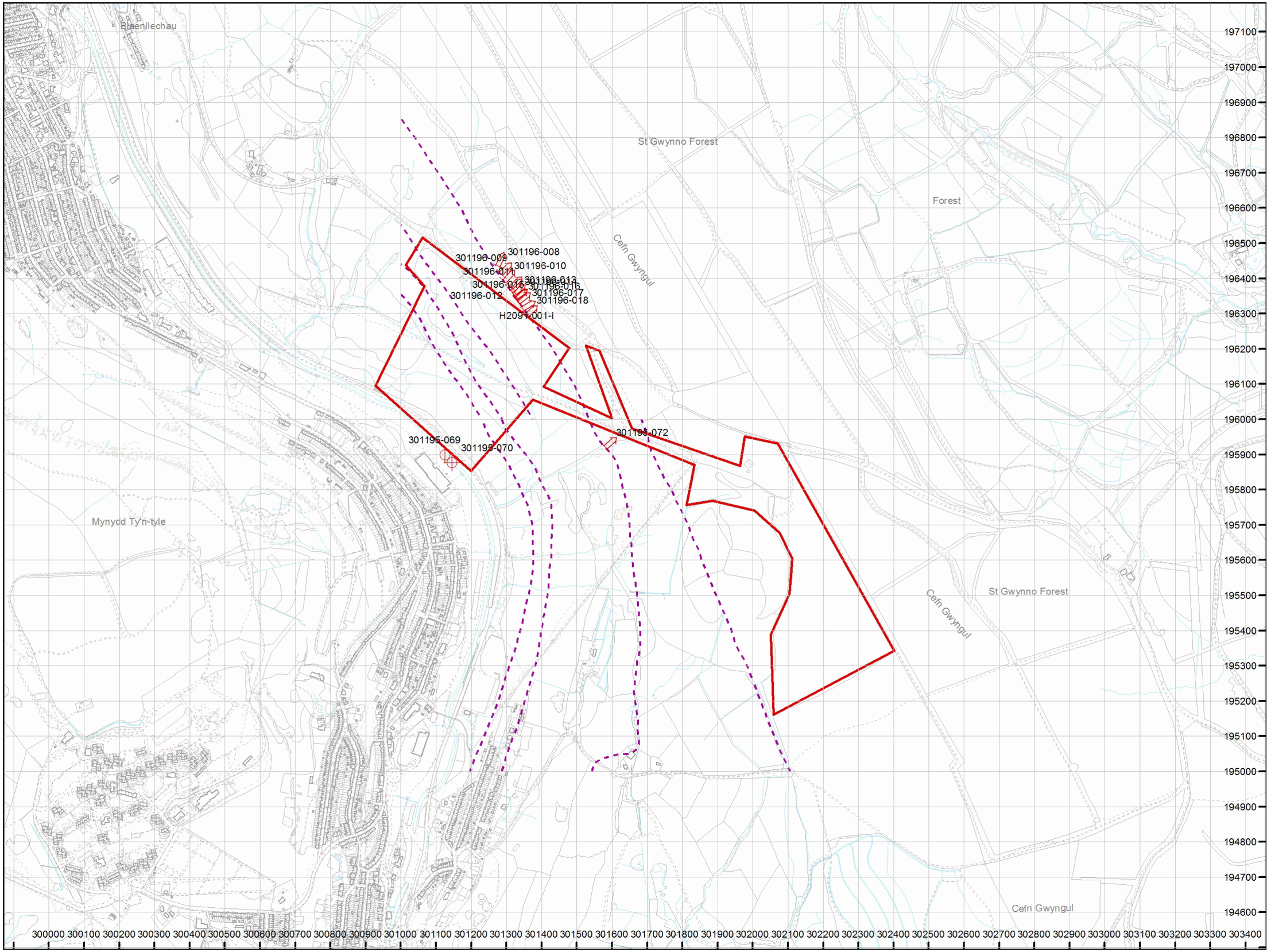
The Coal Authority

Summary of findings

The map highlights any specific surface or subsurface features within or near to the boundary of the site.

Key

- Approximate position of the enquiry boundary shown
- Disused mine shaft
- Disused adit
- Outcrop (Conjectured)
- Remediated sites



How to contact us
0345 762 6848 (UK)
+44 (0)1623 637 000 (International)
www.groundstability.com

REDSTART

APPENDIX F

COAL AUTHORITY SURFACE HAZARDS INCIDENT REPORT

WARDELL ARMSTRONG
MANAGEMENT OF HISTORIC LIABILITIES – SOUTHERN REGION
SURFACE HAZARD RECORD OF INVESTIGATION/TREATMENT

Hazard Ref: H2091	**Date Reported:**

Address/Location of Hazard

St Gwymnno Forest
Penrhys
Tylorstown

1/2500 O.S. Sheet No: SO0196 **N.G. Co-ords: E** 301370 **N** 196300

Description of Hazard

Unsecured Mine entrance (adit).

Hazard Type

Shaft		Adit	✓	Mine working		Gas		Mine Water		Heating		Other	

Coal Authority
Mining Records Ref. No. (Shaft/Adit) if applicable:

Description of Investigation Works

Coal Authority mining report No 050874 00 indicated numerous abandoned mine entries in the hazard vicinity along with coal outcrops and both recorded and potentially unrecorded mine workings. On the basis of the above information we consider the Coal Authority have a liability in this case.

Site Works:	Yes		No	✓	Started:	Completed:

Description of Treatment Works

The hazard was excavated locally at the surface and secured with a concrete block wall prior to surface restoration.

Site Works:	Yes	✓	No		Started: 19/06/00	Completed: 19/06/00

Coal Authority Liability	Accepted		Not Accepted	✓

Other Comments:

We have informed the stakeholder that we have advised the Coal Authority that on completion of the above remedial works any liability has been fully discharged.

	Copy to the Coal Authority:
SIGNED: **Project Manager**	Copy to Mining Reports:

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APPENDIX G
GROUND INVESTIGATION STRATEGY

Key

Borehole

Rev	Drwn	Chk'd	App'd	Description	Date
P01	LB	NG		First Issue.	03/11/2020

Purpose of Issue
S2 - Fit For Information

Classification
Commercial in Confidence

Client
Rhondda Cynon Taf
County Borough Council

Project
Tylorstown Landslip

Drawing
Proposed Exploratory Hole
Location Plan
Phase 4
Landslip Remidiation

Scale @ A3	Drawn	Checked	Approved
1:2,000	LB	NG	

Project No.	Date
CS099676	Nov 2020

Drawing Identifier — BS1192 Compliant
Project - Originator - Zone - Level - File Type - Role - Number — rev
GC3613-RED-75-XX-DR-C-0071 — P01

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Print Date:04/11/2020 12:01:31

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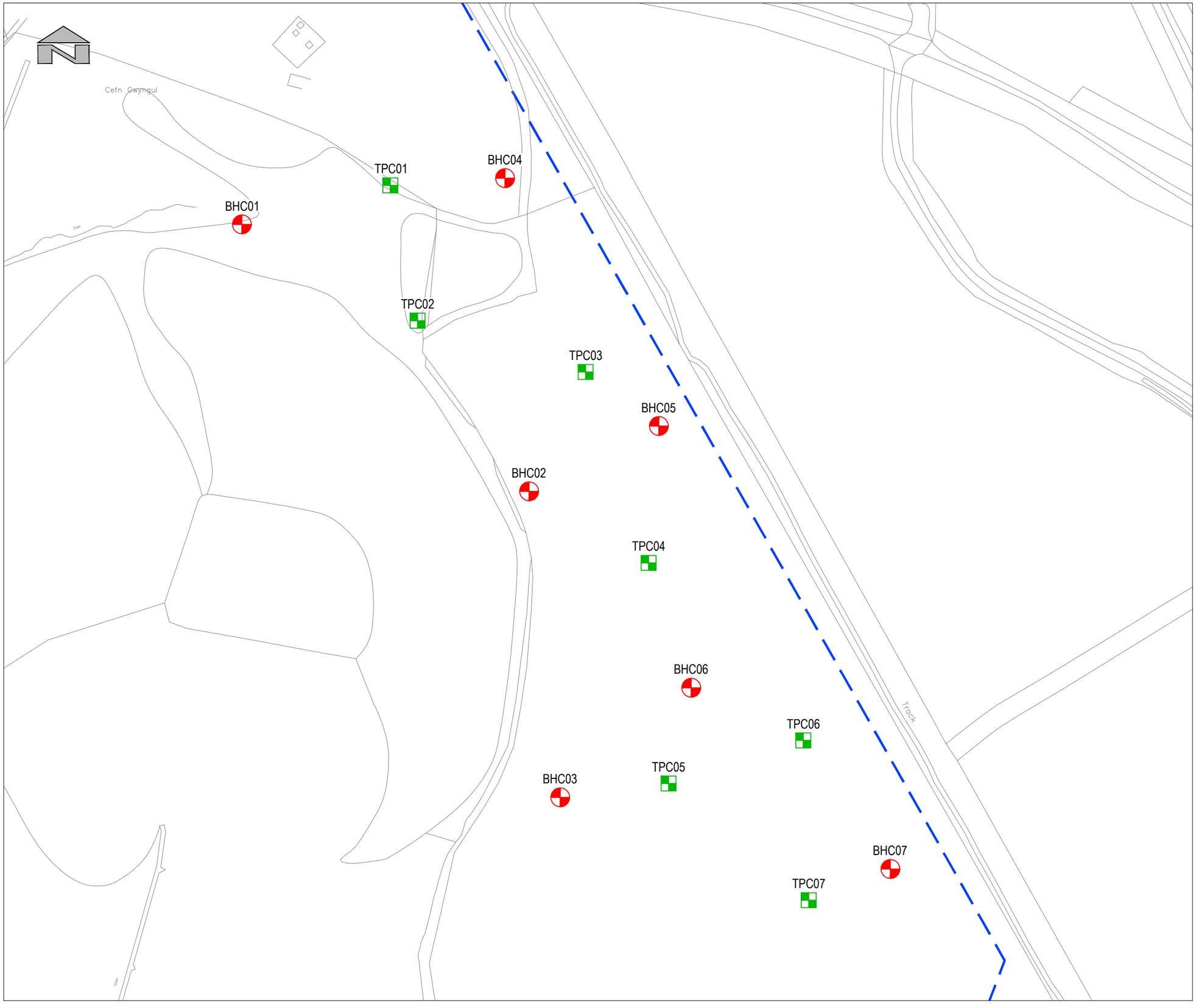

Key

- Borehole
- Trial Pit
- Western Power Distribution

Rev	Drwn	Chk'd	App'd	Description	Date
P01	LB	NG		First Issue.	03/11/2020

Purpose of Issue
S2 - Fit For Information

Classification
Commercial in Confidence

Client
Rhondda Cynon Taf
County Borough Council

Project
Tylorstown Landslip

Drawing
Proposed Exploratory Hole
Location Plan
Phase 4
Receptor Site C

Scale @ A3	Drawn	Checked	Approved
1:2,000	LB	NG	

Project No.	Date
CS099676	Nov 2020

Drawing Identifier — BS1192 Compliant
Project - Originator - Zone - Level - File Type - Role - Number — rev
GC3613-RED-75-XX-DR-C-0070 — P01

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Print Date:04/11/2020 11:59:12

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Appendix 10.3

Ground Investigation (GI) Scope

Technical Note

Doc ref CS100303/GT/002 Rev A

17 February 2021 (first issue 4 November 2020)

To	Jacqueline Mynott - Infrastructure Asset Manager RCT
CC	Neil Griffiths-Capita, Phillip Hardwick-Capita
Subject	Tylorstown Emergency Works Phase 4, Site Investigation Rationale and Proposed Scoping

Introduction and Background

This technical note provides the design rational for a two phased ground investigation at the Phase 4 section of the Tylorstown Emergency Works. The site area is 310 Ha and comprises the hillside and hill crest zone above Tylorstown, Rhondda Cynon Taff, though only about half this area is subject to proposed civil engineering works. The first edition of this scoping note was issued in November 2020, but the design has since progressed and this edition of the note (ie Rev A) now takes into consideration the results of compaction testing and earthwork material suitability testing of material planned to be used as construction fill.

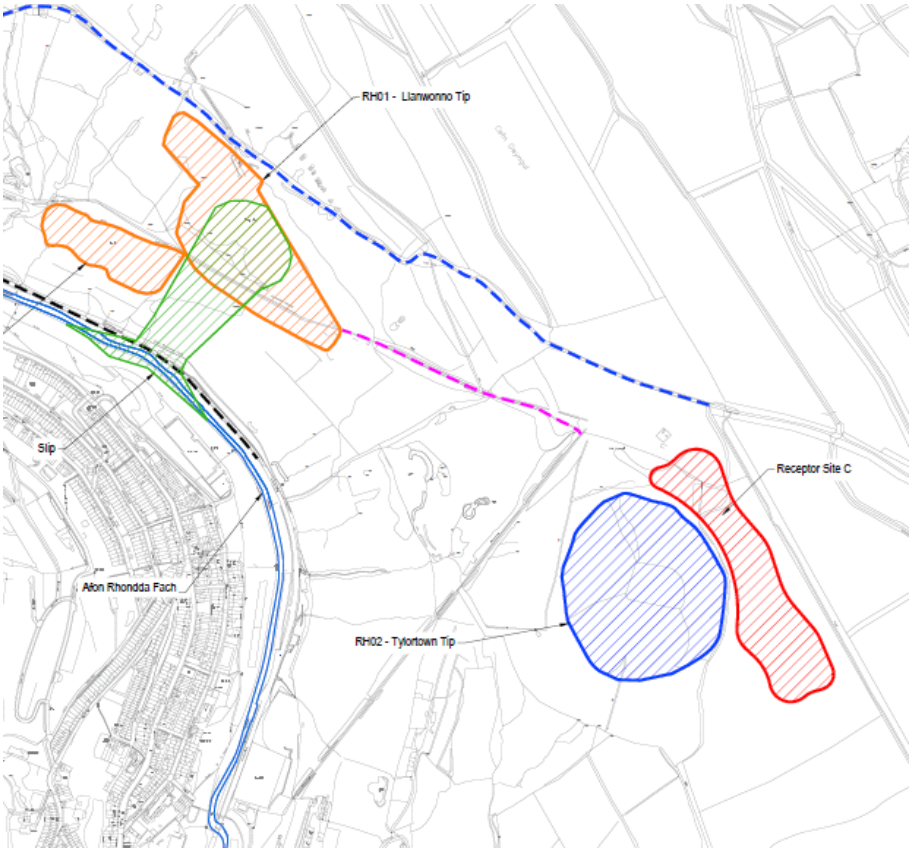
On Sunday 16th February 2020, Storm Dennis flood surge instigated the failure of Llanwonno Upper Tip (RH01) above the village of Tylorstown and this led to approximately 60,000 m3 of slipped debris filling the valley bottom including the river channel of the Afon Rhondda Fach. This caused the river to divert in its course moving across to the western side of the valley bottom and scouring underneath the local leisure centre.

It is estimated that approximately 150,000 m^3 of debris with potential to further slip in the long term needs to be taken off the remnant slipped feature and taken across the valley to a site where it can be safely deposited on level ground and to form a feature which will enhance the local amenity landscape. A separate exercise is underway for dealing with 60,000m^3 of slipped material lying close to the Afon Rhondda Fach. A receptor site (allocated the designation RS-C) has been selected for the 150,000 m^3 of relocated material and this lies to the east of the current position of Tylorstown Tip (known locally as Old Smokey).

The key areas are shown on the plan below and the dotted pink line represents the proposed haul road that will be used for material transfer and this utilises the route of a former mineral tramway.

Property and infrastructure

St David's House, Pascal Close, St Mellons, Cardiff, CF3 0LW
Tel +44 (0) 29 2080 3500 Fax +44 (0) 29 2036 6199 www.capita.co.uk/property
Capita Property and Infrastructure Ltd



Plan showing key features of the Phase 4 Site

The Llanwonno Tip (including the Upper Tip) is located in a development high risk area as driven by the potential for mining ground risks likely due the outcropping of coal seams beneath the site, however the RS-C land parcel is in a low development risk area and the closest outcropping seam lies off site beneath Tylorstown Tip. A consultants mining report obtained for the Phase 4 site suggests that neither sub site (i.e. the RH01 or the RS-C are affected by shallow mining, with active mining being at great depth).

The Llanwonno Upper Tip has been subject to main phase ground investigations by Halcrow (1999 and 2004 plus earlier investigations by Tyssen dating back to 1993) and the ground sequence within the fill and natural ground is well documented. The combined exploratory hole campaign comprised thirteen boreholes and ten trial pits at the Llanwonno Upper Tip.

The RS-C has not been subjected to a formal ground investigation though two BGS borehole logs and viewing close by quarry exposures does give some degree on information on the expected geology underlying this sub area.

Capita has produced a PSSR report for the Site[1] and this collates all the background information and presents a model of geological conditions and a separate hydrogeological model.

Ground Conditions

The ground conditions beneath the tipped mining spoil of Llanwonno Upper Tip comprise a variable essentially granular layer of till (diamicton) which varies between absent and 7.9m thick with bedrock beneath.

[1] Capita Tylorstown Phase 4 Emergency Landslide Debris Removal Preliminary Sources Study Report CS100303/GT/001 p01 October 2020

The ground conditions beneath the RS-C site comprise what is thought to be a shallow burnt shale and possibly other types of Made Ground then thin (or perhaps absent) head deposits with bedrock beneath. The presence of till cannot entirely be ruled out.

In terms of bedrock then the Receptor Site and Tramway is underlain fully by the Brithdir Member of the Pennant Sandstone Formation. This is described by the BGS as having green-grey, lithic arenites with conglomerate lenses at bases of units; thin mudstone/siltstone and seatearth interbeds and mainly thin coals.

The Llanwonno Upper Tip is shown to be underlain by juxtaposed bands of Brithdir Member and Rhondda Member both belonging to the Pennant Sandstone Formation. The Rhondda Member is described as green-grey, lithic arenites with thin mudstone/siltstone and seatearth interbeds and also with mainly thin coals.

The material that requires taking off the Llanwonno slip mass, comprises virgin excavated colliery material forming a well graded mass of clayey silty sandy gravel with occasional cobbles there is a quantity of crushed coal mixed in the fines giving it a black colouration. Halcrow as part of their investigations, tested 17 samples for either 10:1 WAC leaching or 10:1 leaching and results are relatively consistent and low. They also tested 24No samples for physical grading. All of these samples comply with DMRB Class 1B or 2C general fill material specification.

Rationale for Scope of Site Investigation Design and Content

It is the intention that site investigations at RS-C and those taken from a trial pitting traverse across Llanwonno Upper Tip will be instigated and reported prior to submission of the planning application for the scheme and the results will be available for inclusion in the Environmental Statement for the project.

LLanwonno Upper Tip

Rationale

To implement an initial phase of ten hand pits (0.5m deep referenced A to J), taken as a traverse across the width of the slip and at a chainage which reflects where material is to be taken off the slip feature. The timing for this was January 2021 and the following tests have been completed and received in draft format (awaiting final reporting):

- Ten total contaminated land suites;
- Ten leachate suites (on same samples totals were taken on);
- Ten compactions (2.5 kg rammer method);
- Ten moisture contents and wet sieve tests;
- To view and take pictures of where there are ‘issues’ at the downhill end of the slip mass to check for signs of any internal erosion and to repeat the exercise a few months apart to monitor the situation.

To implement a second phase of boreholes to be undertaken post planning submission, at a time when all or most of the material has been removed to stabilise the land mass. The purpose being to check that groundwater levels (which have been assessed using the Halcrow monitoring data) remain stable (within the seasonal variation), particularly in the vicinity of springs and streams and former ponding area, and do not change significantly within the re-landscaped area. A dramatic increase is highly unlikely as the phreatic surface which presents itself in the remnant and lowered slip mass is almost certainly going to be less elevated than the pre-slip and taller landform which Halcrow investigated. Monitoring wells should be placed up slope of the re-landscaped area and within the re-landscaped area adjacent to streams and former ponds. Monitoring wells should mostly be multi-level piezometers with a top section screened in the top-most

sandstone/till aquifer unit for that location and also employ a deeper installation placed in strata lying a little deeper than the first argillaceous layer. The two uphill wells can be single installations with a response zone in the top most sandstone/till. These boreholes cannot be drilled earlier in the programme as the tip needs to be made safe for traversing with drilling rigs.

Details

The ten trial pits are shown on the sketch below and as mentioned above these were completed in January 2021. Currently a detailed survey plan is not available but one will be included in the ground investigation design note which will feed into planning documentation.

Plan showing fill sampling trial pits taken as a traverse across the slide

7 rotary open holed boreholes with dual piezometric installations to be placed with two uphill of the re-landscaped area and five within the re-landscaped area. The two uphill holes to be provided with a single installation in the till/upper sandstone layer. Target depths will vary between 15m uphill to 17m downslope and 22m in the central area. Groundwater levels would ideally be monitored over 6 months , during the latter stages of the stability enhancing earthworks employing a once a month frequency (during winter), and if a particularly heavy period of rainfall occurs then the monitoring schedule changed to bring the next monitoring round forward. Two visits to check down slope face at seepage points are also necessary. Refer Drawing GC3613-RED-75-XX-DR-C-0071 for provisional location of boreholes.

All 7 rotary boreholes would commence with push tube sampling or similar arrangement to retrieve plastic sleeves of the till deposits and capture the made ground/till contact (i.e. utilised between ground surface and rockhead).

RS-C area

Rationale

Seven boreholes drilled to check the depth to competent strata and also to check the depth to coal seams or at least that its greater than 18m (crown hole migration protection thickness) in the foot slope zone to Old Smokey and derive existing groundwater levels before emplacement of material. An additional requirement is to leave monitoring wells in place to facilitate construction checks-with these triangulating across the site. Thereby after emplacement, levels can be gauged to ensure that there is no significant increase in groundwater levels resulting from the emplacement. The majority of monitoring wells should be screened in the top-most sandstone for that location with a selected four wells installed with a multi-level piezometer where the deeper installation should be below the first argillaceous layer.

In the event that the spring to the north of Old Smokey runs wet in wet weather then a surface water sample shall be collected and tested for water quality in addition to groundwater in the sandstone from 2 selected wells. Two collection sampling events for surface water and groundwater are proposed to establish the baseline. Contaminated land sampling shall be on an approximate 100m x 100m square grid for the disturbance footprint.

Details

1 rotary cored borehole to provisional 20m depth to view rock weathering and determine precise thickness of any coal seams. 3 rotary open holed boreholes to provisional 20m depths (or 18m into rock –whichever is the greater) to establish competent rock thickness and check for coal seams and allow dual monitoring installations. A further 3 rotary open holed boreholes to 8m depths or 1.5m below the water table, whichever is the deeper, with one to be provided with a shallow depth piezometer. The layout of the dual installations shall be 3No placed along toe of Old Smokey and the forth to the far east of the RS-C area –thought to be an up-gradient groundwater flow location. All 5 monitoring wells to be in position prior to placement of material, with at least two rounds of water level monitoring before placement (only 4 of these being located outside the fill footprint would be employed in the construction phase monitoring. All 7 rotary holes would commence with push tube sampling or similar arrangement to collect open tube samplers in cohesive materials (i.e. utilised between ground surface and rock head).

Taking samples of Made Ground and top of natural ground samples for contaminated land testing in the seven boreholes an additional 7No machine trial pits. The machine pits will aid in the delineation of rock head. Refer Drawing GC3613-RED-75-XX-DR-C-0070 for proposed exploratory hole layout.

<u>Considerations for future construction phase testing and sampling</u>

As part of good practice, a watching brief will be implemented to identify any high coal containing pockets (provisionally material with calorific value above 10 MJ/kg) and this can be placed as an activity within the Materials Management Plan for the scheme. Testing would be triggered by visually pointing out any large pocket with say 25-30% or more coal by volume and then separating this material for CV testing.

The chemical content of the spoil for leaching can also be checked as part of the MMP operation. It would be prudent to test another 10 or 20 samples taken from the higher sections of the remnant slip for construction quality control.

Closure

We trust that this technical note provides a clear explanation on our rationale behind the design of the ground investigation at Phase 4 and sets out the broad timing of these works. The note also documents how the team carried out earthworks materials classification laboratory tests on the Llanwonno upper tip during January 2021 and we can confirm that frictional properties of the compacted landform will meet prior expectations the design team applied when designing the side batters of the RS-C landform.

Neil Greenwood
Technical Director for Capita REI

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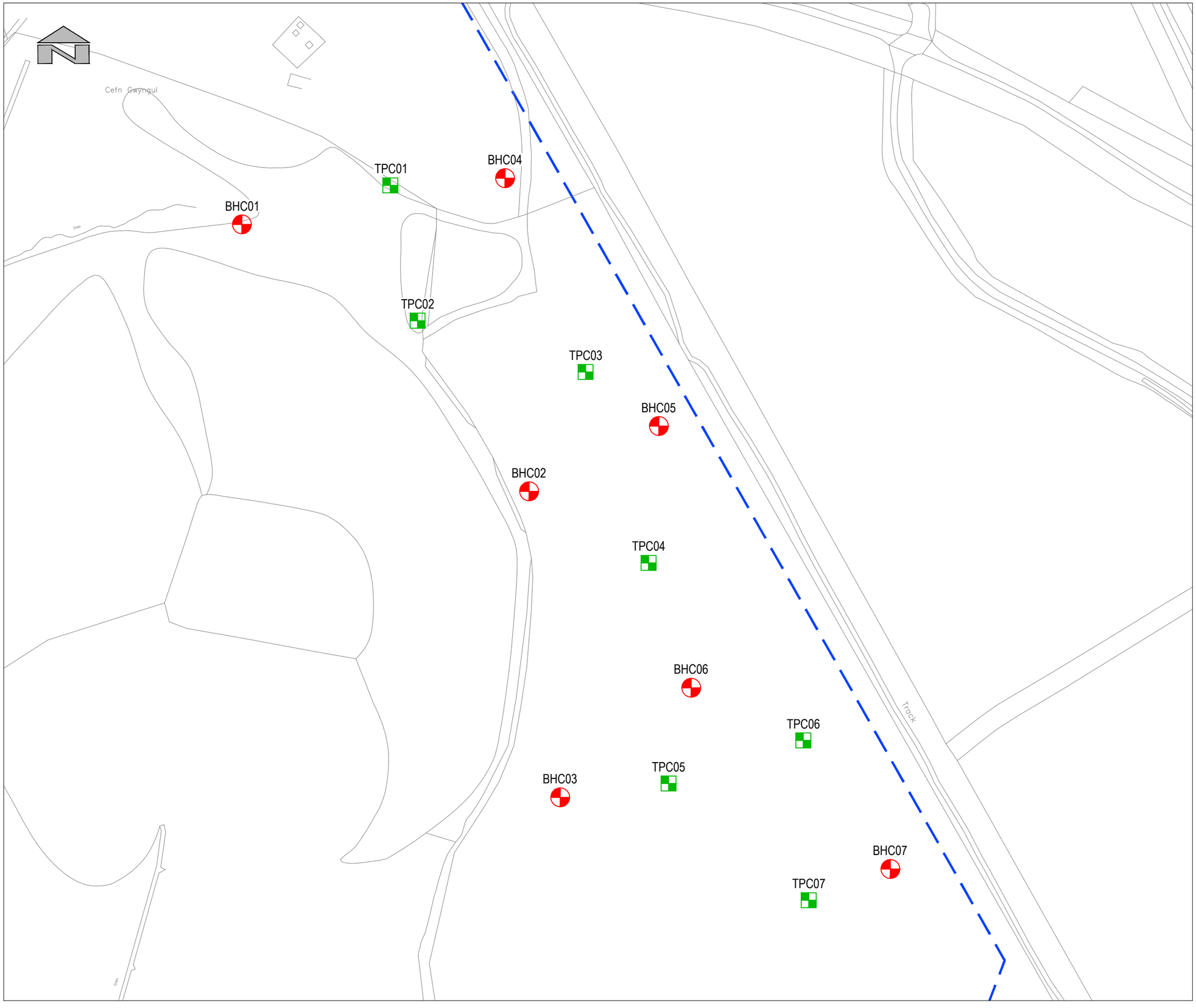
Principal Engineer for Capita REI

Mobile 07785 307108

Enc: drawings GC3613-RED-75-XX-DR-C-0070 and 0071



Key

- Borehole
- Trial Pit
- Western Power Distribution

Rev	Drwn	Chk'd	App'd	Description	Date
P01	LB	NG		First Issue.	03/11/2020

Purpose of Issue
S2 - Fit For Information

Classification
Commercial in Confidence

Client
Rhondda Cynon Taf
County Borough Council

Project
Tylorstown Landslip

Drawing
Proposed Exploratory Hole
Location Plan
Phase 4
Receptor Site C

Scale @ A3	Drawn	Checked	Approved
1:2,000	LB	NG	

Project No.	Date
CS099676	Nov 2020

Drawing Identifier — BS1192 Compliant
Project - Originator - Zone - Level - File Type - Role - Number — rev
GC3613-RED-75-XX-DR-C-0070 — P01

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Key

Borehole

Rev	Drwn	Chk'd	App'd	Description	Date
P01	LB	NG		First Issue.	03/11/2020

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Client
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Project
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Drawing
Proposed Exploratory Hole
Location Plan
Phase 4
Landslip Remidiation

Scale @ A3	Drawn	Checked	Approved
1:2,000	LB	NG	

Project No.	Date
CS099676	Nov 2020

Drawing Identifier — BS1192 Compliant
Project - Originator - Zone - Level - File Type - Role - Number — rev
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REDSTART

Appendix 10.4

Ground Investigation Report

REDSTART

Tylorstown Landslip: Phase 4

Ground Investigation Report

June 2021

Project No: CS/100303 Doc Ref: GC3616-RED-0074-RSC-RP-L-0001 Rev: P01

Rhondda Cynon Taf County Borough Council

June 2021

Tylorstown Landslip: Phase 4

Ground Investigation Report

	NAME	SIGNATURE	DATE
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CHECKER	Neil Greenwood		6/24/2021
APPROVER	Alan Rosier		6/24/2021

ISSUE RECORD

REV	DATE	DESCRIPTION/COMMENTS	AUTHOR/PREPARED BY:	APPROVED FOR ISSUE BY:
P01	6/24/2021	First Issue	S Fellows	A Rosier

General Disclaimer

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Contents

Drawings

Appendices

1. Introduction

1.1 Scope and Objectives of the Report

This Ground Investigation Report (GIR) has been prepared as a combined Phase II geo-environmental report with a detailed geotechnical interpretation section in accordance with the requirements of Land Contamination Risk Management (LCRM) and CD 622 (Managing Geotechnical Risk) of the Welsh Government's Design Manual for Roads and Bridges. The investigation is required to assess ground conditions at the site of a spoil relocation mound and specific parts of the existing coal tip (Llanwonno Upper Tip) from which it is sourced.

This report summarises the findings of previous studies and ground investigations with the following objectives:

- Summarise the pertinent information identified in the desk study relevant to the proposed works;
- Provide a summary of the ground investigation works undertaken and evaluate the quality of the data obtained from the investigation(s);
- Describe the ground conditions that will be encountered during the scheme;
- Provide a summary of material properties of each stratum that will be encountered during the construction of the scheme;
- Provide appropriate information to facilitate the choice of ground model and geotechnical design parameters required for the proposed works; and
- Identify relevant geo-environmental and geotechnical risks and recommend suitable mitigation measures.

This report includes a Geotechnical Risk Register associated with ground risks on cost and programme, and risk to health and safety of contractors and the general public.

1.2 Description of Project

On Sunday 16th February 2020, Storm Dennis caused a flood surge which instigated the failure of Llanwonno Upper Tip (RH01) above the village of Tylorstown, in the county of Rhondda Cynon Taf (RCT).

Due to approximately 60,000 m^3 of slipped debris filling the valley bottom from the toe of slope outwards in an extremely low angled and widely distributed debris envelope, the river channel was filled, and its course diverted to the western side of the valley bottom. Emergency Works have recently been completed (June 2021) to remove the slipped material (this is Phases 2 & 3 of the works).

This report assesses Phase 4 of the landslide repair work, making safe Llanwonno Upper Tip (RH01). Redstart have been commissioned to provide this Ground Investigation Report on a proposed haul road and potential receptor site around the eastern side of Tylorstown Tip (RH02), which will permit the landslide debris to be removed, stockpiled, treated and land formed. Refer Drawing GC3613-RED-61-RSC-DR-C-0002 and -0003 for locations of these land features.

Drawing No. GC3613-RED-61-RSC-DR-C-0001: Phase 4 Location Plan provides a redline boundary for the Phase 4 area, which amounts to 310 Ha of hillside and near hilltop land.

1.3 Geotechnical Category

Guidance in CD 622 (Managing Geotechnical Risk) requires that all geotechnical work should be assigned a category in accordance with BS EN 1997 Eurocode 7. Based on the appraisal of the scheme following the latest review of data available and assessment of the risks involved, it is considered that the scheme should be categorised as follows:

Geotechnical CATEGORY 2: For the scheme as a whole

Within BS EN 1997 Eurocode 7, Geotechnical CATEGORY 2 is defined as:
'Geotechnical Category 2 should include conventional types of structure and foundation with no exceptional risk or difficult or loading conditions

Designs for structures in Geotechnical Category 2 should normally include quantitative geotechnical data and analysis to ensure that the fundamental requirements are satisfied. Routine procedures for field and laboratory testing and for design and execution may be used for Geotechnical Category 2 designs.

NOTE The following are examples of conventional structures or parts of structures complying with Geotechnical Category 2:

- *spread foundations;*
- *raft foundations;*
- *pile foundations;*
- *walls and other structures retaining or supporting soil or water;*
- *excavations;*
- *bridge piers and abutments;*
- *embankments and earthworks;*
- *ground anchors and other tie-back systems;*
- *tunnels in hard, non-fractured rock and not subjected to special water tightness or other requirements.*

1.4 Other Relevant Information

The following sources of information have been used in the preparation of this report, and it is assumed that they are to be read in conjunction with this report.

Table 1.1 – Sources of Information

Item	Title	Document Reference	Document Date	Originator	Comments
1	Tylorstown Phase 4 Llanwonno Upper Tip Remediation Preliminary Sources Study Report (PSSR)	GC3613-RED-75-XX-RP-L-0001	April 2021	Redstart	Desk study based on available existing information.
2	Ground Investigation Factual Report	Q03463/FR	April 2021	Quantum Geotech	Report on ground investigation undertaken for scheme.
3	Llanwonno Tips Reclamation Scheme. Stability Report	KJ/LWTR/R2	January 2004	Halcrow Group Limited	Review of previous work by Halcrow and request for alternative reclamation options.
4	Tylorstown Landslip – Factual Report on Upper Tip Soils	12651/JJ	February 2021	Integral Geotechnique	Soil sampling report at Llanwonno Upper tip.

2. Existing Information

Relevant information is summarised here from the information sources noted in Section 1.4. Further details can also be found within the Preliminary Sources Study Report (PSSR), which is assumed to be read in conjunction with this report.

2.1 Site Location

The nearest village in the valley bottom is Tylorstown, with Ferndale lying a little way to its north. The only vehicle access to the tip and the receptor site is via Llanwonno Road, which links to the valley bottom in the village of Blaenllechau, to the north.

The Llanwonno Tips comprise two areas in which colliery spoil was deposited from the former Ferndale Colliery tramway. Llanwonno Upper Tip is the higher of the two adjacent tips and was the source of the 2020 landslip. The Llanwonno Lower Tip site is located on the lower valley slopes, immediately north-west of the Upper Tip and separated from it by the former tramway. The Upper Tip is to be reprofiled during the Phase 4 works, and is centred at NGR (ST) 301250, 196200.

The most immediately obvious colliery spoil tip in the area is Tylorstown Tip, also known as 'Old Smokey'. It's top forms a large conical feature rising over 30 m above the surrounding land and is situated at the valley crest. It lies uphill, approx. 700 m south-east, of the lower lying Llanwonno Tips.

It is the easterly edge of the Upper Tip which has been subject to ground investigation reported herein as well as the land immediately to the east of 'Old Smokey'. The latter area is centred at NGR (ST) 302150, 195660. The two sites are linked by a former mine tramway.

2.2 Site Description and Topography

Topography and Geomorphology

The Rhondda Fach is a steeply incised valley within the large upland plateau of the South Wales Coalfield. The eastern valley side is stepped due to the alternating geology of hard sandstone, forming the steeper slopes, and weak mudstones, forming broad lower angled steps, known locally as 'slacks'.

Quarries are present at the level of Llanwonno Upper Tip, both up and down valley, and it is likely that a buried quarry lies beneath the southern end of Llanwonno Upper Tip.

Spring lines and boggy ground are present along the slacks, this is due to groundwater in the fractured sandstones being prevented from percolating downwards by the impermeable mudstones and coal seatearths. During and immediately after periods of high/prolonged precipitation the spring lines discharge strongly but dry up during periods of drier weather.

Substantial deep mining across the area has led to past subsidence and mining related fissures, which may have altered natural groundwater flows in the area. Coal crop workings and adits are present on the hillside and potentially beneath the tips, which issue water during periods of high precipitation.

Receptor Site C (RS-C)

Receptor Site C (RS-C) lies to the east/north-east of Tylorstown Tip (Old Smokey) and south/south-east of Llanwonno Road (vehicular access point to RS-C). The eastern edge of RS-C is bounded by conifer plantations, owned by Natural Resources Wales (NRW). WPD recently erected a new 33 kV overhead line diversion (October 2020) immediately to the south of RS-C, which meets the NRW plantation and follows its external boundary northwards, in underground cabling, to meet the access point of Llanwonno Road in the northern corner of RS-C.

The ground levels are relatively flat over RS-C with a gentle fall from the north-west to the south-east behind Old Smokey. South-east of Old Smokey the ground levels become more naturally undulating. Old Smokey is perched on the crest of the plateau and deposited mostly upon the steep valley side below, so ground levels on the south-western edge of RS-C fall rapidly in that direction.

Immediately to the rear of Old Smokey (east) is a large area of bare ground, comprising a surface of burnt colliery shale, and east of this is a shallow depression or man-made ephemeral pond, which lies in the centre of RS-C.

Draining the bare ground area is an informal eroded channel running to the north-west and discharging into a formal drain which runs from the former tramway in the north down the northern side of Old Smokey. A wide and shallow concrete drain is present on the southern edge of Old Smokey.

The area is generally well drained and no standing water or running water was present over several site visits in dry weather. There is a dry runnel located 30m to the north west of the RS-C site which is marked as an ‘issues’ label on OS plans.

The general extent of the site area is as presented in Figure 2.1 below:

Figure 2.1 *Site location map for area under investigation. Not to scale.*

Tramway / Haul Road

Photographic Plates 1 to 5, in Appendix E illustrate the location of features and landforms described below as taken from the 3D aerial photogrammetry model.

The former Ferndale Colliery tramway is constructed transversely across the valley side, rising from northwest to southeast. Within the Phase 4 area, the tramway embankment has been constructed using colliery spoil.

Although the tramway has been destroyed in the landslip area, it remains at the toe of the southern section of Llanwonno Upper Tip. Where the tip meets the tramway, there has been some relatively recent repair work to the toe of the tip, and a masonry wall is present.

At the very southern end of Llanwonno Tip is a tramway turning circle. A culvert is present immediately south of this, passing beneath the tramway. This culvert discharges water flowing from the small valley formed between the natural hillside and crest of the tip into an unlined drain. The culvert has been reformed recently as part of the Phase 1 remediation works so that a series of 6-inch plastic water pipes pass through it.

The tramway rises a further 700 m before reaching Receptor Site C. Over this distance it cuts across slacks and steepenings, consequently, varying thicknesses of fill have been placed to maintain its alignment.

At a point 300 m beyond Llanwonno Upper Tip, the tramway intersects the lower edge of a slack. At this point, the tramway meets a narrow track, leading northwards, up towards Llanwonno Road. Within the slack, the local area uphill is boggy and forms a small drainage basin, which discharges at the intersection of the track and tramway. The water at this intersection has in the past flowed down the tramway and results in deep erosive gullies which have required both historic and recent repairs. Currently two pipes forming culverts are present at this point. The northern culvert is a recently installed plastic pipe, at the junction of the track and tramway. The southern culvert is an old steel pipe, which lies a short distance (approx. 10 m) uphill and diverts another small stream beneath the tramway. The northern culvert discharges to the hillside below in the historical stream course, below the tramway this stream flows over a depression, shown on historical maps and The Coal Authority (CA) plan to be the location of a former coal mining adit. Immediately east of the northern culvert is a brick chamber; this chamber is the source of a water supply for the nearby farm and a small diameter blue plastic water pipe is buried within the tramway.

A further 100 m past the track/tramway intersection, the tramway rises to the crest of the hill and onto a plateau area and is constructed upon a small colliery spoil tip with a flat berm extending outwards into the valley. Beyond this, the tramway becomes indistinct due to the lower relief of the plateau.

Llanwonno Upper Tip

Llanwonno Upper Tip is a linear tram tip, which is oversteepened and poorly vegetated. There was a line of ponds in the centre of the tip, which was lost within the recent landslide.

The tip has been placed across a concave area of the hillside formed by the intersection of a steep section and a slack below.

The northern end of the tip is volumetrically smaller than the central and southern parts and is at a slightly higher level. Llanwonno Road is at the same level as the northern end of the tip but rises to the south beyond this point. The crest of the tip falls to the south.

It is suggested within the Halcrow report that an ancient landslide is present within the natural hillside beneath the northern end of Llanwonno Upper Tip, hummocky ground between the Upper and Lower Tips support this landslide concept.

Within the mid-slope area of the northern part of Llanwonno Upper Tip is a tension crack. There are multiple tension cracks in the southern section of the tip, radiating from the landslide back scar as shown in Figure 2.2 below.

Figure 2.2 *Photograph showing back scar with a high slope of glacial till exposed in lower third of scar face*

Within the central portion of the tip, the recent landslide has left a bowl-shaped depression with a steep back scar. In the upper half of the back scar, a wedge of colliery spoil remains (the crest of the tip), whereas in the lower half of the back scar, natural ground (a stiff orange till) is visible. In front of the back scar is a back-tiled block, traversed by a multitude of transverse cracks. In front of the landslide block, the surface is scoured to natural ground with ribbons of colliery spoil remaining from the downhill flow slide.

There are several water courses and issues above the tip that have been captured by temporary drainage measures, installed during Phase 1 of the remediation works, which immediately followed the landslide event. These drainage measures form a series of 6-inch plastic pipes that collect water from culverts at Llanwonno Road, pipe them along the valley feature on the uphill

side of the tip and subsequently discharge at the southern end of the tip, where it meets the former tramway.

The base of the tip lies on a slack, which has water issues along its entire length and inevitably beneath the tip itself. Since the landslide has occurred, water issues have formed deep erosive gullies down to the valley bottom. It is considered that prior to the slip a longitudinal drain beneath the tramway captured these issues and took the water away to the north and then down to the valley bottom via a channel that is still partially present, immediately south of Llanwonno Lower Tip. In early 2021, this drain was temporarily reinstated with concrete canvas channels (referred to as the Mid Slope Drainage Works) to protect the reinstated valley bottom from wash outs.

Beneath the south-east part of the tip and tramway, excavations into the ground forming the slack were undertaken to install the mid slope drainage. This area was found to be composed of soft clay Head deposits which were in a very wet condition due to the spring line at this elevation.

Further still downhill of the tramway, the landslide has damaged a section of Western Power Distribution (WPD) 33 kV overhead line. This line was removed towards the end of 2020 and diverted to the south of 'Old Smokey' and cabled below ground along the north eastern edge of the NRW plantation boundary, east of the RS-C landform.

2.3 Geological Maps and Memoirs

Geology

The underlying geology has been identified from geology maps and historical British Geological Survey (BGS) borehole logs where available. The descriptions of the anticipated strata are taken from the BGS Lexicon. The geological sequences identified within the study area are listed in Table 2.1 (overleaf).

Table 2.1 – Published Geology

Geological Unit	Description
Made Ground	Made Ground not recorded in geological mapping; however, large quantities of colliery spoil are known to be onsite within the Llanwonno Upper Tip, tramway corridor, and surrounding areas. Exposed ground at RS-C includes significant volumes of burnt shale.
Superficial (Drift) Geology	Geological mapping shows the site to be largely devoid of superficial deposits. A band of glacio-fluvial deposits are predicted in the site, at the valley base. It has been described by the BGS as "sand and gravel, locally with lenses of silt, clay, or organic material". Lying to the north of this band is an area of till which is predicted to overlap a very small area of the site. Typically, it is a heterogeneous mixture of clay, sand, gravel, and boulders varying widely in size and shape (diamicton). In addition, previous site investigations (Halcrow) within the area of Tylorstown Tip have recorded Head deposits.
Solid (Bedrock) Geology	RS-C is underlain fully by the Brithdir Member of the Pennant Sandstone Formation. This is described by the BGS as a "green-grey, lithic arenites with conglomerate lenses at bases of units; thin mudstone/siltstone and seatearth interbeds and mainly thin coals". The tramway and Llanwonno Upper Tip are shown to be underlain by juxtaposed bands of Brithdir Member and Rhondda Member, both belonging to the Pennant Sandstone Formation. The Rhondda Member has been described by the BGS as "green-grey, lithic arenites with thin mudstone/siltstone and seatearth interbeds and mainly thin coals". The Coal Authority reports[1] 8no. coal seams which outcrop at the site, while a number of further seams are present underlying the site which do not outcrop. Coal mining records are discussed further in Section 2.5.

Hydrology

The study area is located adjacent to the Afon Rhondda Fach, which is 30m south of the site at its nearest point. This river received a chemical rating of good, an ecological rating of poor, and an overall rating of poor from the Water Framework Directive in 2016 monitoring. A network of small drains run from the top of the hill to the valley base, with approx. 8no. crossing at least part of the site.

The study site is located within a Flood Zone 1. A Flood Zone 2 is located further south, with Flood Zone 3 closer to the Afon Rhondda Fach. The risk from groundwater flooding is categorised as negligible, excluding the small strip of glacio-fluvial deposits that overlap the site which has been categorised as moderate.

[1] The Coal Authority (2020). *Consultants Coal Mining Report*, Ref: 71006970622001

Hydrogeology

The Pennant Sandstone Formation forms the most extensive shallow aquifer within the County of Rhondda Cynon Taf, and is classified by NRW as a Secondary A aquifer.

Due to the complex hydrogeological conditions at the site it is strongly recommended that section '5. Hydrogeology' of the Redstart PSSR is read in conjunction with this report. The summary of on-site hydrogeological conditions below has been excerpted from the Redstart PSSR (2020):

Table 2.2 – Hydrogeological Conditions

Site Hydrogeology
Site-specific data was only available for the Llanwonno Upper Tip area of the Phase 4 works; this has been reviewed below. No information for Receptor Site C was available at the time of writing and therefore hydrogeological conditions have been inferred. Data from the Halcrow (2004) stability report cross sections support the regional view that in places there are separate aquifer units within the sandstone layers. Whilst it has not been possible within the remit of this PSSR report to view and assess individual borehole strikes or the Halcrow groundwater monitoring dataset, Sections LWT R2 2 and LWT R2 3 with LWT1 and LWT6 indicate two separate aquifers in an upper and lower sandstone unit, with very different groundwater levels obtained within the spoil/superficial deposits and the sandstone layers. The relevant argillaceous layers at Llanwonno Upper Tip, from the surface downwards, are the Brithdir Rider, Brithdir, 1st Rhondda Rider and 1st Rhondda. Were the argillaceous material and sandstones not covered by superficial deposits and colliery spoil, then very distinct, separate unconfined aquifers would be present near the surface in each sandstone layer, with streams emerging where the groundwater met the surface near the boundary with the coal/mudstones. The presence of the superficial deposits and colliery spoil makes this simplistic model less likely, however there are distinct spring line across the slacks which appear to generally coincide with argillaceous layers. The sandstones layers above and immediately below the Brithdir are also unconfined and appear to be separate. Vertical groundwater gradients appear to be downwards in all locations where two strikes or groundwater levels have been monitored. Vertical groundwater gradients may reverse to be upwards near the base of the valley where the river may receive groundwater as part of its base flow. The presence of the adits at the boundary of the Brithdir coal seam is likely to be linked to draining the sandstone immediately above it in order to gain access to this coal seam from the surface (Robins and Davies, 2016). These adits are known to issue water during times of high rainfall, supporting this hypothesis of a drainage mechanism.

Note: Redstart take the location of the coal seams from the BGS mapping and this does not concur with labelling on cross sections in the Halcrow report which we consider are erroneous; all references listed in the table can be found in the Redstart PSSR.

The site is located outside any Groundwater Source Protection Zone (SPZ).

2.4 Aerial Photographs

A drone survey has recently been undertaken by Drone Evolution, on behalf of RCTCBC.

No historical aerial photographs were available for inclusion as part of this GIR.

Historical land uses have, however, been discussed in detail within the Redstart PSSR (2021).

2.5 Records of Mines and Mineral Deposits

Coal Mining

The study area falls within "an area which may have been affected by coal mining activity". Therefore, a site-specific Consultants Coal Mining Report[2] was obtained. A review of the Coal Authority website and consultants report obtained for the study area indicates that both deep and shallow coal mining has occurred within the study area. The shallow coal mining is not well documented, and only juxtaposing the adit location with the seam outcrop mapping can be used to try and assess which seam was worked.

The Coal Authority data shows that approx. 15no. coal seams have been historically worked beneath the site at depths ranging from 278m and 752m bgl. Additionally, 2no. shafts are reported south of the site area, both of which are reported to have been filled and plugged with clay by the local authority.12no. disused adits are reported, 11no. of which lie to the north of the site and 1no. below the former tramway.

In general, the Coal Authority report does not indicate the presence of any known issues relating to coal mining associated with the site, which is influenced in part by the logic that the mining is at depth and historical (c. 1915) so that any seam voids will have closed some time ago and associated ground movement ceased. Discharge from the adits lying uphill of the site is currently being managed by a network of pipes as per the Phase 1 emergency works.

A Coal Mining Risk Assessment was undertaken for the Phase 4 area in April 2021[3], details of which can be found in the Redstart Environmental Impact Assessment (EIA)[4]. Brief summations of the concluding remarks are presented below:

- The Receptor Site C site lies outside the development high risk area;
- Llanwonno Upper Tip (donor site) lies within the development high risk area;
- Two mineshafts from Pendyrus Colliery lie in the valley bottom;
- Deep mining is recorded but is of an age (pre-1950) and at a depth which suggests that any subsidence will have occurred and if not, is unlikely to affect the development;
- Several mine adits occur uphill of the site, which are thought to discharge water;
- Two mine adits occur in the hillside beneath the site. The first adit is thought to have worked a seam, which indicates the potential presence of shallow mine workings beneath the haul road (see Figure 2.3, below), and another which is a moderate depth seam as a result the topography rising in the area of RS-C and increasing the separation between ground surface and top of seam;
- There are no recorded ground stability or subsidence risks; and
- The are no recorded or indicated mine gas risks.

No seams deemed economical to extract are expected beneath the site.

[2] The Coal Authority (2020). *Consultants Coal Mining Report*, Ref: 71006970622001
[3] Redstart (2021). Tylorstown Phase 4 Coal Mining Risk Assessment, Ref: CS/100303/GT/002 P02
[4] Redstart (2021). Tylorstown Phase 4 Environmental Impact Assessment Volume 1 – Environmental Statement, Ref: GC3613-RED-0074-XX-RP-L-0019

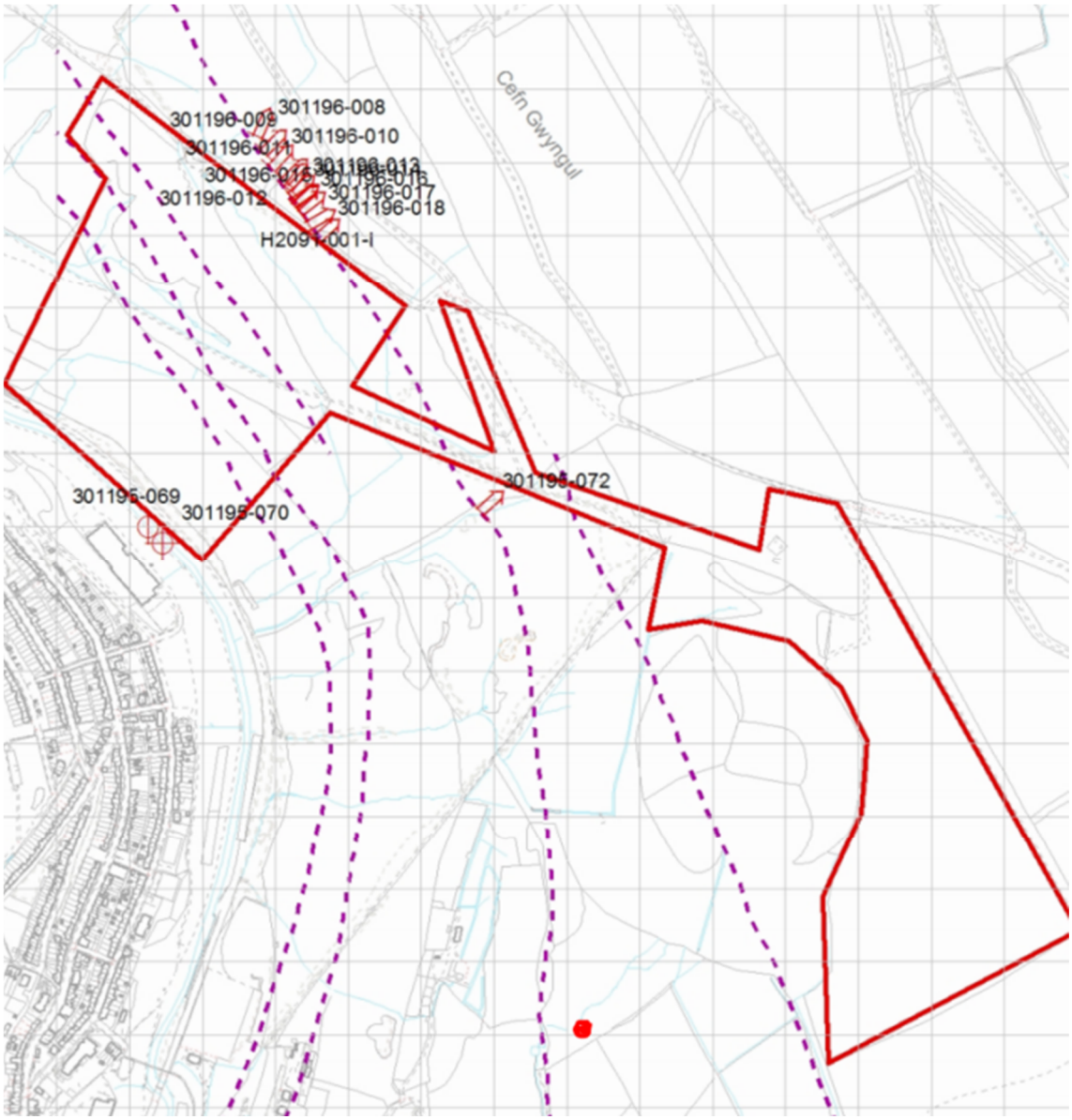

Figure 2.3 ***Extract from Coal Authority Consultants Coal mining report indicating the presence of the mine entries identified on-site. Adits which could be linked to worked coal under the site are marked by arrow and label 301196-072 and the red dot***

Non-Coal Mining

The Redstart EIA[5] has indicted that the site may be underlain by deposits containing the following mineral reserves / resources:

- Sub-alluvial Sand and Gravel; and
- Sandstone with potential for high specification aggregate.

2.6 Land use and Soil Survey Information

Land use and soil survey information has not been consulted.

[5] Redstart (2021). Tylorstown Phase 4 Environmental Impact Assessment Volume 1 – Environmental Statement, Ref: GC3613-RED-0074-XX-RP-L-0019

2.7 Archaeological and historical investigations

A detailed assessment of cultural heritage assets has been undertaken in the Environmental Statement report[6]. The Cultural Heritage Impact Assessment has identified the potential direct and indirect (visual) effects of the proposed development together with an assessment of the setting and significance of high value heritage assets. The ASIDOHL2 assessment considered the potential direct and indirect physical and non-physical (visual) impacts on the setting and significance of statutory designated sites and Historic Landscape Character Areas (HLCAs) within the Registered Historic Landscape.

The only heritage asset within the red line boundary of the Proposed Scheme is 'Tylor's Newydd Tips', which was assessed as being subjected to an overall direct impact of 'High', with the significance of effect being 'Major'. For the purposes of the assessment this group site was broken up into individual elements and a total of eleven heritage assets were identified in this process.

There are a further eleven heritage assets within a 250m study area. The principal of these is the 'Old Smokey Tip' which will suffer a 'Moderate' indirect (visual) effect from the Proposed Receptor Site. The remaining identified assets will be subjected to 'Very Slight' indirect (visual) effects.

Tylor's Newydd Tips Group Site has been assessed as having an overall 'Severe' indirect effect meaning that the key views and/or essential lines of sight to and from the heritage asset are interrupted by the Development resulting in partial severance of cultural heritage links.

One Scheduled Ancient Monument (Carn-y-Wiwer Cairnfield & Platform Houses), five Grade II Listed Buildings, and one Conservation Area located within a secondary 1km (radius) study area were assessed for indirect (visual) and setting effects. The assessment concluded that there would be no indirect (visual) or setting effects to Carn-y-Wiwer Cairnfield and Platform Houses.

The Proposed Scheme was assessed as having a 'Moderate' indirect (visual) effect on Welfare Hall, Tylorstown, a 'Very Slight' effect on the Church of Our Lady Penrhys and no effect on the Penuel Calvinistic Methodist Church. The remaining three assets, Llanwonno Conservation Area, St Gwynno's Church, and Grave of Guto Nyth Bran were included in the EIA assessment but were found to be subjected to no effects.

The ASIDOHL2 identified two Historic Landscape Character Areas (HLCAs) for potential direct effects. The proposed scheme was assessed as having a 'Very Slight' absolute impact on the Rhondda Fach Eastern Enclosed Valley Sites, with the Magnitude of Direct Impact being 'Moderate, and 'a 'Very Slight' absolute impact on the Rhondda Uplands', with the Magnitude of Direct Impact being 'Moderate'. Eight HLCAs were assessed for indirect physical and non-physical (visual) effects in Stage 3 of the ASIDOHL2 process and the relative importance of parts or elements of HLCAs which may be directly or indirectly, wholly or partially, affected by the proposed development were considered in Stage 4.

Stage 5 assessed the overall significance of the impact of development and the effect that altering the HLCAs concerned has on the whole Historic Landscape area on the Register. The 'Rhondda Fach Eastern Enclosed Valley Sides' received an overall significance of impact of 'Fairly Severe'. 'Rhondda Uplands' and 'Pontygwaith, Tylorstown & Stanleytown' both result in a 'Moderate'

[6] Redstart (2021). Tylorstown Phase 4 Environmental Impact Assessment Volume 1 – Environmental Statement, Ref: GC3613-RED-0074-XX-RP-L-0019

overall significance of impact. The remaining five HLCAs have a 'Slight' overall significance of impact, namely 'Wattstown', 'Blaenllechau & Ferndale' and 'Rhondda Fach Western Enclosed Valley Sides', Mynachdy Penrhys and Brith-Weunydd & Troed-y-Rhiw.

2.8 Historical Ground Investigations

The British Geological Survey (BGS) onshore GeoIndex shows there are two historical boreholes nearby to the study area. The coal beds mentioned do not tie in the known coal seam outcrops shown on Coal Authority mapping. For this reason, the geotechnical data associated with these boreholes has not been used in the production of this report.

Halcrow have undertaken boreholes within the donor site and these are summarised within their Reclamation Scheme Stability Report along with geological cross sections and geotechnical design parameters.

2.9 Consultation with Statutory Bodies and Agencies

Third-party utility and services information has been provided by the client.

2.10 Contaminated Land

Study Area History

The following research was undertaken to supplement the information gathered from historical mapping, geological assessment, and hydrogeological study. The purpose of this research is to review environmental records to identify evidence for contaminative activities on the Site or in the surrounding area. The principal source of information was the PSSR. Visits to local libraries were not undertaken as part of these works due to the COVID-19 situation. Summaries of pertinent observations regarding historical on-site and off-site land use is presented below:

- There are no historic or active landfills within 500m of the site;
- There are no historic or active waste sites within 500m of the site;
- There are 4no. recorded pollution incidents reported within 500m of the site, all of which were Category 3 – Minor and are considered historical (the most recent of which occurred in 2013) and unlikely to have any impact upon the site or proposed development;
- There are no active industrial sites within 50m of the site;
- There are no sites within 500m of the site which fall under any hazardous site designations;
- The site is reported to be within an area at Low risk with regard to unexploded ordnance; and
- There are no sites within 500m of the site which fall under any environmentally sensitive site designations.

As a result, potential onsite and offsite sources of contamination, pathways and receptors have been identified and are listed within Table 2.3 which has been excerpted from the Redstart PSSR (future risk allocation assumes an un-remediated land condition).

Table 2.3 – Source - Pathway - Receptor Model

Source	Pathway	Receptor	Plausible Linkage
Onsite			
Llanwonno Upper Tip and the northern foot of Tylorstown Tip – colliery spoil which is within the site boundary. Risk of leachate high in pH, iron, manganese, aluminium, sulphate with low to trace PAH's and ground gas generation. Historic tramways – potential for contaminants including PAHs, herbicides, creosote, or asbestos. Burnt shale fill at RS-C may include arsenic and PAH's.	Inhalation, Ingestion and Dermal Contact.	Current site users	Most likely No; Public access to the site is limited and likely constrained to members of the public out walking around Tylorstown Tip; Principal pathway due to wind-blown contaminated dust.
		Construction workers / contractors	Yes; Testing of slipped material in 2020 and 2021 showed limited levels of contamination; Combustion within Tylorstown Tip may be producing CO_2.
		Future end-users	Similar situation to current site users.
	Leaching, vertical and lateral migration.	Controlled Waters (Secondary A aquifer bedrock)	Yes; Leaching was visibly noted by Halcrow in 2004[7] which indicates the potential for groundwater contamination; Argillaceous bands should / will protect deeper geology.
		Controlled Waters (Afon Rhondda Fach)	Yes; Ferruginous seep was noted by Halcrow in 2004 which flows towards the river.
Off-site			
Llanwonno Lower Tip and Tylorstown Tip – leachate high in pH, iron, manganese, aluminium, and sulphate with low to trace PAH's and ground gas generation. Mine adits – potential for acid mine drainage and ground gas generation. An example being a seepage of ferruginous mine water	Lateral migration through soil and groundwater.	Current site users	No; Off-site tips are well vegetated, decreasing the potential for contaminant particulate migration; Mine gases unlikely to affect receptor.
		Construction workers / contractors	Works may bring workers into contact with surface or groundwaters possibly containing dissolved and/or fluid mobile contaminants;

[7] Halcrow Group Ltd. (2004). Llanwonno Tips Reclamation Scheme Stability Report.

Source	Pathway	Receptor	Plausible Linkage
from Llanwonno Lower Tip. Former quarries, some potentially infilled – generation of ground gas.			There is potential for explosive or asphyxiant gases to accumulate in excavations.

Table 2.4 – Summary of On-site Historical Land Use Observations

Significant Land Use On-Site and Implications	Current Status
Cynllwyn-du Colliery tramline	1915 - 1948
Tylorstown Tip	1945 – present (ceased)
Llanwonno Upper Tip	1948 – present (ceased)
Tramway (to Tylorstown Tip)	1948 – 1974

Table 2.5 – Summary of Off-site Historical Land Use Observations

Significant Land Use Off-Site and Implications	Distance from Site	Dates feature is evident on site
Pendyrus Colliery	50m	1873 – 1974
Taff Vale Railway	Approx. adjacent	1873 – 1992
Ferndale Colliery	300m	1873 – 1974
Quarries, unnamed	Within 500m	1898 – 1948
Tylorstown (settlement)	Within 500m	1898 – present
Quarry	140m	1915 – 1948
Tylorstown Tip	Overlapping	1945 – present (ceased)
Tramway (to Tylorstown Tip)	Overlapping	1945 – 1974
Adits, 10no.	30 – 100m	unknown – present (ceased)
Leisure Centre	80m	1999 – active

Potential Areas of Concern

Based on consideration of the preliminary ground model and potential contaminant linkages, key geo-environmental areas of concern are limited to possible gassing from the adit over which the access track passes and any local tar or asbestos pockets at the tramway corridors. The main sources are disseminated ones where leachable metals can lie within the large deposits of colliery material. Burnt shale was tentatively observed at one area in the RS-C site during a walkover but as is reported latter in this report this source did not materialise when exploratory holes were excavated.

2.11 Other relevant information

This report will be updated following receipt of any additional information and following comments from the client.

3. Field and Laboratory Studies

A suite of supplementary field and laboratory studies have been undertaken to gather information to inform the design of the proposed works. Details of these studies are described below.

3.1 Walkover Survey

An initial walkover survey was undertaken on the RS-C and haul road on 26th February 2021 in order to agree ecological mitigations. Subsequently, specific holes were cleared of long vegetation by strimming prior to drill rig mobilisation.

3.2 Service Clearance

Exploratory hole locations were located with due care to avoiding services as far as reasonably practicable. Final locations were agreed with the ground investigation contractor on-site. The positions of the known services were identified using cable avoidance equipment and clearly marked on the ground where electrical services were present. A PAS 128:2014 non-intrusive Type-B survey was undertaken by Intersect Survey at each exploratory hole location prior to breaking ground.

3.3 Ground Investigations

Llanwonno Upper Tip (Donor Site)

An intrusive sampling exercise was undertaken at Llanwonno Tip in January 2021 and comprised an initial phase of ten hand pits (0.6m deep), taken as a traverse across the width of the slip at locations where material is to be taken off the slip feature and deposited to Receptor Site C.

This investigation was designed by Redstart and undertaken by Integral Géotechnique. An exploratory hole location plan (as extracted from the scheme Volume 1 Environmental Statement) is provided below:

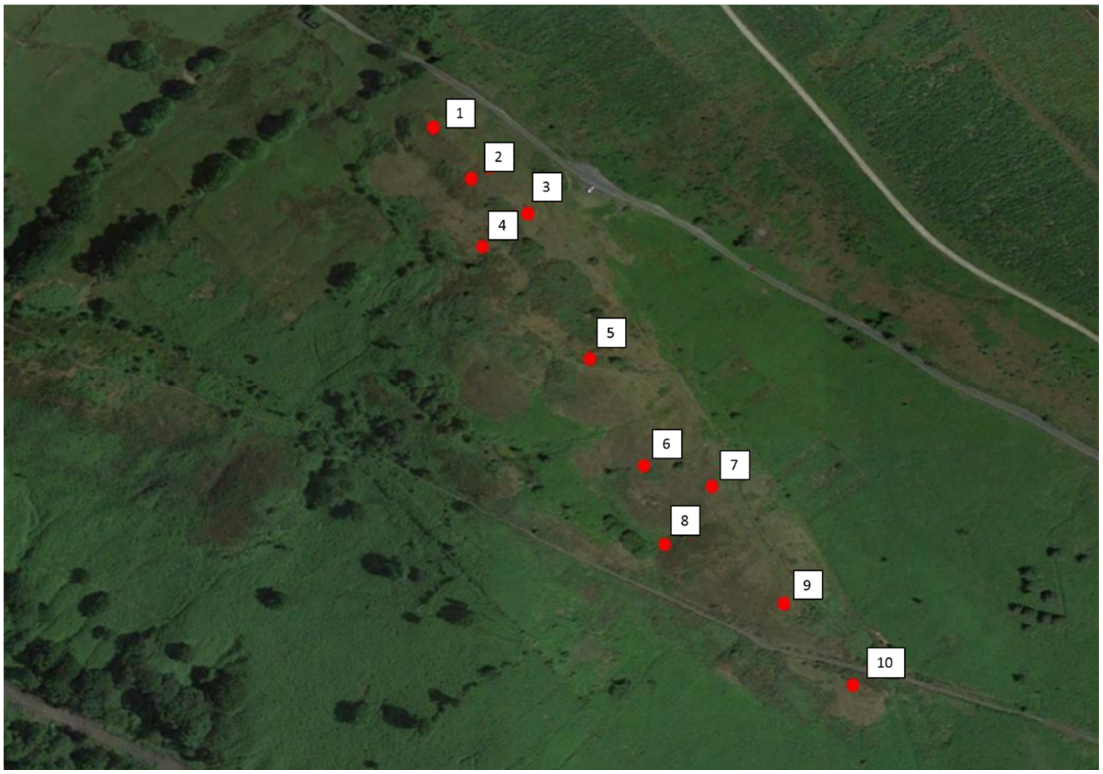

Figure 3.1: *Extract from ES showing location of trial pits at Llanwonno Upper Tip excavated in 2021*

Receptor Site C

A ground investigation has been undertaken at the site specifically for the design and construction of the proposed works. The investigation was designed by Redstart and carried out by the specialist ground investigation contractor Quantum Geotech (QGL).

The ground investigation works were carried out between the 3rd and 16th March 2021. Full-time on-site supervision and attendance by an Engineering Geologist from QGL was undertaken on all aspects of the site works and subsequent reinstatement works of all exploratory hole locations. The ground investigation comprised the following elements:

- Vegetation clearance to access exploratory hole positions;
- 1no. Rotary dynamic sampled with coring borehole;
- 6no. Rotary probe boreholes;
- 6no. Window sample boreholes;
- 7no. Machine excavated trial pits;
- 6no. Installations of gas/groundwater monitoring wells in selected boreholes;
- Post fieldwork groundwater, surface water and ground gas monitoring;
- Geotechnical and geo-environmental laboratory testing; and
- Provision of a factual report detailing the investigation.

An exploratory hole location plan showing positions of all relevant completed exploratory holes is included in Appendix A-GC3613-Red-75-XX-DR-C-0074. Summaries of completed exploratory holes are tabulated below. Depths are reported as metres below ground level (m bgl).

Table 3.1 – Summary of Boreholes

Exploratory Hole ID	Date Completed	Final Depth (m bgl)	Terminating Strata	Installation
BHC01	11/03/2021	20.00	Sandstone	Yes
BHC02	08/03/2021	24.00	Sandstone	Yes
BHC03	10/03/2021	8.00	Sandstone	Yes
BHC04	11/03/2021	8.00	Sandstone	No
BHC05	09/03/2021	20.00	Sandstone	Yes
BHC06	09/03/2021	20.00	Sandstone	Yes
BHC07	10/03/2021	8.00	Sandstone	Yes

Table 3.2 – Summary of Machine Excavated Trial Pits

Exploratory Hole ID	Date Completed	Final Depth (m bgl)	Terminating Strata
TPC01	04/03/2021	1.30	Sandstone
TPC02	04/03/2021	1.20	Sandstone
TPC03	04/03/2021	0.60	Sandstone
TPC04	04/03/2021	1.70	Sandstone
TPC05	04/03/2021	1.70	Sandstone
TPC06	04/03/2021	0.60	Sandstone
TCP07	04/03/2021	2.70	Gravel

Table 3.3 – Summary of Window Samples

Exploratory Hole ID	Date Completed	Final Depth (m bgl)	Terminating Strata
WS01	16/03/2021	3.00	Sandstone
WS03	16.03/2021	1.00	Sandstone
WS04	16/03/2021	1.00	Sandstone
WS05	16/03/2021	0.80	Sandstone
WS06	16/03/2021	1.00	Sandstone
WS07	16/03/2021	1.40	Sandstone

Table 3.4 – Summary of Installations

Exploratory Hole ID	Installation Diameter (mm)	Installation Response Zone (m bgl)	Strata Screened
BHC01	50	17.00 – 20.00	Sandstone
BHC02	50	21.00 – 24.00	Sandstone
BHC03	50	5.00 – 8.00	Sandstone
BHC05	50	17.00 – 20.00	Sandstone
BHC06	50	17.00 – 20.00	Sandstone
BHC07	50	5.00 – 8.00	Sandstone
BH01A*	19	-	-
BH02A*	19	-	-
BH03A*	19	-	-

* Existing historical boreholes 01A, 02A and 03A have designations assigned by Quantum and these may not reflect the original numbering when drilled

Tramway

In addition to the works undertaken during the Ground Investigation at Receptor Site C, QGL also undertook 6no. in-situ California Bearing ratio (CBR) tests and these positioned along the length of the former tramway, between Llanwonno Upper Tip and Receptor Site C. The results were back analysed from 300mm plate loading tests. Excavations all to 0.3m depth bgl and all used an 8-tonne tracked excavator. Samples were taken at the same six locations for supplementary laboratory testing.

3.4 Laboratory Testing

A summary of the geotechnical and geo-environmental tests undertaken is provided in the tables below. Discussion of the laboratory results can be found in Section 4 of this report.

Llanwonno Upper Tip

Table 3.5 – Summary of Geotechnical Testing

Test	Total no. Tests
Moisture content	10
Particle size distribution by wet sieving	10
Proctor Compaction (2.5kg rammer)	10

Table 3.6 – Summary of Geo-environmental Testing

Test	Total no. Tests
Suite E	10
Suite F	10
DOC, dissolved calcium	10
Calorific value	10
Suite H Non-Hazardous	10

Receptor Site C

Table 3.7 – Summary of Geotechnical Testing

Test	Total no. Tests
Moisture content	15
Liquid limit, plastic limit, and plasticity index	11
Particle size distribution by wet sieving	20
Organic matter content	8
Mass loss on ignition	3
Sulphate content of acid extract from soil	7
Sulphate content of acid extract from water	5
Total sulphur content	5
pH value	7
Single point load	6

Table 3.8 – Summary of Geo-environmental Testing

Test	Total no. Tests
Suite E (Soil samples schedule S1.20.3)	16
Suite F (Soil samples Schedule S1.20.3)	5
DOC, dissolved calcium	3
Topsoil to BS3882:2015	3
Calorific value	2
Suite H Non-Hazardous	2

Tramway

Table 3.9 – Summary of Geotechnical Testing

Test	Total no. Tests
Moisture content	2
Liquid limit, plastic limit, and plasticity index	2
Particle size distribution by wet sieving	6
Bulk Density – Linear Measurement Method	6
Mass loss on ignition	4
California Bearing Ratio / Dry Density Moisture Content Relationship	6

4. Ground Conditions

4.1 Introduction

This section describes the ground conditions at each of the three areas investigated, the same order is kept as used in Section 3 to be consistent with other parts of the report.

4.2 Ground conditions at Llanwonno Upper Tip

The strata encountered during the ground investigation were as those anticipated, being predominantly colliery spoil, though in one locality there was a lens of glacial till. The holes were focused on the nature of the shallow formation, which will support the new haul road, and information on the medium and deeper depth geology, as discussed in detail in the PSSR report using information from historical Halcrow investigations.

4.3 Ground Conditions at Receptor Site C

Stratigraphic Succession

The strata encountered during the ground investigation was generally found to be in accordance with the published geology for the area, although the presence of superficial deposits underlying the site area is in contrast to geological mapping, which inferred the site was directly underlain by bedrock. The geological succession is relatively simple and generally comprises areas of Topsoil or Made Ground over superficial lithologies over sandstone, which is interpreted to be Pennant Sandstone Formation.

A summary of the encountered strata and their thicknesses are provided in the table below.

Table 4.1 – Stratum Thickness Encountered during Ground Investigation

Detail	Topsoil**	Made Ground	Superficial Deposits*	Sandstone (Bedrock)*
Stratum Thicknesses (m)	0.00 – 0.30 [0.20]	0.00 – 2.35* [1.06]	0.30 – 2.70* [0.78]	0.55* – 22.50*
Number of Exploratory holes stratum encountered	16	4	20	19

[0.20] = Average thickness (m); * Depth proven; ** See section '4.3 Topsoil' for discussion

Topsoil

According to the driller's description, it is believed that Topsoil was encountered in 16no. exploratory locations across the site.

The Topsoil had a maximum proven thickness of 0.30m in TPC04, TPC05, and TPC07, and has been described as:

- Grass over soft dark grey slightly gravelly SILT with rootlets and rare coal/charcoal. Gravel is fine to coarse sub-angular to sub-rounded Sandstone and Mudstone (BHC02, BHC03, BHC04, BHC05, BHC06, BHC07, WS03, WS04, WS05, WS06, WS07, TPC03, TPC04, TPC05, TPC06, TPC07).

Made Ground

Made Ground was encountered in 4no. exploratory locations across the site.

The Made Ground had a maximum proven thickness of 2.35m in WS01. Made Ground was also encountered in BHC01, TPC01, and TPC02 with proven thicknesses of 0.70m, 0.60m, and 0.60m respectively.

The Made Ground material appears generally consistent in description across the site and within the exploratory locations and, where sampled, comprises of:

- Black dark grey slightly sandy silty GRAVEL with metal. Gravel is fine to coarse angular to sub-angular Mudstone, clinker, and coal (BHC01, TPC01, TPC02); and
- Black dark grey red slightly sandy silty GRAVEL with metal. Gravel is fine to coarse angular to sub-angular Mudstone, clinker, ash, and coal (WS01).

Superficial Deposits

Superficial deposits were encountered in 18no. exploratory locations. The maximum proven thickness of superficial deposits where fully penetrated was in BHC01, where 2.60m of superficial deposits were encountered.

The superficial material is loosely consistent across and within the exploratory locations, and comprises:

- Grey silty sandy GRAVEL with medium to high cobble and boulder content. Gravel is fine to medium angular to sub-angular Sandstone. Cobbles and boulders are sub-angular to angular Sandstone (BHC01);
- (Dense) orange and light brown slightly clayey slightly silty GRAVEL. Gravel is fine to coarse sub-angular to sub-rounded Sandstone and Mudstone (BHC02, BHC03, BHC05, BHC06, BHC07);
- Soft to firm orange and light brown sandy very gravelly CLAY. Gravel is fine to coarse sub-angular to sub-rounded Sandstone and Mudstone (WS03, WS04, WS05, WS06, WS07, TPC05);
- Light brown and orange sandy slightly silty clayey GRAVEL with low to medium cobble content. Gravel is fine to coarse angular to sub-angular Mudstone and Sandstone. Cobbles are angular to sub-angular Sandstone (TPC01);
- Dark grey slightly clayey silty GRAVEL. Gravel is fine to coarse angular to sub-angular Mudstone and Sandstone (TPC02);
- Grey slightly silty clayey gravelly SAND with low to medium cobble content. Gravel is fine to medium angular to sub-angular Mudstone and Sandstone. Cobbles are angular to sub-angular Sandstone (TPC02);
- Orange grey and light brown slightly clayey silty sandy GRAVEL. Gravel is fine to coarse sub-angular to sub-rounded Sandstone and Mudstone (TPC04, TPC06); and
- Orange and light brown slightly silty clayey SAND. Sand is fine to coarse (TPC07).

Based on the descriptions in the driller's logs it is thought that the supposed superficial deposits actually represent highly to completely weathered facies of Brithdir Member bedrock deposits (see Section 5.3).

Very soft to soft brown fibrous PEAT was identified in TPC01 between 0.60m and 0.70m bgl, 'sandwiched' between Made Ground and 'Light brown and orange sandy slightly silty clayey gravel'. This stratum is interpreted as a relict topsoil.

Pennant Sandstone Formation

The Pennant Sandstone Formation was encountered in all 20no. exploratory locations across the site. The Pennant Sandstone Formation encountered at the site area can be divided into weathered sandstone and unweathered bedrock sandstone, which are encountered in 18no. and 9no. exploratory holes, respectively.

The weathered Pennant Sandstone Formation has a maximum proven thickness of 3.10m and has been described as:

- (Dense) grey (light) brown slightly silty clayey GRAVEL with medium to high cobble and boulder content. Gravel is fine to medium angular to sub-angular Sandstone. Cobbles and boulders are sub-angular to angular Sandstone ((POSSIBLE) HIGHY WEATHERED BRITHDIR MEMBER) (BHC02, TPC04, TPC05);
- Orange and light brown slightly clayey sandy GRAVEL. Gravel is fine to coarse sub-angular to sub-rounded Sandstone (HIGHLY WEATHERED BRITHDIR MEMBER) (BHC04);
- Grey slightly sandy Gravel. Gravel is fine to medium angular to sub-angular Sandstone (HIGHLY WEATHERED BRITHDIR MEMBER) (BHC05, BHC06, BHC07, WS05, WS06, WS07);
- Soft to firm grey slightly sandy very gravelly CLAY with low to medium cobble content. Gravel is fine to coarse angular to sub-angular Mudstone and Sandstone (COMPLETELY TO HIGHLY WEATHERED BRITHDIR MEMBER) (WS01);
- Grey sandy silty GRAVEL. Gravel is fine to coarse angular to sub-angular Sandstone (HIGHLY WEATHERED BRITHDIR MEMBER) (WS01, TPC04);
- Grey clayey Gravel. Gravel is fine to medium angular to sub-angular Sandstone (HIGHLY WEATHERED BRITHDIR MEMBER) (WS03, WS04);
- Grey SANDSTONE. Recovered as sandy silty GRAVEL. Gravel is fine to coarse angular to sub-angular Sandstone (HIGHLY WEATHERED BRITHDIR MEMBER) (TPC01, TPC02); and
- Grey silty sandy GRAVEL with medium to high cobble and boulder content. Gravel is fine to medium angular to sub-angular Sandstone. Cobbles and boulders are sub-angular to angular Sandstone (HIGHLY WEATHERED BRITHDIR MEMBER) (TPC06, TPC07).

It is assumed that much of the recorded superficial deposits are instead completely weathered facies of Pennant Sandstone Formation.

The unweathered, solid, bedrock of the Pennant Sandstone Formation has a proven maximum thickness of 22.50m in BHC02, although the stratum was not fully penetrated in any of the exploratory holes. During exploratory hole drilling it has been described as:

- Strong grey SANDSTONE (BHC01, BHC03, BHC04, BHC05, BHC06, BHC07);
- Grey SANDSTONE. Recovered as GRAVEL. Gravel is fine to coarse angular to sub-angular (BHC02);
- Strong grey fine grained SANDSTONE (BRITHDIR MEMBER) (BHC02);
- Weak brown grey highly weathered SANDSTONE (BHC05, BHC06, BHC07);
- Strong grey SANDSTONE with brown weathered Mudstone/Sandstone bands (BHC06);

- Grey SANDSTONE bedrock (BRITHDIR MEMBER) (TPC05); and
- Grey SANDSTONE boulder/bedrock (TPC06).

4.4 Ground conditions at the Haul Road

The ground conditions comprised black silty slightly sandy GRAVEL (Colliery Spoil), except for test 1, which encountered brown sandy gravelly CLAY, and test 4, which encountered broken/weathered brownish grey sandstone rock.

5. Engineering Assessment

The following sections summarise the available material properties from the data sources listed in Section 1.4. Information on material properties are described for each stratum under the following headings where relevant:

- Classification;
- Strength;
- Compaction related testing along the tramway / haul road; and
- Permeability data.

Soil and groundwater chemistry data is presented collectively in Section 5.4.

5.1 Made Ground

Summary of Testing of Made Ground

Table 5.1 – Tests Specific to Made Ground

Test	Total no. Tests	Location
In-Situ Tests		
CBR	**5**	**Tramway (CBR01, CBR02, CBR03, CBR05, CBR06)**
SPT	**2**	**RS-C (WS01)**
Laboratory Tests		
Classification		
Moisture content	**12**	**Upper Tip (10), RS-C (15), Tramway (1)**
Liquid limit, plastic limit, and plasticity index	**1**	**Tramway (CBR02)**
Particle size distribution by wet sieving	**18**	**Upper Tip (10), Tramway (5), RS-C (3)**
Bulk Density – Linear Measurement Method	**5**	**Tramway (5)**
Compaction Related		
California Bearing Ratio / Dry Density Moisture Content Relationship	**4**	**Tramway (CBR01, CBR03, CBR05, CBR06)**
Dry Density Moisture Content Relationship	**10**	**Upper Tip (10)**
Other		
Mass loss on ignition	**7**	**Tramway (4), RS-C (3)**
Organic Matter	**2**	**RS-C (2)**
pH	**4**	**RS-C (4)**
SO4 (Aqueous soln)	**2**	**RS-C (2)**
SO4 (Acid extract)	**4**	**RS-C (4)**
Total Sulphur	**4**	**RS-C (4)**

General

A typical unit weight of 19.9 kN/m^3 (Bulk Density range between 2.12 and 1.91 Mg/m^3) and dry unit weight 17.7 kN/m^3 (Dry Density range between 1.95 and 1.54 Mg/m^3) is interpreted for the Made Ground deposits based upon the five tests undertaken. The results of the tests are summarised in Table 5.2 below.

Table 5.2 –Summary of Bulk Density Testing (linear Measurement Method) for Made Ground

Test ID	CBR01	CBR02	CBR03	CBR05	CBR06
Moisture Content %	24	12	9	9.4	8.9
Bulk Density Mg/m^3	1.91	2.01	2.12	2.09	2.02
Dry Density Mg/m^3	1.54	1.8	1.95	1.91	1.85

Classification

Particle Size Distribution

Samples of Made Ground have fines contents between 5% and 18% (silt and clay fraction passing <0.063mm) implying the nature of these materials are generally controlled by their granular content.

Two of the samples, CBR01 and CBR02, also have a cobble content of 26% and 8% respectively, with the other samples within the Made Ground not containing cobbles. The lack of cobble content in all samples through A to J is potentially a function of the sampling procedure as cobbles were noted within the tip during walkover inspections.

The results of the grading tests are summarised in Table 5.3 below:

Table 5.3 – Sample Grading Proportions for Made Ground

Sample Proportions	CBR01	CBR02	CBR03	CBR05	CBR06	WS01	TPC01	TPC02
Depth (m bgl)	-	-	-	-	-	1.0 - 2.0	0.0 - 0.6	0.0 - 0.6
Cobbles, %	26	8	0	0	0	0	0	0
Gravel, %	38	64	67	62	64	87	48	48
Sand, %	18	20	24	27	27	8	35	36
Silt /Clay, %	18	8	9	11	9	5	17	16

Sample Proportions	A	B	C	D	E	F	G	H	I	J
Cobbles, %	0	0	0	0	0	0	0	0	0	0
Gravel, %	44	60	50	57	55	71	48	62	47	54
Sand, %	40	27	36	32	39	24	46	32	43	38
Silt /Clay, %	15	13	14	11	6	5	6	7	9	8

Moisture Content

A total of 12no. moisture content test results are available for the Made Ground. They show a moisture content range of 8.0% to 13.9%.

Moisture Content and Atterberg Limits

One test for moisture content and Atterberg Limits was undertaken on a sample from CBR02. The percentage of sample passing the 0.425mm sieve was only 14% so the results should be indicative of that proportion of the sample only. Results of the test are shown in Table 5.4 below.

Table 5.4 – Moisture Content and Atterberg Limits for Made Ground

Hole Reference	Depth (mbgl)	Moisture content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)
CBR02	0.30	11	24	14	10

Strength

Standard Penetration Tests (SPT)

SPT N values give an indirect measure of density for granular soils and undrained strength for cohesive soils. Tabulated below are summaries of the uncorrected SPT data.

Table 5.5 – Uncorrected SPT N Values for Made Ground

Soil Type	No. Tests	SPT N – min.	SPT N – max.	SPT N – avg.
Made Ground	2	12	15	**13.5**

The range of SPT values in the granular Made Ground indicates a 'Medium dense' soil in accordance with Table 10 of BS 5930:2015 (2020).

Compaction Testing

Determination of CBR Using Plate Load Tests

Along the tramway portion of the site, 6no. in situ plate load tests were undertaken with equivalent CBR values calculated for each encountered layer (BS 1377:Part 9:1990, and IAN73/06 Rev.1). The nature of the test means the results are indiscriminate of stratum and it may not be possible to determine the exact location of the boundaries. Table 5.6 summarises the results from the in-situ plate load tests with the Made Ground.

Table 5.6 Summary of In-Situ CBR Data for Made Ground

Test ID	Settlement (mm)		Derived load at 1.25 mm	Modulus of Subgrade Reaction*	Equivalent CBR Value (%)
	Start	Finish			
CBR 2	0.00	1.31	43.9	15	1.1
CBR 3	0.00	1.31	67.5	24	2.3
CBR 5	0.00	1.34	67.2	24	2.3
CBR 6	0.00	1.30	67.8	24	2.4

* $(k_{762})(MN/m^2/m)$

Compaction Testing

Four samples from the tramway area were tested in the laboratory to determine their CBR / Dry Density Moisture content relationship as summarised in Table 5.7, overleaf. Clearly, the achievable CBR in laboratory conditions is much higher than that proved in-situ.

Table 5.7 – Summary of CBR / Dry Density Moisture Content Relationship for Made Ground

Test ID	CBR01	CBR03	CBR05	CBR06
Optimum Moisture Content OMC %	9.5	11	11.5	11
CBR @ OMC %	6.9	15	14	9
Max Dry Density Mg/m^3	1.92	1.86	1.86	1.84
Natural Moisture Content (NMC) %	6.5	10	9.2	8.2
CBR @ NMC %	12.7	22.1	25.4	15.9
Dry Density @ NMC Mg/m^3	1.85	1.85	1.84	1.81

Ten samples from Llanwonno Upper Tip (donor site) were tested to determine their Dry Density Moisture Content Relationship as summarised in Table 5.8 below.

Table 5.8 –Summary of Dry Density Moisture Content Relationship for Made Ground

Test ID	A	B	C	D	E	F	G	H	I	J	Avg.
Optimum Moisture Content OMC %	12	13.6	12.1	11.9	8.4	10.7	10.2	11.7	10.1	10.5	**11.2**
Max Dry Density Mg/m^3	1.68	1.73	1.66	1.79	1.94	1.98	1.97	1.87	2.01	1.9	**1.85**

Other Testing

Additional testing was undertaken to determine the chemical characteristics of the Made Ground; this testing is presented along with a summary of the test results in Table 5.9.

Table 5.9 Summary of Chemical Testing for Made Ground

Parameter	No of Tests	Max Value	Min Value	Average
Loss on Ignition %	7	18	2.9	**12.9**
pH	4	7	6	**6.4**
Organic Matter %	1	0.5	0.5	**0.5**
Sulphate Aqueous Extract as SO4 mg/l	2	34	29	**N/A too few samples**
Sulphur as S, Total %	4	0.14	0.08	**0.1**
Sulphate as SO4 Acid Extraction %	4	0.15	0.07	**0.12**

5.2 Superficial Deposits

Summary of Testing of Superficial Deposits

Table 5.10 Summary of Chemical Testing for Superficial Deposits

Laboratory Test	Total no. Tests	Location
Classification		
Moisture content	11	RS-C
Liquid limit, plastic limit, and plasticity index	8	RS-C
Particle size distribution by wet sieving	10	RS-C
Other		
Organic Matter	5	RS-C
pH	2	RS-C
SO4 (Aqueous soln)	2	RS-C
SO4 (Acid extract)	2	RS-C
Total Sulphur	1	RS-C

General

A typical unit weight of 19.5 kN/m^3 is considered appropriate for the granular Glacial Till based upon the guidance given in Figure 1 (above groundwater table) of BS 8002 and past experiences in similar materials.

Classification

Particle Size Distribution

The results of the 10no. particle size distribution tests are summarised in Table 5.11 overleaf.

A total of 2nr. samples of Glacial Till have fines contents of between 25% to 29% (silt and clay fraction passing <0.063mm) implying the nature of this material is likely to be intermediate cohesive / granular material. The remaining 8nr. samples have fines contents of between 4% to 17% (silt and clay fraction passing <0.063mm) implying the nature of this Glacial Till is generally controlled by their granular content.

3no. samples also have a cobble content of between 11 and 15% with the other samples within the Glacial Till not containing cobbles.

Table 5.11 – Sample Grading Proportions for Superficial Deposits

Sample Proportions	BHC1	BHC2	TPC1	TPC2	TPC2	TPC3	TPC4	TPC5	TPC6	TPC7
Depth (m bgl)	1.2	0.5	0.7 - 1.1	0.6 - 0.7	0.7 - 1.1	0.2 - 0.5	0.3 - 0.6	0.3 - 0.9	0.2 - 0.5	0.3 - 0.8
Cobbles, %	0	0	15	0	0	11	13	0	0	0
Gravel, %	71	42	35	56	29	40	55	60	54	49
Sand, %	16	42	21	40	46	35	21	26	36	34
Silt /Clay, %	13	16	29	4	25	14	11	14	10	17

Sample Proportions	No of Tests	Max	Min	Average
Cobbles, %	10	15	0	**3.9**
Gravel, %	10	71	29	**49.1**
Sand, %	10	46	16	**31.7**
Silt /Clay, %	10	29	4	**15.3**

Moisture Content and Atterberg Limits

The results from soil tests for moisture content and Atterberg Limits are shown in Figure 5.12 below. The moisture content of the soils shows a general trend to reducing with depth, although not in all cases.

The plasticity index of the soils are within the range of 17 to 27% with a liquid limit range of between 32 and 63% classifying the soils as MH (silts of High Plasticity) to CI (clay of intermediate plasticity) when plotted on the Casagrande plasticity chart. However, it should be noted that the % passing the 0.425 mm sieve is low (average 33%) indicating that the soils in some cases may be relatively granular in nature.

Table 5.12 – Moisture Content and Atterberg Limits for Superficial Deposits

Hole Reference	Depth (mbgl)	Moisture content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)
WS01	2.0	8.2				
WS01	2.0 – 3.0	18	39	15	18	15
BHC03	0.5	29				
BHC07	1.2	49				
TPC01	0.70 – 1.10	22	38	21	17	42
TPC02	0.70 – 1.10	35	49	27	22	54
TPC03	0.20 – 0.50	34	58	31	27	34
TPC04	0.30 – 0.60	34	63	39	24	23
TPC05	0.30 – 0.9	29	54	35	19	25
TPC06	0.20 – 0.50	31	62	37	25	32
TPC07	0.30 – 0.80	17	32	15	17	40

Table 5.12 – Moisture Content and Atterberg Limits for Superficial Deposits (cont.)

Parameter	No of Tests	Max	Min	Average
Moisture Content %	11	49	8.2	**27.8**
Liquid Limit %	8	63	32	**49.4**
Plastic Limit %	8	39	15	**27.5**
Plasticity Index %	8	27	17	**21.1**
Passing 0.425mm %	8	54	15	**33.1**

Strength

No strength tests are available for the superficial deposits and its high granular content made it unsuitable to retrieve Shelby tubes.

Compaction Testing

No compaction testing results are available for the superficial deposits.

Other Testing

Additional testing was undertaken to determine the chemical characteristics of the superficial deposits; this testing is presented along with a summary of the test results in Table 5.13.

Table 5.13 Summary of Chemical Testing for Superficial Deposits

Parameter	No of Tests	Max Value	Min Value	Average
pH	2	6.4	5.2	**5.8**
Organic Matter %	5	10	0.5	**4.8**
Sulphate Aqueous Extract as SO4 mg/l	2	28	17	**22.5**
Sulphur as S, Total %	1	0.02	0.02	**0.0**
Sulphate as SO4 Acid Extraction %	2	0.17	0.04	**0.1**

5.3 Pennant Sandstone Formation

Summary of Testing of Pennant Sandstone Formation

Table 5.14 Summary of Chemical Testing for Pennant Sandstone

Test	Total no. Tests	Location
In-Situ Tests		
CBR	**1**	**Tramway (CBR04)**
SPT	**17**	**RS-C**
Laboratory Tests		
Classification		
Moisture content	**5**	**RS-C (4), Tramway (CBR04)**
Liquid limit, plastic limit, and plasticity index	**4**	**RS-C (3), Tramway (CBR04)**
Particle size distribution by wet sieving	**7**	**RS-C (6), Tramway (CBR04)**
Bulk Density – Linear Measurement Method	**1**	**Tramway (CBR04)**
Compaction Related		
California Bearing Ratio / Dry Density Moisture Content Relationship	**1**	**Tramway (CBR04)**
Rock Testing		
Point Load Test	**6**	**RS-C (BHC02)**
Other		
Organic Matter	**1**	**RS-C (TPC02)**
pH	**1**	**RS-C (BHC04)**
SO4 (Aqueous soln)	**1**	**RS-C (BHC04)**
SO4 (Acid extract)	**1**	**RS-C (BHC04)**
Total Sulphur	**1**	**RS-C (BHC04)**

General

Most of the testing upon the Pennant Sandstone formation is undertaken upon the near surface, highly weathered in-situ, material with some additional rock testing on cored material.

A typical unit weight of 21.9 kN/m^3 (Bulk Density 2.23 Mg/m^3) and dry unit weight 19.3 kN/m^3 (Dry Density 1.97 Mg/m^3) is considered appropriate for the weathered Pennant Sandstone Formation deposits based upon the single test undertaken.

Intact Pennant Sandstone is anticipated to have a typical unit weight in the region of 23.5 kN/m^3.

Classification

Particle Size Distribution

The highly weathered Pennant Sandstone Formation samples have fines contents of between 9% to 20% (silt and clay fraction passing <0.063mm) implying the nature of this material is generally controlled by their granular content.

Two samples contained no cobbles. However, of the five remaining samples, a cobble content of between 11% and 42% was recorded. The results of the grading tests are summarised in Table 5.15 below.

Table 5.15 – Sample Grading Proportions for Highly Weathered Pennant Sandstone Formation

Sample Proportions	CBR04	TPC04	TPC05	TPC05	TPC06	TPC07	TPC07
Depth (m bgl)		1.00	1.00	1.70	0.5 – 0.6	1.00	2.00 – 2.70
Cobbles, %	27	11	42	0	11	20	0
Gravel, %	51	51	22	63	60	54	71
Sand, %	13	21	16	24	18	17	19
Silt /Clay, %	9	17	20	13	11	9	10

Sample Proportions	No of Tests	Max	Min	Average
Cobbles, %	7	42	0	15.9
Gravel, %	7	71	22	53.1
Sand, %	7	24	13	18.3
Silt /Clay, %	7	20	9	12.7

Moisture Content and Atterberg Limits

The results from soil tests for moisture content and Atterberg Limits are shown in Table 5.16. The limited fines content of the soils means that they will not control the engineering behaviour of the material.

Table 5.16 – Moisture Content and Atterberg Limits for Highly Weathered Pennant Sandstone Formation

Parameter	No of Tests	Max	Min	Average
Moisture Content %	5	39	14	20.6
Liquid Limit %	4	40	26	34.5
Plastic Limit %	4	20	17	18.3
Plasticity Index %	4	22	8	16.3
Passing 0.425mm %	4	31	16	23.3

Strength

Standard Penetration Tests (SPT)

SPT N values give an indirect measure of density for granular soils and undrained strength for cohesive soils. Tabulated overleaf, in Table 5.17, are summaries of the uncorrected SPT data.

Table 5.17 – Uncorrected SPT N Values for Pennant Sandstone Formation

Soil Type	No. Tests	SPT N – min.	SPT N – max.	SPT N – avg.
SANDSTONE GRAVEL	1	50/45mm		
SANDSTONE GRAVEL*	2	50/285mm	50/160mm	50/222.5mm
SANDSTONE	1	39		
SANDSTONE**	5	50/275mm	50/140mm	50/205mm
Strong SANDSTONE	8	50/15mm	50/5mm	50/8.4mm

* SPT believed to have originated within 'SANDSTONE GRAVEL' layer and crossed into 'Strong SANDSTONE' layer where the test was abandoned.
** SPT believed to have originated within 'SANDSTONE' layer and crossed into 'Strong SANDSTONE' layer where the test was abandoned.

One SPT test undertaken at 1.0m depth in WS07 recorded an N value of 39, indicating a dense soil, all other SPTs resulted in refusals with SPT N values in excess of 50 blows.

Point Load Testing

A total of 6no. point load tests were carried out on the Pennant Sandstone Formation recovered from the borehole BHC02. The results are summarised in Table 5.18.

Table 5.18: Summary of Point Load Index Tests Undertaken for Pennant Sandstone

Hole ID	Test Depth, m bgl	Point Load Strength Index	Estimated UCS (based upon Generalised Value C = 24.5)
BHC02	6.70 – 6.85	1.62	39.7
BHC02	7.35 – 7.50	3.16	77.4
BHC02	10.55 – 10.95	3.24	79.4
BHC02	15.50 – 15.70	2.31	56.6
BHC02	18.00 – 18.20	4.21	103.1
BHC02	22.35 – 22.50	3.87	94.8

For a core size of 76.8 mm, an average UCS can be estimated from point load strength index (discarding highest and lowest values) of 77 MPa, indicating a 'Strong' rock.

Determination of CBR Using Plate Load Tests

Along the tramway portion of the site, a single in situ plate load test was undertaken with equivalent CBR value calculated for strata lying within the pressure bulb (BS 1377:Part 9:1990, and IAN73/06 Rev.1). Table 5.19 summarises the results from the in-situ plate load test where the formation comprised the Highly Weathered Pennant Sandstone Formation.

Table 5.19 Summary of In-Situ CBR Data for Weathered Pennant Sandstone

Test ID	Settlement (mm)		Derived load at 1.25 mm	Modulus of Subgrade Reaction*	Equivalent CBR Value (%)
	Start	Finish			
CBR 4	0.00	1.33	798.4	281	169.1

* (k_{762})(MN/m^2/m)

Density Testing

A sample from the tramway area was tested in the laboratory to determine its CBR / Dry Density Moisture content relationship, as summarised in Table 5.20 below. The achievable CBR in laboratory conditions is much lower than that proved in-situ.

Table 5.20 –Summary of CBR / Dry Density Moisture Content Relationship for Weathered Pennant Sandstone

Test ID	CBR04
Optimum Moisture Content OMC %	9.6
CBR @ OMC %	20
Max Dry Density Mg/m^3	1.87
Natural Moisture Content (NMC) %	8.6
CBR @ NMC %	1.87
Dry Density @ NMC Mg/m^3	26

Other Testing

A single chemical test for soil aggressivity was undertaken on the Pennant Sandstone. This test is presented along with a summary of the test results in Table 5.21.

Table 5.21 Summary of Chemical Testing for Pennant Sandstone

Parameter	Value
pH	5.2
Organic Matter %	6.3
Sulphate Aqueous Extract as SO4 mg/l	26
Sulphate as SO4 Acid Extraction %	0.1

5.4 Groundwater/Soil Chemistry

Groundwater

Information on the groundwater regime is available from the following sources:

- Water observations during execution of exploratory holes; and
- The monitoring of groundwater installations (standpipes and piezometers) during and following the fieldwork period.

Water observations during execution of exploratory holes

Groundwater was not encountered during any of the exploratory holes.

Monitoring of groundwater installations (standpipes and piezometers) during and following the fieldwork period

A number of standpipes were installed during the ground investigation fieldwork period. The available monitoring data obtained during and post-fieldwork, is summarised in the Table 5.22, overleaf.

Table 5.22 – Groundwater Observations during Post Fieldwork Period at RRS-C

Exploratory Hole Ref.	Response Zone (m bgl)	Water Level (m OD)	
		19/03/2021	06/04/2021
BHC01	17.00 – 20.00	DRY	DRY
BHC02	21.00 – 24.00	23.20	DRY
BHC03	5.00 – 8.00	DRY	DRY
BHC05	17.00 – 20.00	19.85	DRY
BHC06	17.00 – 20.00	DRY	DRY
BHC07	5.00 – 8.00	6.43	DRY
BH01A (pre-existing)	unknown*	DRY	DRY
BH02A (pre-existing)	unknown**	DRY	DRY
BH03A (pre-existing)	unknown***	DRY	DRY

* Hole depth ~65.00m bgl
** Hole depth ~70.00m bgl
*** Hole depth ~69.00m bgl

Permeability

No permeability tests were undertaken during the ground investigation.

5.5 Geo-environmental Testing

General

The geo-environmental results are described in this Section using the same site order as used previously.

For Llanwonno Upper Tip and Receptor Site C, the soil samples were tested for a range of Contaminants of Concern (CoC), with the results screened against current Generic Assessment Criteria (GAC). The GAC used are those for park open space end use and for all determinants other than lead, the values have been taken from the LQM/CIEH Suitable for Use Levels (S4ULs), utilising a Soil Organic Matter (SOM) content of 1%. The GAC adopted for lead was the value taken from the C4SL's for open space land use, dated 2012.

Llanwonno Upper Tip – Soil Testing

A total of 10no. soil samples were tested from the samples collected as a part of the ground investigation works undertaken.

A screening of all the results obtained for the ground investigation looking at human health risk has been completed and in presented in Appendix C. The results have been screened and a number of observations can be made:

- pH was generally low, with all samples falling below the upper limit of the GAC:
  - Sample A was the only sample measured below the lower limit of the GAC, which recorded a pH= 5.8,
  - Samples that did not fail the GAC ranged from pH=6.0 to 7.4.
- Asbestos was detected in 1no. sample only:
  - Sample A recorded detectances of crocidolite (white) asbestos, although in quantification testing the concentration of asbestos was < 0.001%.

- Hydrocarbons – Naphthalene (min. 0.28ug/kg, max. 0.89ug/kg) and phenanthrene (min. 0.31ug/kg, max. 1.50ug/kg) were detected in all samples, but were the only determinants detected in Samples A, B, C, E, F, G, H, and I.
    - 11no. species of PAHs were detected in Sample D, and 6no. species were detected in Sample J,
    - The remaining samples measured PAH species below the LoD of the measuring equipment.

Llanwonno Upper Tip – Leaching Chemical Results

A total of 10no. soil leachate samples were tested from the samples collected as a part of the ground investigation works undertaken (screened results included in Appendix C). These results were screened against the relevant environmental quality standards (EQS) and drinking water standards (DWS).

- Copper is in exceedance of the $EQS_{bioavailable}$ in 9no. samples:
    - Minimum of < 0.7ug/l in Sample G;
    - Maximum of 6.6ug/l in Sample B;
- Lead is in exceedance of the $EQS_{bioavailable}$ and DWS in 9no. samples:
    - Minimum of < 1.0ug/l in Sample A;
    - Maximum of 7.0ug/l in Sample D;
    - Average of 2.8ug/l; and
- Zinc is in exceedance of the $EQS_{bioavailable}$ in 1no. sample only – 38ug/l in TPC03 0.20m bgl (topsoil / superficial).

No PAHs, monoaromatics or TPH species were present above detection limits. The concentrations of copper, zinc, manganese, and nickel were assessed using the UK Technical Advisory Group Metal Bioavailability Assessment Tool (m-BAT) to determine their bioavailable concentrations. The bioavailable fraction of each contaminant was found to be below levels of concern.

A number of samples have laboratory detection limits at a concentration higher than the corresponding AC. It is conservatively assumed that these samples recorded a value matching the limit of detection when preparing the screening tables. Specialised laboratory testing would be required to improve these detection limits to meet the required standards.

Receptor Site C – Soil testing

A total of 14no. soil samples were tested from the samples collected as a part of the ground investigation works undertaken. A screening of all the results obtained for the ground investigation looking at human health risk has been completed and in presented in Appendix C. The results have been screened and a number of observations can be made:

- pH was generally near neutral but there were 8no. more acidic samples which had a pH value falling below pH=6 which is a limit often used in the brownfield industry:
    - TPC04 0.20m bgl (pH=4.8), TPC05 0.20m bgl (pH=5.2), and TPC07 0.20m bgl (pH=4.9) were sampled within the topsoil layer;
    - TPC03 0.20m bgl (pH=5.4) and TPC06 0.20m bgl (pH=5.5) were sampled at the contact between the topsoil and superficial deposits;
    - BHC01 0.10m bgl (pH=5.0) was sampled within Made Ground; and

- TPC05 0.50m bgl (pH=5.4) and BHC02 0.50m bgl (pH=5.3) were sampled within superficial deposits;

A number of determinant's were detected within a number of samples that display some elevation relative to background values and these are but did not exceed the relevant GAC. These included:

- **Metals** – Maximum concentrations include:
  - Aluminium, of 12,000mg/kg in TPC03 0.20m bgl (topsoil / superficial deposits);
  - Copper, of 170mg/kg in TPC04 0.20m bgl (topsoil);
  - Lead, of 190mg/kg in TPC04 0.20m bgl (topsoil); and
  - Manganese, of 1400mg/kg in WS01 2.00m bgl (Made Ground);

- **Hydrocarbons** – Fluoranthene and pyrene were detected in samples TPC04 0.20m bgl (1.9mg/kg and 1.8mg/kg) and BHC02 0.10m bgl (0.33mg/kg and 0.28mg/kg), but were the only determinants detected in these samples. A full PAH suite was detected in sample TPC01 0.20m bgl but individual values were low (e.g. Benzo(a)pyrene (BaP) =0.69 mg/kg) and dibenzo(a,h)anthracene =0.54 mg/kg. TPH was also recorded in this sample but total aliphatic hydrocarbons were low at 5.3 mg/kg and total aromatic hydrocarbons were also low at 22 mg/kg.

  A total of 13no. soil samples were screened for absence of asbestos 'presence' or 'absence' and none of the samples detected asbestos fibres within the soil samples.

  Two samples, where the Made Ground was noted to contain coal fragments, were tested for caloric value (TPC01 and TPC02) which returned results of 2.1 and 8.1 MJ/kg respectively.

  Receptor Site C – Leaching Results

  A total of 6no. soil leachate samples were tested from the samples collected as a part of the ground investigation works undertaken (screened results included in Appendix C). These results were screened against the relevant environmental quality standards (EQS) and drinking water standards (DWS).

  - Arsenic levels were detected in all samples with a maximum value of 1.6ug/l in TPC06 0.20m bgl (topsoil / superficial) which is below the DWS and EQS;
  - Aluminium is in exceedance of the DWS in 1no. sample only – 230ug/l in TPC06 0.20m bgl (topsoil / superficial);
  - Copper is in exceedance of the $EQS_{bioavailable}$ in 3no. samples – 2.8ug/l in TPC06 0.20m bgl (topsoil / superficial), 2.1ug/l in TPC01 0.50m bgl (Made Ground), and 5.4u/l in BHC02 0.10m bgl (topsoil). The DWS was not exceeded in any tested samples;
  - Iron is in exceedance of the DWS in 5no. samples, with 2no. of these also elevated above the EQS value – 1200ug/l in TPC06 0.20m bgl (topsoil / superficial) and 1100ug/l in BHC02 0.10m bgl (topsoil), and 750ug/l, 550ug/l, and 240ug/l in TPC03 0.20m bgl (topsoil / superficial), TPC01 0.50m bgl (Made Ground), and TPC02 0.20m bgl (Made Ground), respectively; and
  - Zinc is in exceedance of the $EQS_{bioavailable}$ in 1no. sample only – 38ug/l in TPC03 0.20m bgl (topsoil / superficial).

Whilst not exceedances it is noted that:

- Antimony levels were measured below the LoD in all samples which is below the DWS;
- pH levels are between 7.7 and 8.5, which falls within the upper and lower bounds of the DWS;
- PAHs are all measured below the LoD values in all samples; and
- TPHs are all measured below the LoD values in all samples, excluding TPH Aliphatics >C21-C35 in sample WS01 2.00m bgl (Made Ground) only, which measured 830ug/l. This result was unexpected as there were no TPH chemicals measured in the same 'total' soil sample.

A number of samples have laboratory detection limits at a concentration higher than the corresponding AC. It is conservatively assumed that these samples recorded a value matching the limit of detection when preparing the screening tables. Specialised laboratory testing would be required to improve these detection limits to meet the required standards.

Receptor Site C – Water Testing

1no. groundwater sample (BHC07 6.43m bgl) and 3no. surface water (SW01 19/03/2021, SW01 08/04/2021, and SW02 19/03/2021) samples were collected as part of the ground investigation works undertaken (results included in Appendix C). These results were screened against the relevant environmental quality standards (EQS) and drinking water standards (DWS).

The results have been screened against the adopted CWAC (Appendix A, Table A) and a number of observations can be made:

- Dissolved copper is in exceedance of the $EQS_{bioavailable}$ in 4no. samples – 1.5ug/l in BHC07, 5.7ug/l in SW01 19/03, 9.3ug/l in SW01 08/04, and 3.6ug/l in SW02. The DWS was not exceeded in any tested samples; and
- Dissolved manganese is in exceedance of the DWS and $EQS_{bioavailable}$ in 2no. samples – 240ug/l in BH07 and 180ug/l in SW02. When the m-BAT tool is used to check the SW02 result then the value exceeds the adjusted limit for manganese of 123 ug/l.

Whilst not exceedances it is noted that:

- pH levels are between 7.9 and 8.2, which falls within the upper and lower bounds of the DWS;
- Dissolved PAHs are all measured below the LoD values in all samples;
- Dissolved TPHs are all measured below the LoD values in all samples; and
- Dissolved sulphate levels were low with a maximum value of 75ug/l in BHC07 which is below the EQS and DWS.

A number of samples have laboratory detection limits at a concentration higher than the corresponding EQS and/or DWS. It is conservatively assumed that these samples recorded a value matching the limit of detection when preparing the screening tables. Specialised laboratory testing would be required to improve these detection limits to meet the required standards.

Receptor Site C – Ground Gas Monitoring

Ground gas was monitored for 2no. rounds. Gas flow was not recorded (i.e. < 0.0L/hr) in both monitoring rounds. Methane was not recorded in any location and the highest recorded carbon

dioxide concentration was 1.2% within BHC01. On this basis the gas regime at the site is very low risk.

Table 5.23 – Ground Gas Monitoring

Hole Ref.	Response Zone (m bgl)	Date	Flow (L/Hr)	CH_4 (%)	CO_2 (%)	O_2 (%)	CO (ppm)	H_2S (ppm)
BHC01	17.00 – 20.00	19/03/21	0.0	0.0	1.0	20.8	0	0
		06/04/21	0.0	0.0	1.2	20.6	0	0
BHC02	21.00 – 24.00	19/03/21	0.0	0.0	0.2	21.4	0	0
		06/04/21	0.0	0.0	0.4	20.8	0	0
BHC03	5.00 – 8.00	19/03/21	0.0	0.0	0.5	21.2	0	0
		06/04/21	0.0	0.0	0.7	21.0	0	0
BHC05	17.00 – 20.00	19/03/21	0.0	0.0	0.6	18.2	0	0
		06/04/21	0.0	0.0	0.8	19.8	0	0
BHC06	17.00 – 20.00	19/03/21	0.0	0.0	0.1	20.2	0	0
		06/04/21	0.0	0.0	1.0	20.3	0	0
BHC07	5.00 – 8.00	19/03/21	0.0	0.0	0.2	21.1	0	0
		06/04/21	0.0	0.0	0.5	20.3	0	0
BH01A*	unknown	19/03/21	0.0	0.0	0.1	21.4	0	0
		06/04/21	0.0	0.0	0.2	21.2	0	0
BH02A**	unknown	19/03/21	0.0	0.0	0.3	20.9	0	0
		06/04/21	0.0	0.0	0.1	21.0	0	0
BH03A***	unknown	19/03/21	0.0	0.0	0.1	21.3	0	0
		06/04/21	0.0	0.0	0.0	21.4	0	0

* Hole depth ~65.00m bgl
** Hole depth ~70.00m bgl
*** Hole depth ~69.00m bgl

5.6 Material Properties

Based on the data collected during the ground investigation and experience of working in similar materials, the following material properties are deemed as appropriate for the strata encountered within the ground investigation at the site.

Table 5.24 – Material Properties by Strata

Strata	Made Ground	Superficial Deposits	Highly Weathered PSF	Pennant Sandstone Formation
γ (kN/m^3)	19.9	19.5	21.9	23.5
C' (kN/m^2)	0	0	0	-
Φ' (degrees)	33.5	32 to 36	36	-
Cu (kN/m^2)	0	0	0	-

Any excavations / founding layers are to be inspected by a competent ground engineering specialist to confirm the strata exposed for founding is as per the parameters used for the design.

5.7 Further Ground Investigation Requirements and Geotechnical Risk Register

No further ground investigation is required for Receptor Site C as the investigation has given good coverage (in relation to the footprint where the new landform will sit) and the material testing built into the earthworks specification will give confidence as to the stability of the completed landform. A specific report on embankment stability is planned, to inform earthwork geometry and slope angles, and this will need to consider the presence of soft to firm mixed granular and cohesive glacial tills present at shallow depths, in pockets under parts of the new landform.

Limited further ground investigation has been designed for the Llanwonno Upper Tip, this comprises piezometer and inclinometer installation and monitoring. The piezometers and associated monitoring programme are required to confirm that groundwater levels are in accordance with the stability calculations of donor site stability. Furthermore, because hydrogeological calculations to assess spring flows (which arise when the sandstone units become saturated in spring and winter and overtop into the hillside) have shown that each of the proposed herringbone water collection systems will receive between 0.8 to 6.1 L/S of spring water, it would be prudent to check that in operation the drains are functioning as planned and maintaining safe heads in the reprofiled tip. The inclinometers are to be installed as general good practice, to check for any creep effects that would be difficult to assess in the absence of installing these measures.

A stability report on the re-configured donor landform (Llanwonno Upper tip) is a requirement of the wider Capita teams work tasks at Tylorstown.

The detailed design of the haul road will be a contractor design deliverable, and this will include local geogrid reinforcing elements such as where the road passes over the known adit and smaller structures such as drainage pipes.

The Geotechnical Risk Register is found at Appendix D.

6. Contaminated Land Assessment

6.1 Introduction

The information presented in the previous sections of this report has been collated and evaluated to establish a post investigation qualitative risk assessment for the site. A Conceptual Site Model has been generated based on information derived from this assessment.

The site has been considered with regard to current UK legislation and guidance, namely 'Land Contamination: Risk Management 2019', Part 2A of the Environmental Protection Act 1990 and the Contaminated Land (England) Regulations 2000 and in accordance with current UK good practice guidelines.

For a risk of pollution or environmental harm to occur as a result of ground contamination, all of the following elements must be present in order for a pollutant linkage to be formed:

- Source, i.e. a substance that is capable of causing pollution or harm;
- Pathway, i.e. a route by which the contaminant can reach a target; and
- Receptor (target), i.e. something which could be adversely affected by the contaminant.

If one of these elements is absent there can be no significant risk. If all are present then the magnitude of the risk is a function of the magnitude and mobility of the source, the sensitivity of the receptor and the nature of the migration pathway.

The contaminated land 'Preliminary Risk Assessment' provides a qualitative evaluation of potentially active "pollutant linkages" at the site; these being plausible scenarios whereby a contamination source is connected to a possible receptor by one more potential migration pathways:

i. Potential sources of contamination: these include any actual or potential contaminative materials and activities, located either on, or in the vicinity of the site;

ii. Potential pathways for contamination migration: these comprise the routes or mechanism by which in-ground contaminants may connect the source to a receptor, including environmental migration pathways and human health exposure pathways; and

iii. Potential receptors at risk from contamination or pollution: these include present and / or future land users, ecological systems, water resources and property.

Potential sources, pathways and receptors have been identified and the risks associated with possible pollutant linkages assessed in Table 6.1.

6.2 Conceptual Site Model

From the information reviewed in this report the following on-site and off-site sources of potential contamination, receptors and potential pathways have been identified for the site. Sources, pathways, and receptors are numbered in Table 6.1 overleaf, which correspond to Table 6.5 further on in this Section.

Table 6.1 – Conceptual Site Model

Potential Sources of Contamination		Number
On-Site		
Llanwonno Upper Tip and on RS-C taking cognisance that a large component of material from the donor site will be relocated there. Risk of leachate with moderate iron, manganese, and aluminium.		**S1**
Llanwonno Upper Tip and on RS-C taking cognisance that a large component of material from the donor site will be relocated there. Risk of rare pockets of soil with asbestos traces.		**S2**
Historic tramways – potential for contaminants including oils, creosote or asbestos but no visual evidence has been seen.		**S3**
Acidic pH in existing topsoil on RS-C.		**S4**
Off-Site		
Llanwonno Lower Tip and Tylorstown Tip – leachate high in iron, manganese, aluminium, and possible ground gas generation.		**S5**
Mine adits – potential for acid mine drainage and ground gas generation. An example being a seepage of ferruginous mine water from Llanwonno Lower Tip.		**S6**
Identified Pathways		
Human Health – Airborne Migration Pathways / Inhalation	As the majority of the site is not currently surfaced with hardstanding, there are potential **particulate / dust / fibre** inhalation pathways. This pathway includes windblown contaminants from offsite sources.	**P1**
	Vapour inhalation pathways.	**P2**
Human Health – Direct Contact Exposure Pathways	Direct **dermal contact** with soils.	**P3**
Human Health – Ingestion	**Ingestion** via hand to mouth action from contaminated soils and waters.	**P4**
Controlled Waters – Aqueous Migration Pathways	On-site surface / near-surface mobile contaminants have the potential to enter the shallow groundwater regime via **leaching** and migration and impact the underlying aquifers and via seepage outflows impact watercourses within the local area.	**P5**
	The bedrock geology is indicated to be a Secondary A aquifer, in which **groundwater migration** pathways may be active.	**P6**
Potential Receptors		
Human Health	**Current site users** including members of the public such as walkers.	**R1**
	Construction workers / contractors who may undergo exposure during construction work (particularly ground works) undertaken at the site.	**R2**
	Future end-users including members of the public such as walkers.	**R3**
Controlled Waters	The **Afon Rhondda Fach** and tributaries.	**R4**
	Groundwater within the **Secondary A Aquifer** superficial and bedrock deposits.	**R5**

6.3 Discounted Sources

Former Pendyrus and Ferndale Colliery – while the former collieries are a likely source of contamination on the valley floor, it is considered unlikely that any contamination would impact the Phase 4 site as it would be reasonably localised to the sources areas and there is sufficient separation (often uphill) from the site as to rule out any pathway. Historically there were smithies associated with the colliery buildings but again these are quite distant from the Phase 4 site. Of all sources, mine gas is likely to travel the furthest but the old colliery shafts are now filled and or capped and the Pendyrus Colliery is redeveloped as the Rhondda Fach Leisure Centre.

Burnt shale fill (which can have high levels of arsenic), which was tentatively thought to exist in parts of RS-C has not been identified in any of the exploratory holes and consequently this source has been discarded at the post ground investigation stage.

Former offsite quarries, some potentially infilled, lie to the south of the site not far from RS-C. However, the ground gas monitoring at RS-C has not encountered any significantly elevated ground gas levels suggesting that either is no source or no pathway, or perhaps a lack of both.

Some old coal tips in the Welsh Valleys are a hazard as they suffer underground smouldering due to high coal contents. The loss on ignition values obtained by both Halcrow and by the recent ground investigation do not suggest that there are particularly high coal contents in the Llanwonno Upper Tip. On this basis there is considered not be a significant smouldering risk either at the donor site or the receptor area.

6.4 Qualitative Post Investigation Risk Assessment

Based on the Conceptual Site Model outlined in the preceding sections, a qualitative ground contamination Preliminary Risk Assessment has been undertaken in-line with the methodology outlined in CIRIA 552 (CIRIA, 2001).

The assessment of risk is considered as a combination of the severity of the potential risk and likelihood of its occurrence in line with the definitions presented in the following tables.

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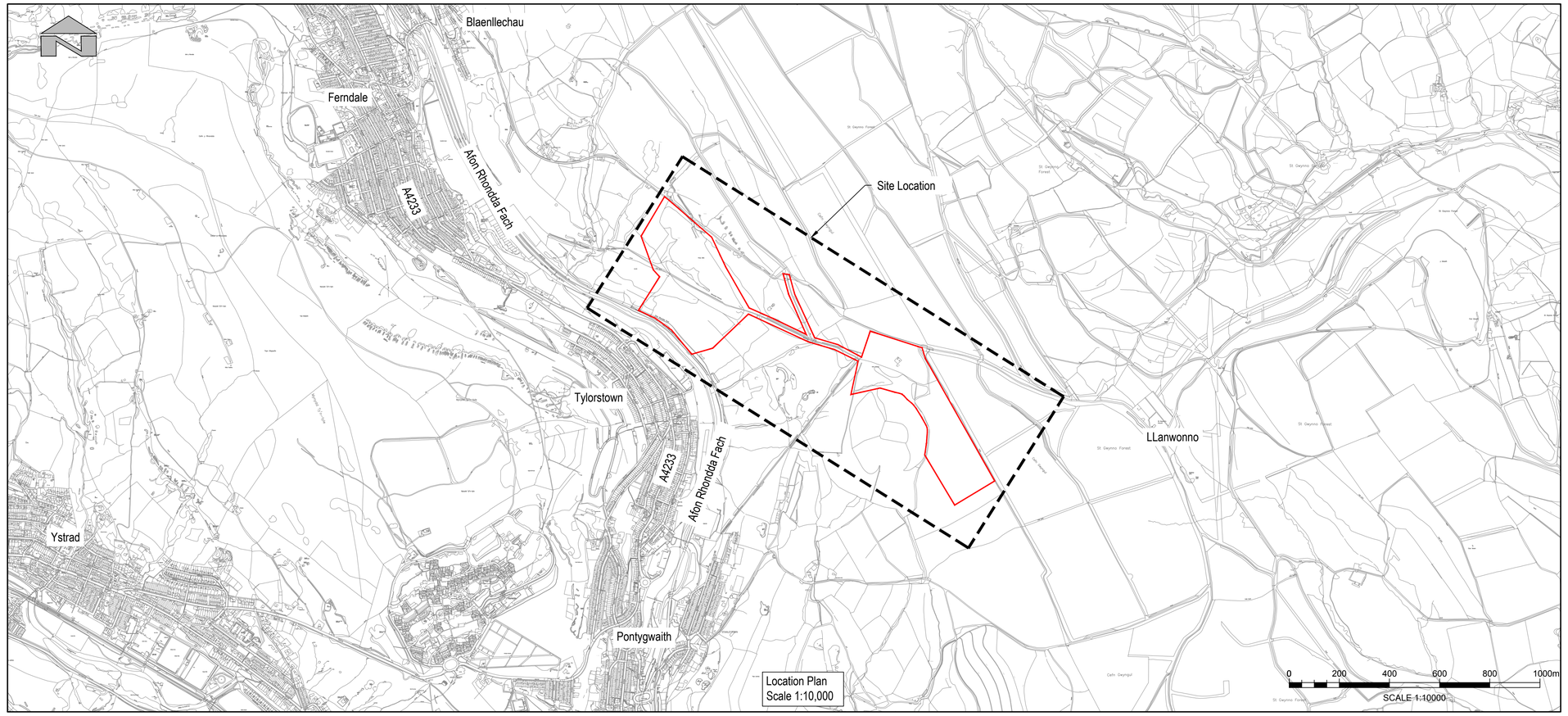
DRAWINGS

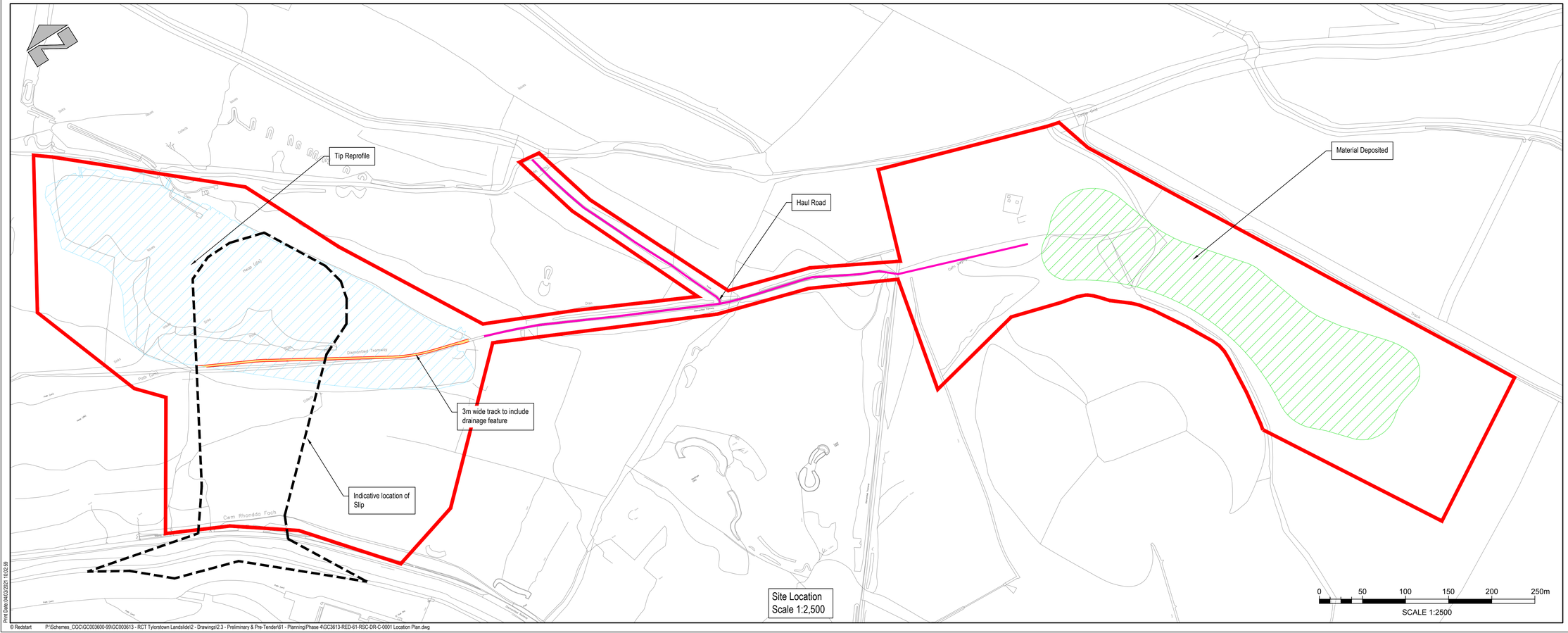


Key:

- Planning Boundary
- Proposed Tip Reprofile (including Tramway)
- Proposed Material deposit
- Proposed Haul Route
- Proposed 3m wide track to include drainage feature
- Indicative location of Slip

Notes:

1. For Tip Reprofile General Arrangement refer to drawing : GC3613-RED-61-RSC-DR-C-0002
2. For Receptor Site C General Arrangement refer to drawing : GC3613-RED-61-RSC-DR-C-0003
3. For cross sections of Tip Reprofile refer to drawings: GC3613-RED-61-RSC-DR-C-0004-0008
4. For cross sections of Receptor Site C refer to drawings: GC3613-RED-61-RSC-DR-C-0009-0013



Rev	Drwn	Chkd	Apprd	Description	Date

Purpose of Issue
D5 - Suitable for Planning

Classification
Public

Client
Rhondda Cynon Taf
County Borough Council

Project
Tylorstown Landslide

Drawing
Phase 4
Location Plan

Scale @ A1	Drawn	Checked	Approved
As Shown	MH	NG	PH

Project No.: GC/3613
Date: March 2021

Drawing Identifier (Project - Originator - Zone - Level - File Type - Role - Number): GC3613-RED-61-RSC-DR-C-0001
BS1192 Compliant revision: P01

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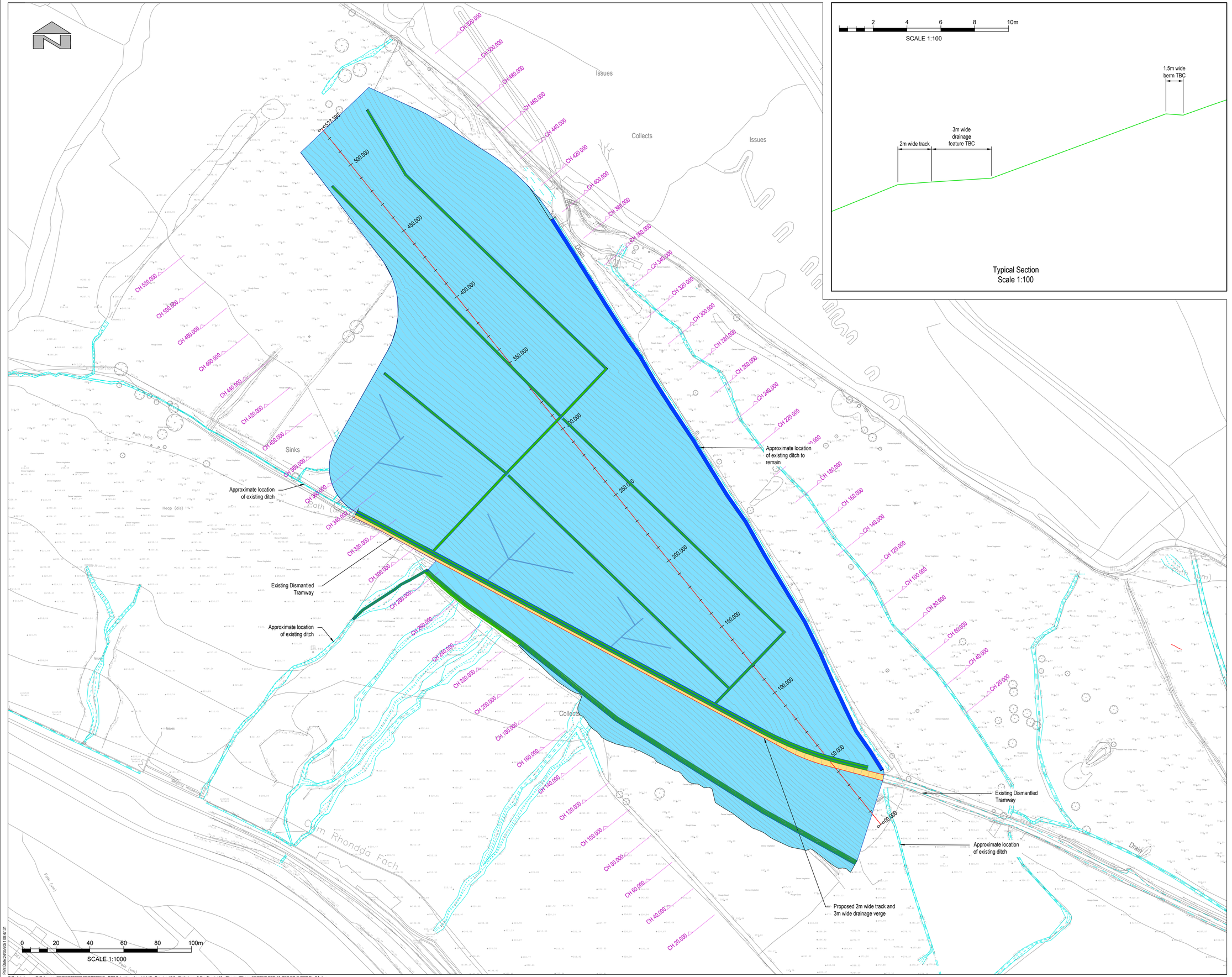
 P:\Schemes_CGC\GC003600-99\GC003613 - RCT Tylorstown Landslide\2 - Drawings\2.3 - Preliminary & Pre-Tender\61 - Planning\Phase 4\GC3613-RED-61-RSC-DR-C-0001 Location Plan.dwg

Print Date: 04/03/2021 10:02:59



Typical Section
Scale 1:100

Key:

- Proposed Tip Reprofile (including Tramway)
- Proposed 2m wide track and 3m wide drainage feature
- Proposed ditch/swale
- Existing ditch

Notes:

1. For Location Plan refer to drawing : GC3613-RED-61-RSC-DR-C-0001
2. For Receptor Site C General Arrangement refer to drawing : GC3613-RED-61-RSC-DR-C-0003
3. For cross sections of Tip Reprofile refer to drawings: GC3613-RED-61-RSC-DR-C-0004-0010
4. For Receptor Site C Cross Sections refer to drawings: GC3613-RED-61-RSC-DR-C-0009-0013

Rev	Drwn	Chk'd	App'd	Description	Date

Purpose of Issue
D5 - Suitable for Planning

Classification
Public

Client
Rhondda Cynon Taf
County Borough Council

Project
Tylorstown Landslide

Drawing
Phase 4
General Arrangement
Tip Reprofile

Scale @ A1	Drawn	Checked	Approved
As Shown	MH	NG	PH

Project No.	Date
GC/3613	March 2021

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number
GC3613-RED-61-RSC-DR-C-0002

BS1192 Compliant revision
P01

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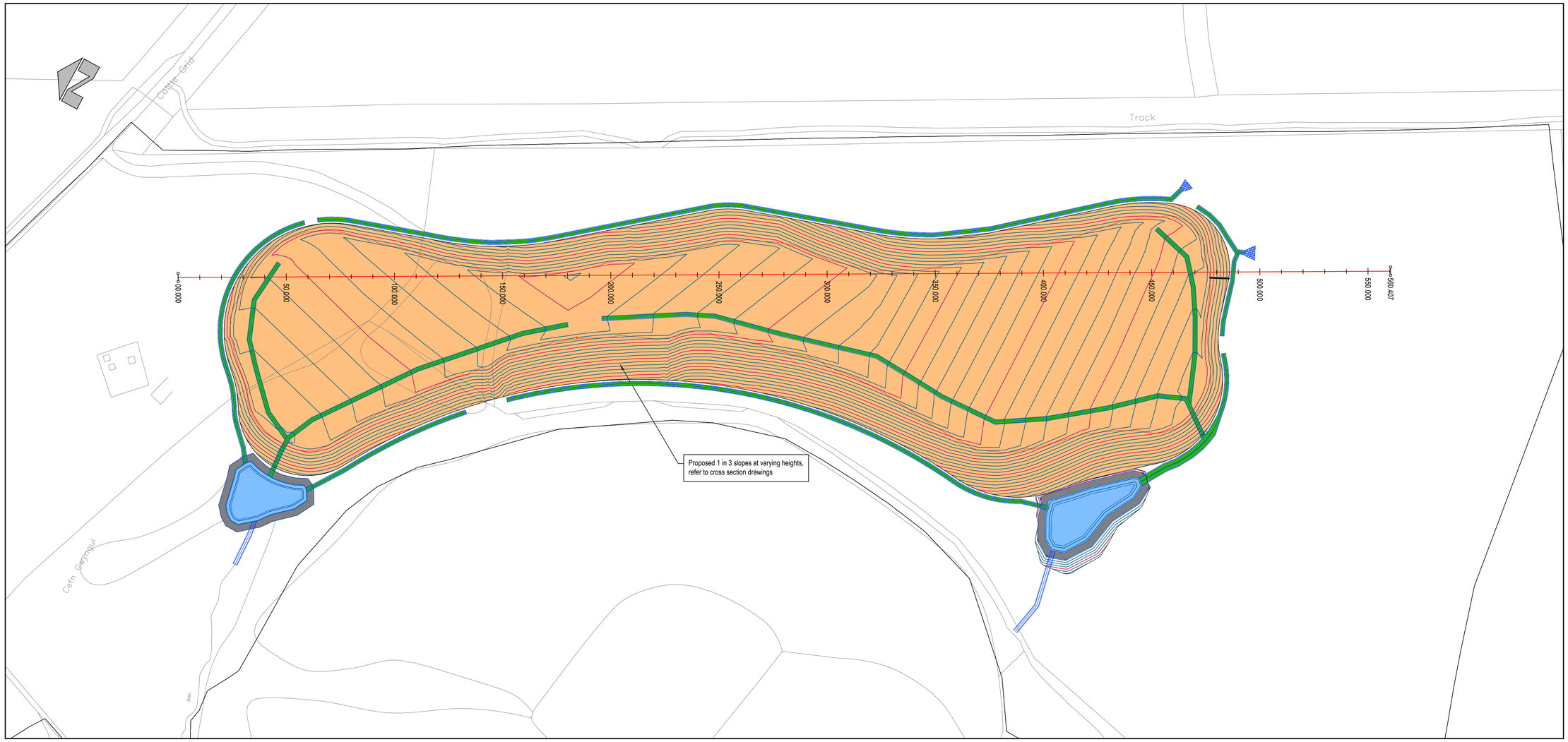


Key:

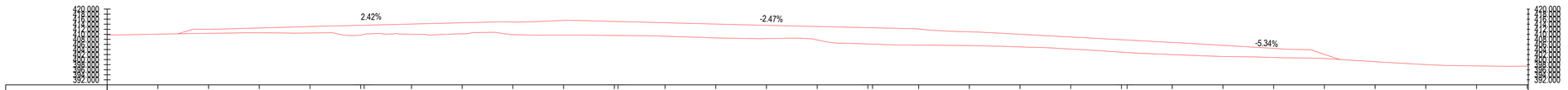
- Proposed Deposited Material
- Proposed Contour Major (2.5m intervals)
- Proposed Contour Minor (0.5m intervals)

Notes:

1. For Location Plan refer to drawing : GC3613-RED-61-RSC-DR-C-0001
2. For Tip Reprofile General Arrangement refer to drawing : GC3613-RED-61-RSC-DR-C-0002
3. For cross sections of Tip Reprofile refer to drawings: GC3613-RED-61-RSC-DR-C-0004-0008
4. For cross sections of Receptor Site C refer to drawings: GC3613-RED-61-RSC-DR-C-0009-0013

Key:

- Existing Ground survey
- Proposed Ground



Long Section through Receptor Site C CHAINAGE	20.000	40.000	60.000	80.000	100.000	101.331	120.000	140.000	160.000	180.000	200.000	201.455	220.000	240.000	260.000	280.000	300.000	301.809	320.000	340.000	360.000	380.000	400.000	402.211	420.000	440.000	460.000	480.000	500.000	520.000	540.000	560.000
EXISTING LEVELS	410.054	410.385	410.596	410.547	409.702	409.713	409.968	410.194	409.906	409.693	409.540	409.470	409.236	408.568	408.345	407.804	406.197	405.902	405.736	405.572	405.022	404.172	402.960	401.999	401.637	401.218	400.844	400.449	399.192	398.043	397.667	397.519	397.449
PROPOSED LEVELS		412.006	412.503	413.065	413.572	413.605	414.070	414.570	414.834	415.522	415.094	415.056	414.582	414.067	413.567	413.094	412.630	412.588	412.123	410.979	410.029	408.952	407.873	407.754	406.794	405.636	404.456	402.077					
LEVEL DIFFERENCE		1.620	1.907	2.518	3.869	4.102	4.376	4.928	5.828	5.553	5.347	5.499	5.222	5.290	6.433	6.388	5.406	5.007	4.780	4.913	4.796	4.418	3.613	1.628								
HORIZONTAL GEOMETRY	L =560.407																															

Long Section through Receptor Site C
SCALE: H 1:1000, V 1:1000

0 20 40 60 80 100m
SCALE 1:1000

Rev	Drwn	Chkd	Appd	Description	Date

Purpose of Issue
D5 - Suitable for Planning

Classification
Public

Client
Rhondda Cynon Taf
County Borough Council

Project
Tylorstown Landslide

Drawing
Phase 4
General Arrangement
Receptor Site C

Scale @ A1	Drawn	Checked	Approved
As Shown	MH	NG	PH

Project No. GC/3613
Date March 2021

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number
GC3613-RED-61-RSC-DR-C-0003
BS1192 Compliant revision P01

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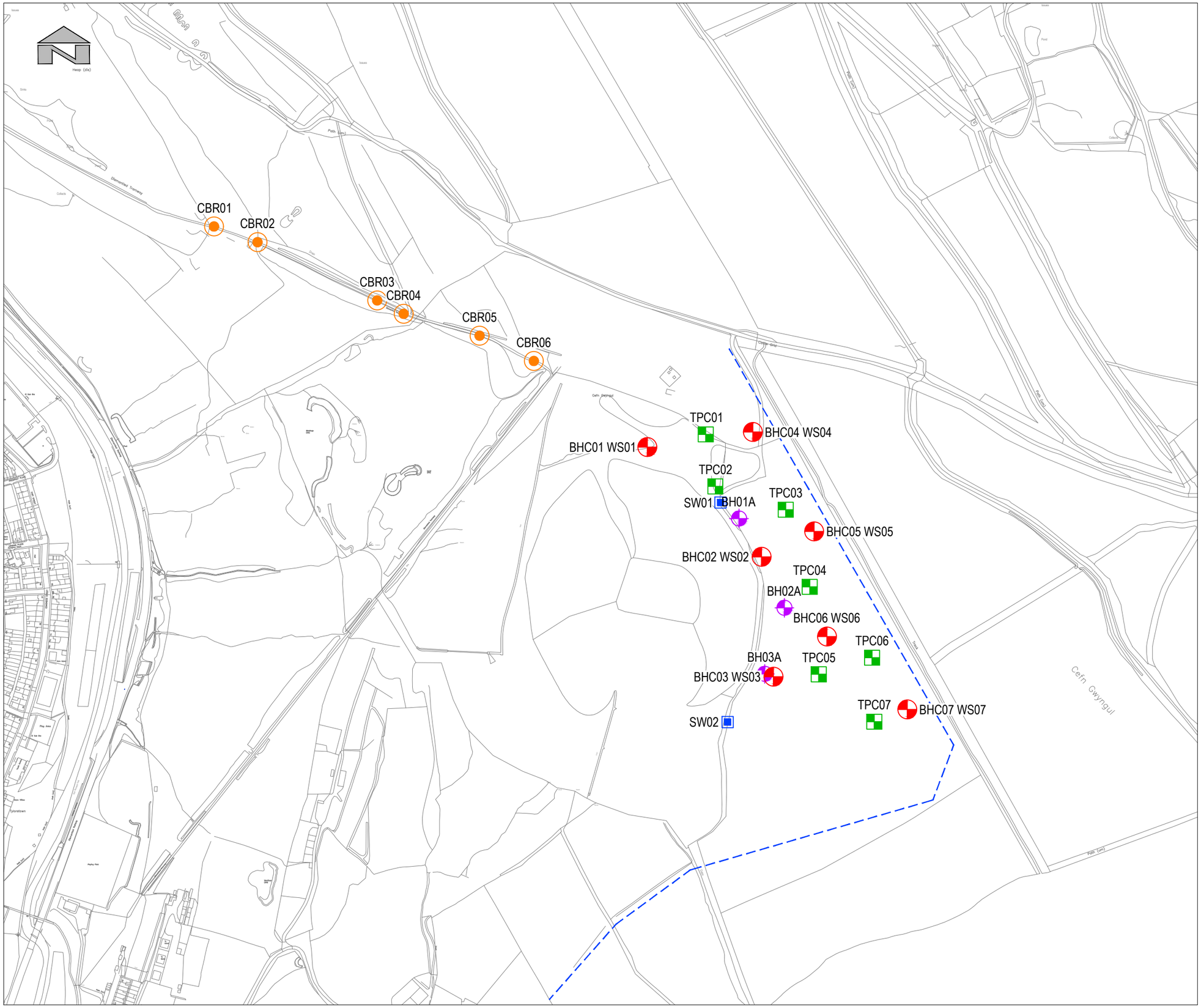
APPENDIX A

EXPLORATORY HOLE LOCATION PLAN



Key

- Borehole
- Trial Pit
- Water Sampling
- Existing Well Pipes
- CBR
- Western Power Distribution

Rev	Drwn	Chk'd	App'd	Description	Date
P01	LB	NG		First Issue.	23/04/2021

Purpose of Issue
S2 - Fit For Information

Classification
Commercial in Confidence

Client
Rhondda Cynon Taf
County Borough Council

Project
Tylorstown Landslip

Drawing
Exploratory Hole Location Plan
Phase 4
Receptor Site C

Scale @ A3	Drawn	Checked	Approved
1:2,000	LB	NG	AR

Project No.	Date
GC3613	April 2021

Drawing Identifier — BS1192 Compliant
Project - Originator - Zone - Level - File Type - Role - Number — rev
GC3613-RED-75-XX-DR-C-0074 — P01

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Print Date: 23/04/2021 11:52:52

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APPENDIX B

FACTUAL GROUND INVESTIGATION REPORTS

Intégral Géotechnique

Intégral House
7 Beddau Way
Castlegate Business Park
Caerphilly
CF83 2AX
Tel: 029 20807991
mail@integralgeotec.com

12651/JJ

23 February 2021

Walters Group
Hirwaun House,
Hirwaun,
Aberdare,
CF44 9UL

For the attention of Mr Luke Holmes

Dear Sirs,

Tylorstown Landslip – Factual Report on Upper Tip Soils

We have now completed the soil sampling and testing works at the above site and can report as follows.

Site Works

Intégral Géotechnique (Wales) Limited (IG) were instructed by Walters to attend site and take a number of near surface soil samples across the existing colliery waste tip (referred to as the 'Upper Tip') situated above the Tylorstown landslip. The location of the Upper Tip indicated in Figure 1.

A Geotechnical Engineer from Intégral Géotechnique (Wales) Limited attended site on 26 January 2020.

Sampling of the near surface soils was undertaken at 10 No. locations (A to J) positioned across the Upper Tip, as indicated in Figure 2.

Ground Conditions

At each sampling location (A to J), a shallow hand excavated trial pit was undertaken to a depth of approximately 0.6m bgl. The encountered soils typically comprised colliery waste, consisting of black clayey sandy fine to coarse gravel of angular coal, shale and mudstone.

Laboratory Chemical Testing (Soils and Soil Leachate)

A total of 10 No. soil samples were obtained from across the Upper Tip, stored at the appropriate temperature, and dispatched to the UKAS and MCERTS accredited laboratories of i2 Analytical for laboratory chemical testing of soil and soil leachate within 24 hours.

The soil samples were placed in the appropriate sample containers deemed suitable for the analysis required. Strict protocols were adopted during this process to limit the cross contamination of samples.

The soil samples (referenced A to J) were obtained from approximately 0.4m bgl.

The soil samples were tested for a range of contaminants in soil and soil leachate, in accordance with a testing specification provided by Capita.

A list of the soil and soil leachate testing carried out on each sample is as follows:

General Inorganics

pH	Water Soluble Sulphate	Total Organic Carbon
Total Cyanide	Sulphide	Loss on Ignition
Total Sulphate	Total Sulphur	Asbestos in soil

Metals and Metalloids

Arsenic	Chromium (VI)	Nickel
Beryllium	Copper	Selenium
Boron	Lead	Vanadium
Cadmium	Mercury	Zinc
Chromium (III)	Manganese	

Organics

Benzene	Aliphatic EC >35-44	Benzo[a]pyrene
Toluene	Aromatic EC 5-7	Benzo[b]fluoranthene
Ethylbenzene	Aromatic EC >7-8	Benzo[ghi]perylene
O-Xylenes	Aromatic EC >8-10	Benzo[k]fluoranthene
M-Xylene	Aromatic EC >10-12	Chrysene
P-Xylene	Aromatic EC >12-16	Dibenz[ah]anthracene
MTBE	Aromatic EC >16-21	Fluoranthene
Aliphatic EC 5-6	Aromatic EC >21-35	Fluorene
Aliphatic EC >6-8	Aromatic EC >35-44	Indenol[123-cd]pyrene
Aliphatic EC >8-10	Acenaphthene	Naphthalene
Aliphatic EC >10-12	Acenaphthylene	Phenanthrene
Aliphatic EC >12-16	Anthracene	Pyrene
Aliphatic EC >16-35	Benz[a]anthracene	

Phenols

Total Phenols

The results of the laboratory chemical testing are presented in Appendix A.

Laboratory Geotechnical Testing

A total of 10 No. soil samples were obtained from across the Upper Tip and dispatched to the UKAS accredited laboratories of Apex Testing Solutions (ATS) for laboratory geotechnical testing.

The soil samples (referenced A to J) were obtained from approximately 0.4m bgl.

A list of the geotechnical testing carried out on each sample (as specified by Capita) is as follows:

- Moisture Content
- Particle Size Distribution (wet sieve)
- Proctor Compaction

The results of the laboratory geotechnical testing are presented in Appendix B.

We trust the above and enclosed are to your satisfaction. However, if you have any queries or require any further information, please do not hesitate to contact us.

Yours faithfully,

Jack Jones
For
Intégral Géotechnique (Wales) Limited

Encl.

Appendix A – Laboratory Chemical Test Results
Appendix B – Laboratory Geotechnical Test Results

Figures

APPENDIX A

LABORATORY CHEMICAL TEST RESULTS

Jack Jones
Integral Geotechnique
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CF83 2AX

t: 02920807991
f: 02920862176
e: jack@integralgeotec.com

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 21-54008

Replaces Analytical Report Number: 21-54008, issue no. 2
Additional analysis undertaken.

Project / Site name:	Upper Tip	**Samples received on:**	29/01/2021
Your job number:	12651	**Samples instructed on/ Analysis started on:**	29/01/2021
Your order number:		**Analysis completed by:**	23/02/2021
Report Issue Number:	3	**Report issued on:**	23/02/2021
Samples Analysed:	10 leachate samples - 10 soil samples		

Signed:

Joanna Wawrzeczko
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 21-54008
Project / Site name: Upper Tip

Lab Sample Number				1753602	1753603	1753604	1753605	1753606
Sample Reference				A	B	C	D	E
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	0.40	0.40	0.40	0.40
Date Sampled				27/01/2021	27/01/2021	27/01/2021	27/01/2021	27/01/2021
Time Taken				0930	0945	1000	1015	1030
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	12	6.9	12	8.2	6.9
Total mass of sample received	kg	0.001	NONE	1	1	1	1	1
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	Crocidolite	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	< 0.001	-	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	< 0.001	-	-	-	-
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	5.8	6.2	6	6.3	7
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO4	mg/kg	50	MCERTS	2300	1200	2400	6000	430
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.043	0.047	0.019	0.048	0.033
Sulphide	mg/kg	1	MCERTS	1.5	< 1.0	< 1.0	4.3	< 1.0
Total Sulphur	mg/kg	50	MCERTS	1400	640	1300	3000	300
Total Organic Carbon (TOC)	%	0.1	MCERTS	2.7	1.3	3.5	1.8	0.9
Loss on Ignition @ 450oC	%	0.2	MCERTS	21.9	13.9	27.8	20.5	9.8
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	0.55	0.45	0.89	0.75	0.37
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.2	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.88	0.52	1.3	1.5	0.41
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.23	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.94	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.78	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.51	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.55	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.38	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.21	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.23	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	1.43	0.97	2.2	6.28	< 0.80

Analytical Report Number: 21-54008
Project / Site name: Upper Tip

Lab Sample Number				1753602	1753603	1753604	1753605	1753606
Sample Reference				A	B	C	D	E
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	0.40	0.40	0.40	0.40
Date Sampled				27/01/2021	27/01/2021	27/01/2021	27/01/2021	27/01/2021
Time Taken				0930	0945	1000	1015	1030
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	15	6.8	14	13	6
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.83	1.4	1	0.61	1.2
Boron (water soluble)	mg/kg	0.2	MCERTS	< 0.2	0.3	< 0.2	0.3	0.3
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	5.9	4.6	5.2	4.1	5.1
Copper (aqua regia extractable)	mg/kg	1	MCERTS	48	52	51	49	44
Lead (aqua regia extractable)	mg/kg	1	MCERTS	30	27	27	25	20
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	310	300	410	120	280
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.4	< 0.3	0.5	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	25	35	25	14	34
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	2.1	1.2	3.2	1.3	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	16	13	12	12	11
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	55	94	63	30	78
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 21-54008
Project / Site name: Upper Tip

Lab Sample Number				1753607	1753608	1753609	1753610	1753611
Sample Reference				F	G	H	I	J
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	0.40	0.40	0.40	0.40
Date Sampled				27/01/2021	27/01/2021	27/01/2021	27/01/2021	27/01/2021
Time Taken				1045	1100	1115	1130	1200
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	9.1	9.5	10	11	9.8
Total mass of sample received	kg	0.001	NONE	1	1	1.2	1	1
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-	-
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	7.1	7.1	6.7	7.4	6.6
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO4	mg/kg	50	MCERTS	330	370	2200	2600	2700
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.035	0.031	0.052	0.078	0.21
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphur	mg/kg	50	MCERTS	270	280	2100	1200	1700
Total Organic Carbon (TOC)	%	0.1	MCERTS	0.7	0.7	1.4	1.7	1.3
Loss on Ignition @ 450oC	%	0.2	MCERTS	5.2	4.9	12.6	13.1	12
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	0.28	0.31	0.67	0.72	0.65
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.31	0.33	0.72	0.78	0.76
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.34
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.32
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.21
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.28
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	1.39	1.5	2.56

Analytical Report Number: 21-54008
Project / Site name: Upper Tip

Lab Sample Number				1753607	1753608	1753609	1753610	1753611
Sample Reference				F	G	H	I	J
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	0.40	0.40	0.40	0.40
Date Sampled				27/01/2021	27/01/2021	27/01/2021	27/01/2021	27/01/2021
Time Taken				1045	1100	1115	1130	1200
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	5.6	5.9	12	27	38
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.1	1	1	1.1	1.4
Boron (water soluble)	mg/kg	0.2	MCERTS	0.3	0.2	0.4	0.2	0.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.2	0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	5.2	4.7	4.4	4.5	6.1
Copper (aqua regia extractable)	mg/kg	1	MCERTS	36	37	40	64	76
Lead (aqua regia extractable)	mg/kg	1	MCERTS	20	18	27	39	68
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	240	220	290	440	460
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	0.5	0.5
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	29	30	27	30	34
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	3.6	3.4
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	10	9.5	12	12	14
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	81	71	63	67	110
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	7.3	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	25	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	83	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	110	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 21-54008
Project / Site name: Upper Tip
Your Order No:

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006-PL based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
1753602	A	0.40	142	Loose Fibres	**Crocidolite**	< 0.001	**< 0.001**

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Analytical Report Number: 21-54008
Project / Site name: Upper Tip

Lab Sample Number				1753612	1753613	1753614	1753615	1753616
Sample Reference				A	B	C	D	E
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	0.40	0.40	0.40	0.40
Date Sampled				27/01/2021	27/01/2021	27/01/2021	27/01/2021	27/01/2021
Time Taken				0930	0945	1000	1015	1030
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
pH	pH Units	N/A	ISO 17025	6.3	6.4	6.2	6.1	7.2
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Sulphate as SO4	µg/l	100	ISO 17025	2300	945	1220	5210	955
Total Sulphur	µg/l	15	NONE	770	310	410	1700	320
Sulphide	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Organic Carbon (TOC)	mg/l	0.1	NONE	5.92	6.09	6.21	6.31	4.13
Dissolved Organic Carbon (DOC)	mg/l	0.1	NONE	5.72	5.99	5.31	5.63	4.44
Total Phenols								
Total Phenols (monohydric)	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Speciated PAHs								
Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Total PAH								
Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Heavy Metals / Metalloids								
Arsenic (dissolved)	µg/l	1	ISO 17025	< 1.0	< 1.0	5.6	< 1.0	< 1.0
Beryllium (dissolved)	µg/l	0.2	ISO 17025	0.3	< 0.2	0.5	0.3	< 0.2
Boron (dissolved)	µg/l	10	ISO 17025	13	15	12	12	11
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chromium (dissolved)	µg/l	0.4	ISO 17025	< 0.4	0.5	0.8	< 0.4	0.5
Copper (dissolved)	µg/l	0.7	ISO 17025	2.7	6.6	5.3	5.8	4
Lead (dissolved)	µg/l	1	ISO 17025	< 1.0	1.3	1.9	7	2
Manganese (dissolved)	µg/l	0.06	ISO 17025	3.5	3.5	10	9.2	9.2
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel (dissolved)	µg/l	0.3	ISO 17025	2	1.7	0.9	2.1	1.9
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Vanadium (dissolved)	µg/l	1.7	ISO 17025	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7
Zinc (dissolved)	µg/l	0.4	ISO 17025	5.8	6.1	5.5	5.7	6.5
Calcium (dissolved)	mg/l	0.012	ISO 17025	2	0.33	1	1.7	1.8
Monoaromatics & Oxygenates								

Analytical Report Number: 21-54008
Project / Site name: Upper Tip

Lab Sample Number				1753612	1753613	1753614	1753615	1753616
Sample Reference				A	B	C	D	E
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	0.40	0.40	0.40	0.40
Date Sampled				27/01/2021	27/01/2021	27/01/2021	27/01/2021	27/01/2021
Time Taken				0930	0945	1000	1015	1030
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 21-54008
Project / Site name: Upper Tip

Lab Sample Number				1753617	1753618	1753619	1753620	1753621
Sample Reference				F	G	H	I	J
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	0.40	0.40	0.40	0.40
Date Sampled				27/01/2021	27/01/2021	27/01/2021	27/01/2021	27/01/2021
Time Taken				1045	1100	1115	1130	1200
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
pH	pH Units	N/A	ISO 17025	6.7	6.5	6.2	6.3	6.4
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Sulphate as SO4	µg/l	100	ISO 17025	972	950	2080	1530	1300
Total Sulphur	µg/l	15	NONE	320	320	690	510	430
Sulphide	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Organic Carbon (TOC)	mg/l	0.1	NONE	4.4	4.52	4.94	5.38	5.06
Dissolved Organic Carbon (DOC)	mg/l	0.1	NONE	4.03	3.96	4.06	4.88	4.39
Total Phenols								
Total Phenols (monohydric)	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Speciated PAHs								
Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Total PAH								
Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Heavy Metals / Metalloids								
Arsenic (dissolved)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Beryllium (dissolved)	µg/l	0.2	ISO 17025	0.4	< 0.2	< 0.2	< 0.2	< 0.2
Boron (dissolved)	µg/l	10	ISO 17025	12	13	11	13	12
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chromium (dissolved)	µg/l	0.4	ISO 17025	0.7	0.8	< 0.4	0.9	0.5
Copper (dissolved)	µg/l	0.7	ISO 17025	4.6	< 0.7	2.4	4.5	2
Lead (dissolved)	µg/l	1	ISO 17025	5.1	2.3	1.6	1.1	3.1
Manganese (dissolved)	µg/l	0.06	ISO 17025	12	6.1	5.6	7.1	7.7
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel (dissolved)	µg/l	0.3	ISO 17025	1.7	0.5	0.9	1.9	1.3
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Vanadium (dissolved)	µg/l	1.7	ISO 17025	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7
Zinc (dissolved)	µg/l	0.4	ISO 17025	6.9	4.4	11	5.7	6.2
Calcium (dissolved)	mg/l	0.012	ISO 17025	1.3	0.98	0.91	0.95	0.93
Monoaromatics & Oxygenates								

Analytical Report Number: 21-54008
Project / Site name: Upper Tip

Lab Sample Number				1753617	1753618	1753619	1753620	1753621
Sample Reference				F	G	H	I	J
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	0.40	0.40	0.40	0.40
Date Sampled				27/01/2021	27/01/2021	27/01/2021	27/01/2021	27/01/2021
Time Taken				1045	1100	1115	1130	1200
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 21-54008
Project / Site name: Upper Tip

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1753602	A	None Supplied	0.4	Grey clay and sand with vegetation and gravel.
1753603	B	None Supplied	0.4	Grey clay and sand with vegetation.
1753604	C	None Supplied	0.4	Grey clay and sand with vegetation.
1753605	D	None Supplied	0.4	Grey clay and sand with vegetation.
1753606	E	None Supplied	0.4	Grey clay and sand with vegetation.
1753607	F	None Supplied	0.4	Grey clay and sand with vegetation.
1753608	G	None Supplied	0.4	Grey clay and sand with vegetation.
1753609	H	None Supplied	0.4	Grey clay and sand with vegetation.
1753610	I	None Supplied	0.4	Grey clay and sand with vegetation.
1753611	J	None Supplied	0.4	Grey clay and sand with vegetation.

Analytical Report Number : 21-54008
Project / Site name: Upper Tip

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
NRA Leachate Prep	10:1 extract with de-ionised water shaken for 24 hours then filtered.	In-house method based on National Rivers Authority	L020-PL	W	NONE
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In house method.	L047-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in leachate	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
pH at 20oC in leachate	Determination of pH in leachate by electrometric measurement.	In house method.	L005-PL	W	ISO 17025

Analytical Report Number : 21-54008
Project / Site name: Upper Tip

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphide in leachate	Determination of sulphide in leachate by ion selective electrode.	In-house method	L010-PL	W	NONE
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphur in leachates	Determination of total sulphur in leachates by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	NONE
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
TPHCWG (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon in leachate	Determination of dissolved organic carbon in leachate by TOC/DOC NDIR analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Dissolved Organic Carbon in leachate	Determination of dissolved organic carbon in leachate by the measurement on a non-dispersive infrared analyser of carbon dioxide released by acidification.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L023-PL	W	NONE
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
BTEX and MTBE in leachates (Monoaromatics)	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025

Analytical Report Number : 21-54008
Project / Site name: Upper Tip

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

APPENDIX B

LABORATORY GEOTECHNICAL TEST RESULTS

TEST REPORT

Determination Of Water Content

ISO 17892-1: 2014

Project No:	D21063	**Client:**	Integral Geotechnique
Project Name:	Tylorstown Upper Tip	**Address:**	Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH
ATS Sample No:	23220		

Site Ref / Hole ID:	Upper Tip A	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Black clayey very sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Unknown
Date Sampled:	Unknown	**Material Supplier:**	Unknown
Sampled By:	Client	**Specification:**	BS1377
Date Received:	27 January 2021	**Date Tested:**	28 January 2021

Test Results

Moisture Content (%)	13.4

Remarks:

QA Ref.	**Apex Testing Solutions**		Approver	Date	Fig
EN ISO 17892-1:2014 E	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	A Grogan	29/01/2021	**MC**
			A Grogan, Laboratory Manager		

TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS1377:Part 2:1990

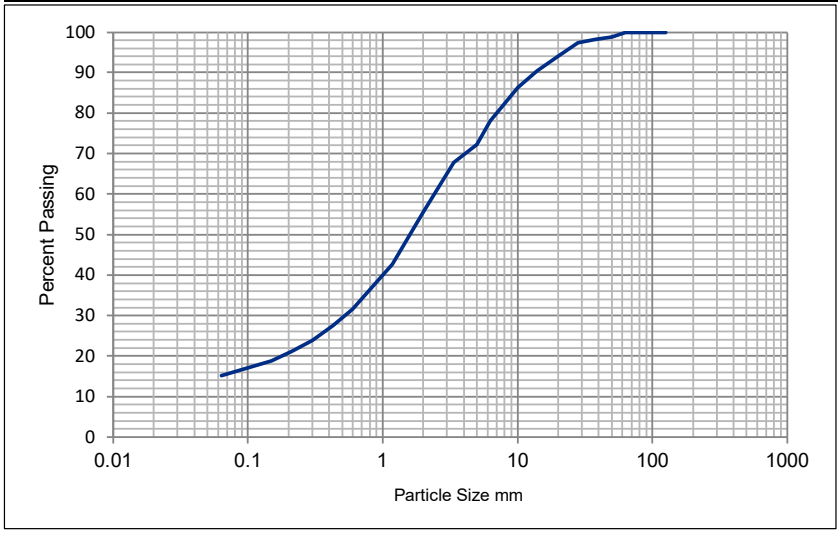
Project No:	D21063	**Client:**	Integral Geotechnique
Project Name:	Tylorstown Upper Tip	**Address**	Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH
ATS Sample No:	23220		

Site Ref / Hole ID:	Upper Tip A	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Black clayey very sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Unknown
Date Sampled:	Unknown	**Material Supplier:**	Unknown
Sampled By:	Client	**Specification:**	**BS1377**
Date Received:	27 January 2021	**Date Tested:**	29 January 2021

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	100
50	99
37.5	98
28	97
20	94
14	90
10	86
6.3	78
5.0	72
3.35	68
2.00	56
1.18	43
0.600	32
0.425	27
0.300	24
0.212	21
0.150	19
0.063	15

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	0	N/A	D_{60} / D_{10}
Gravel	44		
Sand	40	Dry mass of sample, kg	
Silt / Clay	15	10.9	N/A

Remarks:

TEST REPORT

Determination Of Water Content

ISO 17892-1: 2014

Project No:	D21063	**Client:**	Integral Geotechnique
Project Name:	Tylorstown Upper Tip	**Address:**	Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH
ATS Sample No:	23221		

Site Ref / Hole ID:	Upper Tip B	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Black clayey very sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Unknown
Date Sampled:	Unknown	**Material Supplier:**	Unknown
Sampled By:	Client	**Specification:**	BS1377
Date Received:	27 January 2021	**Date Tested:**	28 January 2021

Test Results

Moisture Content (%)	13.9

Remarks:

TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS1377:Part 2:1990

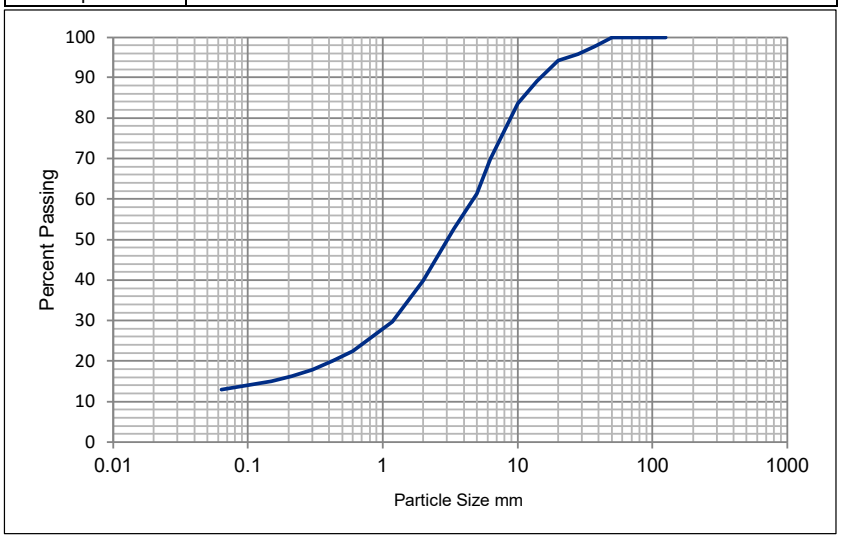
Project No:	D21063	**Client:**	Integral Geotechnique
Project Name:	Tylorstown Upper Tip	**Address**	Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH
ATS Sample No:	23221		

Site Ref / Hole ID:	Upper Tip B	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Black clayey very sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Unknown
Date Sampled:	Unknown	**Material Supplier:**	Unknown
Sampled By:	Client	**Specification:**	**BS1377**
Date Received:	27 January 2021	**Date Tested:**	29 January 2021

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	98
28	96
20	94
14	89
10	84
6.3	70
5.0	61
3.35	53
2.00	40
1.18	30
0.600	22
0.425	20
0.300	18
0.212	16
0.150	15
0.063	13

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	0	N/A	D_{60} / D_{10}
Gravel	60		
Sand	27	**Dry mass of sample, kg**	
Silt / Clay	13	12.5	N/A

Remarks:

QA Ref.			Approver	Date	Fig
BS1377 - 4 Rev. 1.0	**Apex Testing Solutions** Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	A Grogan	29/01/2021	**PSD**
			A Grogan, Laboratory Manager		

TEST REPORT

Determination Of Water Content

ISO 17892-1: 2014

Project No:	D21063	**Client:**	Integral Geotechnique
Project Name:	Tylorstown Upper Tip	**Address:**	Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH
ATS Sample No:	23222		

Site Ref / Hole ID:	Upper Tip C	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Black clayey very sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Unknown
Date Sampled:	Unknown	**Material Supplier:**	Unknown
Sampled By:	Client	**Specification:**	BS1377
Date Received:	27 January 2021	**Date Tested:**	28 January 2021

Test Results

Moisture Content (%)	11.7

Remarks:

QA Ref.	**Apex Testing Solutions**		Approver	Date	Fig
EN ISO 17892-1:2014 E	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	A Grogan	29/01/2021	**MC**
			A Grogan, Laboratory Manager		

TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS1377:Part 2:1990

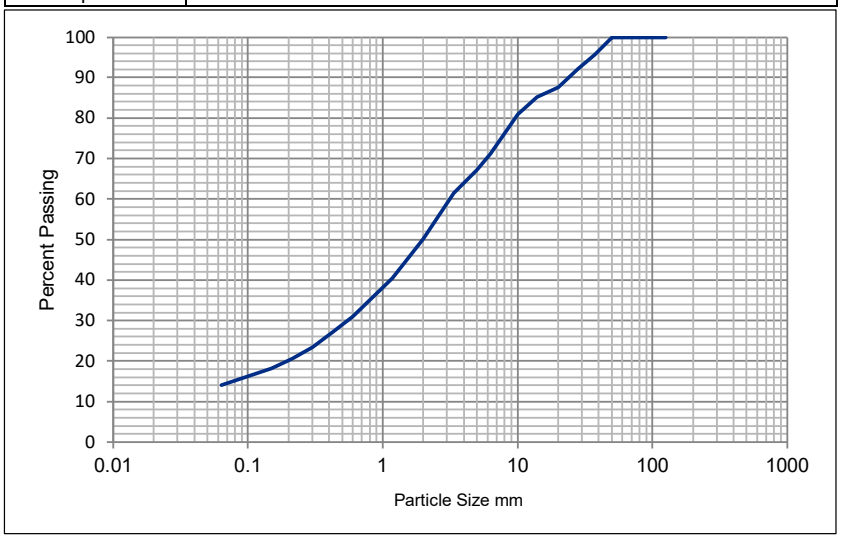
Project No:	D21063	**Client:**	Integral Geotechnique
Project Name:	Tylorstown Upper Tip	**Address**	Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH
ATS Sample No:	23222		

Site Ref / Hole ID:	Upper Tip C	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Black clayey very sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Unknown
Date Sampled:	Unknown	**Material Supplier:**	Unknown
Sampled By:	Client	**Specification:**	**BS1377**
Date Received:	27 January 2021	**Date Tested:**	29 January 2021

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	96
28	92
20	88
14	85
10	81
6.3	71
5.0	67
3.35	61
2.00	50
1.18	40
0.600	31
0.425	27
0.300	23
0.212	20
0.150	18
0.063	14

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	0	N/A	D_{60} / D_{10}
Gravel	50		
Sand	36	**Dry mass of sample, kg**	
Silt / Clay	14	11.4	N/A

Remarks:

QA Ref.			Approver	Date	Fig
BS1377 - 4 Rev. 1.0	**Apex Testing Solutions** Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	A Grogan	29/01/2021	**PSD**
			A Grogan, Laboratory Manager		

TEST REPORT

Determination Of Water Content

ISO 17892-1: 2014

Project No:	D21063	**Client:**	Integral Geotechnique
Project Name:	Tylorstown Upper Tip	**Address:**	Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH
ATS Sample No:	23223		

Site Ref / Hole ID:	Upper Tip D	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Black clayey very sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Unknown
Date Sampled:	Unknown	**Material Supplier:**	Unknown
Sampled By:	Client	**Specification:**	BS1377
Date Received:	27 January 2021	**Date Tested:**	29 January 2021

Test Results

Moisture Content (%)	10.0

Remarks:

QA Ref.	**Apex Testing Solutions**		Approver	Date	Fig
EN ISO 17892-1:2014 E	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	A Grogan	29/01/2021	**MC**
			A Grogan, Laboratory Manager		

TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS1377:Part 2:1990

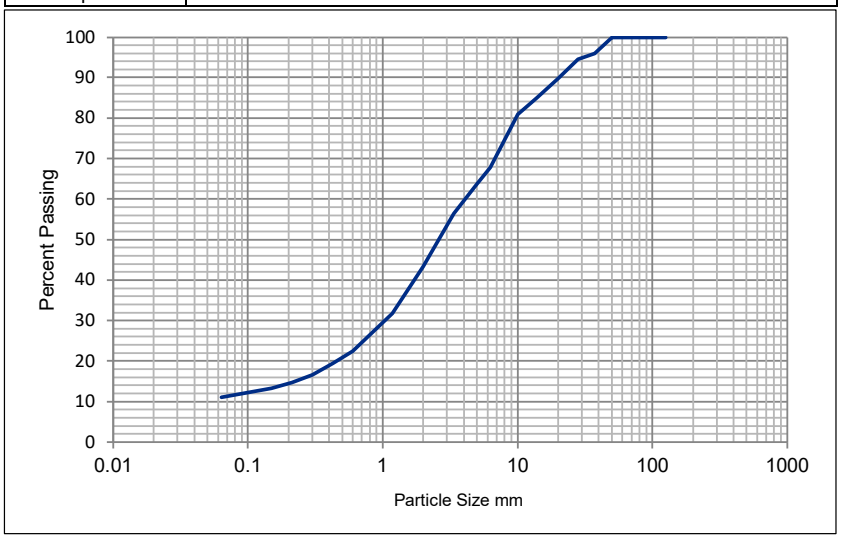
Project No:	D21063	**Client:**	Integral Geotechnique
Project Name:	Tylorstown Upper Tip	**Address**	Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH
ATS Sample No:	23223		

Site Ref / Hole ID:	Upper Tip D	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Black clayey very sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Unknown
Date Sampled:	Unknown	**Material Supplier:**	Unknown
Sampled By:	Client	**Specification:**	**BS1377**
Date Received:	27 January 2021	**Date Tested:**	29 January 2021

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	96
28	95
20	90
14	85
10	81
6.3	68
5.0	64
3.35	56
2.00	43
1.18	32
0.600	23
0.425	19
0.300	17
0.212	15
0.150	13
0.063	11

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	0	N/A	D_{60} / D_{10}
Gravel	57		
Sand	32	**Dry mass of sample, kg**	
Silt / Clay	11	12.0	N/A

Remarks:

QA Ref.			Approver	Date	Fig
BS1377 - 4 Rev. 1.0	**Apex Testing Solutions** Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	A Grogan	29/01/2021	**PSD**
			A Grogan, Laboratory Manager		

TEST REPORT

Determination Of Water Content

ISO 17892-1: 2014

Project No:	D21063	**Client:**	Integral Geotechnique
Project Name:	Tylorstown Upper Tip	**Address:**	Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH
ATS Sample No:	23224		

Site Ref / Hole ID:	Upper Tip E	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Black clayey very sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Unknown
Date Sampled:	Unknown	**Material Supplier:**	Unknown
Sampled By:	Client	**Specification:**	BS1377
Date Received:	27 January 2021	**Date Tested:**	28 January 2021

Test Results

Moisture Content (%)	12.8

Remarks:

TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS1377:Part 2:1990

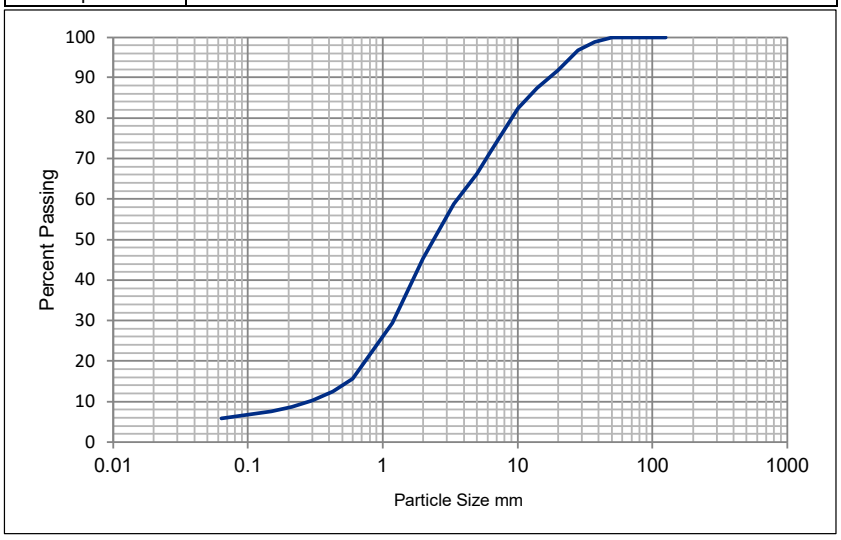
Project No:	D21063	**Client:**	Integral Geotechnique
Project Name:	Tylorstown Upper Tip	**Address**	Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH
ATS Sample No:	23224		

Site Ref / Hole ID:	Upper Tip E	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Black clayey very sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Unknown
Date Sampled:	Unknown	**Material Supplier:**	Unknown
Sampled By:	Client	**Specification:**	**BS1377**
Date Received:	27 January 2021	**Date Tested:**	29 January 2021

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	99
28	97
20	92
14	87
10	82
6.3	72
5.0	66
3.35	59
2.00	45
1.18	29
0.600	16
0.425	12
0.300	10
0.212	9
0.150	8
0.063	6

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	0	N/A	D_{60} / D_{10}
Gravel	55		
Sand	39	**Dry mass of sample, kg**	
Silt / Clay	6	8.9	N/A

Remarks:

QA Ref.			Approver	Date	Fig
BS1377 - 4 Rev. 1.0	**Apex Testing Solutions** Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	A Grogan	07/10/2020	**PSD**
			A Grogan, Laboratory Manager		

TEST REPORT

Determination Of Water Content

ISO 17892-1: 2014

Project No:	D21063	**Client:**	Integral Geotechnique
Project Name:	Tylorstown Upper Tip	**Address:**	Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH
ATS Sample No:	23225		

Site Ref / Hole ID:	Upper Tip F	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Black clayey very sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Unknown
Date Sampled:	Unknown	**Material Supplier:**	Unknown
Sampled By:	Client	**Specification:**	BS1377
Date Received:	27 January 2021	**Date Tested:**	28 January 2021

Test Results

Moisture Content (%)	8.0

Remarks:

QA Ref.	**Apex Testing Solutions**		Approver	Date	Fig
EN ISO 17892-1:2014 E	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	A Grogan	01/02/2021	**MC**
			A Grogan, Laboratory Manager		

TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS1377:Part 2:1990

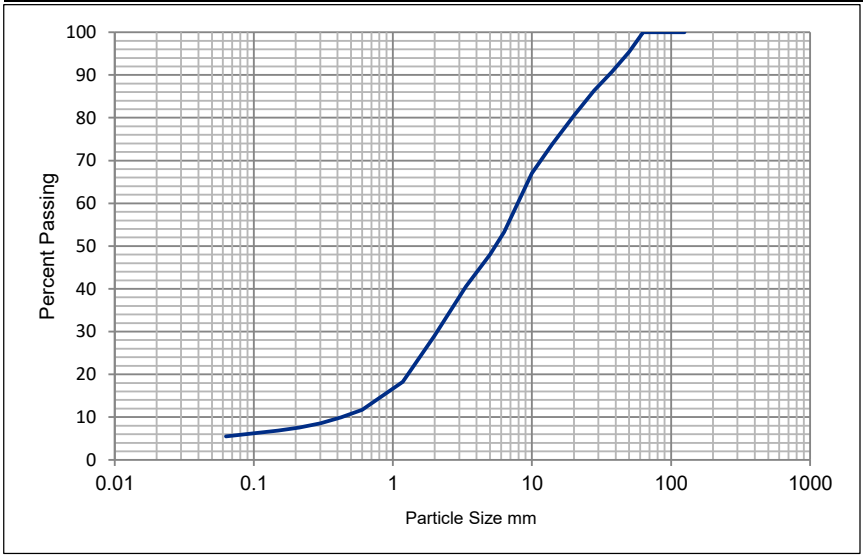
Project No:	D21063	**Client:**	Integral Geotechnique
Project Name:	Tylorstown Upper Tip	**Address**	Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH
ATS Sample No:	23225		

Site Ref / Hole ID:	Upper Tip F	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Black clayey very sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Unknown
Date Sampled:	Unknown	**Material Supplier:**	Unknown
Sampled By:	Client	**Specification:**	**BS1377**
Date Received:	27 January 2021	**Date Tested:**	29 January 2021

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	100
50	95
37.5	91
28	86
20	81
14	74
10	67
6.3	53
5.0	48
3.35	41
2.00	29
1.18	18
0.600	12
0.425	10
0.300	9
0.212	8
0.150	7
0.063	5

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	0	N/A	D_{60} / D_{10}
Gravel	71		
Sand	24	**Dry mass of sample, kg**	
Silt / Clay	5	12.8	N/A

Remarks:

QA Ref.				
BS1377 - 4 Rev. 1.0	**Apex Testing Solutions** Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	Approver: A Grogan A Grogan, Laboratory Manager	Date: 01/02/2021	Fig: **PSD**

TEST REPORT

Determination Of Water Content

ISO 17892-1: 2014

Project No:	D21063	**Client:**	Integral Geotechnique
Project Name:	Tylorstown Upper Tip	**Address:**	Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH
ATS Sample No:	23226		

Site Ref / Hole ID:	Upper Tip G	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Black clayey very sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Unknown
Date Sampled:	Unknown	**Material Supplier:**	Unknown
Sampled By:	Client	**Specification:**	BS1377
Date Received:	27 January 2021	**Date Tested:**	28 January 2021

Test Results

Moisture Content (%)	9.9

Remarks:

QA Ref.	**Apex Testing Solutions**		Approver	Date	Fig
EN ISO 17892-1:2014 E	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	A Grogan	01/02/2021	**MC**
			A Grogan, Laboratory Manager		

TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS1377:Part 2:1990

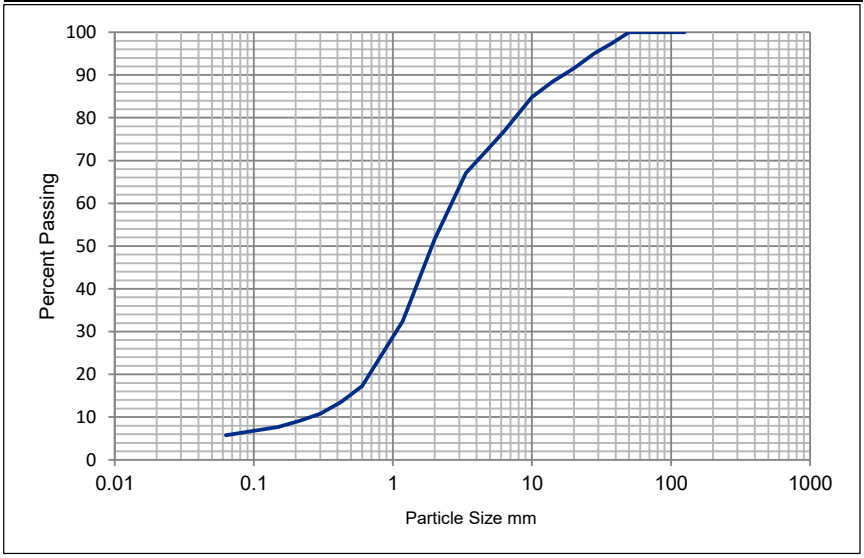
Project No:	D21063	**Client:**	Integral Geotechnique
Project Name:	Tylorstown Upper Tip	**Address**	Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH
ATS Sample No:	23226		

Site Ref / Hole ID:	Upper Tip G	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Black clayey very sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Unknown
Date Sampled:	Unknown	**Material Supplier:**	Unknown
Sampled By:	Client	**Specification:**	**BS1377**
Date Received:	27 January 2021	**Date Tested:**	29 January 2021

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	97
28	95
20	92
14	88
10	85
6.3	77
5.0	73
3.35	67
2.00	52
1.18	32
0.600	17
0.425	14
0.300	11
0.212	9
0.150	8
0.063	6

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	0	N/A	D_{60} / D_{10}
Gravel	48		
Sand	46	**Dry mass of sample, kg**	
Silt / Clay	6	14.1	N/A

Remarks:

QA Ref.					
BS1377 - 4 Rev. 1.0	**Apex Testing Solutions** Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	Approver A Grogan A Grogan, Laboratory Manager	Date 01/02/2021	Fig **PSD**

TEST REPORT

Determination Of Water Content

ISO 17892-1: 2014

Project No:	D21063	**Client:**	Integral Geotechnique
Project Name:	Tylorstown Upper Tip	**Address:**	Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH
ATS Sample No:	23227		

Site Ref / Hole ID:	Upper Tip H	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Black clayey very sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Unknown
Date Sampled:	Unknown	**Material Supplier:**	Unknown
Sampled By:	Client	**Specification:**	BS1377
Date Received:	27 January 2021	**Date Tested:**	28 January 2021

Test Results

Moisture Content (%)	10.4

Remarks:

QA Ref.	**Apex Testing Solutions**		Approver	Date	Fig
EN ISO 17892-1:2014 E	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	A Grogan	01/02/2021	**MC**
			A Grogan, Laboratory Manager		

TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS1377:Part 2:1990

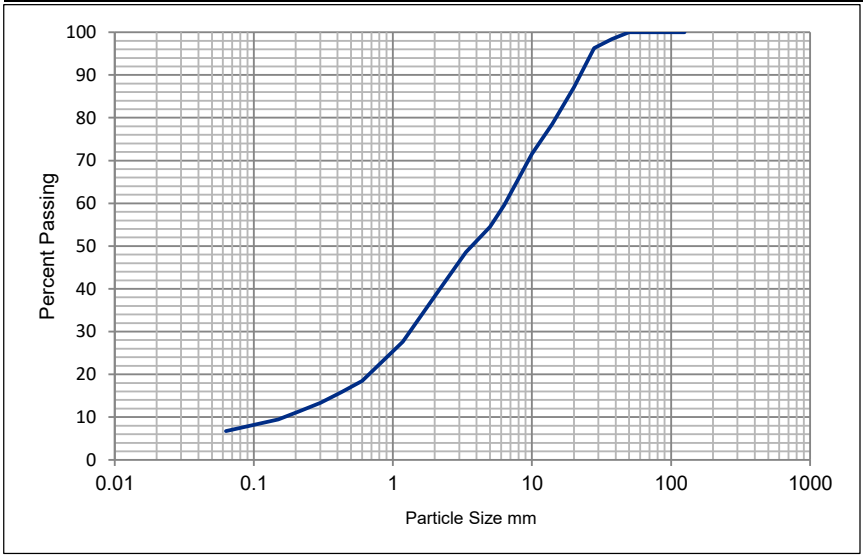
Project No:	D21063	**Client:**	Integral Geotechnique
Project Name:	Tylorstown Upper Tip	**Address**	Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH
ATS Sample No:	23227		

Site Ref / Hole ID:	Upper Tip H	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Black clayey very sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Unknown
Date Sampled:	Unknown	**Material Supplier:**	Unknown
Sampled By:	Client	**Specification:**	**BS1377**
Date Received:	27 January 2021	**Date Tested:**	29 January 2021

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	98
28	96
20	87
14	79
10	72
6.3	60
5.0	55
3.35	49
2.00	38
1.18	28
0.600	18
0.425	16
0.300	13
0.212	11
0.150	9
0.063	7

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	0	N/A	D_{60} / D_{10}
Gravel	62		
Sand	32	**Dry mass of sample, kg**	
Silt / Clay	7	11.2	N/A

Remarks:

QA Ref.				
BS1377 - 4 Rev. 1.0	**Apex Testing Solutions** Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	Approver: A Grogan A Grogan, Laboratory Manager	Date: 01/02/2021	Fig: **PSD**

TEST REPORT

Determination Of Water Content

ISO 17892-1: 2014

Project No:	D21063	**Client:**	Integral Geotechnique
Project Name:	Tylorstown Upper Tip	**Address:**	Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH
ATS Sample No:	23228		

Site Ref / Hole ID:	Upper Tip I	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Black clayey very sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Unknown
Date Sampled:	Unknown	**Material Supplier:**	Unknown
Sampled By:	Client	**Specification:**	BS1377
Date Received:	27 January 2021	**Date Tested:**	28 January 2021

Test Results

Moisture Content (%)	11.1

Remarks:

QA Ref.	**Apex Testing Solutions**		Approver	Date	Fig
EN ISO 17892-1:2014 E	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	A Grogan	01/02/2021	**MC**
			A Grogan, Laboratory Manager		

TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS1377:Part 2:1990

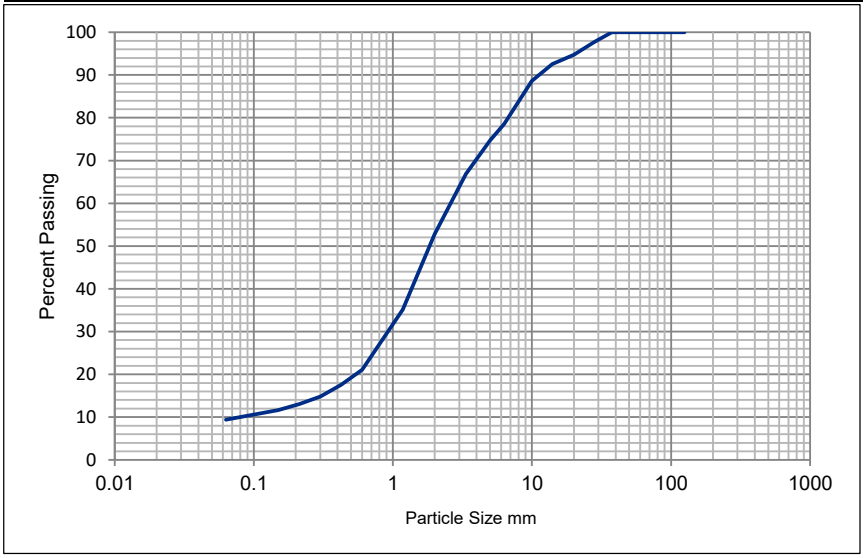
Project No:	D21063	**Client:**	Integral Geotechnique
Project Name:	Tylorstown Upper Tip	**Address**	Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH
ATS Sample No:	23228		

Site Ref / Hole ID:	Upper Tip I	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Black clayey very sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Unknown
Date Sampled:	Unknown	**Material Supplier:**	Unknown
Sampled By:	Client	**Specification:**	**BS1377**
Date Received:	27 January 2021	**Date Tested:**	29 January 2021

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	98
20	95
14	93
10	89
6.3	79
5.0	75
3.35	67
2.00	53
1.18	35
0.600	21
0.425	18
0.300	15
0.212	13
0.150	12
0.063	9

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	0	N/A	D_{60} / D_{10}
Gravel	47		
Sand	43	**Dry mass of sample, kg**	
Silt / Clay	9	11.4	N/A

Remarks:

QA Ref.				
BS1377 - 4 Rev. 1.0	**Apex Testing Solutions** Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	Approver: A Grogan A Grogan, Laboratory Manager	Date: 01/02/2021	Fig: **PSD**

TEST REPORT

Determination Of Water Content

ISO 17892-1: 2014

Project No:	D21063	**Client:**	Integral Geotechnique
Project Name:	Tylorstown Upper Tip	**Address:**	Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH
ATS Sample No:	23229		

Site Ref / Hole ID:	Upper Tip J	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Black clayey very sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Unknown
Date Sampled:	Unknown	**Material Supplier:**	Unknown
Sampled By:	Client	**Specification:**	BS1377
Date Received:	27 January 2021	**Date Tested:**	28 January 2021

Test Results

Moisture Content (%)	11.8

Remarks:

QA Ref.	**Apex Testing Solutions**		Approver	Date	Fig
EN ISO 17892-1:2014 E	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	A Grogan	01/02/2021	**MC**
			A Grogan, Laboratory Manager		

TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS1377:Part 2:1990

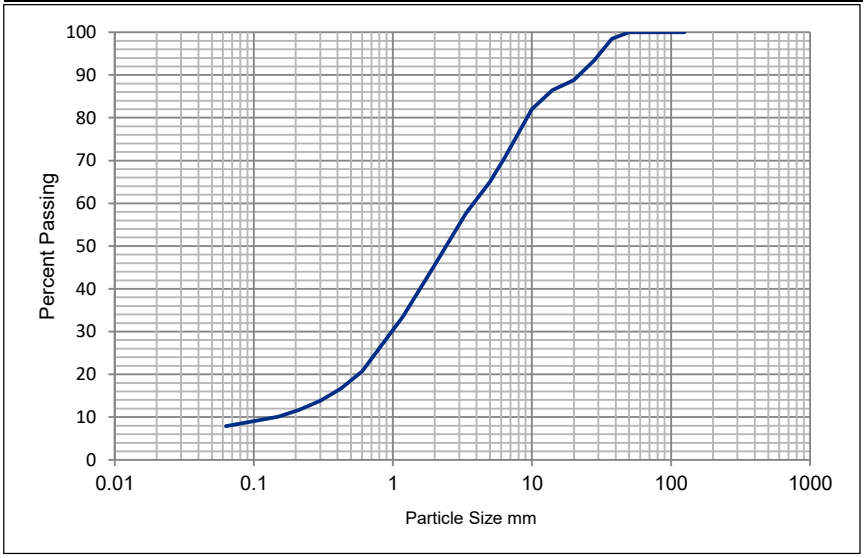
Project No:	D21063	**Client:**	Integral Geotechnique
Project Name:	Tylorstown Upper Tip	**Address**	Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH
ATS Sample No:	23229		

Site Ref / Hole ID:	Upper Tip J	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Black clayey very sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Unknown
Date Sampled:	Unknown	**Material Supplier:**	Unknown
Sampled By:	Client	**Specification:**	**BS1377**
Date Received:	27 January 2021	**Date Tested:**	29 January 2021

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	98
28	93
20	89
14	86
10	82
6.3	70
5.0	65
3.35	58
2.00	46
1.18	33
0.600	21
0.425	17
0.300	14
0.212	12
0.150	10
0.063	8

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	0	N/A	D_{60} / D_{10}
Gravel	54		
Sand	38	**Dry mass of sample, kg**	
Silt / Clay	8	10.3	N/A

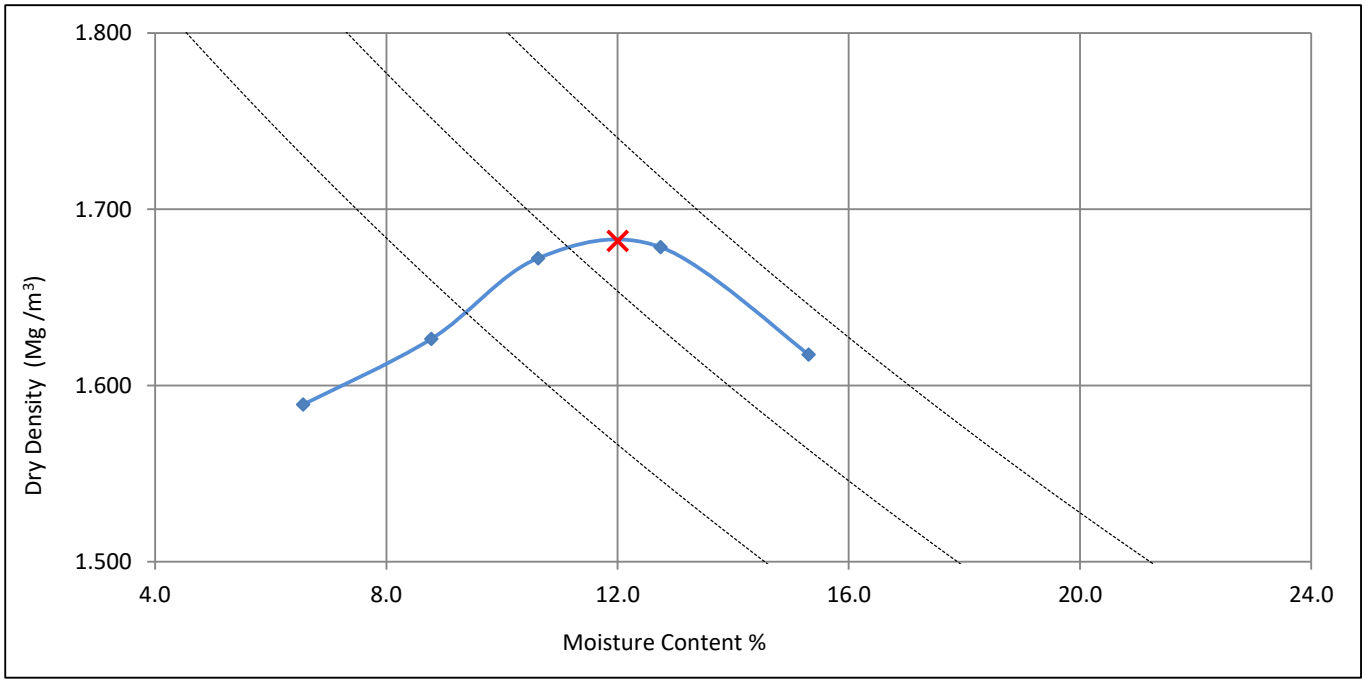
Remarks:

QA Ref.			Approver	Date	Fig
BS1377 - 4 Rev. 1.0	**Apex Testing Solutions** Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	A Grogan	01/02/2021	**PSD**
			A Grogan, Laboratory Manager		

TEST REPORT
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377:Part 4:1990: Clause 3.4

Project No:	D21063	**Client:**	Integral Geotechnique
Project Name:	Tylorstown Upper Tip	**Address:**	Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH
ATS Sample No:	23220		

Site Ref / Hole ID:	Upper Tip A	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Black clayey very sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	Unknown	**Material Supplier:**	Site
Sampled By:	Client	**Specification:**	BS1377
Date Received:	27 January 2021	**Date Tested:**	01 February 2021



Test Method:	BS 1377: part 4: 1990: clause 3.4, 2.5kg rammer in a CBR mould
Preparation:	Original sample was oven dried @ 105 oC, separate specimens tested

Particle Density, Mg/m^3	2.20	assumed
Material > 37.5mm	2	%
Material < 37.5mm > 20mm	4	%

Derived Parameters ×	
Maximum Dry Density, Mg/m^3	1.68
Optimum Moisture Content %	12.0

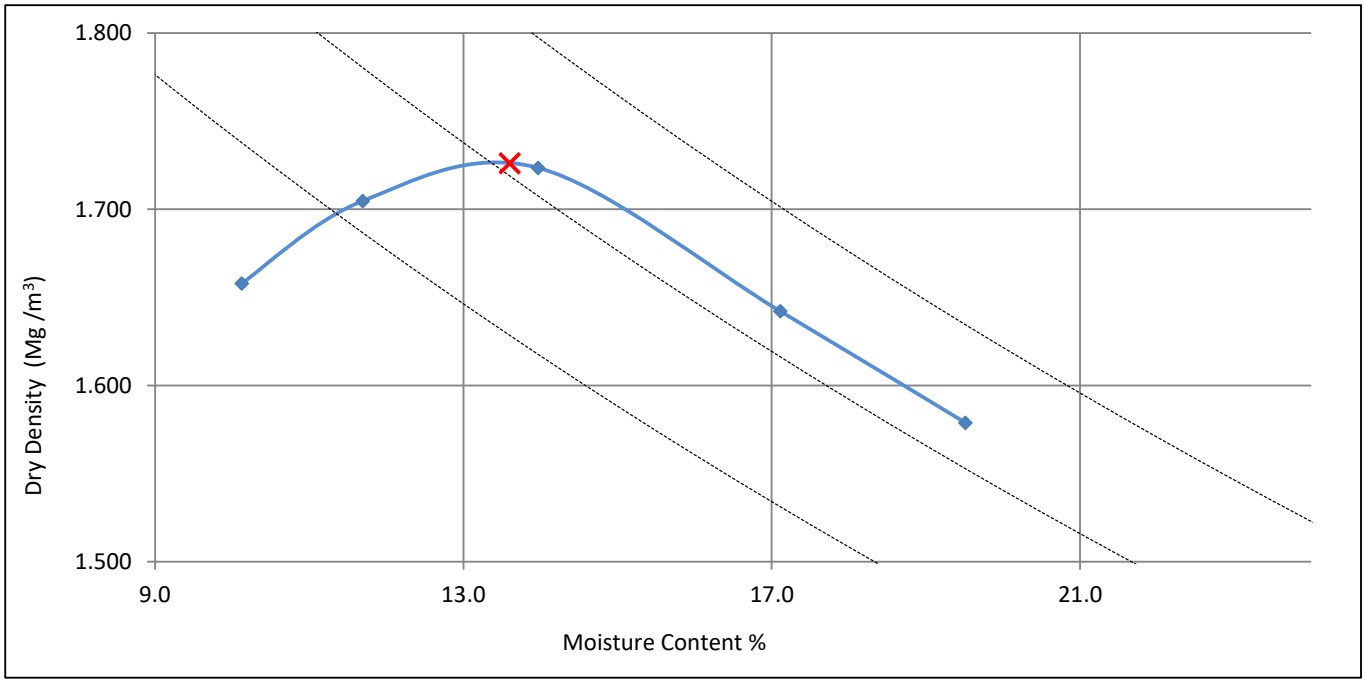
Remarks:

QA Ref.	**Apex Testing Solutions**		Approver	Date
BS1377 - 4	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ	7771	L Davis	03/02/2021
Rev. 2.0	Tel: 01656 746762 Fax: 01656 749096		L Davis, Quality Manager	Fig. **COMP**

TEST REPORT
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377:Part 4:1990: Clause 3.4

Project No:	D21063	**Client:**	Integral Geotechnique
Project Name:	Tylorstown Upper Tip	**Address:**	Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH
ATS Sample No:	23221		

Site Ref / Hole ID:	Upper Tip B	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Black clayey very sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	Unknown	**Material Supplier:**	Site
Sampled By:	Client	**Specification:**	BS1377
Date Received:	27 January 2021	**Date Tested:**	28 January 2021



Test Method:	BS 1377: part 4: 1990: clause 3.3, 2.5kg rammer in a 1 litre mould
Preparation:	Original sample was oven dried @ 105 oC, separate specimens tested

Particle Density, Mg/m^3	2.40	assumed
Material > 37.5mm	2	%
Material < 37.5mm > 20mm	3	%

Derived Parameters ×	
Maximum Dry Density, Mg/m^3	1.73
Optimum Moisture Content %	13.6

Remarks:

QA Ref.	**Apex Testing Solutions**		Approver	Date
BS1377 - 4	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ	7771	L Davis	01/02/2021
Rev. 2.0	Tel: 01656 746762 Fax: 01656 749096		L Davis, Quality Manager	Fig. **COMP**

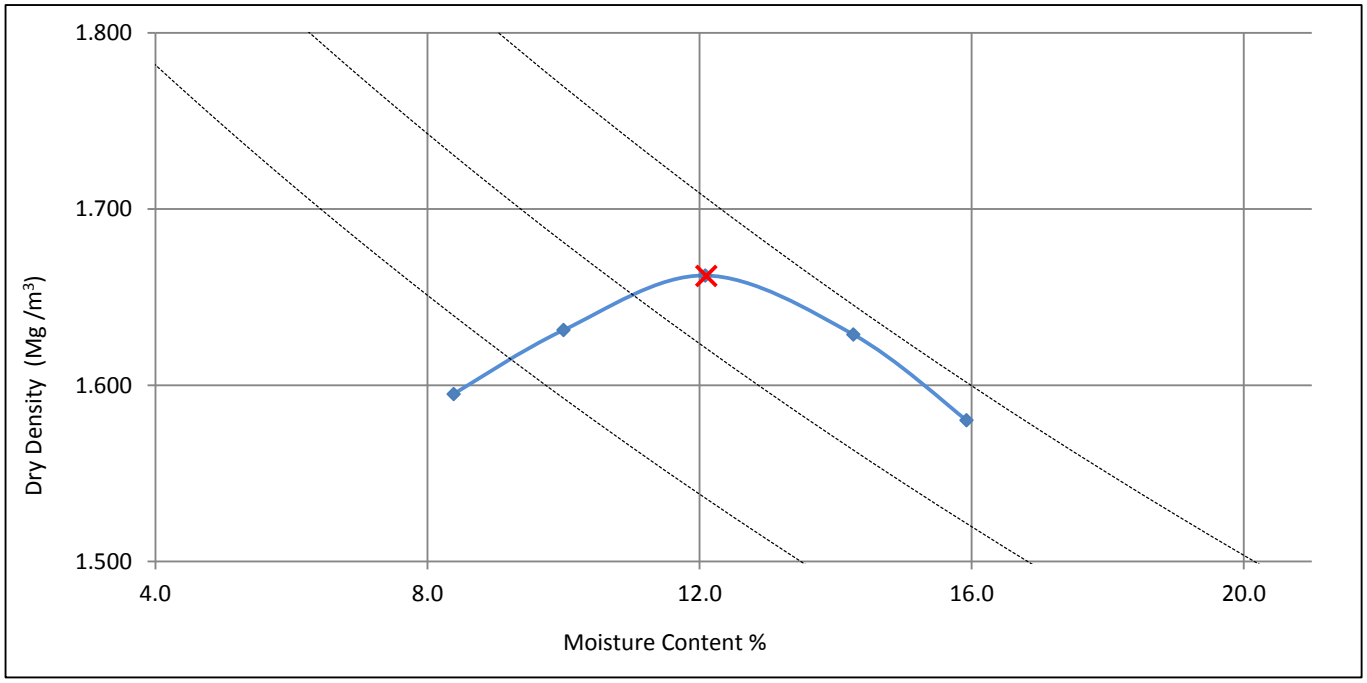
TEST REPORT

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS1377:Part 4:1990: Clause 3.4

Project No:	D21063	**Client:**	Integral Geotechnique
Project Name:	Tylorstown Upper Tip	**Address:**	Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH
ATS Sample No:	23222		

Site Ref / Hole ID:	Upper Tip C	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Black clayey very sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	Unknown	**Material Supplier:**	Site
Sampled By:	Client	**Specification:**	BS1377
Date Received:	27 January 2021	**Date Tested:**	01 February 2021



Test Method:	BS 1377: part 4: 1990: clause 3.4, 2.5kg rammer in a CBR mould
Preparation:	Original sample was oven dried @ 105 oC, separate specimens tested

Particle Density, Mg/m^3	2.15	assumed
Material > 37.5mm	4	%
Material < 37.5mm > 20mm	8	%

Derived Parameters ×	
Maximum Dry Density, Mg/m^3	1.66
Optimum Moisture Content %	12.1

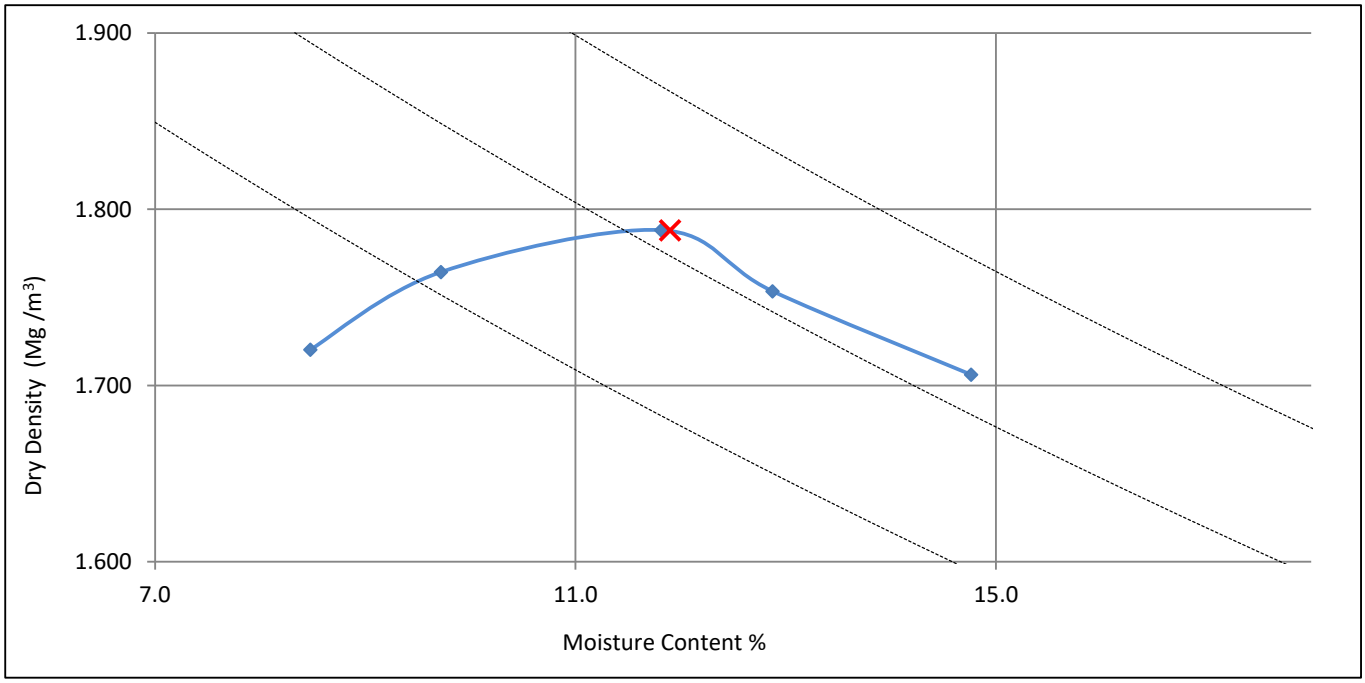
Remarks:

QA Ref.	**Apex Testing Solutions**		Approver	Date
BS1377 - 4	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ	7771	L Davis	02/02/2021
Rev. 2.0	Tel: 01656 746762 Fax: 01656 749096		L Davis, Quality Manager	Fig. **COMP**

TEST REPORT
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377:Part 4:1990: Clause 3.4

Project No:	D21063	**Client:**	Integral Geotechnique
Project Name:	Tylorstown Upper Tip	**Address:**	Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH
ATS Sample No:	23223		

Site Ref / Hole ID:	Upper Tip D	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Black clayey very sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	Unknown	**Material Supplier:**	Site
Sampled By:	Client	**Specification:**	BS1377
Date Received:	27 January 2021	**Date Tested:**	01 February 2021



Test Method:	BS 1377: part 4: 1990: clause 3.4, 2.5kg rammer in a CBR mould
Preparation:	Original sample was oven dried @ 105 oC, separate specimens tested

Particle Density, Mg/m^3	2.40	assumed
Material > 37.5mm	4	%
Material < 37.5mm > 20mm	6	%

Derived Parameters ×	
Maximum Dry Density, Mg/m^3	1.79
Optimum Moisture Content %	11.9

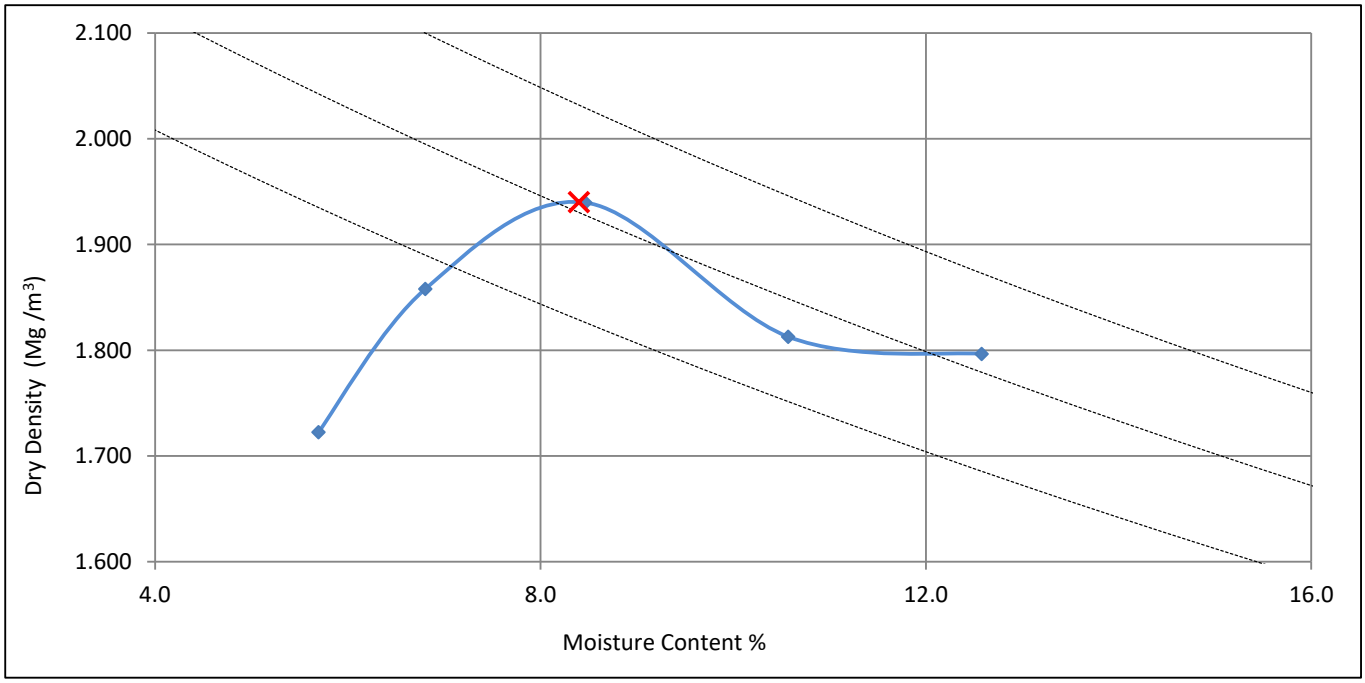
Remarks:

QA Ref.	**Apex Testing Solutions**		Approver	Date
BS1377 - 4	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ	7771	L Davis	02/02/2021
Rev. 2.0	Tel: 01656 746762 Fax: 01656 749096		L Davis, Quality Manager	Fig. **COMP**

TEST REPORT
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377:Part 4:1990: Clause 3.4

Project No:	D21063	**Client:**	Integral Geotechnique
Project Name:	Tylorstown Upper Tip	**Address:**	Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH
ATS Sample No:	23224		

Site Ref / Hole ID:	Upper Tip E	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Black clayey very sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	Unknown	**Material Supplier:**	Site
Sampled By:	Client	**Specification:**	BS1377
Date Received:	27 January 2021	**Date Tested:**	28 January 2021



Test Method:	BS 1377: part 4: 1990: clause 3.3, 2.5kg rammer in a 1 litre mould
Preparation:	Original sample was oven dried @ 105 oC, separate specimens tested

Particle Density, Mg/m^3	2.45	assumed
Material > 37.5mm	1	%
Material < 37.5mm > 20mm	7	%

Derived Parameters ×	
Maximum Dry Density, Mg/m^3	1.94
Optimum Moisture Content %	8.4

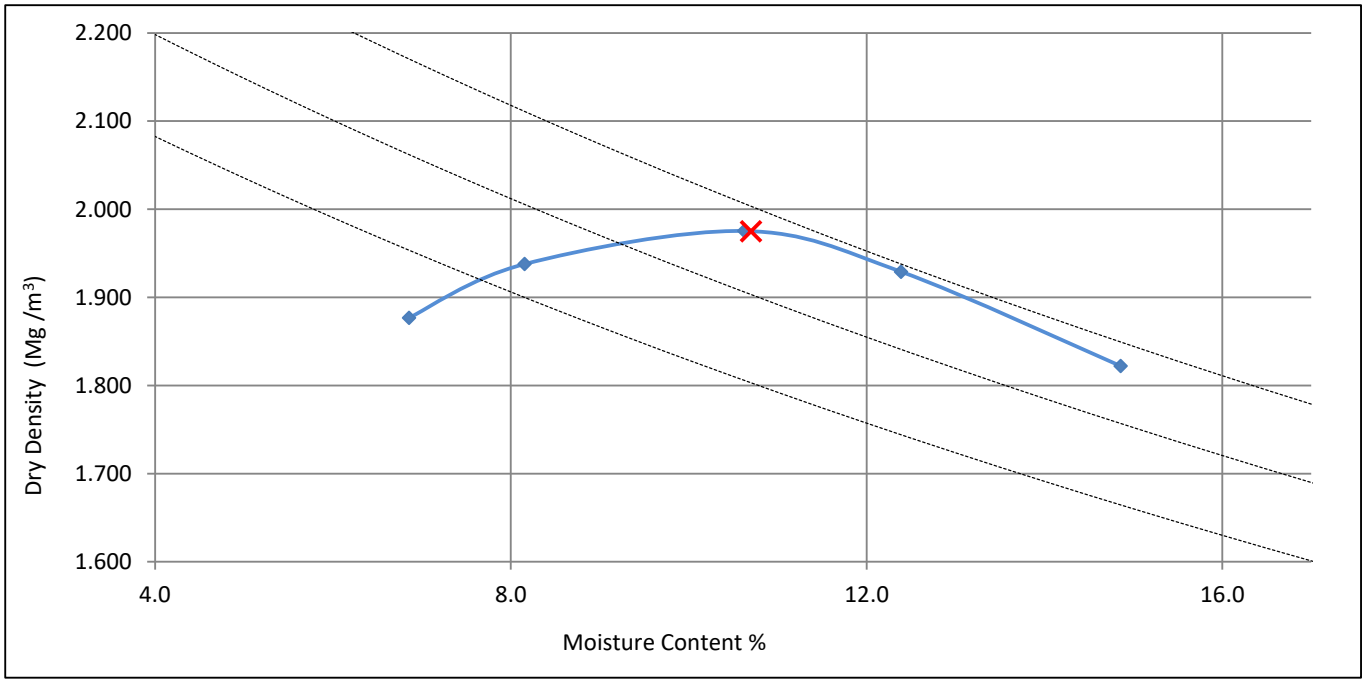
Remarks:

QA Ref.	**Apex Testing Solutions**		Approver	Date
BS1377 - 4	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ	7771	L Davis	01/02/2021
Rev. 2.0	Tel: 01656 746762 Fax: 01656 749096		L Davis, Quality Manager	Fig. **COMP**

TEST REPORT
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377:Part 4:1990: Clause 3.4

Project No:	D21063	**Client:**	Integral Geotechnique
Project Name:	Tylorstown Upper Tip	**Address:**	Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH
ATS Sample No:	23225		

Site Ref / Hole ID:	Upper Tip F	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Black clayey very sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	Unknown	**Material Supplier:**	Site
Sampled By:	Client	**Specification:**	BS1377
Date Received:	27 January 2021	**Date Tested:**	28 January 2021



Test Method:	BS 1377: part 4: 1990: clause 3.3, 2.5kg rammer in a 1 litre mould
Preparation:	Original sample was oven dried @ 105 oC, separate specimens tested

Particle Density, Mg/m^3	2.55	assumed
Material > 37.5mm	9	%
Material < 37.5mm > 20mm	10	%

Derived Parameters ×	
Maximum Dry Density, Mg/m^3	1.98
Optimum Moisture Content %	10.7

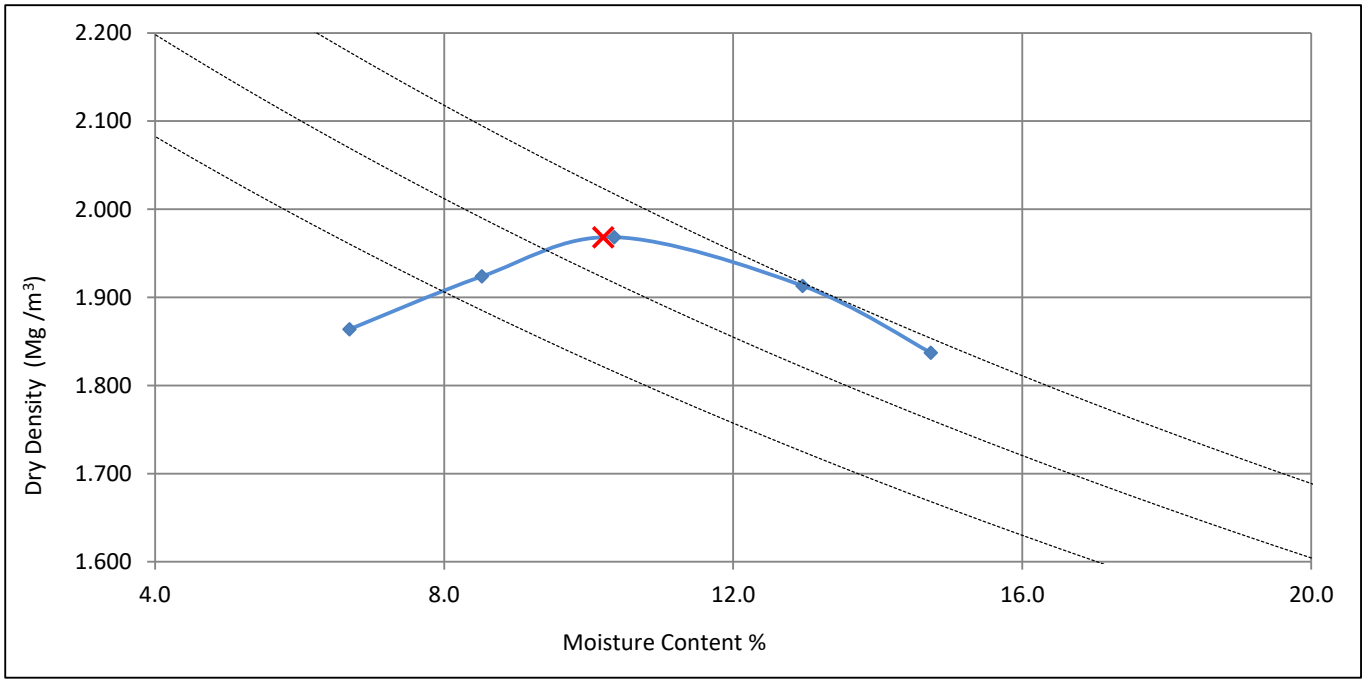
Remarks:

QA Ref.	**Apex Testing Solutions**		Approver	Date
BS1377 - 4	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ	7771	L Davis	01/02/2021
Rev. 2.0	Tel: 01656 746762 Fax: 01656 749096		L Davis, Quality Manager	Fig. COMP

TEST REPORT
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377:Part 4:1990: Clause 3.4

Project No:	D21063	**Client:**	Integral Geotechnique
Project Name:	Tylorstown Upper Tip	**Address:**	Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH
ATS Sample No:	23226		

Site Ref / Hole ID:	Upper Tip G	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Black clayey very sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	Unknown	**Material Supplier:**	Site
Sampled By:	Client	**Specification:**	BS1377
Date Received:	27 January 2021	**Date Tested:**	28 January 2021



Test Method:	BS 1377: part 4: 1990: clause 3.3, 2.5kg rammer in a 1 litre mould
Preparation:	Original sample was oven dried @ 105 oC, separate specimens tested

Particle Density, Mg/m^3	2.55	assumed
Material > 37.5mm	3	%
Material < 37.5mm > 20mm	6	%

Derived Parameters ×	
Maximum Dry Density, Mg/m^3	1.97
Optimum Moisture Content %	10.2

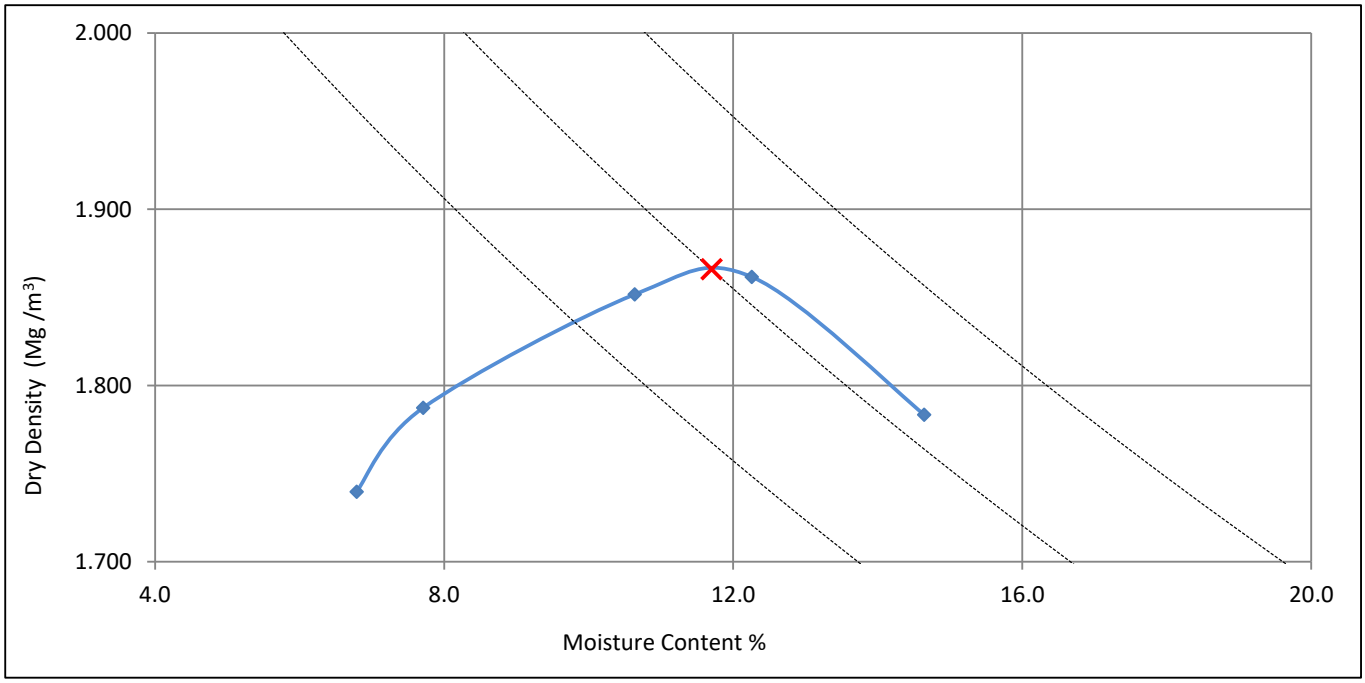
Remarks:

QA Ref.	**Apex Testing Solutions**		Approver	Date
BS1377 - 4	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ	7771	L Davis	01/02/2021
Rev. 2.0	Tel: 01656 746762 Fax: 01656 749096		L Davis, Quality Manager	Fig. **COMP**

TEST REPORT
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377:Part 4:1990: Clause 3.4

Project No:	D21063	**Client:**	Integral Geotechnique
Project Name:	Tylorstown Upper Tip	**Address:**	Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH
ATS Sample No:	23227		

Site Ref / Hole ID:	Upper Tip H	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Black clayey very sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	Unknown	**Material Supplier:**	Site
Sampled By:	Client	**Specification:**	BS1377
Date Received:	27 January 2021	**Date Tested:**	28 January 2021



Test Method:	BS 1377: part 4: 1990: clause 3.3, 2.5kg rammer in a 1 litre mould
Preparation:	Original sample was oven dried @ 105 oC, separate specimens tested

Particle Density, Mg/m³	2.55	assumed
Material > 37.5mm	2	%
Material < 37.5mm > 20mm	11	%

Derived Parameters ×	
Maximum Dry Density, Mg/m³	1.87
Optimum Moisture Content %	11.7

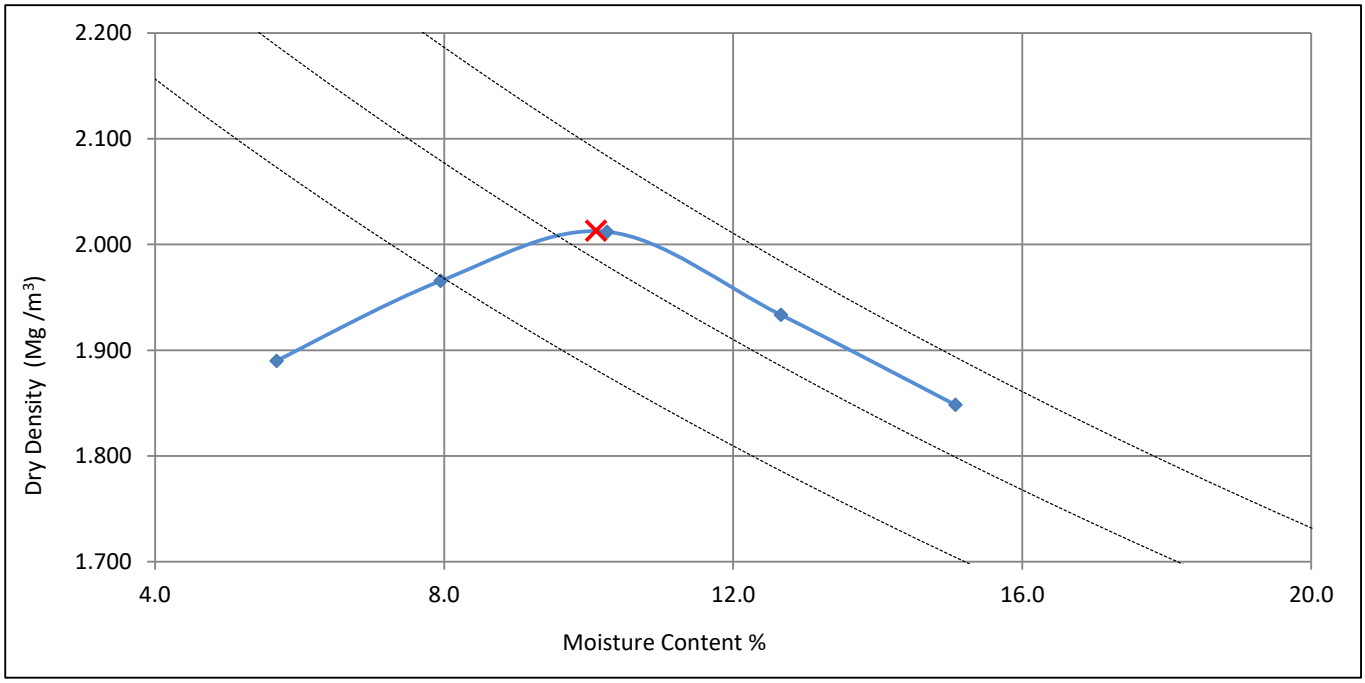
Remarks:

QA Ref.				
BS1377 - 4 Rev. 2.0	**Apex Testing Solutions** Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	Approver: *L Davis* L Davis, Quality Manager	Date: 01/02/2021	Fig. **COMP**

TEST REPORT
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377:Part 4:1990: Clause 3.4

Project No:	D21063	**Client:**	Integral Geotechnique
Project Name:	Tylorstown Upper Tip	**Address:**	Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH
ATS Sample No:	23228		

Site Ref / Hole ID:	Upper Tip I	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Black clayey very sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	Unknown	**Material Supplier:**	Site
Sampled By:	Client	**Specification:**	BS1377
Date Received:	27 January 2021	**Date Tested:**	28 January 2021



Test Method:	BS 1377: part 4: 1990: clause 3.3, 2.5kg rammer in a 1 litre mould
Preparation:	Original sample was oven dried @ 105 oC, separate specimens tested

Particle Density, Mg/m^3	2.65	assumed
Material > 37.5mm	0	%
Material < 37.5mm > 20mm	5	%

Derived Parameters ×	
Maximum Dry Density, Mg/m^3	2.01
Optimum Moisture Content %	10.1

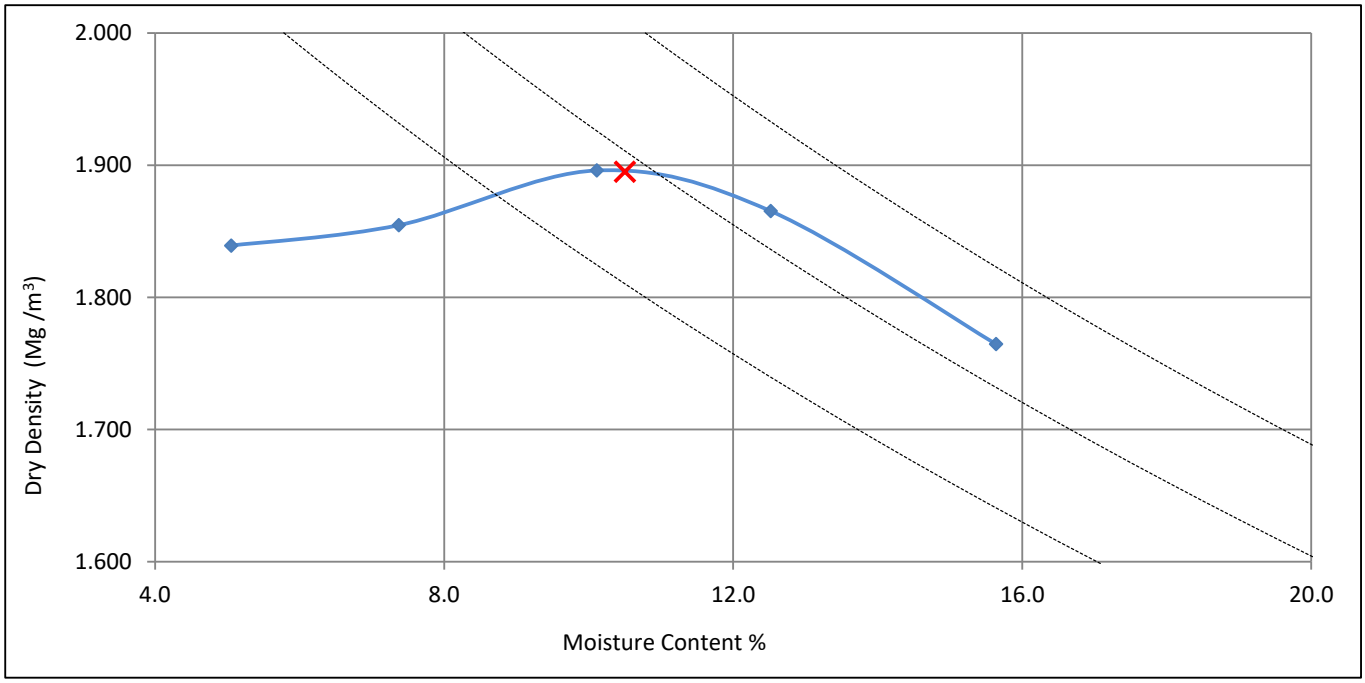
Remarks:

QA Ref.	**Apex Testing Solutions**		Approver	Date
BS1377 - 4	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ	7771	L Davis	01/02/2021
Rev. 2.0	Tel: 01656 746762 Fax: 01656 749096		L Davis, Quality Manager	Fig. COMP

TEST REPORT
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377:Part 4:1990: Clause 3.4

Project No:	D21063	**Client:**	Integral Geotechnique
Project Name:	Tylorstown Upper Tip	**Address:**	Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH
ATS Sample No:	23229		

Site Ref / Hole ID:	Upper Tip J	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Black clayey very sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	Unknown	**Material Supplier:**	Site
Sampled By:	Client	**Specification:**	BS1377
Date Received:	27 January 2021	**Date Tested:**	29 January 2021



Test Method:	BS 1377: part 4: 1990: clause 3.3, 2.5kg rammer in a 1 litre mould
Preparation:	Original sample was oven dried @ 105 oC, separate specimens tested

Particle Density, Mg/m^3	2.55	assumed
Material > 37.5mm	2	%
Material < 37.5mm > 20mm	10	%

Derived Parameters ×	
Maximum Dry Density, Mg/m^3	1.90
Optimum Moisture Content %	10.5

Remarks:

FIGURES

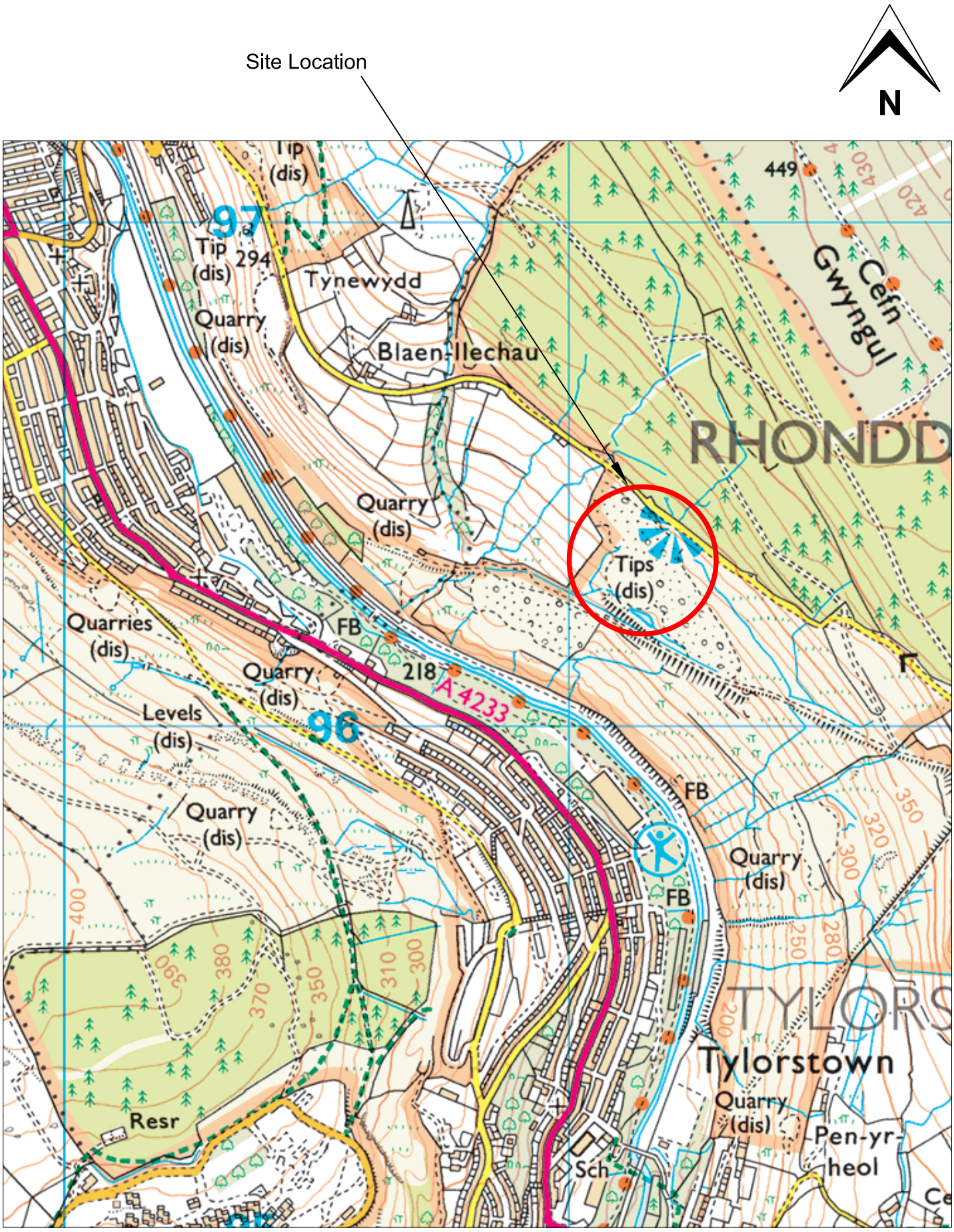


Figure 1: Site Location

Project: Upper Tip, Tylorstown Landslip	Job no.: 12651	Intégral Géotechnique	Integral House, 7 Beddau Way, Castlegate Business Park, Caerphilly, CF83 2AX. Tel: 029 2080 7991
Client: Walters Group Ltd.	Scale: 1:10,000 at A4		

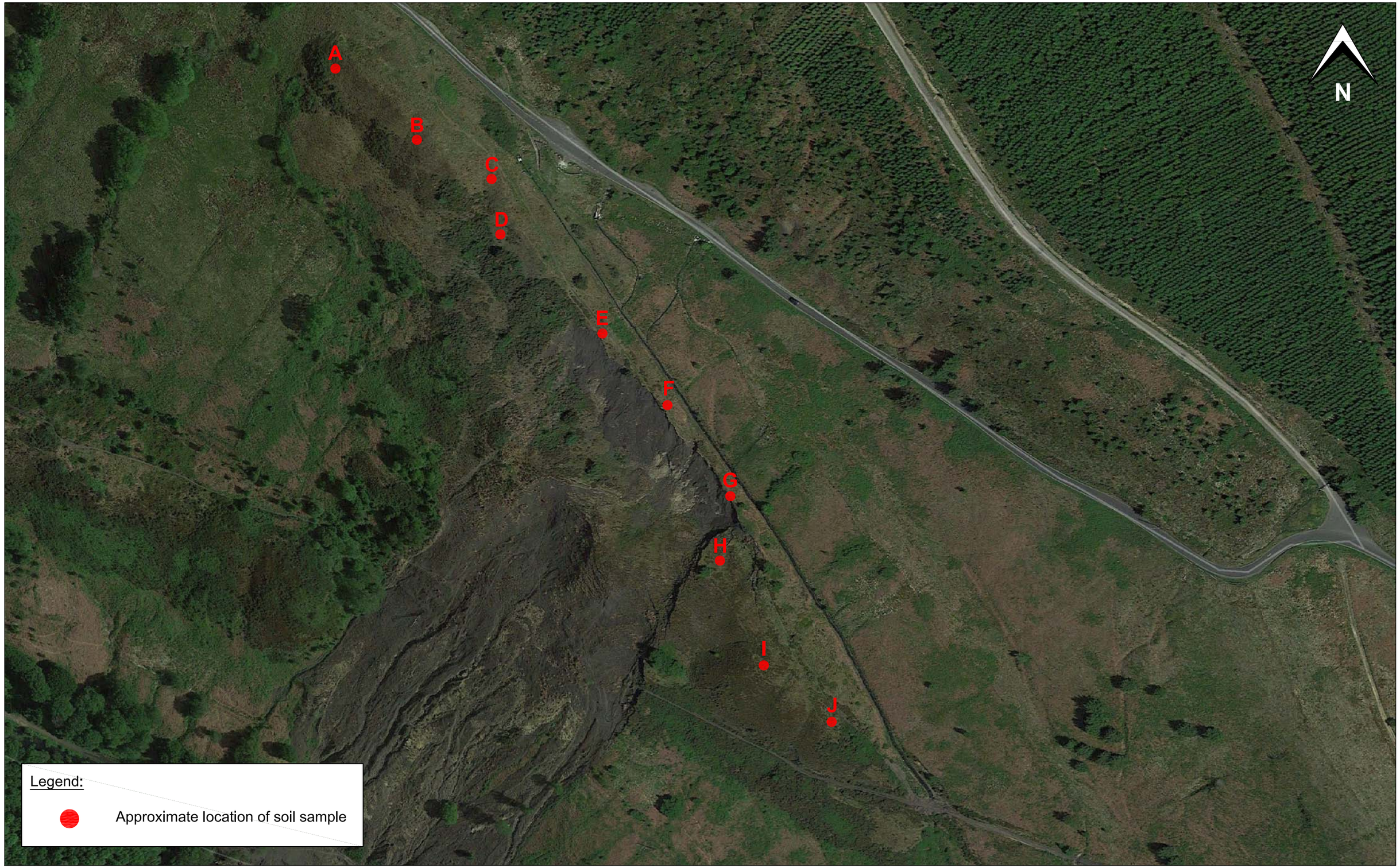


Figure 2: Soil Sample Locations

Project: Upper Tip, Tylorstown Landslip	Job No.: 12651	Intégral Géotechnique
Client: Walters Group Ltd.	Scale: NTS	

Integral House,
7 Beddau Way,
Castlegate Business Park,
Caerphilly,
CF83 2AX.
Tel: 029 2080 7991

REDSTART

APPENDIX C
GEO-ENVIRONMENTAL CHEMICAL ANALYSIS

CAPITA

Screened on POS Parks 1% SOM
Averages provided for determinands with 6 or more results above LOD, with the LOD used for samples below that concentration.
LOD values in column C relate to the RRS-C analysis, and some Upper Tip determinants have different LODs

Determinand	Units	LOD	GAC	Min	Max	Avg.	Sample Location:	UPPER TIP	UPPER TIP	UPPER TIP	UPPER TIP	UPPER TIP	UPPER TIP	UPPER TIP	UPPER TIP	UPPER TIP	UPPER TIP	RRS-C	RRS-C	RRS-C	RRS-C	RRS-C	RRS-C	RRS-C	RRS-C	RRS-C	RRS-C	RRS-C	RRS-C	RRS-C
							Sample Description	A	B	C	D	E	F	G	H	I	J	TP1	TP1	TP2	TP2	TP2	TP3	TP4	TP5	TP5	TP6	TP7	WS01	BH2	BH2
							Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
							Top Depth (m):	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.2	0.5	0.2	0.5	1	0.2	0.2	0.2	0.5	0.2	0.2	2	0.1	0.5
							Date Sampled:	27/01/2021	27/01/2021	27/01/2021	27/01/2021	27/01/2021	27/01/2021	27/01/2021	27/01/2021	27/01/2021	27/01/2021	04/03/2021	04/03/2021	04/03/2021	04/03/2021	04/03/2021	04/03/2021	04/03/2021	04/03/2021	04/03/2021	04/03/2021	04/03/2021	16/03/2021	05/03/2021	05/03/2021
General																															
ACM Type	-	N/A	-	-	-	-		Crocidolite																							
Asbestos Identification	-	N/A	-	-	-	-		Detected	NotDetected	NotDetected	NotDetected	NotDetected	NotDetected	NotDetected	NotDetected	NotDetected	NotDetected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected		No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
ACM Detection Stage	-	N/A	-	-	<0.001	-		<0.001																							
Moisture	%	0.02	-	6.90	76.00	17.6		12	6.9	12	8.2	6.9	9.1	9.5	10	11	9.8	16	19	18	26	16	16	76	14	18	22	22	8.1	34	22
pH	pH Units	4	6-9	4.80	8.90	6.42		5.8	6.2	6.0	6.3	7.0	7.1	7.1	6.7	7.4	6.6	7.8	7.5	7.6	7.3	7.2	5.4	4.8	5.2	5.4	5.5	4.9	8.9	5	5.3
Organic Matter	%	0.4	-	1.10	45.00	9.95												11	9.3	16		9.1	3.3	45	1.7	1.1	2.4	3.5	< 0.40	24	2.6
Total Organic Carbon	%	0.1	-	0.70	3.50	1.60		2.7	1.3	3.5	1.8	0.90	0.70	0.70	1.4	1.7	1.3														
Sulphate (2:1 Water Soluble) as SO4	g/l	0.01	-	< 0.010	0.21	0.038		0.04	0.05	0.02	0.05	0.03	0.04	0.03	0.05	0.08	0.21	0.049	0.031	< 0.010		< 0.010	< 0.010	0.046	< 0.010	< 0.010	< 0.010	< 0.010	0.047	< 0.010	0.02
Calorific Value	MJ/kg		-	2.10	8.10	-												2.1			8.1										
Cyanide (Total)	mg/kg	0.5	-	< 0.50	0.50	-		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	< 0.50	< 0.50	< 0.50		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.5
Metals																															
Aluminium (Total)	mg/kg	100	-	1500	12000	6454												8000	6200	5400		8000	12000	2200	1500	9500	9400	3700	5900	3500	8600
Arsenic	mg/kg	1	170	6	38	12.3		15	6.8	14	13	6.0	5.6	5.9	12	27	38	11	7.7	9.4		7.8	12	6.9	13	6.4	13	18	8.2	19	6.8
Boron (Hot Water Soluble)	mg/kg	0.4	46000	< 0.40	0.7	0.411		<0.2	0.3	<0.2	0.3	0.3	0.3	0.2	0.4	0.2	0.4	0.51	< 0.40	0.59		< 0.40	< 0.40	0.71	< 0.40	< 0.40	< 0.40	< 0.40	0.59	0.43	0.63
Cadmium	mg/kg	0.1	532	< 0.10	0.5	0.169		<0.2	<0.2	<0.2	<0.2	<0.2	0.2	0.2	<0.2	<0.2	<0.2	0.37	0.33	0.27		0.12	0.19	0.45	0.16	< 0.10	0.13	0.1	0.23	0.14	< 0.10
Chromium	mg/kg	1	33000	4.1	18.0	8.90		5.9	4.6	5.2	4.1	5.1	5.2	4.7	4.4	4.5	6.1	12	10	8.7		13	18	9.9	4.4	18	17	7	12	7.9	17
Manganese	mg/kg	5	-	59	1400	334		310	300	410	120	280	240	220	290	440	460	470	320	390		210	310	59	190	410	310	170	1400	100	270
Antimony	mg/kg	2	-	< 2.0	5.5	-												2.6	< 2.0	< 2.0		< 2.0	< 2.0	5.5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Copper	mg/kg	0.5	44000	3	170	37.1		48	52	51	49	44	36	37	40	64	76	39	32	39		15	6.1	170	2.9	4.8	4.6	9.2	12	15	6.9
Mercury	mg/kg	0.1	68	< 0.10	0.5	0.205		0.4	<0.3	0.5	<0.3	<0.3	<0.3	<0.3	<0.3	0.5	0.5	0.21	0.37	0.35		0.14	< 0.10	0.33	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.11	< 0.10
Nickel	mg/kg	0.5	3400	3	39	22.3		25	35	25	14	34	29	30	27	30	24	33	25	29		18	22	13	3.9	15	16	3.4	39	6	17
Lead	mg/kg	0.5		6	190	34.1		30	27	27	25	20	20	18	27	39	68	40	30	36		18	13	190	6.1	8.1	11	26	31	58	17
Selenium	mg/kg	0.2	1800	0.3	3.6	1.31		2.1	1.2	3.2	1.3	<1.0	<1.0	<1.0	<1.0	3.6	3.4	1.2	1.1	1.7		1.1	1.5	1.8	0.29	0.84	1.2	0.79	0.47	1.4	1.2
Zinc	mg/kg	0.5	5000	9	110	54.3		55	94	63	30	78	81	71	63	67	110	88	57	59		36	42	59	11	35	30	9.1	60	15	36
Chromium (Hexavalent)	mg/kg	0.5	170000	< 0.50	-	-		<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	< 0.50	< 0.50	< 0.50		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Total Petroleum Hydrocarbons																															
Aliphatic TPH >C5-C6	mg/kg	0.01	95000	< 0.010	-	-		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aliphatic TPH >C6-C8	mg/kg	0.01	150000	< 0.010	-	-		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aliphatic TPH >C8-C10	mg/kg	0.1	14000	< 0.10	-	-		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.10	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12	mg/kg	0.1	21000	< 0.10	0.77	-		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.77	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	mg/kg	0.1	25000	< 0.10	7.30	-		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	7.30	<2.0	0.53	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C16-C21	mg/kg	0.1	450000	< 0.10	25.00	-		<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	25.00	<8.0	< 0.10	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35	mg/kg	0.1	450000	< 0.10	83.00	-		<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	83.00	<8.0	4	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C35-C44	mg/kg	0.1	450000	< 0.10	110.00	-		<8.4	<8.4	<8.4	<8.4	<8.4	<8.4	<8.4	<8.4	110.00	<8.4	< 0.10	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	mg/kg	1	-	< 1.0	5.30	-		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5.3	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C5-C7	mg/kg	0.01	76000	< 0.010	-	-		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aromatic TPH >C7-C8	mg/kg	0.01	87000	< 0.010	-	-		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aromatic TPH >C8-C10	mg/kg	0.1	7200	< 0.10	3.60	-		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	3.6	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C10-C12	mg/kg	0.1	9200	< 0.10	-	-		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 0.10	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C12-C16	mg/kg	0.1	10000	< 0.10	-	-		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	< 0.10	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C16-C21	mg/kg	0.1	7600	< 0.10	1.80	-		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	1.8	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C21-C35	mg/kg	0.1	7800	< 0.10	16.00	-		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	16	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C35-C44	mg/kg	0.1	7800	< 0.10	-	-		<8.4	<8.4	<8.4	<8.4	<8.4	<8.4	<8.4	<8.4	<8.4	<8.4	< 0.10	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	mg/kg	1	-	< 1.0	22.00	-		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	22	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Petroleum Hydrocarbons	mg/kg	2	-	< 2.0	27.00	-												27	< 2.0	< 2.0		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Polycyclic Aromatic Hydrocarbons																															
Naphthalene	mg/kg	0.1	1200	< 0.10	0.89	0.336		0.55	0.45	0.89	0.75	0.37	0.28	0.31	0.67	0.72	0.65	0.88	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	mg/kg	0.1	29000	< 0.10	0.33	-		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.33	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	mg/kg	0.1	29000	< 0.10	0.47	-		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.47	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg	0.1	20000	< 0.10	0.55	-		<0.05	<0.05	<0.05	0.20	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.55	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	mg/kg	0.1	6200	< 0.10	2.80	0.500		0.88	0.52	1.30	1.50	0.41	0.31	0.33	0.72	0.78	0.76	2.8	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	mg/kg	0.1	150000	< 0.10	0.51	-		<0.05	<0.05	<0.05	0.23	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.51	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	mg/kg	0.1	6300	< 0.10	2.70	-		<0.05	<0.05	<0.05	0.94	<0.05	<0.05	<0.05	<0.05	<0.05	0.34	2.7	< 0.10	< 0.10		< 0.10	< 0.10	1.9	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.33	< 0.10
Pyrene	mg/kg	0.1	15000	< 0.10	2.50	-		<0.05	<0.05	<0.05	0.78	<0.05	<0.05	<0.05	<0.05	<0.05	0.32	2.5	< 0.10	< 0.10		< 0.10	< 0.10	1.8	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.28	< 0.10
Benzo[a]anthracene	mg/kg	0.1	49	< 0.10	1.10	-		<0.05	<0.05	<0.05	0.51	<0.05	<0.05	<0.05	<0.05	<0.05	0.21	1.1	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	mg/kg	0.1	93	< 0.10	1.80	-		<0.05	<0.05	<0.05	0.55	<0.05	<0.05	<0.05	<0.05	<0.05	0.28	1.8	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	mg/kg	0.1	13	< 0.10	0.81	-		<0.05	<0.05	<0.05	0.38	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.81	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	mg/kg	0.1	370	< 0.10	1.50	-		<0.05	<0.05	<0.05	0.21	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	1.5	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	mg/kg	0.1	11	< 0.10	0.69	-		<0.05	<0.05	<0.05	0.23	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.69	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	mg/kg	0.1	150	< 0.10	0.39	-		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.39	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	mg/kg	0.1	1.1	< 0.10	0.54	-		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.54	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	mg/kg	0.1	1400	< 0.10	0.58	-		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.58	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	mg/kg	2	-	< 2.0	18.00	2.87		1.4	0.97	2.2	6.3	<0.80	<0.80	<0.80	1.4	1.5	2.6	18	< 2.0	< 2.0		< 2.0	< 2.0	3.7	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Phenols																															
Total Phenols	mg/kg	0.3	440	< 0.30	<1.0	-		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 0.30	< 0.30	< 0.30		< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30

CAPITA

Averages provided for determinands with 3 or more results above LOD, with the LOD used for samples below that concentration.
LOD values in column D relate to the RRS-C analysis, and some Upper Tip determinants have different LODs

Determinand	Type	Units	LOD	DWS	EQS	Min	Max	Avg.	Sample Location:	UPPER TIP	UPPER TIP	UPPER TIP	UPPER TIP	UPPER TIP	UPPER TIP	UPPER TIP	UPPER TIP	UPPER TIP	UPPER TIP	RRS-C	RRS-C	RRS-C	RRS-C	RRS-C	RRS-C
									Sample Description:	A	B	C	D	E	F	G	H	I	J	TP6	WS01	TP1	TP2	TP3	BH2
									Sample Type:	LEACHATE	LEACHATE	LEACHATE	LEACHATE	LEACHATE	LEACHATE	LEACHATE	LEACHATE	LEACHATE	LEACHATE	LEACHATE	LEACHATE	LEACHATE	LEACHATE	LEACHATE	LEACHATE
									Top Depth (m):	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.2	2	0.5	0.2	0.2	0.1
									Date Sampled:	27/01/2021	27/01/2021	27/01/2021	27/01/2021	27/01/2021	27/01/2021	27/01/2021	27/01/2021	27/01/2021	27/01/2021	04/03/2021	16/03/2021	04/03/2021	04/03/2021	04/03/2021	05/03/2021
General																									
pH	10:1		N/A	6.5-9.5	-	6.1	8.5	7.04		6.3	6.4	6.2	6.1	7.2	6.7	6.5	6.2	6.3	6.4	7.8	8.5	8.2	8	8.2	7.7
Sulphate	10:1	mg/l	1	250	400	< 1.0	19	2.87		2.3	0.95	1.2	5.2	0.96	0.97	0.95	2.1	1.5	1.3	2.1	19	2.4	2.6	< 1.0	1.4
Cyanide (Total)	10:1	mg/l	0.05	0.05	1	< 0.050	-	-		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Calcium	10:1	mg/l	2	-	-	< 2.0	3.5	1.59		2.0	0.33	1.0	1.7	1.8	1.3	0.98	0.91	0.95	0.93	< 2.0	3.5	< 2.0	< 2.0	< 2.0	< 2.0
Hardness	10:1	mg/l	1	-	-	< 1.0	13	3.78												< 1.0	13	4.7	2	< 1.0	< 1.0
Dissolved Organic Carbon Low Level	10:1	mg/l	N/A	-	-	3.96	10	5.76		5.7	6.0	5.3	5.6	4.4	4.0	4.0	4.1	4.9	4.4	8	7.8	6.5	5.4	6.1	10
Metals																									
Aluminium (Dissolved)	10:1	µg/l	5	200	-	78.00	230	144												230	89	87	78	190	190
Arsenic (Dissolved)	10:1	µg/l	0.2	10	50	0.44	5.6	0.838		<1.0	<1.0	5.60	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.6	1.5	0.48	0.44	0.48	1.5
Boron (Dissolved)	10:1	µg/l	10	1000	2000	< 10	16	-		13	15	12	12	11	12	13	11	13	12	< 10	16	< 10	13	< 10	< 10
Cadmium (Dissolved)	10:1	µg/l	0.12	5	0.08	< 0.12	-	-		<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12
Copper (Dissolved)	10:1	µg/l	0.5	2000	1*	< 0.50	6.6	3.17		2.7	6.6	5.3	5.8	4.0	4.6	<0.7	2.4	4.5	2.0	2.8	< 0.50	2.1	0.96	0.56	5.4
Mercury (Dissolved)	10:1	µg/l	0.05	1	0.07	< 0.05	-	-		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Manganese (Dissolved)	10:1	µg/l	0.5	50	123*	3.50	21	8.63		3.5	3.5	10	9.2	9.2	12.00	6.1	5.6	7.1	7.7	3.8	3.8	12	21	19	4.5
Nickel (Dissolved)	10:1	µg/l	0.5	20	4*	< 0.50	2.1	1.27		2.0	1.7	0.90	2.1	1.9	1.7	0.50	0.90	1.9	1.3	0.75	< 0.50	1.8	0.93	< 0.50	0.88
Lead (Dissolved)	10:1	µg/l	0.5	1	1.2*	< 0.50	7.0	2.19		<1.0	1.3	1.9	7.0	2.0	5.1	2.3	1.6	1.1	3.1	2.8	< 0.50	1.2	0.74	0.67	3.2
Antimony (Dissolved)	10:1	µg/l	0.5	5	-	< 0.50	-	-												< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Selenium (Dissolved)	10:1	µg/l	0.5	10	-	< 0.50	0.64	-		<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	< 0.50	0.64	< 0.50	< 0.50	< 0.50	< 0.50
Zinc (Dissolved)	10:1	µg/l	3	-	10.9*	< 3.0	38	7.63		5.8	6.1	5.5	5.7	6.5	6.9	4.4	11	5.7	6.2	3	< 3.0	6.7	< 3.0	38	4.5
Chromium (Total)	10:1	µg/l	0.5	50	4.7	< 0.50	0.90	0.601		<0.4	0.50	0.80	<0.4	0.50	0.70	0.80	<0.4	0.90	0.50	0.71	< 0.50	< 0.50	< 0.50	< 0.50	0.7
Iron (Dissolved)	10:1	µg/l	5	200	1000	120.00	1200	660												1200	120	550	240	750	1100
Total Petroleum Hydrocarbons																									
Aliphatic TPH >C5-C6	10:1	µg/l	0.01	-	-	< 0.010	-	-		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aliphatic TPH >C6-C8	10:1	µg/l	0.01	-	-	< 0.010	-	-		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aliphatic TPH >C8-C10	10:1	µg/l	0.1	-	-	< 0.10	-	-		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12	10:1	µg/l	0.1	-	-	< 0.10	-	-		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	10:1	µg/l	0.1	-	-	< 0.10	-	-		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C16-C21	10:1	µg/l	0.1	-	-	< 0.10	-	-		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35	10:1	µg/l	0.1	-	-	< 0.10	830	-		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	< 0.10	830	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C35-C44	10:1	µg/l	0.1	-	-	< 0.10	-	-												< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	10:1	µg/l	1	-	-	< 1.0	830	-												< 1.0	830	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C5-C7	10:1	µg/l	0.01	1	-	< 0.010	-	-		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aromatic TPH >C7-C8	10:1	µg/l	0.01	-	-	< 0.010	-	-		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aromatic TPH >C8-C10	10:1	µg/l	0.1	-	-	< 0.10	-	-		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C10-C12	10:1	µg/l	0.1	-	-	< 0.10	-	-		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C12-C16	10:1	µg/l	0.1	-	-	< 0.10	-	-		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C16-C21	10:1	µg/l	0.1	0.01	-	< 0.10	-	-		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C21-C35	10:1	µg/l	0.1	-	-	< 0.10	-	-		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C35-C44	10:1	µg/l	0.1	-	-	< 0.10	-	-												< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	10:1	µg/l	1	-	-	< 1.0	-	-												< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Petroleum Hydrocarbons	10:1	µg/l	2	-	-	< 2.0	830	-												< 2.0	830	< 2.0	< 2.0	< 2.0	< 2.0
Polycyclic Aromatic Hydrocarbons																									
Naphthalene	10:1	µg/l	0.1	-	2	< 0.10	-	-		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	10:1	µg/l	0.1	-	-	< 0.10	-	-		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	10:1	µg/l	0.1	-	-	< 0.10	-	-		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	10:1	µg/l	0.1	-	-	< 0.10	-	-		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	10:1	µg/l	0.1	-	-	< 0.10	-	-		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	10:1	µg/l	0.1	-	0.1	< 0.10	-	-		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	10:1	µg/l	0.1	-	0.0063	< 0.10	-	-		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	10:1	µg/l	0.1	-	-	< 0.10	-	-		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	10:1	µg/l	0.1	-	-	< 0.10	-	-		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	10:1	µg/l	0.1	-	-	< 0.10	-	-		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	10:1	µg/l	0.1	-	0.00017	< 0.10	-	-		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	10:1	µg/l	0.1	-	0.00017	< 0.10	-	-		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	10:1	µg/l	0.1	0.01	0.27	< 0.10	-	-		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	10:1	µg/l	0.1	-	0.00017	< 0.10	-	-		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	10:1	µg/l	0.1	-	-	< 0.10	-	-		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	10:1	µg/l	0.1	-	0.00017	< 0.10	-	-		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	10:1	µg/l	2	-	-	< 2.0	-	-		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Phenols																									
Total Phenols	10:1	mg/l	0.03	-	-	< 0.030	-	-		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030

*bioavailable concentration

Fails against an EQS that represents bioavailable concentration
Fails against DWS
Fails against EQS
Fails both EQS and DWS

CAPITA

Averages provided for determinands with 2 or more results above LOD, with the LOD used for samples below that concentration.

Determinand	Units	LOD	DWS	EQS	Min	Max	Avg.	Sample Location:	Sample Description:	Sample Type:	Top Depth (m):	Date Sampled:
								RRS-C	RRS-C	RRS-C	RRS-C	
								BH07	SW01	SW01	SW02	
								WATER	WATER	WATER	WATER	
								6.43	0.00	0.00	0.00	
								19/03/2021	19/03/2021	08/04/2021	19/03/2021	
General												
pH		N/A	6.5-9.5	0	7.9	8.2	8.10	8.1	8.2	8.2	7.9	
Electrical Conductivity	µS/cm	1	-	-	130	580	323.33	580	260		130	
Biochemical Oxygen Demand	mg O2/l	4	-	-	< 4.0	-	-	< 4.0	< 4.0		< 4.0	
Chemical Oxygen Demand	mg O2/l	10	-	-	13	15	14.00	13	14		15	
Sulphur	mg/l	1	-	-	4	25	11.77	25	6.3		4	
Sulphate	mg/l	1	250	400	12	75	34.00	75	19	30	12	
Cyanide (Total)	mg/l	0.05	0.05	1	-	-	0.05	< 0.050	< 0.050	<0.050	< 0.050	
Thiocyanate	mg/l	0.5	-	-	-	-	0.50	< 0.50	< 0.50		< 0.50	
Calcium	mg/l	2	-	-	5.1	65	32.03		26	65	5.1	
Total Hardness as CaCO3	mg/l	15	-	-	33	280	130.75	110	100	280	33	
Dissolved Organic Carbon	mg/l	2	-	-	6.1	7.5	6.60	7.5	6.1		6.2	
Total Organic Carbon	mg/l	2	-	-	6.2	7.1	6.77	7	6.2		7.1	
Metals												
Aluminium (Dissolved)	µg/l	5	200	-	5.8	13	8.90	5.8	13	5.8	11	
Arsenic (Dissolved)	µg/l	0.2	10	50	0.35	0.68	0.55	0.68	0.35	0.6	0.56	
Boron (Dissolved)	µg/l	10	1000	2000	18	92	40.00	27	18	92	23	
Barium (Dissolved)	µg/l	5	-	-	5.5	32	17.83	16	32		5.5	
Beryllium (Dissolved)	µg/l	1	-	-	-	-	-	< 1.0	< 1.0		< 1.0	
Cadmium (Dissolved)	µg/l	0.12	5	0.08	-	-	-	< 0.12	< 0.12	<0.12	< 0.12	
Chromium (Dissolved)	µg/l	0.5	-	-	5	8.7	7.10	5	7.7	7	8.7	
Copper (Dissolved)	µg/l	0.5	2000	1*	1.5	9.3	5.03	1.5	5.7	9.3	3.6	
Iron (Dissolved)	µg/l	5	200	1000	< 5.0	38	21.33	< 5.0	38		21	
Mercury (Dissolved)	µg/l	0.05	1	0.07	< 0.05	-	-	< 0.05	< 0.05	<0.05	< 0.05	
Manganese (Dissolved)	µg/l	0.5	50	123*	9.2	240	115.05	240	31	9.2	180	
Nickel (Dissolved)	µg/l	0.5	20	4*	1.1	1.9	1.63	1.7	1.1	1.8	1.9	
Lead (Dissolved)	µg/l	0.5	1	1.2*	< 0.50	-	-	< 0.50	< 0.50	<0.50	< 0.50	
Antimony (Dissolved)	µg/l	0.5	5	-	< 0.50	0.64	-	0.63	< 0.50	0.64	< 0.50	
Selenium (Dissolved)	µg/l	0.5	10	-	< 0.50	2.5	1.01	2.5	< 0.50	<0.50	0.54	
Vanadium (Dissolved)	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50	
Zinc (Dissolved)	µg/l	3	-	10.9*	< 3.0	-	-	< 3.0	< 3.0	<3.0	< 3.0	
Chromium (Hexavalent)	µg/l	20	-	-	< 20	-	-	< 20	< 20		< 20	
Total Petroleum Hydrocarbons												
Aliphatic TPH >C5-C6	µg/l	0.1	-	-	< 0.10	-	-	< 0.10	< 0.10	< 0.010	< 0.10	
Aliphatic TPH >C6-C8	µg/l	0.1	-	-	< 0.10	-	-	< 0.10	< 0.10	< 0.010	< 0.10	
Aliphatic TPH >C8-C10	µg/l	0.1	-	-	< 0.10	-	-	< 0.10	< 0.10	< 0.10	< 0.10	
Aliphatic TPH >C10-C12	µg/l	0.1	-	-	< 0.10	-	-	< 0.10	< 0.10	< 0.10	< 0.10	
Aliphatic TPH >C12-C16	µg/l	0.1	-	-	< 0.10	-	-	< 0.10	< 0.10	< 0.10	< 0.10	
Aliphatic TPH >C16-C21	µg/l	0.1	-	-	< 0.10	-	-	< 0.10	< 0.10	< 0.10	< 0.10	
Aliphatic TPH >C21-C35	µg/l	0.1	-	-	< 0.10	-	-	< 0.10	< 0.10	< 0.10	< 0.10	
Aliphatic TPH >C35-C44	µg/l	0.1	-	-	< 0.10	-	-	< 0.10	< 0.10	< 0.10	< 0.10	
Total Aliphatic Hydrocarbons	µg/l	5	-	-	< 5.0	-	-	< 5.0	< 5.0	< 1.0	< 5.0	
Aromatic TPH >C5-C7	µg/l	0.1	1	-	< 0.10	-	-	< 0.10	< 0.10	< 0.010	< 0.10	
Aromatic TPH >C7-C8	µg/l	0.1	-	-	< 0.10	-	-	< 0.10	< 0.10	< 0.010	< 0.10	
Aromatic TPH >C8-C10	µg/l	0.1	-	-	< 0.10	-	-	< 0.10	< 0.10	< 0.10	< 0.10	
Aromatic TPH >C10-C12	µg/l	0.1	-	-	< 0.10	-	-	< 0.10	< 0.10	< 0.10	< 0.10	
Aromatic TPH >C12-C16	µg/l	0.1	-	-	< 0.10	-	-	< 0.10	< 0.10	< 0.10	< 0.10	
Aromatic TPH >C16-C21	µg/l	0.1	0.01	-	< 0.10	-	-	< 0.10	< 0.10	< 0.10	< 0.10	
Aromatic TPH >C21-C35	µg/l	0.1	-	-	< 0.10	-	-	< 0.10	< 0.10	< 0.10	< 0.10	
Aromatic TPH >C35-C44	µg/l	0.1	-	-	< 0.10	-	-	< 0.10	< 0.10	< 0.10	< 0.10	
Total Aromatic Hydrocarbons	µg/l	5	-	-	< 5.0	-	-	< 5.0	< 5.0	< 1.0	< 5.0	
Total Petroleum Hydrocarbons	µg/l	10	-	-	< 10	-	-	< 10	< 10	< 2.0	< 10	
Polycyclic Aromatic Hydrocarbons												
Naphthalene	µg/l	0.1	-	2	< 0.10	-	-	< 0.10	< 0.10	< 0.10	< 0.10	
Acenaphthylene	µg/l	0.1	-	-	< 0.10	-	-	< 0.10	< 0.10	< 0.10	< 0.10	
Acenaphthene	µg/l	0.1	-	-	< 0.10	-	-	< 0.10	< 0.10	< 0.10	< 0.10	
Fluorene	µg/l	0.1	-	-	< 0.10	-	-	< 0.10	< 0.10	< 0.10	< 0.10	
Phenanthrene	µg/l	0.1	-	-	< 0.10	-	-	< 0.10	< 0.10	< 0.10	< 0.10	
Anthracene	µg/l	0.1	-	0.1	< 0.10	-	-	< 0.10	< 0.10	< 0.10	< 0.10	
Fluoranthene	µg/l	0.1	-	0.0063	< 0.10	-	-	< 0.10	< 0.10	< 0.10	< 0.10	
Pyrene	µg/l	0.1	-	-	< 0.10	-	-	< 0.10	< 0.10	< 0.10	< 0.10	
Benzo[a]anthracene	µg/l	0.1	-	-	< 0.10	-	-	< 0.10	< 0.10	< 0.10	< 0.10	
Chrysene	µg/l	0.1	-	-	< 0.10	-	-	< 0.10	< 0.10	< 0.10	< 0.10	
Benzo[b]fluoranthene	µg/l	0.1	-	0.00017	< 0.10	-	-	< 0.10	< 0.10	< 0.10	< 0.10	
Benzo[k]fluoranthene	µg/l	0.1	-	0.00017	< 0.10	-	-	< 0.10	< 0.10	< 0.10	< 0.10	
Benzo[a]pyrene	µg/l	0.1	0.01	0.27	< 0.10	-	-	< 0.10	< 0.10	< 0.10	< 0.10	
Indeno(1,2,3-c,d)Pyrene	µg/l	0.1	-	0.00017	< 0.10	-	-	< 0.10	< 0.10	< 0.10	< 0.10	
Dibenz(a,h)Anthracene	µg/l	0.1	-	-	< 0.10	-	-	< 0.10	< 0.10	< 0.10	< 0.10	
Benzo[g,h,i]perylene	µg/l	0.1	-	0.00017	< 0.10	-	-	< 0.10	< 0.10	< 0.10	< 0.10	
Total Of 16 PAH's	µg/l	2	-	-	< 2.0	-	-	< 2.0	< 2.0	< 2.0	< 2.0	
Phenols												
Total Phenols	mg/l	0.03	-	-	< 0.030	-	-	< 0.030	< 0.030	<0.030	< 0.030	
VOCs												
Dichlorodifluoromethane	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0	
Chloromethane	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0	
Vinyl Chloride	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0	
Bromomethane	µg/l	5	-	-	< 5	-	-	< 5	< 5		< 5	
Chloroethane	µg/l	2	-	-	< 2.0	-	-	< 2.0	< 2.0		< 2.0	
Trichlorofluoromethane	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0	
1,1-Dichloroethene	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0	
Trans 1,2-Dichloroethene	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0	
1,1-Dichloroethane	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0	
cis 1,2-Dichloroethene	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0	
Bromochloromethane	µg/l	5	-	-	< 5	-	-	< 5	< 5		< 5	
Trichloromethane	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0	
1,1,1-Trichloroethane	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0	
Tetrachloromethane	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0	
1,1-Dichloropropene	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0	
Benzene	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0	

1,2-Dichloroethane	µg/l	2	-	-	< 2.0	-	-	< 2.0	< 2.0		< 2.0
Trichloroethene	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0
1,2-Dichloropropane	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0
Dibromomethane	µg/l	10	-	-	< 10	-	-	< 10	< 10		< 10
Bromodichloromethane	µg/l	5	-	-	< 5	-	-	< 5	< 5		< 5
cis-1,3-Dichloropropene	µg/l	10	-	-	< 10	-	-	< 10	< 10		< 10
Toluene	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0
Trans-1,3-Dichloropropene	µg/l	10	-	-	< 10	-	-	< 10	< 10		< 10
1,1,2-Trichloroethane	µg/l	10	-	-	< 10	-	-	< 10	< 10		< 10
Tetrachloroethene	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0
1,3-Dichloropropane	µg/l	2	-	-	< 2.0	-	-	< 2.0	< 2.0		< 2.0
Dibromochloromethane	µg/l	10	-	-	< 10	-	-	< 10	< 10		< 10
1,2-Dibromoethane	µg/l	5	-	-	< 5	-	-	< 5	< 5		< 5
Chlorobenzene	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0
1,1,1,2-Tetrachloroethane	µg/l	2	-	-	< 2.0	-	-	< 2.0	< 2.0		< 2.0
Ethylbenzene	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0
m & p-Xylene	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0
o-Xylene	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0
Styrene	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0
Tribromomethane	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0
Isopropylbenzene	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0
Bromobenzene	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0
1,2,3-Trichloropropane	µg/l	50	-	-	< 50	-	-	< 50	< 50		< 50
N-Propylbenzene	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0
2-Chlorotoluene	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0
1,3,5-Trimethylbenzene	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0
4-Chlorotoluene	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0
Tert-Butylbenzene	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0
1,2,4-Trimethylbenzene	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0
Sec-Butylbenzene	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0
1,3-Dichlorobenzene	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0
4-Isopropyltoluene	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0
1,4-Dichlorobenzene	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0
N-Butylbenzene	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0
1,2-Dichlorobenzene	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0
1,2-Dibromo-3-Chloropropane	µg/l	50	-	-	< 50	-	-	< 50	< 50		< 50
1,2,4-Trichlorobenzene	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0
Hexachlorobutadiene	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0
1,2,3-Trichlorobenzene	µg/l	2	-	-	< 2.0	-	-	< 2.0	< 2.0		< 2.0
Methyl Tert-Butyl Ether	µg/l	1	-	-	< 1.0	-	-	< 1.0	< 1.0		< 1.0
N-Nitrosodimethylamine	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Phenol	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
2-Chlorophenol	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Bis-(2-Chloroethyl)Ether	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
1,3-Dichlorobenzene	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
1,4-Dichlorobenzene	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
1,2-Dichlorobenzene	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
2-Methylphenol (o-Cresol)	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Bis(2-Chloroisopropyl)Ether	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Hexachloroethane	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
N-Nitrosodi-n-propylamine	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
4-Methylphenol	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Nitrobenzene	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Isophorone	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
2-Nitrophenol	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
2,4-Dimethylphenol	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Bis(2-Chloroethoxy)Methane	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
2,4-Dichlorophenol	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
1,2,4-Trichlorobenzene	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Naphthalene	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
4-Chloroaniline	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Hexachlorobutadiene	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
4-Chloro-3-Methylphenol	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
2-Methylnaphthalene	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Hexachlorocyclopentadiene	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
2,4,6-Trichlorophenol	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
2,4,5-Trichlorophenol	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
2-Chloronaphthalene	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
2-Nitroaniline	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Acenaphthylene	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Dimethylphthalate	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
2,6-Dinitrotoluene	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Acenaphthene	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
3-Nitroaniline	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Dibenzofuran	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
4-Chlorophenylphenylether	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
2,4-Dinitrotoluene	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Fluorene	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Diethyl Phthalate	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
4-Nitroaniline	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
2-Methyl-4,6-Dinitrophenol	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Azobenzene	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
4-Bromophenylphenyl Ether	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Hexachlorobenzene	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Pentachlorophenol	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Phenanthrene	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Anthracene	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Carbazole	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Di-N-Butyl Phthalate	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Fluoranthene	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Pyrene	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Butylbenzyl Phthalate	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Benzo[a]anthracene	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Chrysene	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Bis(2-Ethylhexyl)Phthalate	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Di-N-Octyl Phthalate	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Benzo[b]fluoranthene	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Benzo[k]fluoranthene	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Benzo[a]pyrene	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Indeno(1,2,3-c,d)Pyrene	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Dibenz(a,h)Anthracene	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
Benzo[g,h,i]perylene	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50
4-Nitrophenol	µg/l	0.5	-	-	< 0.50	-	-	< 0.50	< 0.50		< 0.50

*bioavailable concentration

Fails against an EQS that represents bioavailable concentration

REDSTART

APPENDIX D

GEOTECHNICAL RISK REGISTER

Geotechnical Risk Register

A review of the geotechnical risks associated with the scheme has been undertaken. The risks have been evaluated based on the matrix suggested in HD22 Managing Geotechnical Risk.

Risk Rating (R) = Probability (P) x Impact (I)

Probability (P)			Impact (I)		Increase in duration or project cost		Risk Rating (R)
Very Likely	5		Very High	5	>20%		25
Likely	4	X	High	4	5% to 20%	=	16
Probable	3		Medium	3	2% to 5%		9
Unlikely	2		Low	2	0.5% to 2%		4
Negligible	1		Very Low	1	<0.5%		1

The current risk register is detailed in the following Table.

The register lists the anticipated geotechnical and geo-environmental hazards associated with the works and the potential consequences of those hazards at this stage in the project.

The risk before control of the hazard has been assessed as has the anticipated risk following the proposed mitigation measure.

No	Geotechnical Hazard	Potential Consequence	Risk Before Control			Mitigation Measures	Risk After Control		
			P	I	R		P	I	R
1	Weak, soft till at RS-C under embankment edge zones.	Deep seated slip if side slopes set too steep.	4	3	12	• Refer to planned stability assessment exercise for RS-C landform and slacken slopes if necessary.	1	3	3
2	Risk of fresh slide if water pressures build up in final donor landform, driven by poor functioning herringbone drains.	Mass movement, damage to newly installed drainage infrastructure, possible loss of life.	2	5	10	• Refer to stability assessment currently in design. Assessment to include sensitivity on water levels /pressures. • Herringbone drains deigned with cognisance of spring flows from base/toe. • Install piezometers in completed landform and apply monitoring programme, set water level triggers.	1	5	5
3	Poor weather during soil transport -overwet fill.	Lengthened earthworks programme, lack of strength in finished embankment.	4	2	8	• Allow land and programme for moisture conditioning.	4	1	4
4	Collapse of adit.	Collapse of road, potential loss of life.	2	5	10	• Refer to CMRA and Ground Investigation results. • Suitable supervision on site during construction. • Confirm ground conditions during construction and undertake remediation if required. • Contractor design element.	1	5	5
5	Mine gas in adit passing beneath haul road or unknown adits at Llanwonno Upper Tip.	Illness-asphyxiation risk to construction workers and maintenance workers if working in silt trap manholes or similar.	2	5	10	• Toolbox talks. • Warning signs on manhole lids.	1	5	5
6	Surface water testing programme locates spring waters containing leachate.	Risk of eco -toxicity impact on Rhondda Fach.	1	4	4	• Refer sister programme of surface water testing.	1	4	4

7	Contaminated soil. Pockets of soil with higher asbestos content.	Risk to construction workers and end users depending on placement decisions.	3	3	9	• Refer to Ground Investigation results. • Implement watching brief and testing plan and undertake remediation if required.	1	3	3
8	Contaminated soil. Hidden accumulations of soil with very high coal content.	Increased cost for waste disposal.	3	2	6	• Refer to Ground Investigation results. • Suitable supervision on site during construction. • Confirm ground contamination conditions during construction and undertake additional testing if required.	1	2	2
9	Soil piping or erosion of embankment due to progressive water movement due to tipped over historical water courses.	Local collapse or settlement, possible deterioration of herringbone drains.	3	2	6	• Refer to Ground Investigation results. • Make regular inspection of toe edge zone where springs daylight. • If necessary, repair any erosion pipes/hollows.	2	2	4

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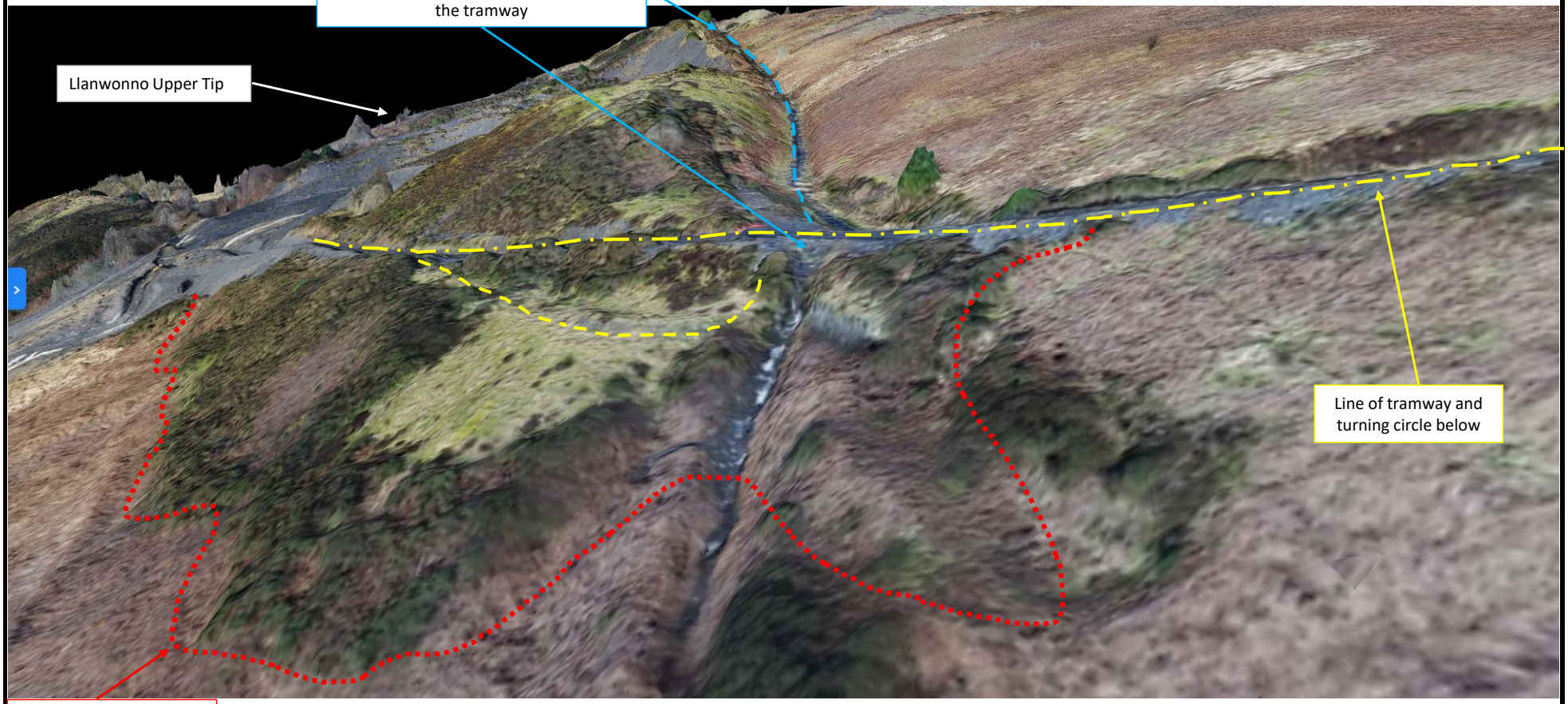
APPENDIX E
PHOTOGRAPHIC PLATES

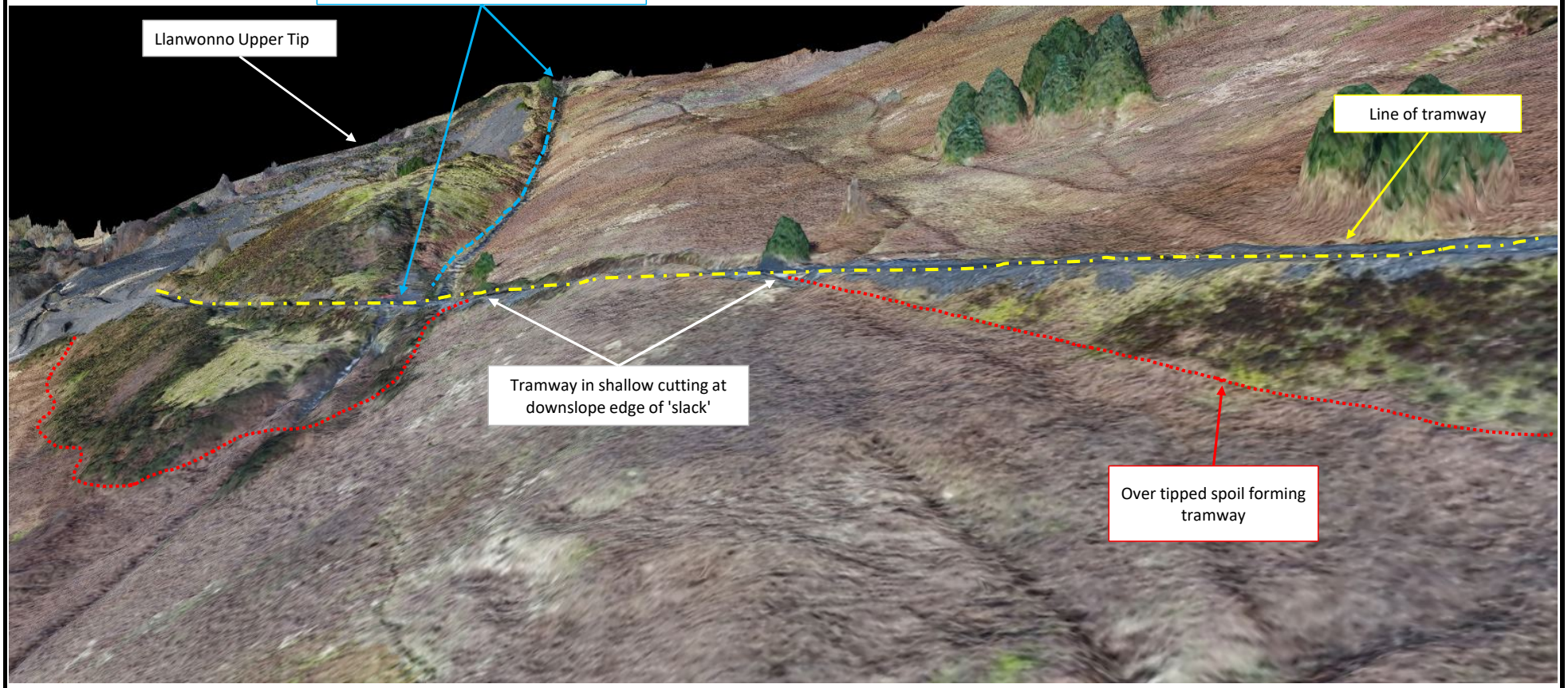
REDSTART	**Tylorstown Landslip: Phase 4**	**Document No.**
	Areial photograph of tramway between Llanwonno Upper Tip and Tylorstown Tip	**Photographic Plate No.** **1**
		RHONDDA CYNON TAF



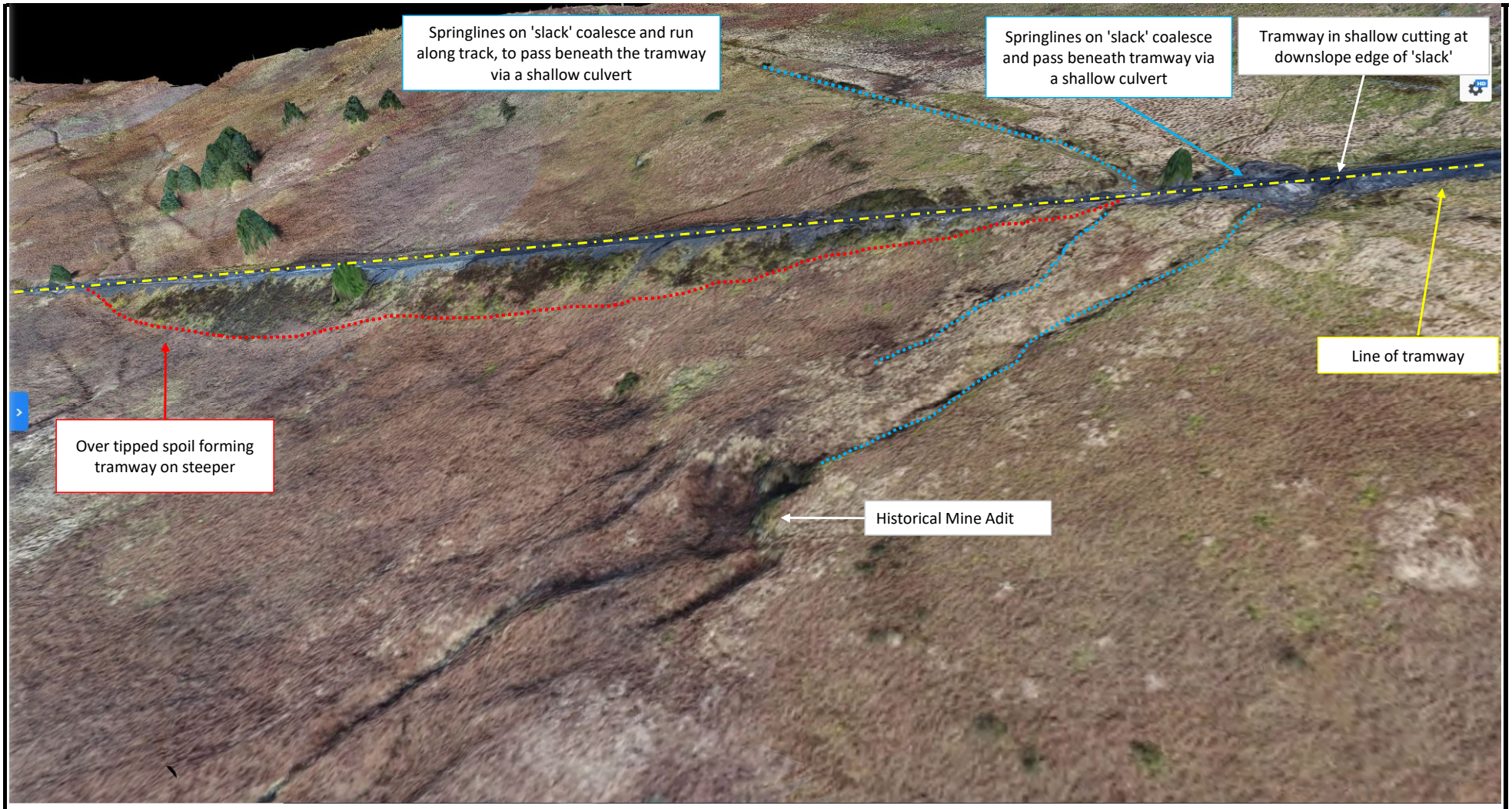
REDSTART

Tylorstown Landslip: Phase 4	**Document No.**
Oblique Areial photogrammetry showing tramway and drainage at their intersection with Llanwonno Upper Tip	**Photographic Plate No.** **2**

RHONDDA CYNON TAF



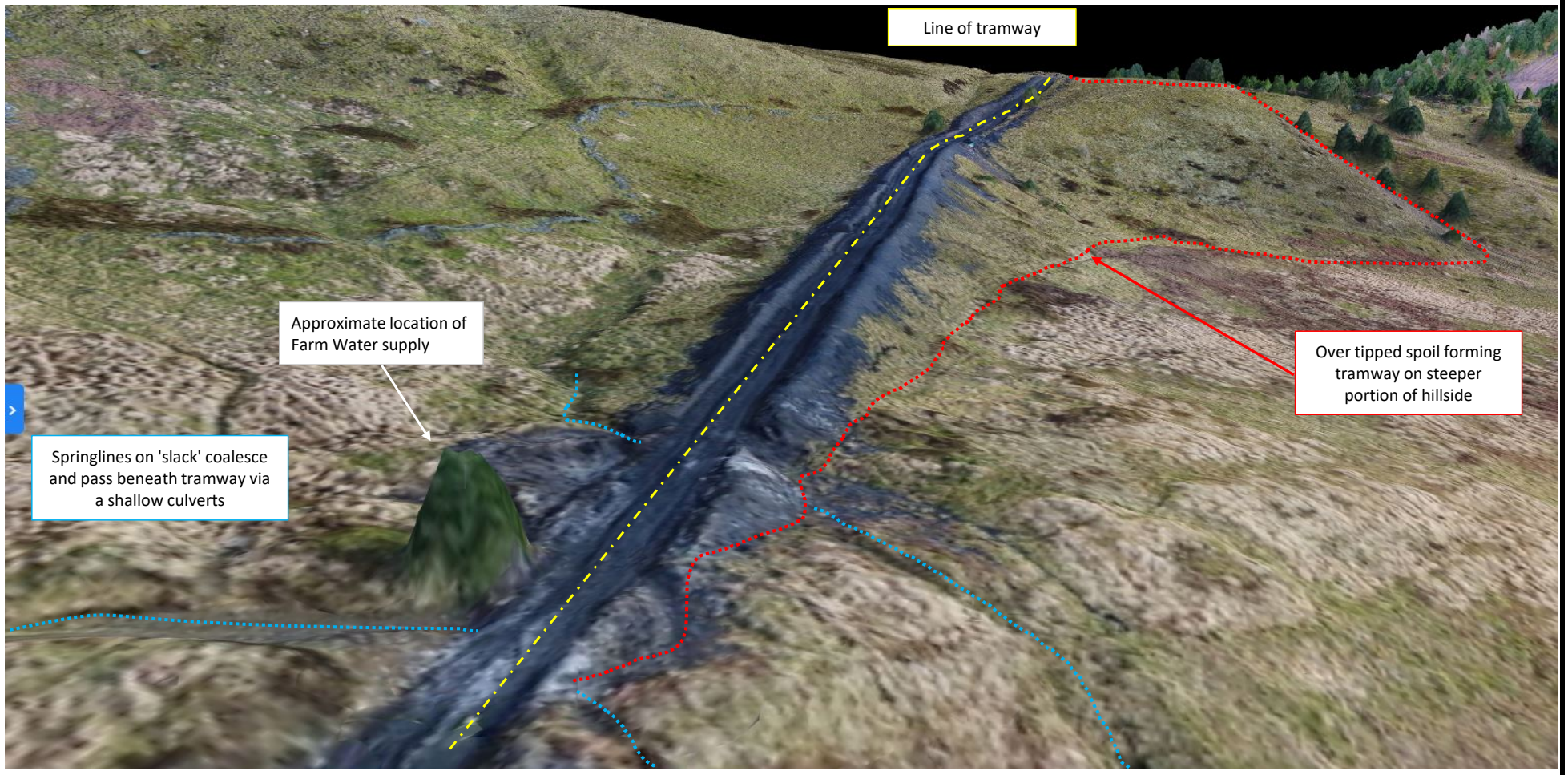
REDSTART	**Tylorstown Landslip: Phase 4**	**Document No.**	RHONDDA CYNON TAF
	Oblique Areial photogrammetry showing tramway in cutting at intersection of edge of 'slack'.	**Photographic Plate No.** **3**	



REDSTART

Tylorstown Landslip: Phase 4	**Document No.**
Oblique Areial photogrammetry showing tramway in fill between two 'slacks'.	**Photographic Plate No.** **4**

RHONDDA CYNON TAF



REDSTART	**Tylorstown Landslip: Phase 4**	**Document No.**	RHONDDA CYNON TAF
	Oblique Areial photogrammetry showing tramway in fill rising to plateau of Tylorstown Tip.	**Photographic Plate No.** **5**	

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Appendix 10.5

Materials Management Plan

Materials Management Plan for Tylorstown Tip Phase 4

1. Specify the scenario to which this MMP relates, as described in the Definition of Waste: Development Industry Code of Practice (DoW CoP) (1, 2, 3 or 4):

☐ 1. Reuse on the Site of Origin

☐ 2. Direct Transfer of clean naturally occurring soil / mineral materials

☐ 3. Cluster Project

☒ 4. Combination of any of the above

In the case of a combination of reuse scenarios, please describe it below (e.g. (i) Reuse on Site of Origin and Direct Transfer of clean naturally occurring unpolluted soils, (ii) Reuse on the Site of Origin with Direct Transfer of clean naturally occurring soil to x number of development sites etc:

Re-use on the Site of Origin with Direct Transfer of mineral materials to 1No re-deposit sites selected to have an uplifted landform.

(NB: A Declaration is required for reuse on the Site of Origin and for any 2-site arrangement i.e. there is no facility for a combination Declaration)

2. Organisation and name of person preparing this MMP	Ben Withers of Capita Property & Infrastructure Ltd, 65 Gresham Street, London EC2V 7NQ

Document Control

Document Reference	GC3613-CAP-75- XX-RP-Y-0004
Revision	P01
Status	S0 Work in Progress
Date issued	3rd December 2021
Revision date	
Summary of revision 1	
Summary of revision 2	

Site Details

3. Site / Project name(s)	Tylorstown Phase 4
Reuse / receiving site name:	Tylorstown Tip Receptor Site C
Donor site name (if Direct Transfer)	Llanwonno Tip

Landowners

4a. Name of Landowner(s) (full address and contact details) – where excavated materials are to be reused	Rhonda Cynon Taf County Borough Council (RCT) owned. See RCT drawing 'land ownership' rev 01 June 2020
4b. Name of Landowner(s) (full address and contact details) – where excavated materials are arising from	Rhondda Cynon Taf Council Headquarters The Pavilions, Cambrian Park, Clydach Vale, Tonypandy, Rhondda Cynon Taf CF40 2XX

Summary and objectives

5a. Provide a brief description of the planned project and how excavated materials are to be reused.	On Sunday 16th February, Storm Dennis flood surge instigated the failure of Tylorstown Upper Tip (Llanwonno Tip and RH01). The initial, larger (main) slip appears to have occurred overnight, upslope within the main tip. A portion of the landslide material fills the valley bottom from the toe of the valley slope outwards in an extremely low angled and widely distributed debris envelope, and in so doing the river channel was filled, and its course diverted to the western side of the valley bottom. The displaced river has eroded the toe of the slope beneath the proposed leisure centre overflow car park, creating an approximately 5 m vertical unstable face and causing serious scouring of the valley sides and damaging a Welsh Water sewer. The slipped material is covering a significant Welsh Water potable supply main and the public footpath owned by Railway paths. Consequently, repairing the area and moving the slipped debris is deemed a necessity by Welsh Water and an emergency works operation by the local authority. The area occupied by the slipped debris fell under Phase 2 and 3. Phase 4, which this document concerns, covers the remainder of Llanwonno Tip left on the valley slope and a receptor site (RH02) at the top of the valley to the east of an existing conical tip known locally as 'Old Smokey'. The proposals, referred to as the 'Proposed Scheme', are for the excavation of 200,000m^3 from RH01 with 60,000m^3 being used to reinstate the slip and 140,000m^3 transported to the receptor site to the east of Old Smokey. The Proposed Scheme will reduce the risk of material slips into the Afon Rhonda Fach valley and any associated impacts on the nearby settlements of Tylorstown and Ferndale. The finished landform at the proposed receptor site will comprise an approx. 500m long plateau which varies in width between 50 and 120m. The landform has batter slopes of 1 in 3 and rises to a maximum height above of 5m above the existing ground level.

General Plans and Schematics

6. **Attach** a location plan for the site(s) and a plan of the site(s) which identifies where different materials are to be excavated from, stockpile locations (if applicable), where materials are to be treated (if applicable) and where materials are to be reused.	Plan Document Reference(s): Location plan GC3613-RED-01-XX-SK-C-0001. This drawing depicts the whole scheme, including the sites of the earlier phases, and shows the proposed haul roads from RH01 to the receptor site. Cross sections of the stockpile at the site of the landfill are depicted in drawings GC3613-RED-75-XX-DR-C-0063 to GC3613-RED-75-XX-DR-C-0069.

7. **Attach** a schematic of proposed materials movement. Where there is only one source area and one placement area briefly describe it. For all other projects a schematic is required.	Description & Schematic Document Reference: The source area for approx. 200,000m^3 is RH01 Llanwonno Tip, with 60,000m^3 of material being used to re-profile the source site and the remainder being transported to a receptor site to the east of RH02, Old Smokey. The proposed haul route uses a former tramway connecting the source and receptor sites. Refer drawing GC3613-RED-01-XX-SK-C-0001 for details.

Parties Involved and Consultation – if more than one party please provide additional details for them and identify the location that they will be working e.g. where a site is zoned

8a. Main earthworks contractor(s) (full address and contact details) – Where excavated materials are to be reused	To be confirmed
8b. Main earthworks contractor(s) (full address and contact details) - Where excavated materials are arising from	As above

9. Treatment contractor(s) (full address and contact details) – for treatment on site of origin, or at a Hub site within a fixed STF / Cluster Project	As above

10. Where wastes and materials are to be transported between sites, provide details of the transport contractor(s) (full address, contact details and waste carriers registration details (if applicable))	As above. A carrier's registration is not applicable because the material is not waste and there is no off-site material movement. All on site movements do not involve public highways.

11. Provide Local Authority contact details (full address and named contacts) where excavated materials are to be reused	Jaqueline Mynott Rhondda Cynon Taff Borough County Council Bronwydd House, Porth Rhondda Cynon Taf CF39 9DL

12a. For the site where materials are to be reused and for Hub Site locations provide NRW contact details):	Gareth Davies National Resources Wales Maes Newydd Neath SA10 6JQ
For all Cluster Projects: 12b. Attach any relevant documentation from the NRW relating to the excavation and reuse of the materials to demonstrate no objection to the proposals (see 3.37 of DoW CoP) If the NRW has not been consulted please explain why (see paragraph 3.39 of the DoW CoP).	NRW references: not applicable

Lines of Evidence

There is no one single factor that can be used to decide that a substance or object is waste, or when it is, at what point it ceases to be waste; as complete a picture as possible has to be created.

The following sections require completion to ensure the correct decision is made.

If a requested item is not relevant it is important to clearly state why this is so (e.g. no planning permission required because permitted development status exists).

Suitable for use criteria

13. Please describe or provide copies of the required specification(s) for the materials to be reused on each site.	Document Reference(s): No specification required.

Where contamination is suspected or known to be present 14a. Please provide copies of or relevant extracts from the risk assessment(s) that has been used to determine the specification for use on the site. **This must relate to the place where materials are to be used.** This must be in terms of (i) human health (ii) controlled waters and (iii) any other relevant receptors. If a risk assessment is not relevant for a particular receptor given the site setting please explain why below:	Document Reference(s): A risk assessment for Phase 2/3 of the scheme is found in document GC3613-CAP-75-XX-RP-Y-0002 and this builds on the factual site investigation (letter) report by Integral Geotechnique 13 May 2020 ref 12651/JJ and the Capita HazWaste Online printout for samples collected within the site investigation. The material to be relocated as part of Phase 4 is assumed to be of the same nature and again it is considered to be appropriate to deposit this at the proposed receptor site to the rear of Llanwonno Tip without any further treatment. A risk assessment for Phase 4 is presented in Redstart Preliminary Sources (Desk) Study Tylorstown Phase 4 Emergency landslide Debris removal. The conclusions are that all material is naturally occurring, and contamination is not suspected but cannot entirely be ruled out hence as a precautionary approach we have completed the items required to satisfy 14a.
14b. Please attach any relevant documentation from the LA relating to the excavation and reuse of the materials to demonstrate no objection (see 3.37 of the CoP)	LA Document references:
14c. Please attach any relevant documentation from NRWrelating to the	The scope and intentions have been discussed with the NRW waste officer. Agreement as to submission of this MMP to CL:AIRE has not been forthcoming.

excavation and reuse of the materials to demonstrate no objection (see 3.37 and Table 2 of the CoP)	
14d. Please attach any relevant documentation from any other regulators (if relevant) relating to the excavation and reuse of the materials to demonstrate no objection (see 3.37 of the CoP)	Document Reference(s)

Where contamination is not suspected 15a. Please attach copies or relevant extracts from the Desk Top Study that demonstrates that there is no suspicion of contamination.	Document Reference(s): Tylorstown Phase 4 Preliminary Sources Study Report, Capita, 2020, CS100303/GT/001 The desktop study revealed both sites have never been developed, with the exception of the tramway, and were greenfield before their use as a historic colliery spoil heap.
15b. Please attach copies of or relevant extracts from the site investigation/testing reports that adequately characterise the clean materials to be used (if appropriate).	Document Reference(s): Llanwonno Tips Reclamation Scheme Stability Report, Halcrow Group Ltd., 2004, Ref. KJ/LWTR/R2
15c. Please attach copies of any other relevant information (if available) confirming that land contamination is not an issue.	Document Reference(s): Tylorstown Landslip Receptor Site – Factual Report on Ground Conditions, 2020, Ref. 12651/JJ

Certainty of use

Various lines of evidence are required to demonstrate that the materials are certain to be used. This includes:

- The production of this MMP
- An appropriate planning permission (or conditions that link with the reuse of the said materials)
- An agreed Remediation Strategy(ies)

- An agreed Design Statement(s)
- Details of the contractual arrangements

Please identify in the following sections what lines of evidence relate to the site(s) **where the materials are to be used**.

16a. Planning Permission(s) relating to the site where materials are to be reused Please provide a copy of the relevant planning permission	Document Reference: A planning application has not yet been submitted. The planning application will refer to the excavation of material and deposit for landform creation at the receptor site.
16b. Explain how the reuse of the excavated materials fits within the planning permission(s) for each site.	See above
16c. If planning permission is not required for any one site please explain why below e.g. permitted development, clean up of a chemical spill, surrender of an Environmental Permit, re-contouring within the existing permission.	Not applicable

Where contamination is suspected or is known to be present 17. Please provide a copy of any Remediation Strategy(ies) that have been agreed with relevant regulators.	Document Reference(s): A dilute and disperse scenario is proposed to deal with small scale oxidation issues and leaching of sulphate and a limited number of metals. Entrained tree pieces and branches can be sorted by bucket. No monitoring of the re-use or donor sub-sites is proposed in the risk assessment document other than within the Rhonda Fach which is part of NRW standard monitoring regime. Carbon dioxide ground gas will likely be created at very slow rates as coal pieces in the placed material are weathered.

	Walkers in open air environment will not be adversely affected. Based on testing during the recent site investigation the calorific value of the material is at the low end of the range where smouldering has potential to be an issue and by application of compaction it is considered that the air voids content will be small, so lessening the chances of smouldering further. The movement of material and deposit of material is still to be agreed with the Local Authority.

Where contamination is not suspected 18. Please provide a copy of any Design Statement(s) that have been agreed (e.g. with the planning authority or in the case of permitted developments the client).	Document Reference(s):

Quantity of Use

19. Please provide a breakdown of the excavated materials for each site and how much will be placed at each site or sub area of each site.	Document Reference(s): Final exact design volumes are not yet available for the scheme. At present, the approximate volumes will be the excavation of approx. 200,000m^3 from the source site, of which 60,000m^3 will be used to re-profile the valley slope. 140,000m^3 will be

Where this is not specific to a single readily identifiable source refer to an annotated plan, schematic or attach a tabulated summary.	transported to the receptor site.

20a. How has consolidation/compaction being considered in the above mass balance calculations?	No mass balance calculations have been completed to date. Water loss is anticipated throughout lifetime of earthworks and beyond. The landform will be created to permit a degree of settlement due to long term soil drainage. No structures are proposed so the landforms have a low sensitivity to consolidation settlement.
20b. How has loss due to treatment being considered in the above mass balance calculations (if applicable)?	No screening or sieve treatment is required so losses of volume due to these processes will not affect this site.
20c. How has the addition of treatment materials being considered in the above mass balance calculations (if applicable)? Note - An exact figure is not required but one that is reasonable in the circumstances and can be justified if challenged.	No addition of treatment materials is required rather spreading and air drying is the chosen technique. For this reason, gains of volume due to addition of materials will not affect this site.

Contingency arrangements

21a. What is to happen to, and who is to pay for out of specification materials?	A chemical specification has not yet been set. All material is historic colliery spoil which is of known parameters and, as a result of mining methods and mass movement processes, it will comprise a well-mixed/reasonably uniform material.

	It is possible to remove some material which is found unsuitable to Bryn Pica landfill for daily cover or similar use. Although unlikely, if required provision will be made to contain any soils suspected of being contaminated. These soils will be stored on a geo-membrane in a separately signed and delineated area. Material will either be confirmed as acceptable for use by suitable analysis or if found to be unsuitable for placement, would be transported from site and taken to a suitable waste management facility.
21b. What is to happen to, and who is to pay for any excess materials?	Reference: The quantum of the scheme is based on volumes of surveyed landforms and the slipped debris is relatively consistent in chemical character and the footprint of surveyed areas are fixed. In this setting excess materials are not expected. Rhondda Cynon Taff Borough County Council would pay for the removal to a suitable waste management facility.
21c. What happens if the project programme slips in relation to excavated materials or materials under-going treatment?	Reference: The project programme has not yet been set and will be developed in conjunction with other documents such as the Phase 4 EIA.
21d. Other identified risk scenarios for the project (relating to excavated materials)?	Reference: A flood event may cause temporary instability of tip and excavation to temporarily cease.

The Tracking System

Where contamination is suspected or known to be present, state the procedures put in place to:

22a. For all sites please describe the tracking system to be employed to monitor materials movements.	Surveys of as-laid and excavated volumes are the key parameters to monitor. A LiDAR survey has been undertaken to provide the baseline and after the works have been completed a further measured survey will confirm volumes. Weekly summary logs of dump truck journeys will be made and held by the Contractor. Movement of material will be tracked and logged on a daily basis, an example of a tracking form to be used is given in Appendix A.
Where contamination is suspected or known to be present, state the procedures put in place to: 22b. Prevent contaminants not suitable for the treatment process being accepted	The treatment process is air dying and consolidation dewatering. The slipped material has been tested for leaching performance and a risk assessment made showing acceptability. Due to the well-mixed nature of the material and local knowledge in handling similar historic colliery spoils there is no plausible circumstance where chemically unsuitable material may arise. Banksmen and excavator drivers are required to visually check the consistency of the spoil, with particular regard to coal content, supplemented with occasional oversight by a Capita engineer. Instructing chemical testing (such as Calorific Value) will be an action available if concerns over the chemical content are raised. Any soils considered to be out of specification will be segregated in separate stockpiles for further analysis and/or disposal.
Where contamination is suspected or known to be present, state the procedures put in place to: 22c. Prevent cross contamination of materials not in need of treatment, wastes awaiting treatment and treated materials	The treatment process is air dying and consolidation dewatering so cross contamination could only occur by downward draining waters. In the unlikely event that unsuitable material is identified by the process in our response to 22b then the material will be set aside, and a response plan generated. Material set aside will be placed on impermeable membrane or hardstanding and a bund formed around the stockpile to prevent leachate runoff.
Where contamination is suspected or known to be present, state the procedures put in place to: 22d. Demonstrate that materials that do not require treatment and successfully treated materials reach their specific destination	There is no sub-division of materials in the placement landforms and the specification is openly specified to allow use of 100% of historic colliery spoil. Due to this strategy there is no intention to track differing materials (such as Class 1 and Class 2). All articulated earthmoving vehicles at the site do not have a road licence so it will be extremely difficult for a load of material to reach an unsuitable location such as an off-site farm or such like location. Material to be moved has been appropriately analysed and a risk assessment carried out to determine its suitability for use.
Where contamination is suspected or known to be present, state the	Waste allocated for offsite disposal is not anticipated to be encountered. An inspection by a RE will occur at regular intervals. If a landfill destination is required for a volume of material not expected to occur at present, then this will require a full client approved

procedures put in place to: 22e. Ensure that waste for off-site disposal or treatment is properly characterised and goes to the correct facility	change process which will involve: classification/tip quotation and written approvals, an approved haulier and full chain of custody documentation.

23. Please attach a copy of the tracking forms / control sheets that are to be used to monitor materials movements. To include transfer of loads on site into stockpiles prior to treatment (if applicable), stockpiled after treatment (if applicable), stockpiled awaiting use (as appropriate) and final placement.	Document reference(s) Daily tracking of haul trips for each dump truck transferring slip spoil will be recorded and this will be the responsibility of each dump truck driver. An example of the form is provided in Appendix A.

For Hub Sites within Cluster Projects & where materials need treatment before reuse 24. Please attach a copy of the Environmental Permit covering the treatment process. Alternatively if the treatment is covered by a Mobile Plant Permit and associated Deployment Form, attach a copy of the NRW agreement to the Deployment Form.	Permit reference / NRW letter reference: Not applicable

Records

25. Where, and in what form, are records to be kept? Note – records e.g. transfer notes, delivery tickets, Desk Top Study, Site Investigation, Risk Assessment(s), Verification Report(s) need to be kept for at least 2 years after the completion of the works and production of the Verification Report	Contractor will keep site records and store all the data that provides the works information. Capita will be given access to the weekly haul summary sheets. Capita/RCT design documents relating to design of the new landforms will be made available on the RCTCBC Planning Portal.

Verification Plan

26. Provide or explain the Verification Plan which sets out how you will record the placement of materials and prove that excavated materials have been reused in the correct location and in the correct quantities within the development works (see 3.4 of the DoW CoP).	Document Reference A verification plan, to be completed by the landowner or their representative, will require the following: • Recorded placement of material by comparison of before and after 3rd party LIDAR and contractor topographical surveys. In planning terms, there will be a control on the footprint and heights of the landform created. • To test samples at an agreed rate in the contract for physical parameters and make checks that material is suitable for use (the rate is either 1 sample per 1000m^3 or weekly) • To collate evidence of the method of compaction taking place at bi-weekly intervals (e.g. photographs of plant and layer thicknesses) • To collate haul movements • In the event that change orders are made to take small quantities of materials off site, summaries of waste class/volumes/ haulier and destination must be

	presented • To track the testing and action decisions of any suspect material as viewed by the RE or flagged by the Contractor The verification report will include the following: • Reference to the MMP • Reference to the design statement • Reference to placement site plans and project description • Photographic evidence of excavation and placement of materials • Any revisions to the MMP (e.g. if unexpected contamination is encountered) • Results of sampling (e.g. if unexpected contamination is encountered) • Details of any materials moved off-site (e.g. if unexpected contamination is encountered) • Details of how the placement of material has been recorded (the tracking system) • Copies of the tracking form detailing volumes. quantity of materials used and placement location; • Any correspondence with the LA or NRW; • Copies of the signed declaration by the qualified person The landowner or their representative will be responsible for collation of all relevant documents and commissioning the verification report.

Appendix A extract of materials tracking form to be used

Soil tracking form

For tracking all soils under a material management plan

Material transferred

Date and time……

Vehicle reg……..

Name of haulier……..

Material origin	*Type of material*	*Placement*	*Volume (ton. m^3)*