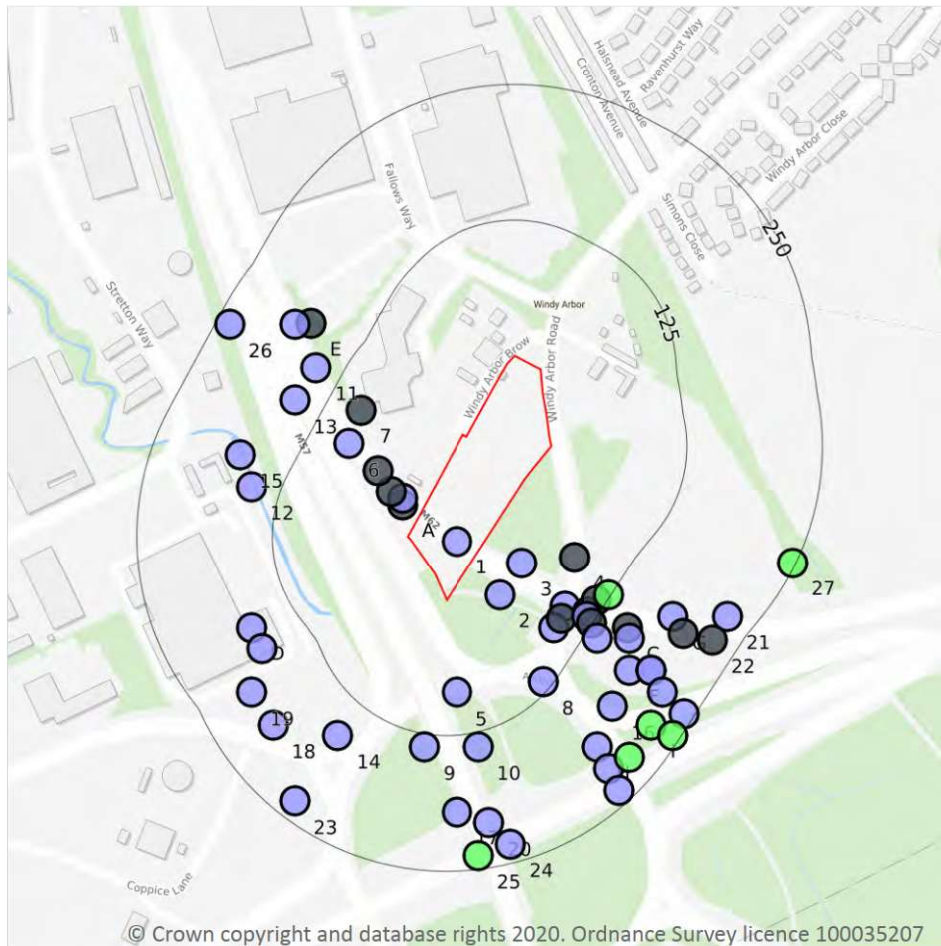


16 Boreholes



— Site Outline
Search buffers in metres (m)

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

16.1 BGS Boreholes

Records within 250m

59

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 102**

ID	Location	Grid reference	Name	Length	Confidential	Web link
1	On site	346310 389640	M62 IMPROVEMENT JUNCTION 6 TO 7	3.4	N	164068
A	18m NW	346260 389674	M62 J6 Ground Investigation BW2	-	Y	N/A
A	21m NW	346260 389680	M62 IMPROVEMENT JUNCTION 6 TO 7	4.0	N	164113



ID	Location	Grid reference	Name	Length	Confidential	Web link
A	34m NW	346249 389686	M62 J6 Ground Investigation TP05	-	Y	N/A
2	39m SE	346350 389590	M62 IMPROVEMENT JUNCTION 6 TO 7	0.85	N	164115
3	39m SE	346370 389620	M62 IMPROVEMENT JUNCTION 6 TO 7	2.1	N	164114
A	53m NW	346237 389705	M62 J6 Ground Investigation BW1	-	Y	N/A
4	78m SE	346419 389625	M62 J6 Ground Investigation TP25H	-	Y	N/A
5	86m S	346310 389500	LANCS/YORKS M/WAY TARBOCK-CROFT B19A	4.27	N	163809
6	89m NW	346210 389730	M62 IMPROVEMENT JUNCTION 6 TO 7	2.5	N	164067
7	94m NW	346221 389761	M62 J6 Ground Investigation WS5	-	Y	N/A
B	95m SE	346410 389580	M62 IMPROVEMENT JUNCTION 6 TO 7	4.3	N	164117
B	97m SE	346400 389560	M62 IMPROVEMENT JUNCTION 6 TO 7	4.3	N	164116
B	99m SE	346407 389568	M62 J6 Ground Investigation TP24H	-	Y	N/A
B	116m SE	346431 389574	M62 J6 Ground Investigation TP06	-	Y	N/A
B	116m SE	346439 389585	M62 J6 Ground Investigation BB2	-	Y	N/A
8	117m SE	346390 389510	LANCS/YORKS M/WAY TARBOCK-CROFT B20	1.22	N	163810
B	117m SE	346430 389570	M62 IMPROVEMENT JUNCTION 6 TO 7	3.9	N	164118
B	123m SE	346450 389590	M62 IMPROVEMENT JUNCTION 6 TO 7	10.98	N	164070
B	124m SE	346435 389564	M62 J6 Ground Investigation BB1	-	Y	N/A
B	136m SE	346440 389550	M62 IMPROVEMENT JUNCTION 6 TO 7	9.77	N	164069
9	137m S	346280 389450	M57 TO A562 LINK ROAD TP 1	4.5	N	163985
10	138m S	346330 389450	M57 TO A562 LINK ROAD TP 2	4.3	N	163986
11	149m NW	346180 389800	M62 IMPROVEMENT JUNCTION 6 TO 7	3.3	N	164112
12	152m W	346120 389690	HUYTON 12	2.8	N	15937793
13	152m NW	346160 389770	M62 IMPROVEMENT JUNCTION 6 TO 7	2.8	N	164111
C	154m SE	346468 389560	M62 J6 Ground Investigation TP07	-	Y	N/A
14	161m SW	346200 389460	LANCS/YORKS M/WAY TARBOCK-CROFT B19	2.44	N	163918
C	161m SE	346470 389550	M62 IMPROVEMENT JUNCTION 6 TO 7	3.8	N	164119
D	167m SW	346120 389560	LUCAS AEROSPACE HUYTON 2	5.1	N	15937785
D	170m SW	346130 389540	LUCAS AEROSPACE HUYTON 1	3.0	N	15937784



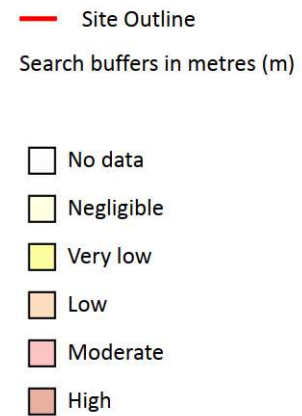
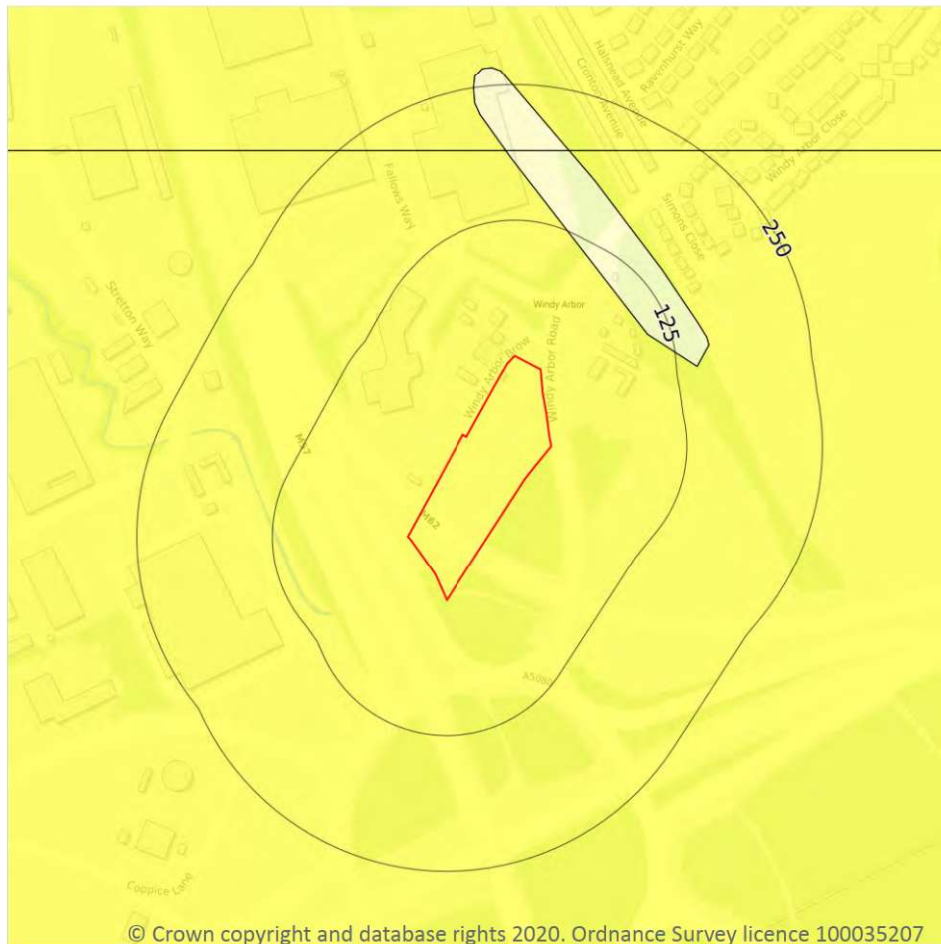
ID	Location	Grid reference	Name	Length	Confidential	Web link
15	172m NW	346110 389720	HUYTON 13	3.05	N	15937789
E	174m NW	346175 389841	M62 J6 Ground Investigation TP13H	-	Y	N/A
F	178m SE	346470 389520	M62 IMPROVEMENT JUNCTION 6 TO 7	3.8	N	164120
16	182m SE	346454 389487	M62 PACKAGE 1 (FOX'S BACK LANE TO J6) DS/M62/1/23	3.7	N	18913260
G	184m SE	346510 389570	M62 IMPROVEMENT JUNCTION 6 TO 7	3.4	N	164122
E	186m NW	346160 389840	M62 IMPROVEMENT JUNCTION 6 TO 7	4.5	N	164066
H	194m SE	346440 389450	LANCS/YORKS M/WAY TARBOCK-CROFT 5731/1	4.57	N	163913
F	194m SE	346490 389520	LANCS/YORKS M/WAY TARBOCK-CROFT B21	4.57	N	163821
F	194m SE	346490 389520	M62 IMPROVEMENT JUNCTION 6 TO 7	3.8	N	164121
17	195m S	346310 389390	M57 TO A562 LINK ROAD TP 3	4.5	N	163987
18	198m SW	346140 389470	Not Entered	-2.0	N	164217
19	200m SW	346120 389500	LUCAS AEROSPACE HUYTON 3	5.0	N	15937787
G	200m SE	346519 389554	M62 J6 Ground Investigation BE2	-	Y	N/A
20	209m S	346340 389380	LANCS/YORKS M/WAY TARBOCK-CROFT B15A	6.4	N	163909
F	214m SE	346500 389500	LANCS/YORKS M/WAY TARBOCK-CROFT 5730/1	3.05	N	163823
H	215m SE	346450 389430	M62 IMPROVEMENT JUNCTION 6 TO 7	8.79	N	164101
I	222m SE	346490 389470	M62 IMPROVEMENT JUNCTION 6 TO 7	14.93	N	164094
H	223m SE	346470 389440	LANCS/YORKS M/WAY TARBOCK-CROFT 5731/2	21.34	N	163914
21	226m SE	346560 389570	M62 IMPROVEMENT JUNCTION 6 TO 7	6.95	N	164071
22	226m SE	346546 389548	M62 J6 Ground Investigation TP11	-	Y	N/A
23	233m SW	346160 389400	LANCS/YORKS M/WAY TARBOCK-CROFT B16	2.44	N	163917
24	233m S	346360 389360	LANCS/YORKS M/WAY TARBOCK-CROFT B15B	6.4	N	163910
H	237m SE	346460 389410	LANCS/YORKS M/WAY TARBOCK-CROFT 5731/3	4.27	N	163915
25	237m S	346330 389350	LANCS/YORKS M/WAY TARBOCK-CROFT B15D	13.72	N	163912
26	238m NW	346100 389840	M62 IMPROVEMENT JUNCTION 6 TO 7	3.5	N	164110
I	241m SE	346520 389480	LANCS/YORKS M/WAY TARBOCK-CROFT 5730/2	3.05	N	163824
I	244m SE	346510 389460	LANCS/YORKS M/WAY TARBOCK-CROFT B21A	12.19	N	163822
27	247m SE	346620 389620	M62 IMPROVEMENT JUNCTION 6 TO 7	12.07	N	164072



This data is sourced from the British Geological Survey.



17 Natural ground subsidence - Shrink swell clays



17.1 Shrink swell clays

Records within 50m

1

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).

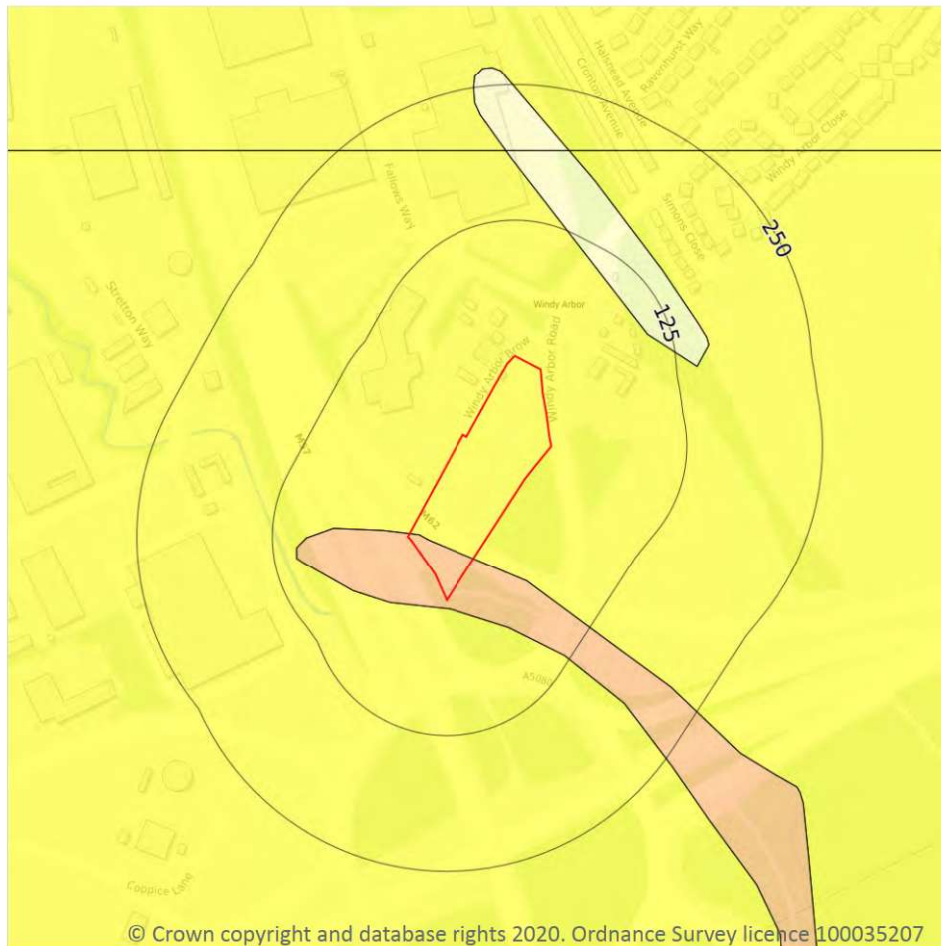
Features are displayed on the Natural ground subsidence - Shrink swell clays map on **page 106**

Location	Hazard rating	Details
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 107**

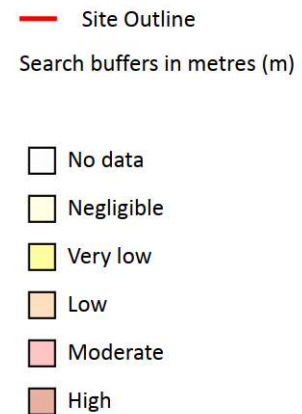
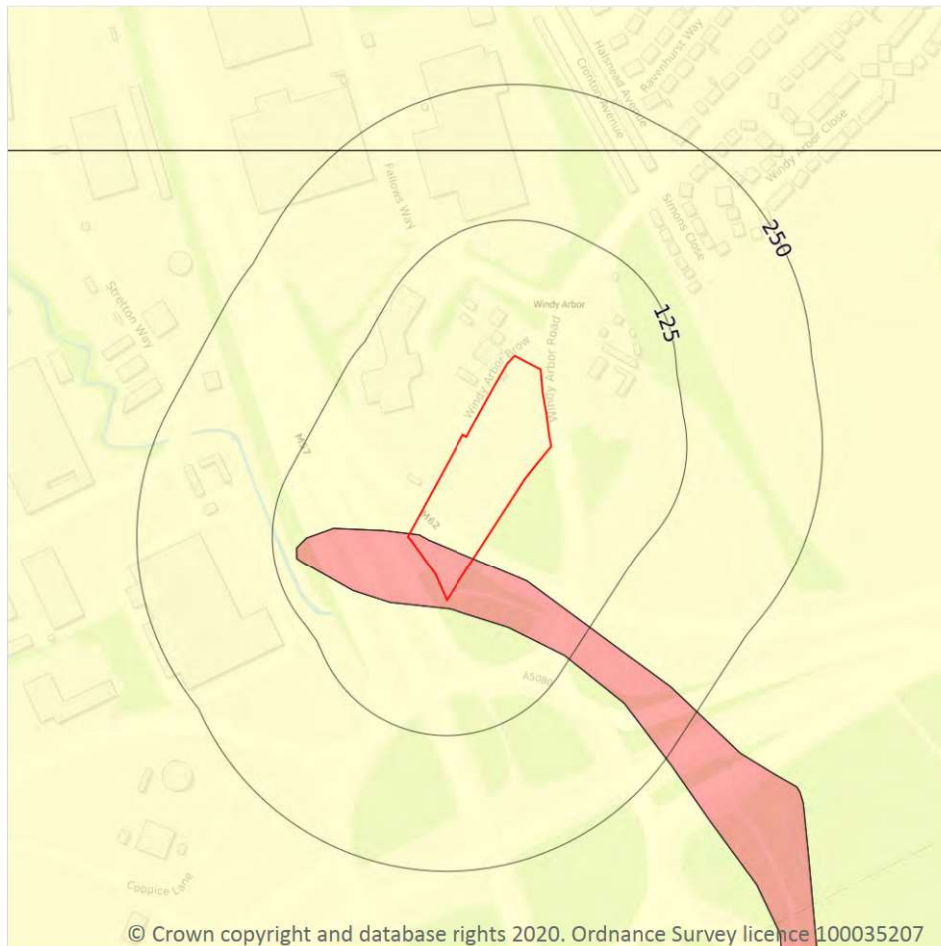
Location	Hazard rating	Details
On site	Very low	Running sand conditions are unlikely. No identified constraints on land use due to running conditions unless water table rises rapidly.

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

This data is sourced from the British Geological Survey.



Natural ground subsidence - Compressible deposits



17.3 Compressible deposits

Records within 50m

2

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

Features are displayed on the Natural ground subsidence - Compressible deposits map on **page 109**

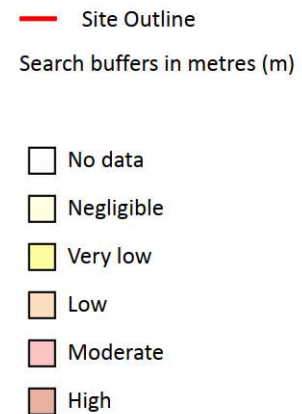
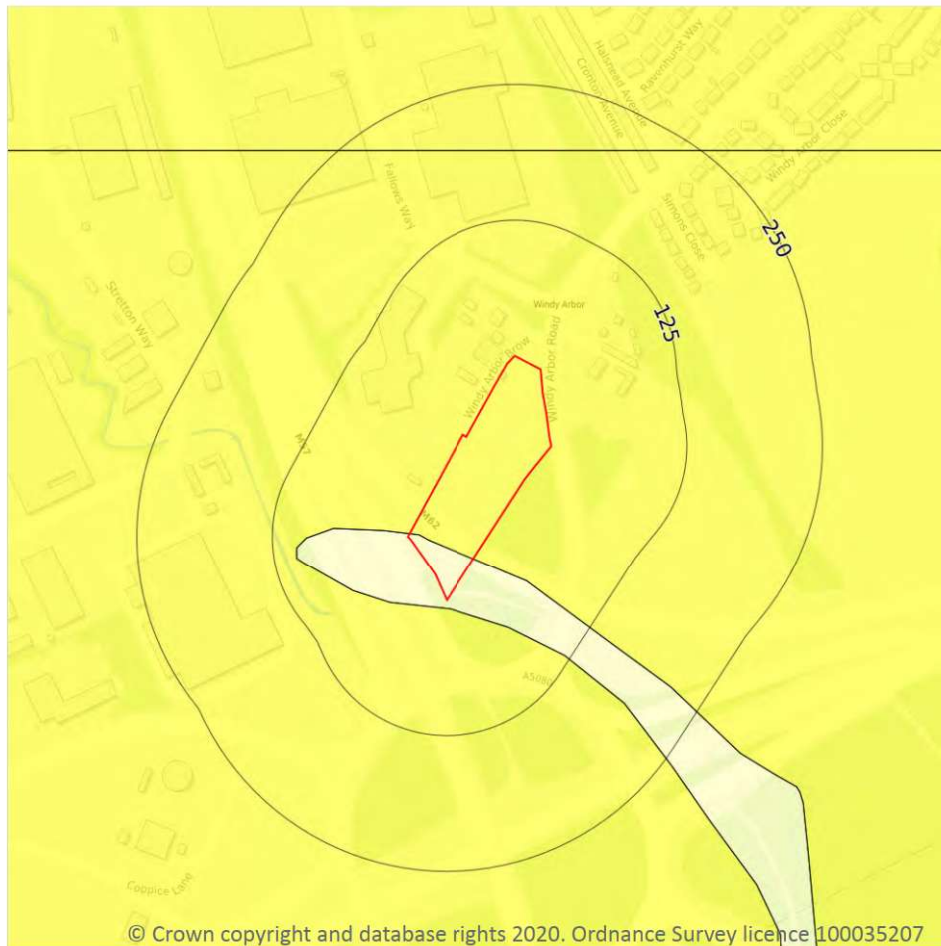
Location	Hazard rating	Details
On site	Negligible	Compressible strata are not thought to occur.
On site	Moderate	Compressibility and uneven settlement hazards are probably present. Land use should consider specifically the compressibility and variability of the site.



This data is sourced from the British Geological Survey.



Natural ground subsidence - Collapsible deposits



17.4 Collapsible deposits

Records within 50m

2

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

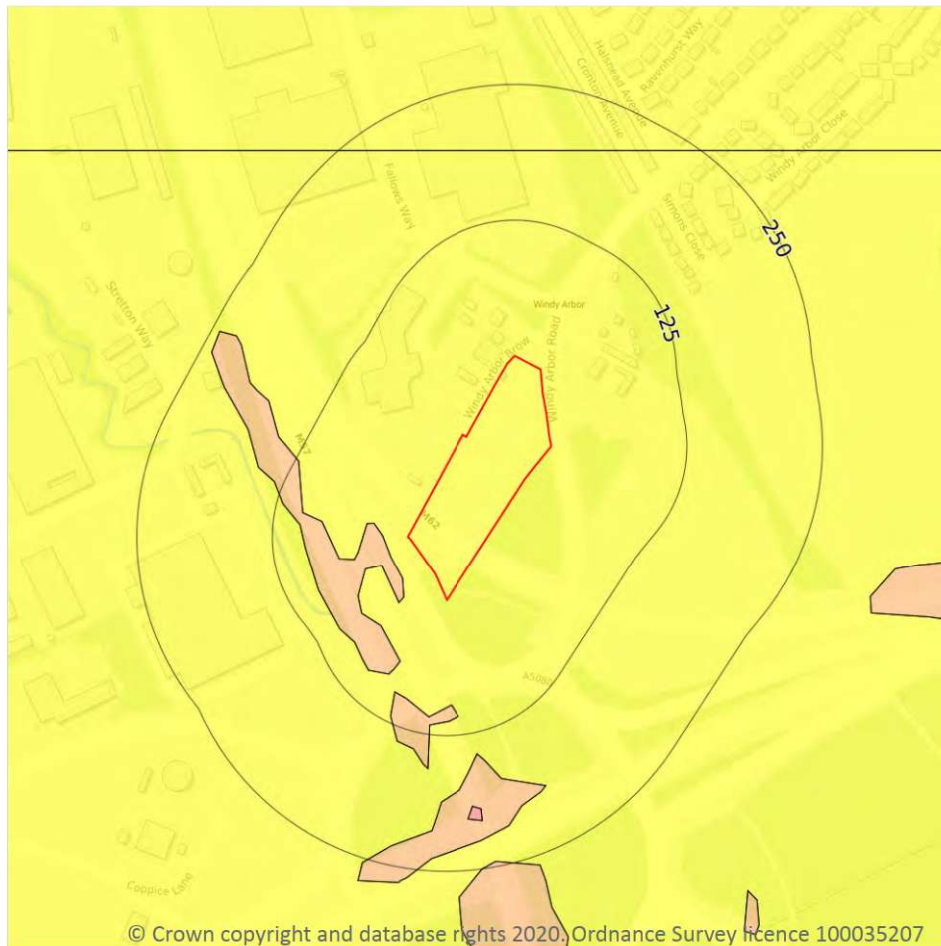
Features are displayed on the Natural ground subsidence - Collapsible deposits map on **page 111**

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

This data is sourced from the British Geological Survey.



Natural ground subsidence - Landslides



— 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 112**

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.

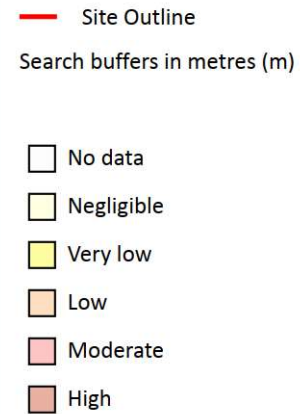


Location	Hazard rating	Details
21m W	Low	Slope instability problems may be present or anticipated. Site investigation should consider specifically the slope stability of the site.

This data is sourced from the British Geological Survey.



Natural ground subsidence - Ground dissolution of soluble rocks



17.6 Ground dissolution of soluble rocks

Records within 50m

1

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

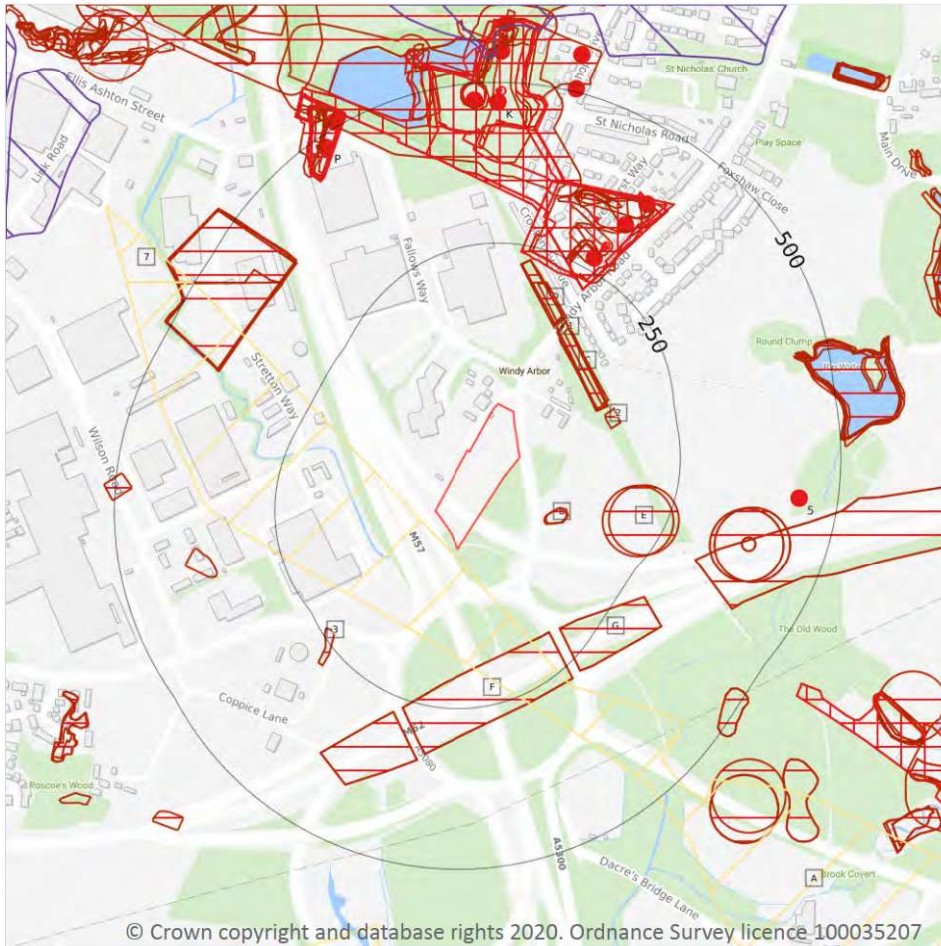
Features are displayed on the Natural ground subsidence - Ground dissolution of soluble rocks map on **page 114**

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

9

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 116**

ID	Location	Details	Description
I	270m NE	Name: Halsnead Colliery, Bye Pit Address: Whiston Lane Ends, Whiston, PRESCOT, Merseyside 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
I	294m NE	Name: Halsnead Colliery, No. 1 Pit Address: Whiston Lane Ends, Whiston, PRESCOT, Merseyside 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
I	338m NE	Name: Halsnead Colliery, No. 2 Pit Address: Whiston Lane Ends, Whiston, PRESCOT, Merseyside 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
I	383m NE	Name: Halsnead Colliery, No. 3 Pit Address: Whiston Lane Ends, Whiston, PRESCOT, Merseyside 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
5	439m E	Name: The Old Delf Address: Whiston, PRESCOT, Merseyside 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
K	469m N	Name: Houghton's Hey Colliery Address: Whiston Lane Ends, Whiston, PRESCOT, Merseyside 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
K	474m N	Name: Houghton's Hey Colliery Shaft Address: Whiston Lane Ends, Whiston, PRESCOT, Merseyside 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
P	481m NW	Name: Cronton Colliery Pit Address: Whiston Lane Ends, Whiston, PRESCOT, Merseyside 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
K	484m N	Name: Halsnead Colliery Shaft No 5 Address: Whiston Lane Ends, Whiston, PRESCOT, Merseyside 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

26

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 116**

ID	Location	Land Use	Year of mapping	Mapping scale
B	87m SE	Pond	1947	1:10560
B	88m SE	Pond	1950	1:10560
C	116m NE	Cuttings	1950	1:10560
C	117m NE	Cuttings	1947	1:10560
C	117m NE	Cuttings	1925	1:10560
1	119m NE	Cuttings	1938	1:10560
C	127m NE	Cuttings	1989	1:10000
2	141m E	Cuttings	1989	1:10000
D	146m NE	Cuttings	1950	1:10560
D	148m NE	Cuttings	1947	1:10560
D	148m NE	Cuttings	1925	1:10560
D	154m NE	Cuttings	1989	1:10000
E	154m SE	Unspecified Pits	1906	1:10560
E	162m SE	Unspecified Pits	1891	1:10560
F	180m SE	Cuttings	1975	1:10000
F	180m SE	Cuttings	1989	1:10000
G	203m SE	Cuttings	1975	1:10000
G	203m SE	Cuttings	1989	1:10000
H	219m NE	Disused Colliery	1947	1:10560
H	219m NE	Disused Colliery	1925	1:10560
I	224m NE	Old Colliery	1891	1:10560
I	232m NE	Old Colliery	1906	1:10560
I	232m NE	Colliery	1851	1:10560



ID	Location	Land Use	Year of mapping	Mapping scale
3	236m SW	Pond	1950	1:10560
I	245m NE	Unspecified Heaps	1891	1:10560
I	250m NE	Unspecified Ground Workings	1925	1:10560

This is data is sourced from Ordnance Survey/Groundsure.

18.4 Underground workings

Records within 1000m

57

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 116**

ID	Location	Land Use	Year of mapping	Mapping scale
H	219m NE	Disused Colliery	1947	1:10560
H	219m NE	Disused Colliery	1925	1:10560
I	224m NE	Old Colliery	1891	1:10560
I	232m NE	Old Colliery	1906	1:10560
I	265m NE	Unspecified Disused Shafts	1966	1:10560
I	288m NE	Unspecified Old Shafts	1947	1:10560
I	288m NE	Unspecified Old Shafts	1925	1:10560
I	291m NE	Unspecified Disused Shafts	1966	1:10560
I	291m NE	Unspecified Old Shaft	1947	1:10560
K	306m N	Colliery	1891	1:10560
I	324m NE	Unspecified Old Shaft	1947	1:10560
I	333m NE	Unspecified Old Shafts	1947	1:10560
I	333m NE	Unspecified Old Shafts	1925	1:10560
I	335m NE	Unspecified Old Shaft	1947	1:10560
I	337m NE	Unspecified Disused Shafts	1966	1:10560
K	358m N	Disused Colliery	1906	1:10560
I	374m NE	Unspecified Old Shafts	1947	1:10560



ID	Location	Land Use	Year of mapping	Mapping scale
I	374m NE	Unspecified Old Shafts	1925	1:10560
I	378m NE	Unspecified Disused Shafts	1966	1:10560
I	378m NE	Unspecified Old Shaft	1947	1:10560
K	411m N	Unspecified Disused Mine	1966	1:10560
P	444m NW	Old Colliery	1947	1:10560
P	444m NW	Old Colliery	1925	1:10560
P	444m NW	Old Colliery	1906	1:10560
P	444m NW	Old Colliery	1891	1:10560
P	444m NW	Old Colliery	1947	1:10560
P	445m NW	Unspecified Disused Mine	1966	1:10560
K	464m N	Unspecified Old Shaft	1947	1:10560
K	466m N	Unspecified Disused Shaft	1966	1:10560
K	468m N	Unspecified Old Shafts	1947	1:10560
K	468m N	Unspecified Old Shafts	1925	1:10560
K	469m N	Unspecified Old Shaft	1947	1:10560
K	470m N	Unspecified Shafts	1891	1:10560
P	474m NW	Unspecified Disused Shaft	1966	1:10560
P	481m NW	Unspecified Old Shaft	1947	1:10560
K	481m N	Unspecified Disused Shaft	1966	1:10560
P	482m NW	Unspecified Old Shaft	1947	1:10560
P	482m NW	Unspecified Old Shaft	1925	1:10560
K	484m N	Unspecified Old Shafts	1947	1:10560
K	484m N	Unspecified Old Shafts	1925	1:10560
K	485m N	Unspecified Old Shaft	1947	1:10560
V	564m SE	Colliery	1925	1:10560
-	702m S	Disused Delf	1949	1:10560
-	702m S	Disused Delf	1967	1:10560
-	702m S	Disused Delf	1975	1:10000



ID	Location	Land Use	Year of mapping	Mapping scale
-	702m S	Disused Delf	1989	1:10000
-	713m S	Delf	1891	1:10560
-	713m S	Disused Delf	1938	1:10560
-	713m S	Disused Delf	1925	1:10560
-	713m S	Disused Delf	1905	1:10560
-	770m NW	Disused Colliery	1906	1:10560
-	809m N	Colliery	1891	1:10560
V	810m SE	Unspecified Mine	1967	1:10560
-	842m N	Unspecified Old Shaft	1925	1:10560
-	894m NW	Unspecified Old Shaft	1891	1:10560
-	952m SE	Colliery	1947	1:10560
-	964m E	Colliery	1949	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

3

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 116**



ID	Location	Name	Commodity	Class	Likelihood
A	12m SW	Not available	Vein Mineral	A	Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered
7	504m NW	Not available	Vein Mineral	A	Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered
10	601m S	Not available	Vein Mineral	A	Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and 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

0

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

This data is sourced from Johnson Poole and Bloomer.

18.9 Coal mining

Records on site

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

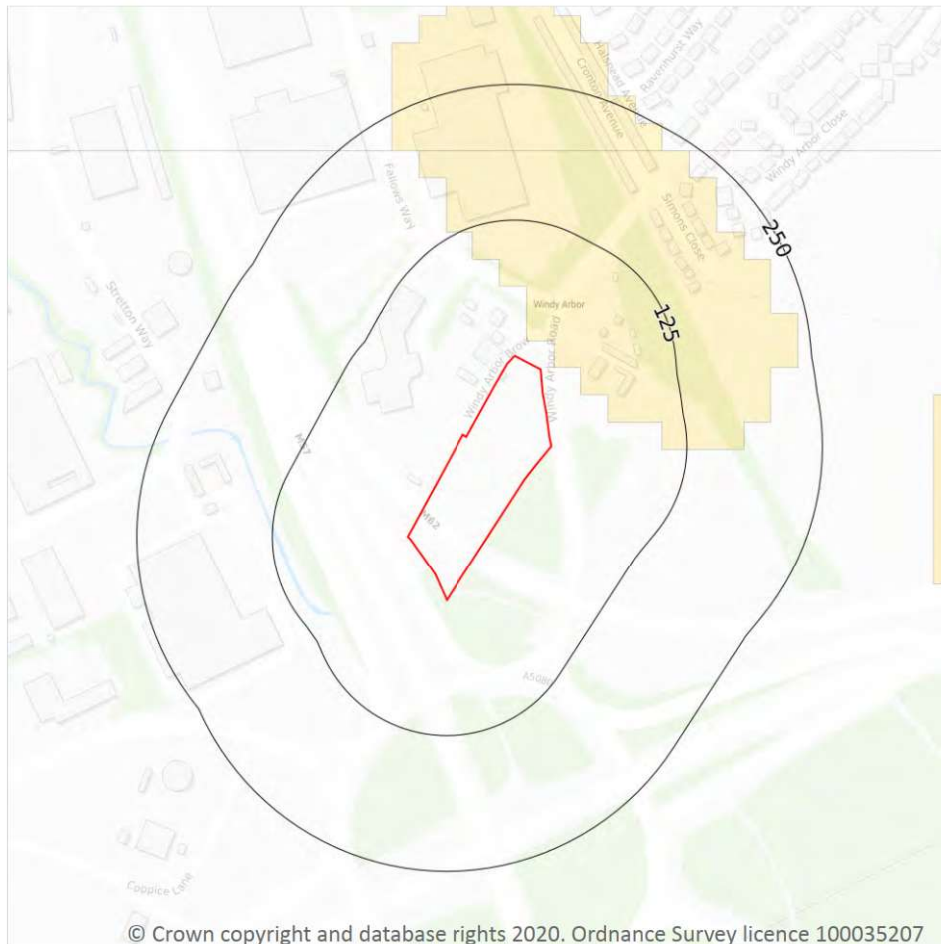
Records on site	0
-----------------	---

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

1

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 125**

Location	Estimated properties affected	Radon Protection Measures required
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

6

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 km². 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 km²; 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 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 mg/kg	No data	100 - 200 mg/kg	60 - 120 mg/kg	1.8 mg/kg	90 - 120 mg/kg	15 - 30 mg/kg
On site	15 mg/kg	No data	100 - 200 mg/kg	60 - 120 mg/kg	1.8 mg/kg	90 - 120 mg/kg	15 - 30 mg/kg
8m S	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
12m SW	15 mg/kg	No data	100 - 200 mg/kg	60 - 120 mg/kg	1.8 mg/kg	90 - 120 mg/kg	15 - 30 mg/kg
12m W	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

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 km²).

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 km².

This data is sourced from the British Geological Survey.



21 Railway infrastructure and projects



- Site Outline
- Search buffers in metres (m)
- C1 Crossrail 1 Stations
- Crossrail 1 Route
- Crossrail 1 Worksites
- C2 Crossrail 2 Stations
- Crossrail 2 Route
- Crossrail 2 Worksites
- Crossrail 2 Safeguarding
- Crossrail 2 Headhouses
- 🚂 Railway stations
- ⋯ Active railways
- ⋯ Active tunnels
- ⋯ Abandoned railways
- Historic railways
- Historic tunnels
- 🚂 Underground stations
- Underground Lines
- Royal Mail tunnels
- HS2 optimised route
- HS2 Stations
- HS2 Depots
- HS2 Surface Safeguarding
- HS2 Subsurface Safeguarding

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

2

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 128**

Location	Land Use	Year of mapping	Mapping scale
196m N	Railway Sidings	1955	10560
248m NE	Railway Sidings	1851	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

0

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

This data is sourced from OpenStreetMap.



21.7 Railways

Records within 250m**0**

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

This data is sourced from Ordnance Survey and OpenStreetMap.

21.8 Crossrail 1

Records within 500m**0**

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

This data is sourced from publicly available information by Groundsure.

21.9 Crossrail 2

Records within 500m**0**

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

This data is sourced from publicly available information by Groundsure.

21.10 HS2

Records within 500m**0**

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

This data is sourced from HS2 Ltd.



Data providers

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

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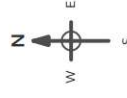
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Report Ref: EMS-621072_827495
Grid Ref: 346331, 389698

Map Name: County Series

Map date: 1892

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1892
Revised 1892
Edition N/A
Copyright N/A
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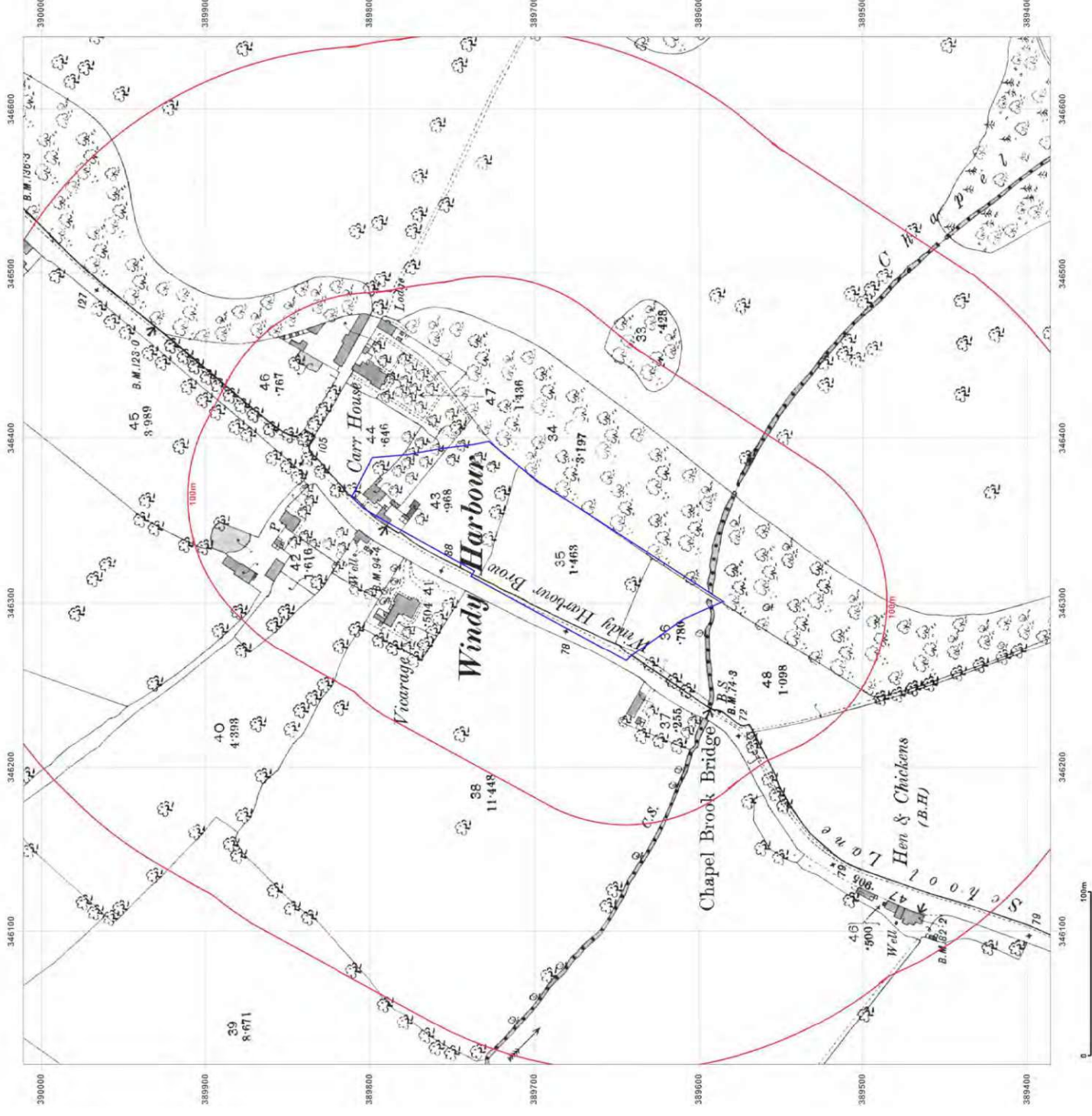
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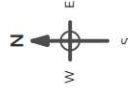
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Grid Ref: 346331, 389698

Map Name: County Series

Map date: 1907

Scale: 1:2,500

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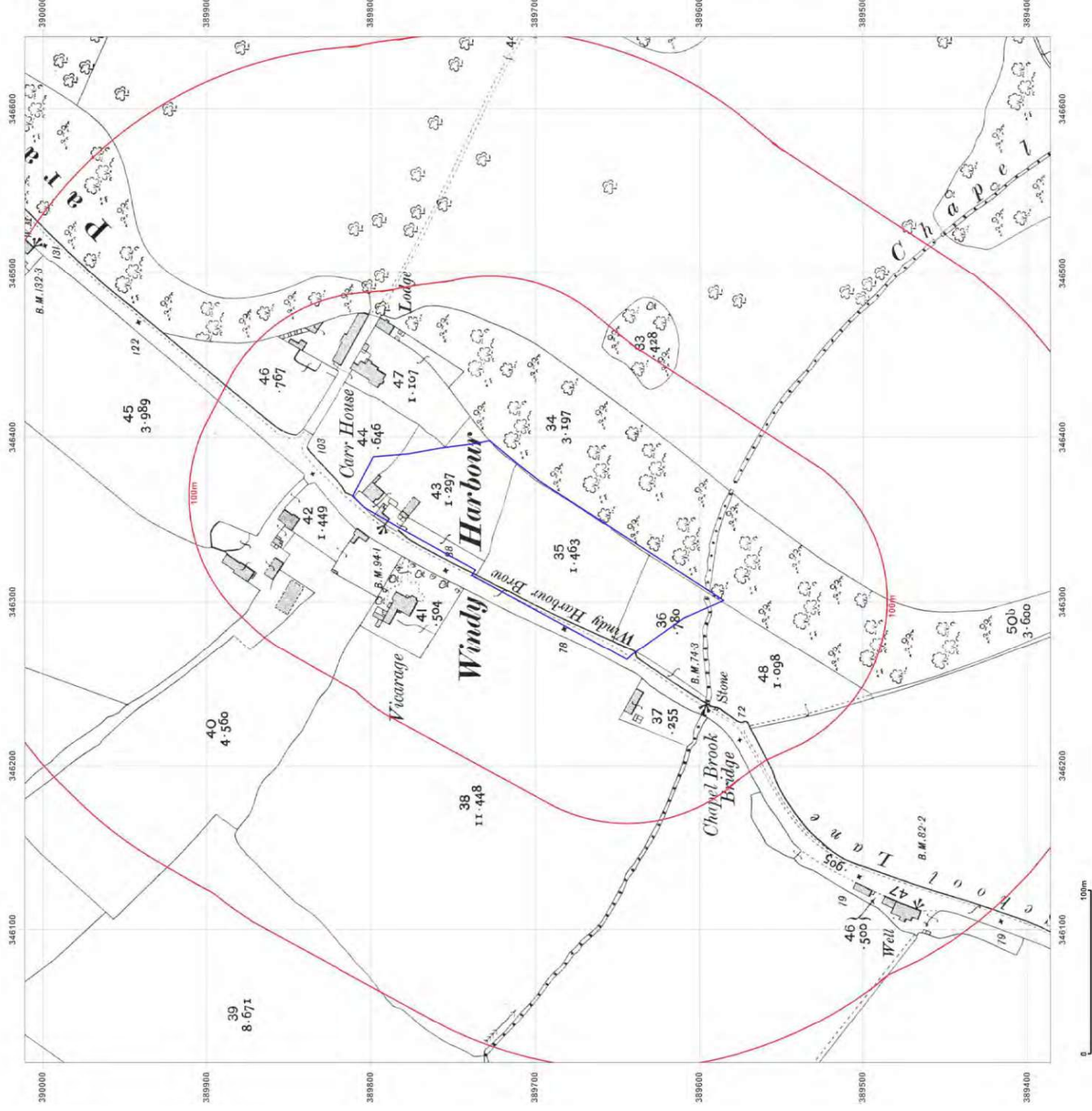
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Grid Ref: 346331, 389698

Map Name: County Series

Map date: 1927

Scale: 1:2.500

Printed at: 1:2.500



Surveyed 1827
Revised 1927
Edition N/A
Copyright N/A
Levelled N/A



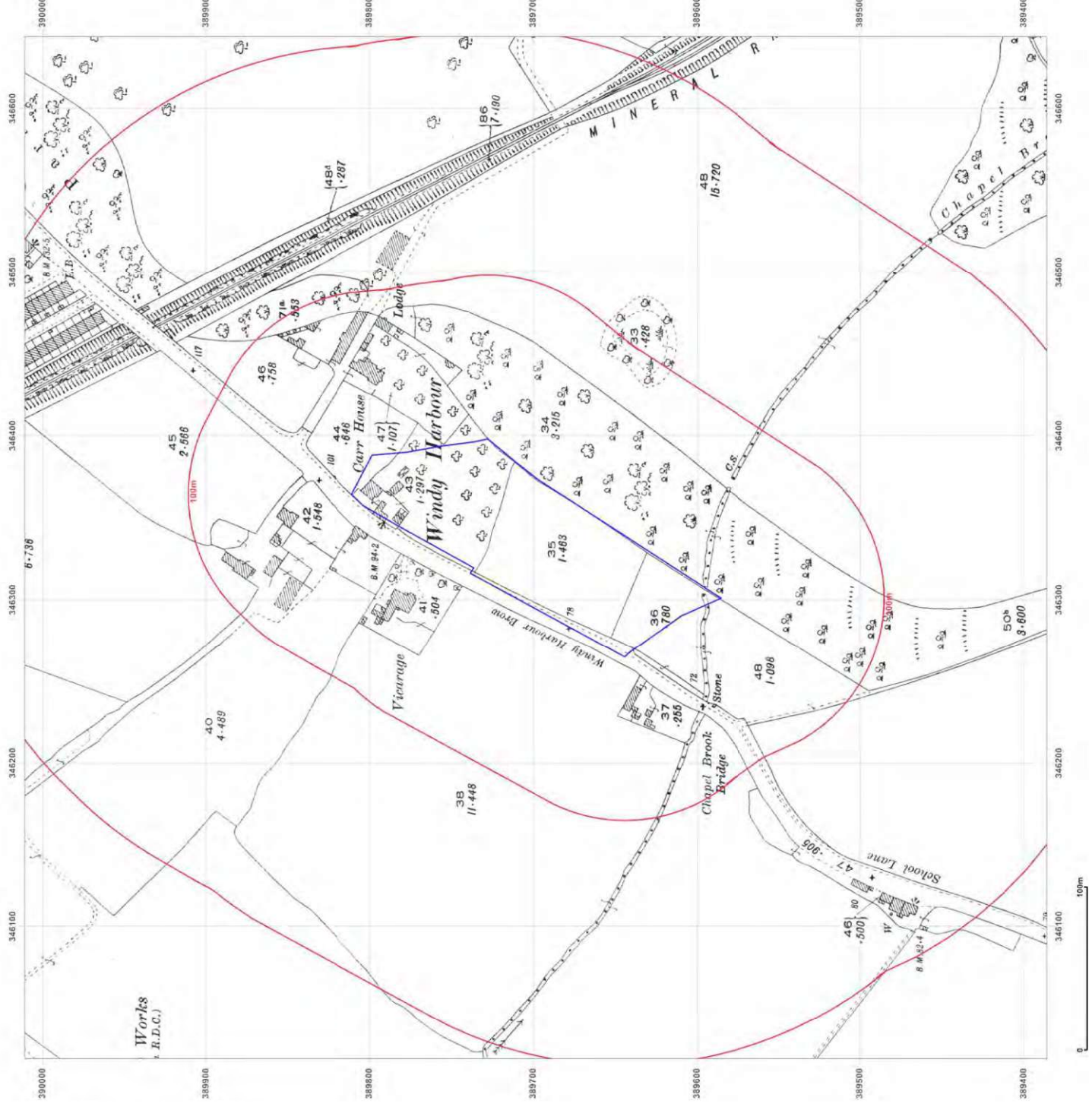
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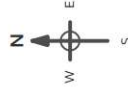
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Map Name: County Series

Map date: 1937

Scale: 1:2,500

Printed at: 1:2,500



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Edition N/A
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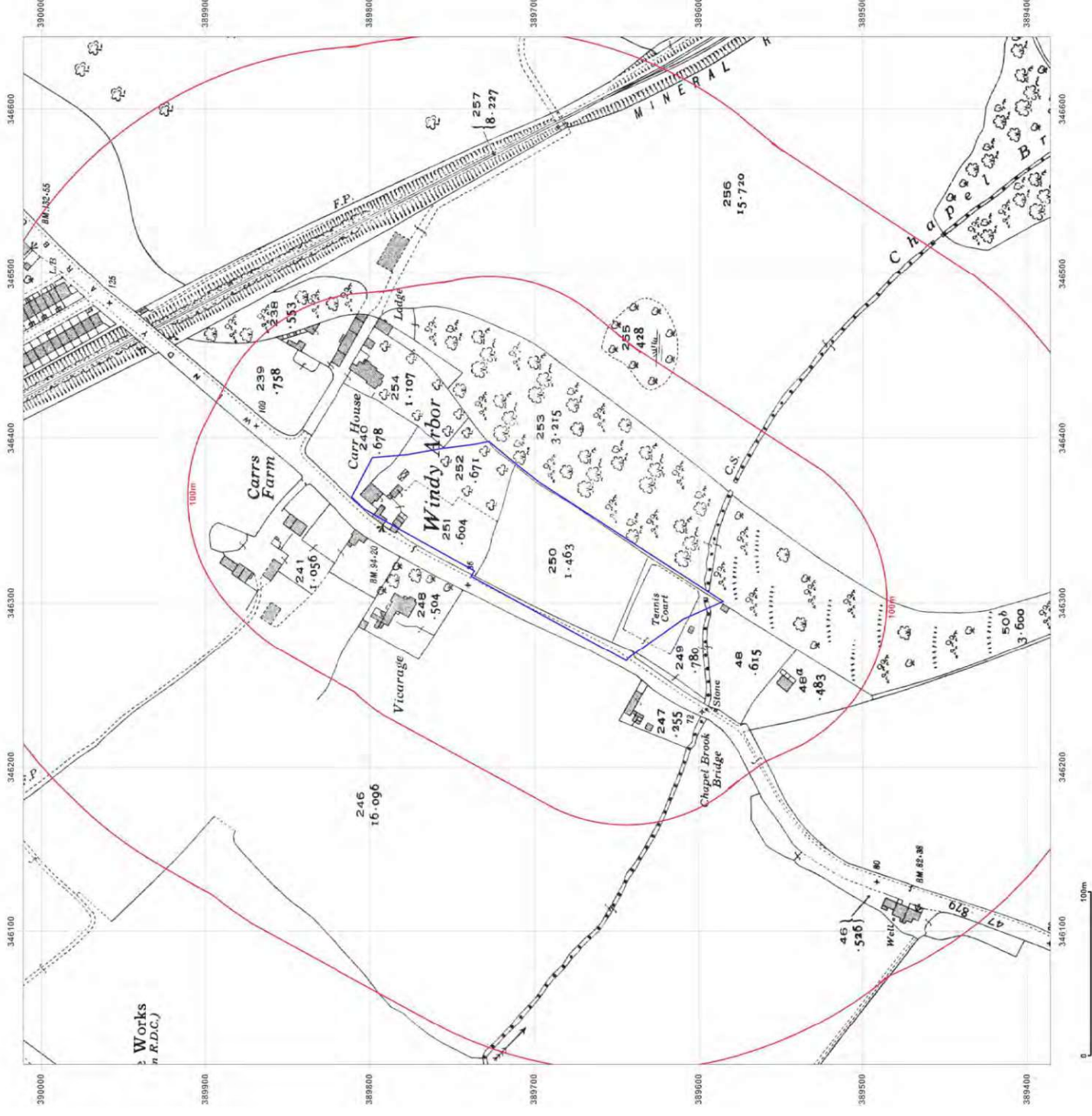
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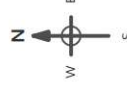
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Grid Ref: 346331, 389698

Map Name: National Grid

Map date: 1958

Scale: 1:2.500

Printed at: 1:2.500



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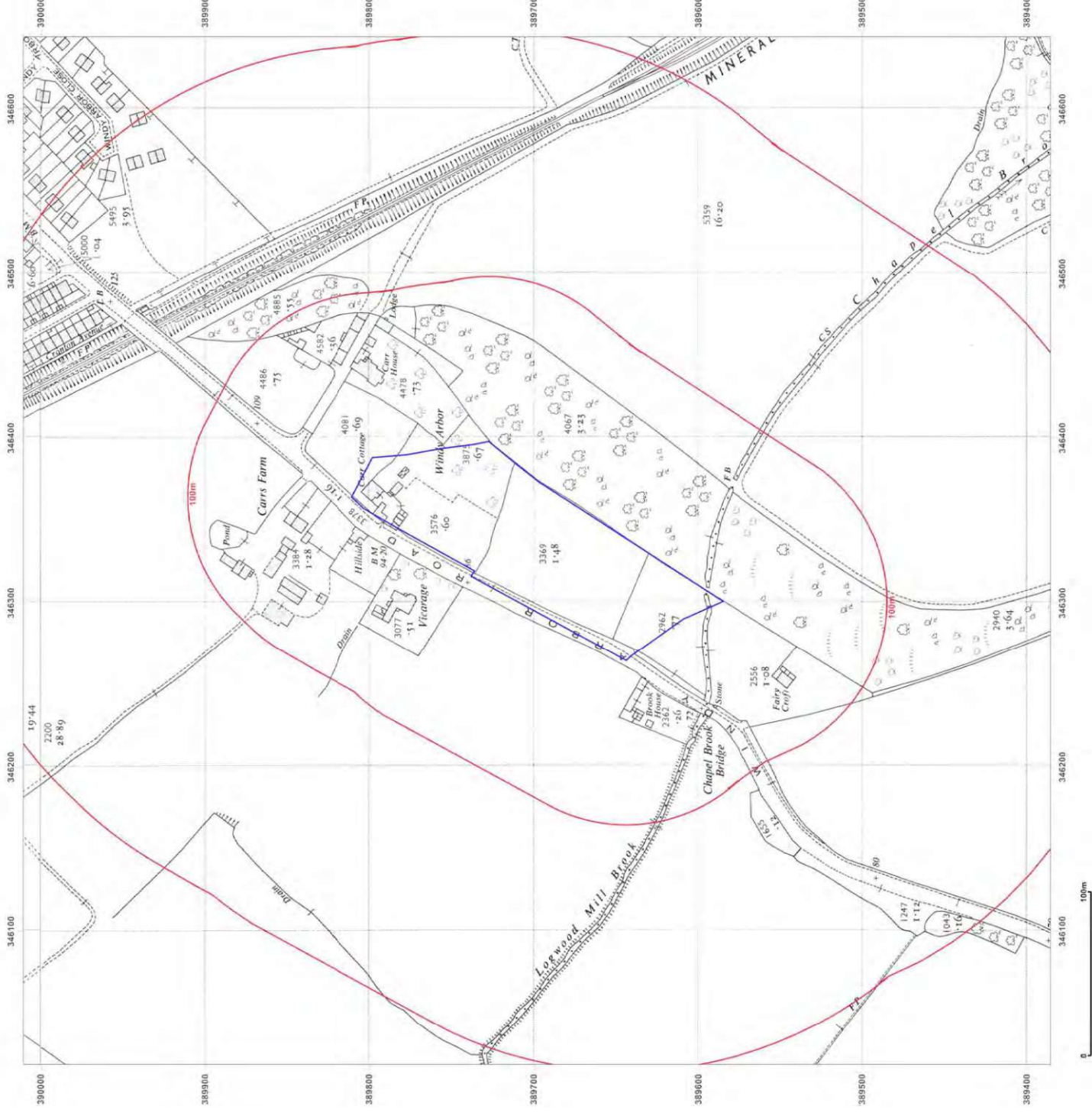
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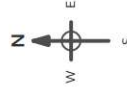
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Grid Ref: 346331, 389698

Map Name: National Grid

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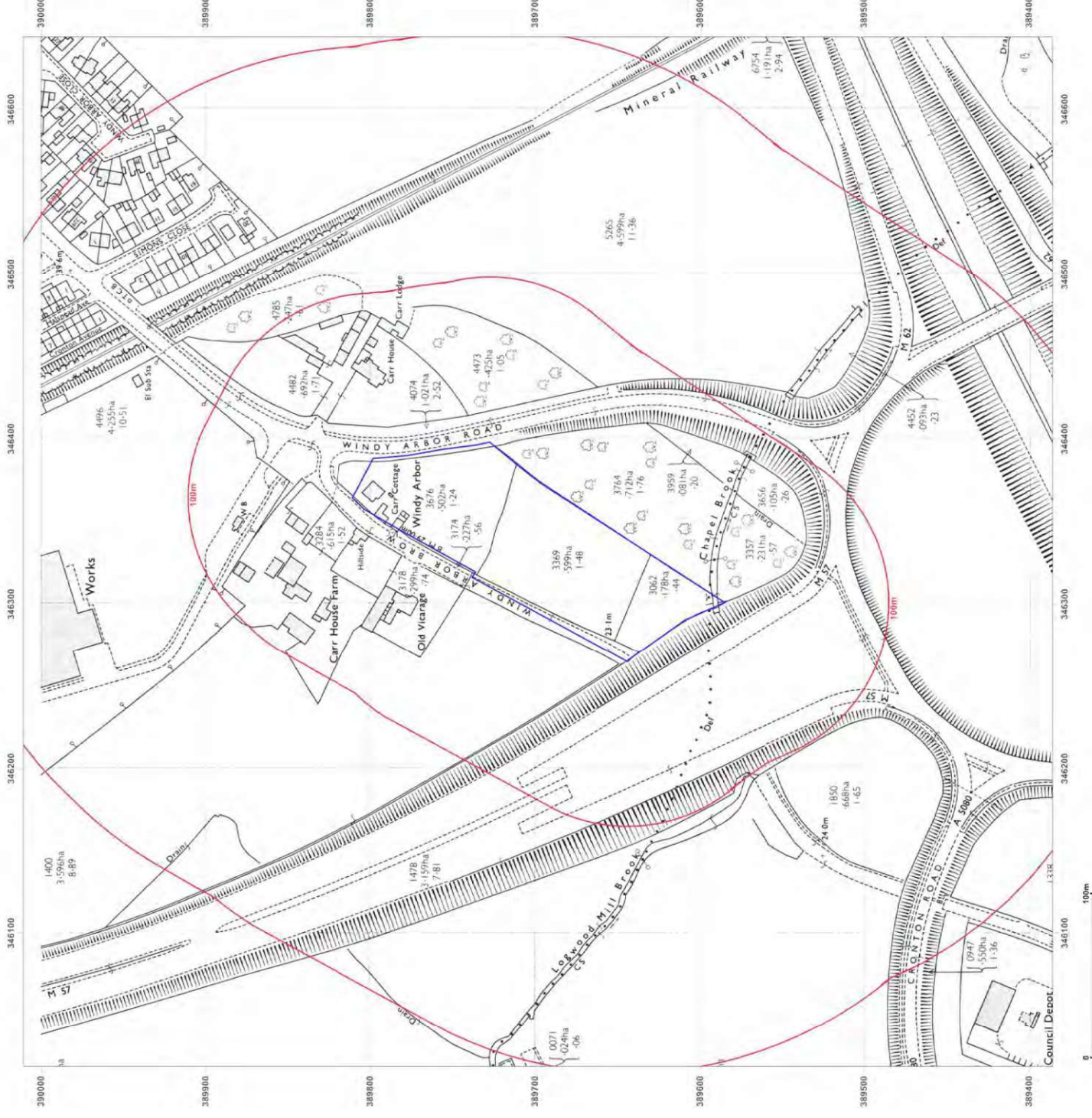


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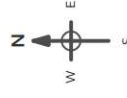
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Grid Ref: 346331, 389698

Map Name: National Grid

Map date: 1984

Scale: 1:2.500

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Revised 1984
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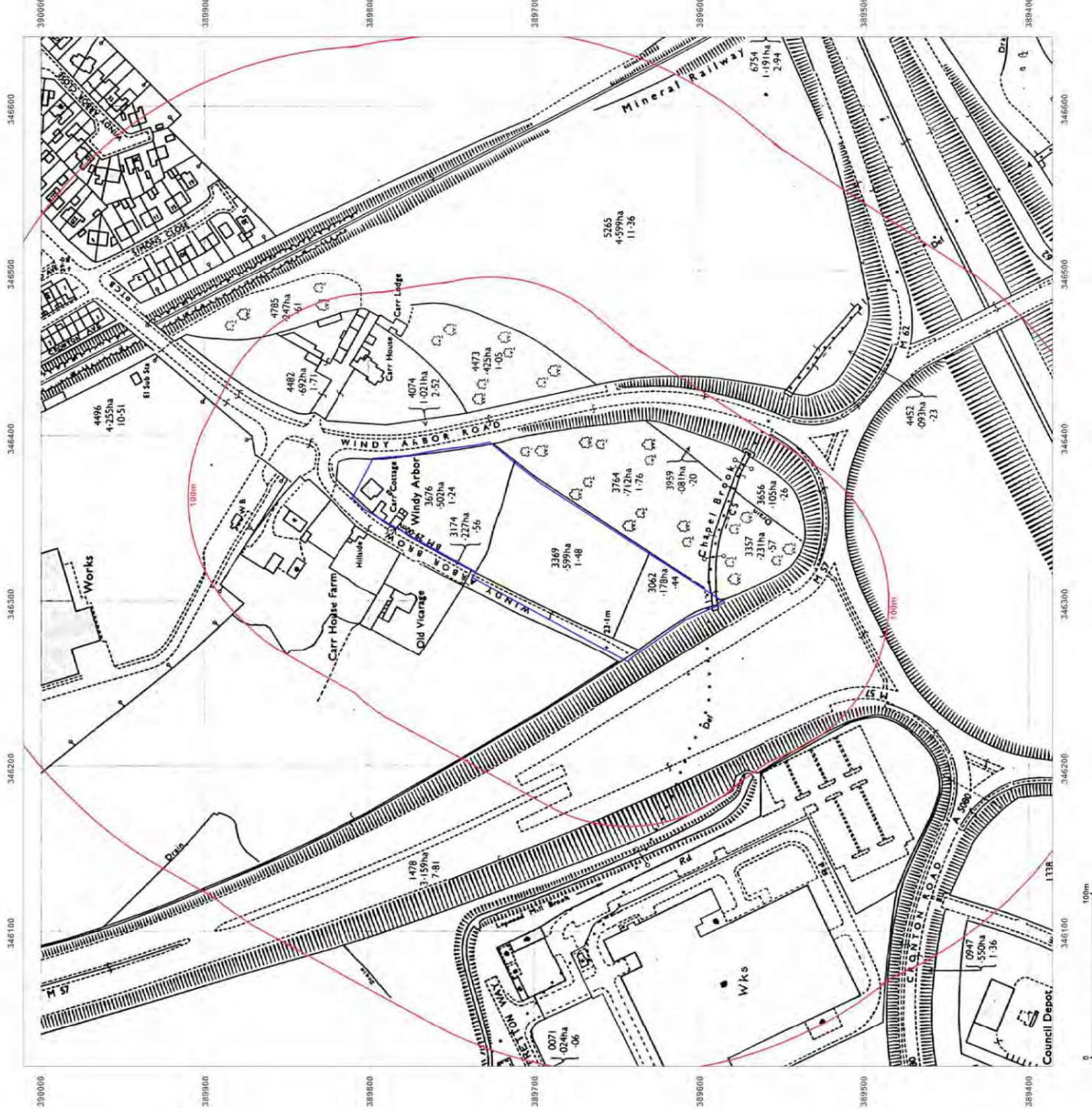


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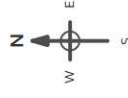
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Report Ref: EMS-621072_827495
Grid Ref: 346331, 389698

Map Name: National Grid

Map date: 1989

Scale: 1:2,500

Printed at: 1:2,500



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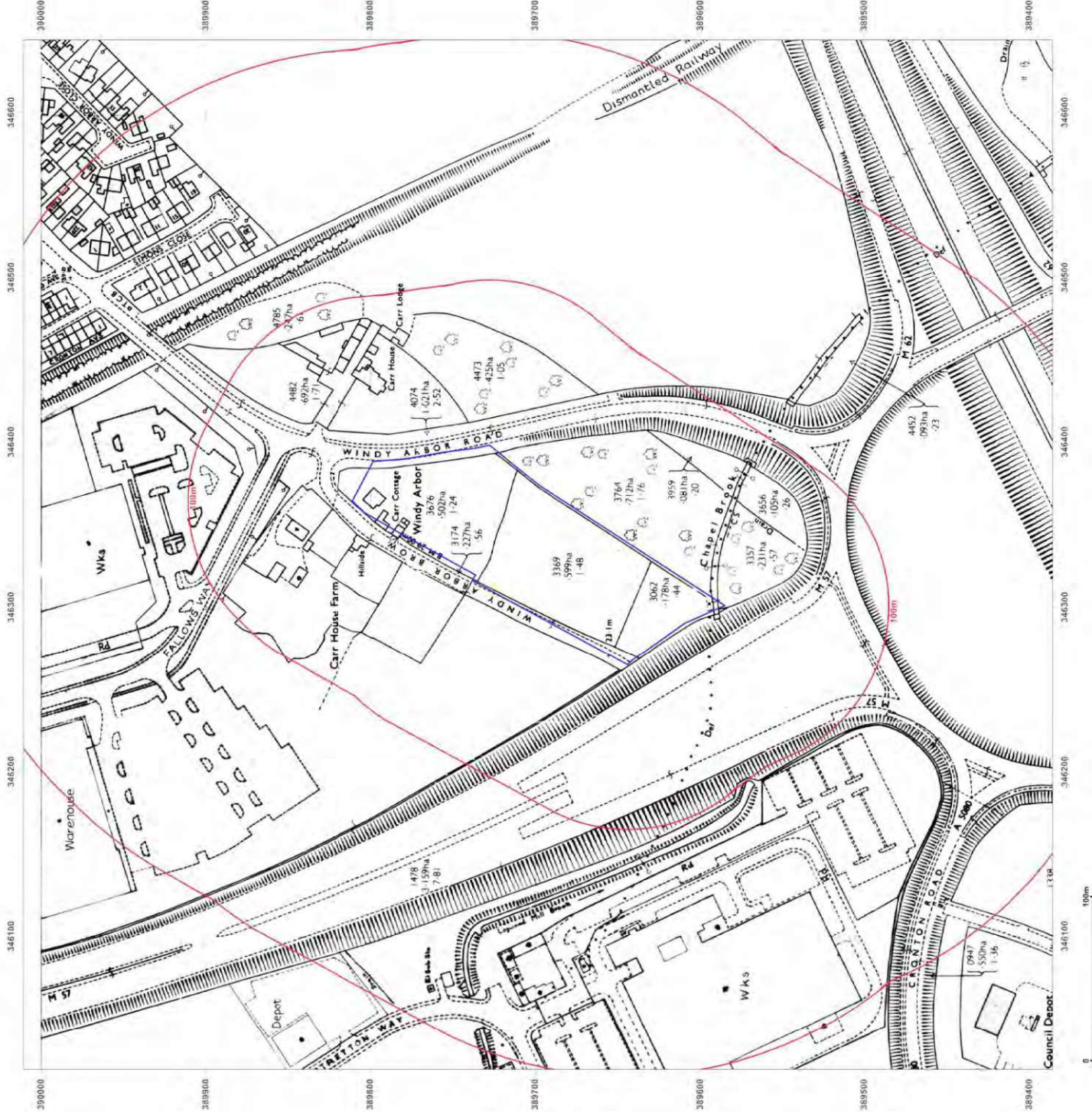


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Grid Ref: 346331, 389698

Map Name: National Grid

Map date: 1992

Scale: 1:2,500

Printed at: 1:2,500



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Report Ref: EMS-621072_827495
Grid Ref: 346331, 389698

Map Name: National Grid

Map date: 1993

Scale: 1:2,500

Printed at: 1:2,500



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Report Ref: EMS-621072_827495
Grid Ref: 346331, 389698

Map Name: LandLine

Map date: 2003

Scale: 1:1,250

Printed at: 1:1,250



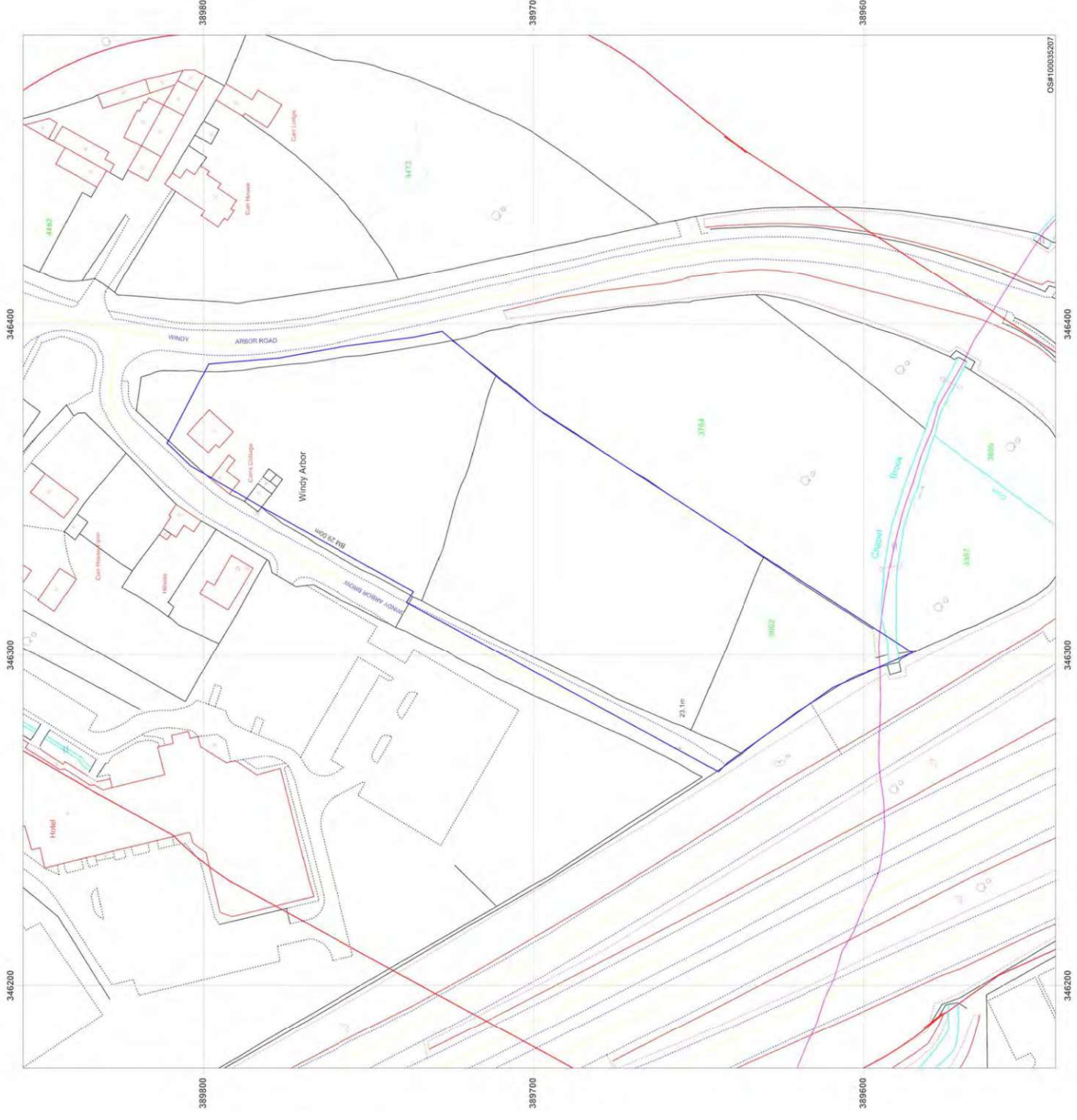
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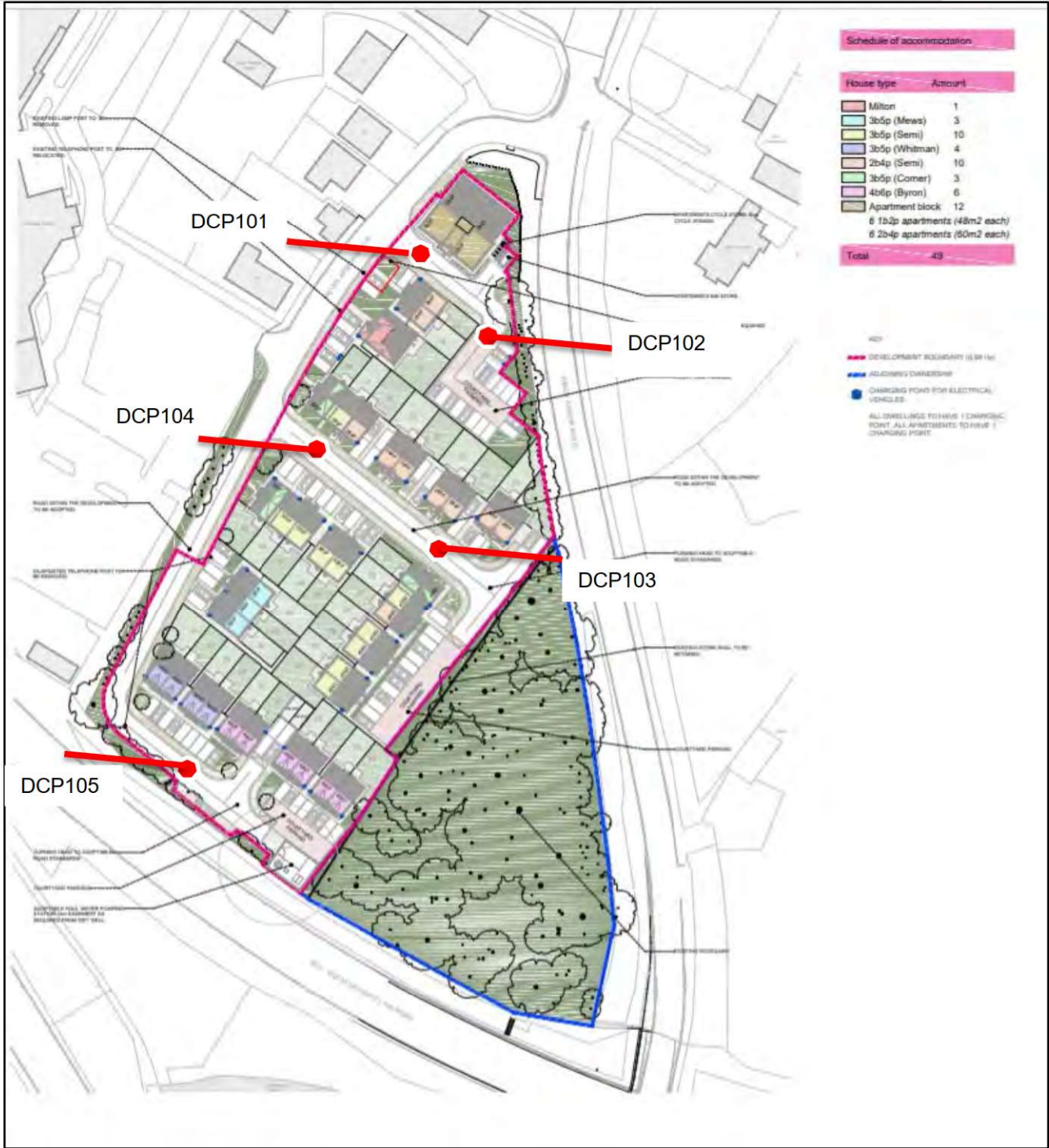
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APPENDIX C – PROPOSED DEVELOPMENT PLAN WITH DCP LOCATIONS

Phase I and II Geo Environmental Site Assessment



Windy Arbor, Whiston
Phase I and II Geo Environmental Site Assessment
Site Investigation Location Plan



Key:

Trial Pit:	
Window Sample	
Window Sample with Install	
Soakaway	

CLIENT	Forth Homes	PROJECT NAME	
PROJECT NUMBER		PROJECT LOCATION	Windy Arbor
DATE STARTED	16/7/20	COMPLETED	16/7/20
EXCAVATION CONTRACTOR	Dave Thornley	GROUND ELEVATION	
EXCAVATION METHOD	Trial Pit	TEST PIT SIZE	
LOGGED BY	Charlotte Radiven	CHECKED BY	Jennifer Devlin
East		North	
		GROUND WATER LEVELS:	
		AT TIME OF EXCAVATION	---
		AT END OF EXCAVATION	---
		AFTER EXCAVATION	---

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION
			(Grass over) Blackish brown firm silty gravelly sandy (reworked) clay. Gravel is fine to coarse, sub angular to sub rounded of brick, sandstone and mudstone. MADE GROUND
0.5			0.40 0.50 Fine black clayey gravelly silty sand MADE GROUND. Gravel is fine to coarse, sub angular to sub rounded of brick, sandstone and mudstone High cobble content of brick
1.0			1.00 Reddish greyish (mottled) brown very sandy gravelly CLAY. Gravel is fine to coarse sub angular to sub rounded of sandstone and mudstone. (2m to 2.8m sand bands)
1.5			
2.0			
2.5			
3.0			2.80 3.00 SANDSTONE (Arisings described as dense orange brown very sandy angular to sub angular cobbles)

Bottom of test pit at 3.00 meters.

Swan Environmental Services Ltd
Offices 24/25, The Rear Walled Garden, The Nostell Estate, Nostell
Wakefield, WF4 1AB
Telephone: 01977624364

TEST PIT NUMBER TP102

CLIENT Forth Homes

PROJECT NAME _____

PROJECT NUMBER _____

PROJECT LOCATION Windy Arbor

DATE STARTED 16/7/20 COMPLETED 16/7/20

GROUND ELEVATION _____ TEST PIT SIZE _____

EXCAVATION CONTRACTOR Dave Thornley

GROUND WATER LEVELS:

EXCAVATION METHOD Trial Pit

▽ AT TIME OF EXCAVATION 2.50 m

LOGGED BY Charlotte Radiven CHECKED BY Jennifer Devlin

AT END OF EXCAVATION ---

East _____ North _____

AFTER EXCAVATION ---

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION
			(Grass over) Blackish brown firm silty gravelly sandy (reworked) clay. Gravel is fine to coarse, sub angular to sub rounded of brick, sandstone and mudstone. MADE GROUND
0.30			
0.5			Reddish greyish (mottled) brown very sandy gravelly CLAY. (Gravel is fine to coarse sub angular to sub rounded of sandstone and mudstone. Grey silty sand bands throughout)
1.0			
1.5			
2.0			
2.5			
2.50			▽ (Weathered) SANDSTONE (Arisings described as dense greyish orangish brown very sandy gravelly sub angular becoming angular COBBLES)
3.0			
3.00			

Bottom of test pit at 3.00 meters.

CLIENT <u>Forth Homes</u>	PROJECT NAME _____		
PROJECT NUMBER _____	PROJECT LOCATION <u>Windy Arbor</u>		
DATE STARTED <u>17/7/20</u>	COMPLETED <u>17/7/20</u>	GROUND ELEVATION _____	TEST PIT SIZE _____
EXCAVATION CONTRACTOR <u>Dave Thornley</u>	GROUND WATER LEVELS:		
EXCAVATION METHOD <u>Trial Pit</u>	AT TIME OF EXCAVATION <u>---</u>		
LOGGED BY <u>Charlotte Radiven</u>	CHECKED BY <u>Jennifer Devlin</u>	AT END OF EXCAVATION <u>---</u>	
East _____	North _____	AFTER EXCAVATION <u>---</u>	

DEPTH (m)	SAMPLE TYPE NUMBER	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION
0.5			0.50	(Grass over) Blackish brown firm silty gravelly sandy (reworked) clay. Gravel is fine to coarse, sub angular to sub rounded of brick, sandstone and mudstone. MADE GROUND
0.70			0.70	Blackish brown very sandy gravel. Gravel is fine to very coarse sub angular to sub rounded of brick ash and coal. Medium cobble content of brick MADE GROUND
1.0			1.00	Fine to medium light brown clayey gravelly SAND. Gravel is fine to coarse sub angular to sub rounded of mudstone
1.5				Reddish greyish (mottled) brown very sandy gravelly CLAY. Gravel is fine to coarse sub angular to sub rounded of sandstone and mudstone. Becoming very gravelly
2.0			2.00	
2.5			2.50	(Weathered) SANDSTONE (Arising described as dense greyish orangish brown very sandy gravelly sub angular becoming angular COBBLES)

Soakaway carried
out at 2.5m bgl

Bottom of test pit at 2.50 meters.

CLIENT <u>Forth Homes</u>		PROJECT NAME _____	
PROJECT NUMBER _____		PROJECT LOCATION <u>Windy Arbor</u>	
DATE STARTED <u>17/7/20</u>	COMPLETED <u>17/7/20</u>	GROUND ELEVATION _____	TEST PIT SIZE _____
EXCAVATION CONTRACTOR <u>Dave Thornley</u>		GROUND WATER LEVELS:	
EXCAVATION METHOD <u>Trial Pit</u>		AT TIME OF EXCAVATION <u>---</u>	
LOGGED BY <u>Charlotte Radiven</u>		AT END OF EXCAVATION <u>---</u>	
CHECKED BY <u>Jennifer Devlin</u>		AFTER EXCAVATION <u>---</u>	
East _____		North _____	

DEPTH (m)	SAMPLE TYPE NUMBER	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION
				(Grass over) Blackish brown firm silty gravelly sandy (reworked) clay. Gravel is fine to coarse, sub angular to sub rounded of brick, sandstone and mudstone MADE GROUND
			0.30	
0.5			0.40	Blackish brown very sandy gravel. Gravel is fine to very coarse sub angular to sub rounded of brick ash and coal. Medium cobble content of brick MADE GROUND
				Reddish greyish (mottled) brown becoming yellowish greyish brown very sandy gravelly (becoming very gravelly) CLAY. Gravel is fine to coarse sub angular to sub rounded of sandstone and mudstone.
1.0				
1.5				
2.0			2.00	
				(Weathered) SANDSTONE (Arisings described as slightly damp dense greyish orangish brown very sandy gravelly sub angular becoming angular COBBLES)
			2.30	

Soakaway carried
out at 2.3m bgl

Bottom of test pit at 2.30 meters.

CLIENT Forth Homes PROJECT NAME _____
PROJECT NUMBER _____ PROJECT LOCATION Windy Arbor
DATE STARTED 17/7/20 COMPLETED 17/7/20 GROUND ELEVATION _____ TEST PIT SIZE _____
EXCAVATION CONTRACTOR Dave Thornley GROUND WATER LEVELS:
EXCAVATION METHOD Trial Pit AT TIME OF EXCAVATION ---
LOGGED BY Charlotte Radiven CHECKED BY Jennifer Devlin AT END OF EXCAVATION ---
East _____ North _____ AFTER EXCAVATION ---

DEPTH (m)	SAMPLE TYPE NUMBER	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
				(Dense vegetation over) Fine greyish black silty clayey gravelly SAND (TOPSOIL). Gravel is fine to coarse sub angular to sub rounded of mudstone.
0.5			0.30	Stiff reddish greyish (mottled) brown silty very sandy gravelly CLAY. Gravel is fine to coarse sub angular to sub rounded of sandstone and mudstone.
1.0				
1.5				
2.0				
2.5	GB TP105 2.0		2.50	Very high strength very stiff dark grey very clayey laminated MUDSTONE
3.0				
3.5				
4.0			3.80	Very dense purplish greyish brown becoming grey weathered slightly clayey MUDSTONE
			4.00	

Bottom of test pit at 4.00 meters.

CLIENT <u>Forth Homes</u>	PROJECT NAME _____
PROJECT NUMBER _____	PROJECT LOCATION <u>Windy Arbor</u>
DATE STARTED <u>17/7/20</u> COMPLETED <u>17/7/20</u>	GROUND ELEVATION _____ TEST PIT SIZE _____
EXCAVATION CONTRACTOR <u>Dave Thornley</u>	GROUND WATER LEVELS:
EXCAVATION METHOD <u>Trial Pit</u>	AT TIME OF EXCAVATION <u>---</u>
LOGGED BY <u>Charlotte Radiven</u> CHECKED BY <u>Jennifer Devlin</u>	AT END OF EXCAVATION <u>---</u>
East _____ North _____	AFTER EXCAVATION <u>---</u>

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION
			(Dense vegetation over) Fine greyish black silty clayey gravelly SAND (TOPSOIL). Gravel is fine to coarse sub angular to sub rounded of mudstone.
0.5			Stiff reddish greyish (mottled) brown silty very sandy gravelly CLAY. Gravel is fine to coarse sub angular to sub rounded of sandstone and mudstone.
1.0			
1.5			
2.0			
2.5			
			2.70
			Very high strength very stiff dark grey very clayey laminated MUDSTONE
3.0			
			3.20
			Very dense purplish greyish brown becoming grey weathered slightly clayey MUDSTONE
3.5			3.50

Bottom of test pit at 3.50 meters.

PAGE 1 OF 1

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION
			(Dense vegetation over) Fine greyish black silty clayey gravelly SAND (TOPSOIL). Gravel is fine to coarse sub angular to sub rounded of mudstone.
0.5			Stiff reddish greyish (mottled) brown becoming grey silty very sandy gravelly CLAY. Gravel is fine to coarse sub angular to sub rounded of sandstone and mudstone.
1.0			
1.5			
		1.70 ▽	
2.0			(Weathered) SANDSTONE (Arising described as dense greyish orangish brown very sandy gravelly sub angular becoming angular COBBLES)
		2.00	

SWAN BOREHOLE WITHOUT REFUSAL WINDY ARBOR.GPJ GINT STD A4 ASTM LAB.GDT 11/8/20

CLIENT Forth Homes

PROJECT NAME _____

PROJECT NUMBER _____

PROJECT LOCATION Windy Arbor

DATE STARTED 17/7/20 COMPLETED 17/7/20

GROUND ELEVATION _____ TEST PIT SIZE _____

EXCAVATION CONTRACTOR Dave Thornley

GROUND WATER LEVELS:

EXCAVATION METHOD Trial Pit

AT TIME OF EXCAVATION ---

LOGGED BY Charlotte Radiven CHECKED BY Jennifer Devlin

AT END OF EXCAVATION ---

East _____ North _____

AFTER EXCAVATION ---

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION
			(Dense vegetation over) Fine greyish black silty clayey gravelly SAND (TOPSOIL). Gravel is fine to coarse sub angular to sub rounded of mudstone.
0.5		0.35	Stiff reddish greyish (mottled) brown becoming grey silty very sandy gravelly CLAY. Gravel is fine to coarse sub angular to sub rounded of sandstone and mudstone.
1.0			
1.5			
2.0			
2.5		2.50	(Weathered) SANDSTONE (Arising described as dense greyish orangish brown very sandy gravelly sub angular becoming angular COBBLES)
3.0		3.00	

Bottom of test pit at 3.00 meters.

CLIENT	Forth Homes	PROJECT NAME	
PROJECT NUMBER		PROJECT LOCATION	Windy Arbor
DATE STARTED	17/7/20	COMPLETED	17/7/20
EXCAVATION CONTRACTOR	Dave Thornley	GROUND ELEVATION	
EXCAVATION METHOD	Trial Pit	TEST PIT SIZE	
LOGGED BY	Charlotte Radiven	CHECKED BY	Jennifer Devlin
East		North	
		GROUND WATER LEVELS:	
		AT TIME OF EXCAVATION	---
		AT END OF EXCAVATION	---
		AFTER EXCAVATION	---

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION
			(Dense vegetation over) Fine greyish black silty clayey gravelly SAND (TOPSOIL). Gravel is fine to coarse sub angular to sub rounded of mudstone.
0.5			Stiff reddish greyish (mottled) brown becoming grey silty very sandy gravelly CLAY. Gravel is fine to coarse sub angular to sub rounded of sandstone and mudstone.
1.0			
1.5			
2.0			
2.5			
3.0			(Weathered) SANDSTONE (Arising described as dense greyish orangish brown very sandy gravelly sub angular becoming angular COBBLES) (Possible MUDSTONE at 3.0m bgl)
			Bottom of test pit at 3.00 meters.

CLIENT Forth Homes PROJECT NAME _____
PROJECT NUMBER _____ PROJECT LOCATION Windy Arbor
DATE STARTED 17/7/20 COMPLETED 17/7/20 GROUND ELEVATION _____ TEST PIT SIZE _____
EXCAVATION CONTRACTOR Dave Thornley GROUND WATER LEVELS:
EXCAVATION METHOD Trial Pit AT TIME OF EXCAVATION ---
LOGGED BY Charlotte Radiven CHECKED BY Jennifer Devlin AT END OF EXCAVATION ---
East _____ North _____ AFTER EXCAVATION ---

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION
			(Dense vegetation over) Fine greyish black silty clayey gravelly SAND (TOPSOIL). Gravel is fine to coarse sub angular to sub rounded of mudstone.
0.30			
0.5			Stiff yellowish greyish brown gravelly silty sandy CLAY. Gravel is fine to coarse sub angular to rounded of mudstone and sandstone
1.0			
1.5			1.50
			Very stiff grey very silty CLAY
2.0			
2.5			2.50
			Very stiff grey very silty very clayey laminated MUDSTONE
2.80			
3.0			(Weathered) MUDSTONE (Arising described as dense greyish brown very sandy gravelly sub angular becoming angular COBBLES)
3.00			

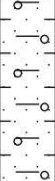
Bottom of test pit at 3.00 meters.

CLIENT Forth Homes PROJECT NAME _____
 PROJECT NUMBER _____ PROJECT LOCATION Windy Arbor
 DATE STARTED 16/7/20 COMPLETED 16/7/20 GROUND ELEVATION _____ HOLE SIZE 63mm
 DRILLING CONTRACTOR GEO Site Surveys GROUND WATER LEVELS:
 DRILLING METHOD Window Sampler AT TIME OF DRILLING ---
 LOGGED BY Charlotte Radiven CHECKED BY Jennifer Devlin AT END OF DRILLING ---
 East _____ North _____ AFTER DRILLING ---

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0.15					(Grass over) Blackish brown firm silty gravelly sandy (reworked) clay. Gravel is fine to coarse, sub angular to sub rounded of brick, sandstone and mudstone.	Casing Type: 50mm pvc Plain pipe and bentonite seal Perforated pipe and gravel filter pack Bentonite seal
0.25					Fine black clayey gravelly silty Sand. Gravel is fine to coarse, sub angular to sub rounded of brick, sandstone and mudstone	
0.5	GB WS101 0.5				Reddish brown sandy slightly clayey gravel. Gravel is fine to very coarse sub angular to sub rounded of brick ash and coal. Medium cobble content of brick	
0.60					Fine light brown silty clayey SAND	
0.90	GB WS101 0.8				Medium strength stiff reddish medium brown silty gravelly sandy CLAY with occasional sand bands. Gravel is fine to medium sub angular to sub rounded of sandstone and mudstone	
1.0	SPT	3-2-2-3	N=10			
1.0	B WS101 1.0					
1.5						
1.70						
1.80					Fine to very coarse greyish reddish brown silty gravelly SAND. Gravel is coarse sub rounded of sandstone and mudstone. Low cobble content of mudstone	
2.0					Very high strength very stiff greyish orangish (mottled) brown silty sandy gravelly CLAY. Gravel is fine to coarse sub angular of sandstone and mudstone	Bentonite seal
2.30	SPT	10-10-12-18	N=50			
2.0	B WS101 2.0					
2.45					Very high strength very stiff dark grey very clayey laminated MUDSTONE	

Bottom of borehole at 2.45 meters.

CLIENT <u>Forth Homes</u>		PROJECT NAME _____	
PROJECT NUMBER _____		PROJECT LOCATION <u>Windy Arbor</u>	
DATE STARTED <u>16/7/20</u>	COMPLETED <u>16/7/20</u>	GROUND ELEVATION _____	HOLE SIZE <u>63mm</u>
DRILLING CONTRACTOR <u>GEO Site Surveys</u>		GROUND WATER LEVELS:	
DRILLING METHOD <u>Window Sampler</u>		AT TIME OF DRILLING <u>---</u>	
LOGGED BY <u>Charlotte Radiven</u>		AT END OF DRILLING <u>---</u>	
CHECKED BY <u>Jennifer Devlin</u>		AFTER DRILLING <u>---</u>	
East _____		North _____	

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0.5	GB WS102 0.1				(Dense vegetation over) Fine black silty gravelly SAND (TOPSOIL). Gravel is fine to coarse sub angular to sub rounded of mudstone. Low cobble content of mudstone
1.0	GB WS102 1.0 SPT	2-3-3	N=11		Fine to medium dark brown gravelly slightly clayey silty SAND. Gravel is fine to coarse sub angular to sub rounded of mudstone. (0.55m to 0.8m becoming light brown) (0.8m to 0.9m becoming compact and very dense with loose coal fragments)
1.5	GB WS102 1.5				Medium strength stiff reddish greyish (mottled) brown sandy gravelly silty CLAY. Gravel is fine to coarse sub angular to sub rounded of sandstone and mudstone
2.0	SPT	13-12-14	N=50		Very high strength very stiff dark grey very clayey laminated MUDSTONE
2.45					

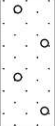
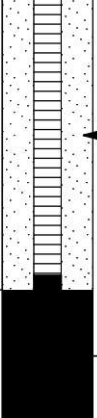
Bottom of borehole at 2.45 meters.

CLIENT <u>Forth Homes</u>		PROJECT NAME _____	
PROJECT NUMBER _____		PROJECT LOCATION <u>Windy Arbor</u>	
DATE STARTED <u>16/7/20</u>		COMPLETED <u>16/7/20</u>	
DRILLING CONTRACTOR <u>GEO Site Surveys</u>		GROUND ELEVATION _____	
DRILLING METHOD <u>Window Sampler</u>		HOLE SIZE <u>63mm</u>	
LOGGED BY <u>Charlotte Radiven</u>		GROUND WATER LEVELS:	
CHECKED BY <u>Jennifer Devlin</u>		AT TIME OF DRILLING <u>---</u>	
East _____		AT END OF DRILLING <u>---</u>	
North _____		AFTER DRILLING <u>---</u>	

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0.5					(Dense vegetation over) Fine black silty clayey gravelly SAND (TOPSOIL). Gravel is fine to coarse sub angular to sub rounded of mudstone.
					Fine to medium dark brown gravelly very clayey SAND. Gravel is fine to coarse sub angular to sub rounded of mudstone
1.0					Medium strength stiff reddish greyish (mottled) brown very sandy gravelly CLAY. Gravel is fine to coarse sub angular to sub rounded of sandstone and mudstone
	SPT	4-15-17-14	N=50		Very dense fine to medium reddish brown very clayey SAND
	GB WS103 1.0				

Bottom of borehole at 1.45 meters.

CLIENT Forth Homes PROJECT NAME _____
PROJECT NUMBER _____ PROJECT LOCATION Windy Arbor
DATE STARTED 16/7/20 COMPLETED 16/7/20 GROUND ELEVATION _____ HOLE SIZE 63mm
DRILLING CONTRACTOR GEO Site Surveys GROUND WATER LEVELS:
DRILLING METHOD Window Sampler ∇ AT TIME OF DRILLING 2.00 m
LOGGED BY Charlotte Radiven CHECKED BY Jennifer Devlin AT END OF DRILLING ---
East _____ North _____ AFTER DRILLING ---

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
						Casing Type: 50mm pvc
0.5	GB WS104 0.3				(Dense vegetation over) Fine black silty clayey gravelly SAND (TOPSOIL). Gravel is fine to coarse sub angular to sub rounded of mudstone. (0.35m to 0.6m becoming Sand)	
1.0	GB WS104 0.8				Fine to medium dark becoming light brown gravelly very clayey SAND. Gravel is fine to coarse sub angular to sub rounded of mudstone. (0.6m to 0.75m becoming orangish light brown) (0.75m to 1m becoming dense reddish brown SAND damp)	
1.5	GB WS104 1.0	1-2-2-2	N=7		Medium strength stiff reddish greyish (mottled) brown very sandy gravelly CLAY. Gravel is fine to coarse sub angular to sub rounded of sandstone and mudstone. Sand bands throughout. (1.9m to 2m low cobble content of mudstone)	
2.0	SPT GB WS104 2.0	12-12-13-12	N=49		Very dense orangish brown very gravelly SAND. Gravel is fine to very coarse sub angular of sandstone. (2m water strike)	
2.45						

Bottom of borehole at 2.45 meters.

CLIENT Forth Homes PROJECT NAME _____
PROJECT NUMBER _____ PROJECT LOCATION Windy Arbor
DATE STARTED 16/7/20 COMPLETED 16/7/20 GROUND ELEVATION _____ HOLE SIZE 63mm
DRILLING CONTRACTOR GEO Site Surveys GROUND WATER LEVELS:
DRILLING METHOD Window Sampler AT TIME OF DRILLING ---
LOGGED BY Charlotte Radiven CHECKED BY Jennifer Devlin AT END OF DRILLING ---
East _____ North _____ AFTER DRILLING ---

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
					(Grass over) Blackish brown firm silty gravelly sandy (reworked) clay. Gravel is fine to coarse, sub angular to sub rounded of brick, sandstone and mudstone.
0.5	GB WS105 0.4			0.30	Fine black clayey gravelly silty SAND. Gravel is fine to coarse, sub angular to sub rounded of brick, sandstone and mudstone
				0.60	Reddish brown sandy slightly clayey GRAVEL. Gravel is fine to very coarse sub angular to sub rounded of brick ash and coal. Medium cobble content of brick
1.0				0.80	Fine light brown silty clayey SAND
	SPT	2-2-3-3	N=10	1.10	Medium strength stiff reddish greyish (mottled) brown sandy gravelly silty CLAY. Gravel is fine to coarse sub angular to sub rounded of sandstone and mudstone. Yellow sand bands throughout
1.5	GB WS105 1.2 GB WS105 1.0			2.00	Very dense fine to medium red very clayey SAND
2.0	SPT	12-13-25	N=50 Refusal	2.40	
	GB WS105 2.0			2.45	Brownish red weathered SANDSTONE

Bottom of borehole at 2.45 meters.

CLIENT Forth Homes **PROJECT NAME** _____

PROJECT NUMBER _____ **PROJECT LOCATION** Windy Arbor

DATE STARTED 16/7/20 **COMPLETED** 16/7/20 **GROUND ELEVATION** _____ **HOLE SIZE** 63mm

DRILLING CONTRACTOR GEO Site Surveys **GROUND WATER LEVELS:**

DRILLING METHOD Window Sampler ☒ **AT TIME OF DRILLING** 2.00 m

LOGGED BY Charlotte Radiven **CHECKED BY** Jennifer Devlin **AT END OF DRILLING** ---

East _____ **North** _____ **AFTER DRILLING** ---

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0.20					(Dense vegetation over) Fine black silty clayey gravelly SAND (TOPSOIL). Gravel is fine to coarse sub angular to sub rounded of mudstone.
0.5					Fine black clayey gravelly silty SAND. Gravel is fine to coarse, sub angular to sub rounded of brick, sandstone and mudstone
1.0					
1.5	SPT GB WS106 1.0	2-1-2-2	N=7		Very dense fine to medium greyish light brown slightly silty gravelly SAND. Gravel is fine to medium sub angular of sandstone and mudstone. (orange sand pockets throughout) (1.4m to 1.5m becoming dark brown with coal fragments becoming reddish brown gravelly sand)
2.0					
2.5	SPT GB WS106 2.0	2-2-3-3	N=10		Medium strength stiff reddish greyish (mottled) brown very sandy gravelly CLAY. Gravel is fine to coarse sub angular to sub rounded of sandstone and mudstone. Sand bands throughout. (2m to 2.2m becoming very sandy with water strike)
3.0					
3.45	SPT GB WS106 3.0	10-12-13-15	N=50		Very high strength very stiff yellowish greyish brown gravelly silty sandy CLAY. Gravel is fine to coarse sub angular to rounded of mudstone and occasional coal fragments
					Very high strength very stiff dark grey very clayey laminated MUDSTONE

Bottom of borehole at 3.45 meters.

CLIENT <u>Forth Homes</u>	PROJECT NAME _____		
PROJECT NUMBER _____	PROJECT LOCATION <u>Windy Arbor</u>		
DATE STARTED <u>17/7/20</u>	COMPLETED <u>17/7/20</u>	GROUND ELEVATION _____	HOLE SIZE <u>63mm</u>
DRILLING CONTRACTOR <u>GEO Site Surveys</u>	GROUND WATER LEVELS:		
DRILLING METHOD <u>Window Sampler</u>	AT TIME OF DRILLING <u>---</u>		
LOGGED BY <u>Charlotte Radiven</u>	CHECKED BY <u>Jennifer Devlin</u>	AT END OF DRILLING <u>---</u>	
East _____	North _____	AFTER DRILLING <u>---</u>	

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
					(Dense vegetation over) Fine black silty clayey gravelly SAND (TOPSOIL). Gravel is fine to coarse sub angular to sub rounded of mudstone.
0.5	GB WS107 0.15				0.30
					Medium strength stiff reddish greyish (mottled) brown very sandy gravelly CLAY. Gravel is fine to coarse sub angular to sub rounded of sandstone and mudstone. Sand bands throughout
1.0	GB WS107 0.8				
	SPT	3-2-3-3	N=11		
1.5	GB WS107 1.0				
					High strength very stiff reddish greyish brown very clayey laminated MUDSTONE
2.0					
	SPT	10-13-27	N=50 Refusal		
	GB WS107 2.0				
					2.45

Bottom of borehole at 2.45 meters.

CLIENT Forth Homes **PROJECT NAME** _____

PROJECT NUMBER _____ **PROJECT LOCATION** Windy Arbor

DATE STARTED 17/7/20 **COMPLETED** 17/7/20 **GROUND ELEVATION** _____ **HOLE SIZE** 63mm

DRILLING CONTRACTOR GEO Site Surveys **GROUND WATER LEVELS:**

DRILLING METHOD Window Sampler **AT TIME OF DRILLING** ---

LOGGED BY Charlotte Radiven **CHECKED BY** Jennifer Devlin **AT END OF DRILLING** ---

East _____ **North** _____ **AFTER DRILLING** ---

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
						Casing Type: 50mm pvc
0.5	GB WS108 0.2			0.30	(Dense vegetation over) Fine black silty clayey gravelly SAND (TOPSOIL). Gravel is fine to coarse sub angular to sub rounded of mudstone.	Plain pipe and bentonite seal Perforated pipe and gravel filter pack Bentonite seal
1.0	GB WS108 0.5				Medium strength stiff reddish greyish (mottled) brown very sandy gravelly CLAY. Gravel is fine to coarse sub angular to sub rounded of sandstone and mudstone.	
1.5	SPT	3-2-2-2	N=9			
2.0	GB WS108 1.0			1.70	Very dense purpleish greyish brown becoming grey weathered very clayey MUDSTONE	
2.45	SPT	50	N=50 Refusal	1.90	Very dense pruplish grey weathered MUDSTONE	
	GB WS108 2.0			2.45		

Bottom of borehole at 2.45 meters.

CLIENT Forth Homes

PROJECT NAME _____

PROJECT NUMBER _____

PROJECT LOCATION Windy Arbor

DATE STARTED 17/7/20 COMPLETED 17/7/20

GROUND ELEVATION _____ HOLE SIZE 63mm

DRILLING CONTRACTOR GEO Site Surveys

GROUND WATER LEVELS:

DRILLING METHOD Window Sampler

AT TIME OF DRILLING ---

LOGGED BY Charlotte Radiven CHECKED BY Jennifer Devlin

AT END OF DRILLING ---

East _____ North _____

AFTER DRILLING ---

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0.35					(Dense vegetation over) Fine black silty clayey gravelly SAND (TOPSOIL). Gravel is fine to coarse sub angular to sub rounded of mudstone.
0.5					Medium strength stiff yellowish greyish brown gravelly silty sandy CLAY. Gravel is fine to coarse sub angular to rounded of mudstone and occasional sand bands
1.0					
1.5	SPT GB WS109 1.0	3-2-3-2	N=10		Very high strength stiff reddish becoming purplish brown very gravelly slity CLAY. Gravel is fine to very coarse sub angular to angular of sandstone and mudstone. Sand bands throughout
2.0					
2.10	SPT GB WS109 2.0	11-13-13-14	N=51		Very dense brownish red weathered SANDSTONE
2.45					

Bottom of borehole at 2.45 meters.

CLIENT Forth Homes PROJECT NAME _____
PROJECT NUMBER _____ PROJECT LOCATION Windy Arbor
DATE STARTED 17/7/20 COMPLETED 17/7/20 GROUND ELEVATION _____ HOLE SIZE 63mm
DRILLING CONTRACTOR GEO Site Surveys GROUND WATER LEVELS:
DRILLING METHOD Window Sampler AT TIME OF DRILLING ---
LOGGED BY Charlotte Radiven CHECKED BY Jennifer Devlin AT END OF DRILLING ---
East _____ North _____ AFTER DRILLING ---

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
	GB WS110 0.1				(Dense vegetation over) Fine black silty clayey gravelly SAND (TOPSOIL). Gravel is fine to coarse sub angular to sub rounded of mudstone.
0.5					Fine to medium light brown gravelly clayey SAND
	GB WS110 0.6				Very high strength very stiff reddish becoming purplish brown very gravelly silty CLAY. Gravel is fine to very coarse sub angular to angular of sandstone and mudstone. Sand bands throughout
1.0					
	SPT	3-13-18-19	N=50 Refusal		
	GB WS110 1.0				
					Bottom of borehole at 1.45 meters.

APPENDIX F – CHEMICAL LABORATORY CERTIFICATES



ANALYTICAL TEST REPORT

Contract no: 87605

Contract name: Windy Arbor

Client reference: 4000417

Clients name: Swan Environmental Services

Clients address: Cedars Business Centre
Barnsley Road, Hemsworth
Pontefract
WF9 4PU

Samples received: 21 July 2020

Analysis started: 21 July 2020

Analysis completed: 28 July 2020

Report issued: 28 July 2020

Notes: Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.
All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
This report shall not be reproduced except in full, without prior written approval.
Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

Key: U UKAS accredited test
M MCERTS & UKAS accredited test
\$ Test carried out by an approved subcontractor
I/S Insufficient sample to carry out test
N/S Sample not suitable for testing
NAD No Asbestos Detected

Approved by: _____
Dave Bowerbank
Customer Support Hero

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.
Analytical results are inclusive of stones.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
87605-1	WS101	0.50	Sand with Gravel	-	-	24.9
87605-2	WS101	0.80	Sand with Gravel and Roots	-	-	10.7
87605-3	WS104	0.30	Clay Sand with Gravel and Roots	-	-	19.0
87605-5	WS105	0.40	Clay Sand with Gravel and Roots	-	-	15.0
87605-6	WS105	1.20	Clay with Gravel	-	-	12.0
87605-7	WS107	0.15	Clay Sand with Roots	-	-	22.4
87605-8	WS107	0.80	Clay Sand with Gravel	-	-	9.9
87605-9	WS108	0.20	Clay Sand with Gravel and Roots	-	-	19.8
87605-10	WS110	0.10	Clay Sand with Gravel and Roots	-	-	20.4

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SOILS

Lab number Sample id Depth (m) Date sampled			87605-1 WS101 0.50 17/07/2020	87605-2 WS101 0.80 17/07/2020	87605-3 WS104 0.30 17/07/2020	87605-5 WS105 0.40 17/07/2020	87605-6 WS105 1.20 17/07/2020	87605-7 WS107 0.15 17/07/2020
Test	Method	Units						
Arsenic (total)	CE127 ^M	mg/kg As	15	5.5	17	19	8.5	17
Cadmium (total)	CE127 ^M	mg/kg Cd	0.5	<0.2	0.7	0.5	<0.2	0.5
Chromium (total)	CE127 ^M	mg/kg Cr	0.5	<0.2	0.7	0.5	<0.2	0.5
Chromium (III)	CE208	mg/kg CrIII	0.5	<0.2	0.7	0.5	<0.2	0.5
Chromium (VI)	CE146	mg/kg CrVI	<1	<1	<1	<1	<1	<1
Copper (total)	CE127 ^M	mg/kg Cu	50	22	91	104	24	70
Lead (total)	CE127 ^M	mg/kg Pb	274	56	111	193	15	89
Mercury (total)	CE127 ^M	mg/kg Hg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel (total)	CE127 ^M	mg/kg Ni	28	22	35	37	39	30
Selenium (total)	CE127 ^M	mg/kg Se	1.1	0.6	1.6	1.7	1.8	1.9
Zinc (total)	CE127 ^M	mg/kg Zn	157	67	178	197	52	111
pH	CE004 ^M	units	7.7	7.3	6.6	7.8	6.7	5.7
Total Organic Carbon (TOC)	CE072 ^M	% w/w C	3.3	-	6.6	4.5	-	3.8
Estimate of OMC (calculated from TOC)	CE072 ^M	% w/w	5.6	-	11.4	7.8	-	6.6
PAH								
Naphthalene	CE087 ^M	mg/kg	<0.02	<0.02	<0.02	0.27	<0.02	<0.02
Acenaphthylene	CE087 ^M	mg/kg	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Acenaphthene	CE087 ^M	mg/kg	3.02	<0.02	<0.02	0.24	<0.02	<0.02
Fluorene	CE087 ^U	mg/kg	2.47	<0.02	<0.02	<0.02	<0.02	<0.02
Phenanthrene	CE087 ^M	mg/kg	34.70	<0.02	0.41	2.28	<0.02	<0.02
Anthracene	CE087 ^U	mg/kg	11.17	<0.02	<0.02	0.46	<0.02	<0.02
Fluoranthene	CE087 ^M	mg/kg	69.25	0.44	0.86	3.88	<0.02	0.31
Pyrene	CE087 ^M	mg/kg	59.00	0.65	0.79	3.67	<0.02	0.26
Benzo(a)anthracene	CE087 ^U	mg/kg	26.03	0.59	0.42	1.77	<0.02	<0.02
Chrysene	CE087 ^M	mg/kg	24.96	0.60	0.46	1.99	<0.03	<0.03
Benzo(b)fluoranthene	CE087 ^M	mg/kg	34.17	1.95	0.78	3.51	<0.02	<0.02
Benzo(k)fluoranthene	CE087 ^M	mg/kg	14.12	0.73	0.31	1.30	<0.03	<0.03
Benzo(a)pyrene	CE087 ^U	mg/kg	24.97	1.40	0.45	2.21	<0.02	<0.02
Indeno(123cd)pyrene	CE087 ^M	mg/kg	14.37	1.19	0.35	1.63	<0.02	<0.02
Dibenz(ah)anthracene	CE087 ^M	mg/kg	3.80	<0.02	<0.02	0.40	<0.02	<0.02
Benzo(ghi)perylene	CE087 ^M	mg/kg	15.34	1.22	0.39	2.01	<0.02	<0.02
PAH (total of USEPA 16)	CE087	mg/kg	337	8.78	5.23	25.6	<0.34	0.57
TPH								
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
EPH Aromatic (>EC10-EC12)	CE068	mg/kg	<1	<1	<1	<1	<1	<1
EPH Aromatic (>EC12-EC16)	CE068	mg/kg	4	<1	<1	<1	<1	<1
EPH Aromatic (>EC16-EC21)	CE068	mg/kg	178	2	3	11	<1	<1
EPH Aromatic (>EC21-EC35)	CE068	mg/kg	143	7	4	14	<1	<1
EPH Aromatic (>EC35-EC44)	CE068	mg/kg	16	2	<1	3	<1	<1

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SOILS

Lab number			87605-1	87605-2	87605-3	87605-5	87605-6	87605-7
Sample id			WS101	WS101	WS104	WS105	WS105	WS107
Depth (m)			0.50	0.80	0.30	0.40	1.20	0.15
Date sampled			17/07/2020	17/07/2020	17/07/2020	17/07/2020	17/07/2020	17/07/2020
Test	Method	Units						
VPH Aliphatic (>C5-C6)	CE067	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
VPH Aliphatic (>C6-C8)	CE067	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
VPH Aliphatic (>C8-C10)	CE067	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
EPH Aliphatic (>C10-C12)	CE068	mg/kg	<4	<4	<4	<4	<4	<4
EPH Aliphatic (>C12-C16)	CE068	mg/kg	19	<4	<4	<4	<4	<4
EPH Aliphatic (>C16-C35)	CE068	mg/kg	973	47	41	79	<4	20
EPH Aliphatic (>C35-C44)	CE068	mg/kg	74	<10	<10	31	<10	<10
Subcontracted analysis								
Asbestos (qualitative)	\$	-	NAD	-	NAD	NAD	-	NAD

Chemtech Environmental Limited

SOILS

Lab number Sample id Depth (m) Date sampled			87605-8 WS107 0.80 17/07/2020	87605-9 WS108 0.20 17/07/2020	87605-10 WS110 0.10 17/07/2020
Test	Method	Units			
Arsenic (total)	CE127 ^M	mg/kg As	4.2	14	21
Cadmium (total)	CE127 ^M	mg/kg Cd	<0.2	0.5	0.8
Chromium (total)	CE127 ^M	mg/kg Cr	<0.2	0.5	0.8
Chromium (III)	CE208	mg/kg CrIII	<0.2	0.5	0.8
Chromium (VI)	CE146	mg/kg CrVI	<1	<1	<1
Copper (total)	CE127 ^M	mg/kg Cu	15	51	88
Lead (total)	CE127 ^M	mg/kg Pb	17	67	94
Mercury (total)	CE127 ^M	mg/kg Hg	<0.5	<0.5	<0.5
Nickel (total)	CE127 ^M	mg/kg Ni	18	24	23
Selenium (total)	CE127 ^M	mg/kg Se	1.0	1.6	1.6
Zinc (total)	CE127 ^M	mg/kg Zn	34	98	93
pH	CE004 ^M	units	6.0	5.5	5.2
Total Organic Carbon (TOC)	CE072 ^M	% w/w C	-	4.1	4.8
Estimate of OMC (calculated from TOC)	CE072 ^M	% w/w	-	7.1	8.3
PAH					
Naphthalene	CE087 ^M	mg/kg	<0.02	<0.02	<0.02
Acenaphthylene	CE087 ^M	mg/kg	<0.02	<0.02	<0.02
Acenaphthene	CE087 ^M	mg/kg	<0.02	<0.02	<0.02
Fluorene	CE087 ^U	mg/kg	<0.02	<0.02	<0.02
Phenanthrene	CE087 ^M	mg/kg	<0.02	<0.02	0.42
Anthracene	CE087 ^U	mg/kg	<0.02	<0.02	<0.02
Fluoranthene	CE087 ^M	mg/kg	<0.02	<0.02	0.54
Pyrene	CE087 ^M	mg/kg	<0.02	<0.02	0.43
Benzo(a)anthracene	CE087 ^U	mg/kg	<0.02	<0.02	<0.02
Chrysene	CE087 ^M	mg/kg	<0.03	<0.03	0.26
Benzo(b)fluoranthene	CE087 ^M	mg/kg	<0.02	<0.02	0.44
Benzo(k)fluoranthene	CE087 ^M	mg/kg	<0.03	<0.03	<0.03
Benzo(a)pyrene	CE087 ^U	mg/kg	<0.02	<0.02	<0.02
Indeno(123cd)pyrene	CE087 ^M	mg/kg	<0.02	<0.02	<0.02
Dibenz(ah)anthracene	CE087 ^M	mg/kg	<0.02	<0.02	<0.02
Benzo(ghi)perylene	CE087 ^M	mg/kg	<0.02	<0.02	<0.02
PAH (total of USEPA 16)	CE087	mg/kg	<0.34	<0.34	2.10
TPH					
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	<0.01	<0.01	<0.01
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	<0.01	<0.01	<0.01
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	<0.01	<0.01	<0.01
EPH Aromatic (>EC10-EC12)	CE068	mg/kg	<1	<1	<1
EPH Aromatic (>EC12-EC16)	CE068	mg/kg	<1	<1	<1
EPH Aromatic (>EC16-EC21)	CE068	mg/kg	<1	<1	2
EPH Aromatic (>EC21-EC35)	CE068	mg/kg	<1	<1	<1
EPH Aromatic (>EC35-EC44)	CE068	mg/kg	<1	<1	<1

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SOILS

Lab number			87605-8	87605-9	87605-10
Sample id			WS107	WS108	WS110
Depth (m)			0.80	0.20	0.10
Date sampled			17/07/2020	17/07/2020	17/07/2020
Test	Method	Units			
VPH Aliphatic (>C5-C6)	CE067	mg/kg	<0.1	<0.1	<0.1
VPH Aliphatic (>C6-C8)	CE067	mg/kg	<0.1	<0.1	<0.1
VPH Aliphatic (>C8-C10)	CE067	mg/kg	<0.1	<0.1	<0.1
EPH Aliphatic (>C10-C12)	CE068	mg/kg	<4	<4	<4
EPH Aliphatic (>C12-C16)	CE068	mg/kg	<4	<4	<4
EPH Aliphatic (>C16-C35)	CE068	mg/kg	6	26	22
EPH Aliphatic (>C35-C44)	CE068	mg/kg	<10	<10	<10
Subcontracted analysis					
Asbestos (qualitative)	\$	-	-	NAD	NAD

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PREPARED LEACHATES

Lab number			87605-4L
Sample id			WS104
Depth (m)			2.00
Test	Method	Units	
Arsenic (dissolved)	CE128 ^U	µg/l As	2.09
Boron (dissolved)	CE128 ^U	µg/l B	32
Cadmium (dissolved)	CE128 ^U	µg/l Cd	<0.07
Chromium (dissolved)	CE128 ^U	µg/l Cr	18.8
Copper (dissolved)	CE128 ^U	µg/l Cu	8.9
Lead (dissolved)	CE128 ^U	µg/l Pb	<0.2
Mercury (dissolved)	CE128 ^U	µg/l Hg	<0.008
Nickel (dissolved)	CE128 ^U	µg/l Ni	9.0
Selenium (dissolved)	CE128 ^U	µg/l Se	0.35
Zinc (dissolved)	CE128 ^U	µg/l Zn	6

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE127	Arsenic (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg As
CE127	Cadmium (total)	Aqua regia digest, ICP-MS	Dry	M	0.2	mg/kg Cd
CE127	Chromium (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cr
CE208	Chromium (III)	Calculation: Cr (total) - Cr (VI)	Dry		1	mg/kg CrIII
CE146	Chromium (VI)	Acid extraction, Colorimetry	Dry		1	mg/kg CrVI
CE127	Copper (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cu
CE127	Lead (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Pb
CE127	Mercury (total)	Aqua regia digest, ICP-MS	Dry	M	0.5	mg/kg Hg
CE127	Nickel (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Ni
CE127	Selenium (total)	Aqua regia digest, ICP-MS	Dry	M	0.3	mg/kg Se
CE127	Zinc (total)	Aqua regia digest, ICP-MS	Dry	M	5	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	As received	M	-	units
CE072	Total Organic Carbon (TOC)	Removal of IC by acidification, Carbon Analyser	Dry	M	0.1	% w/w C
CE072	Estimate of OMC (calculated from TOC)	Calculation from Total Organic Carbon	Dry	M	0.1	% w/w
CE087	Naphthalene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Acenaphthylene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Acenaphthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Fluorene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Phenanthrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Anthracene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(a)anthracene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Chrysene	Solvent extraction, GC-MS	As received	M	0.03	mg/kg
CE087	Benzo(b)fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(k)fluoranthene	Solvent extraction, GC-MS	As received	M	0.03	mg/kg
CE087	Benzo(a)pyrene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Indeno(123cd)pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Dibenz(ah)anthracene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(ghi)perylene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	PAH (total of USEPA 16)	Solvent extraction, GC-MS	As received		0.34	mg/kg
CE067	VPH Aromatic (>EC5-EC7)	Headspace GC-FID	As received		0.01	mg/kg
CE067	VPH Aromatic (>EC7-EC8)	Headspace GC-FID	As received		0.01	mg/kg
CE067	VPH Aromatic (>EC8-EC10)	Headspace GC-FID	As received		0.01	mg/kg
CE068	EPH Aromatic (>EC10-EC12)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC12-EC16)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC16-EC21)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC21-EC35)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC35-EC44)	Solvent extraction, GC-FID	As received		1	mg/kg
CE067	VPH Aliphatic (>C5-C6)	Headspace GC-FID	As received		0.1	mg/kg
CE067	VPH Aliphatic (>C6-C8)	Headspace GC-FID	As received		0.1	mg/kg
CE067	VPH Aliphatic (>C8-C10)	Headspace GC-FID	As received		0.1	mg/kg
CE068	EPH Aliphatic (>C10-C12)	Solvent extraction, GC-FID	As received		4	mg/kg
CE068	EPH Aliphatic (>C12-C16)	Solvent extraction, GC-FID	As received		4	mg/kg

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE068	EPH Aliphatic (>C16-C35)	Solvent extraction, GC-FID	As received		4	mg/kg
CE068	EPH Aliphatic (>C35-C44)	Solvent extraction, GC-FID	As received		10	mg/kg
\$	Asbestos (qualitative)	HSG 248, Microscopy	Dry	U	-	-

Chemtech Environmental Limited

METHOD DETAILS

METHOD	PREPARED LEACHATES	METHOD SUMMARY	STATUS	LOD	UNITS
CE002	Leachate preparation (EA)	L:S 10:1		-	-
CE128	Arsenic (dissolved)	ICP-MS	U	0.06	µg/l As
CE128	Boron (dissolved)	ICP-MS	U	8	µg/l B
CE128	Cadmium (dissolved)	ICP-MS	U	0.07	µg/l Cd
CE128	Chromium (dissolved)	ICP-MS	U	0.2	µg/l Cr
CE128	Copper (dissolved)	ICP-MS	U	0.4	µg/l Cu
CE128	Lead (dissolved)	ICP-MS	U	0.2	µg/l Pb
CE128	Mercury (dissolved)	ICP-MS	U	0.008	µg/l Hg
CE128	Nickel (dissolved)	ICP-MS	U	0.5	µg/l Ni
CE128	Selenium (dissolved)	ICP-MS	U	0.07	µg/l Se
CE128	Zinc (dissolved)	ICP-MS	U	1	µg/l Zn

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DEVIATING SAMPLE INFORMATION

Comments

Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.

For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.

Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
87605-1	WS101	0.50	N	
87605-2	WS101	0.80	N	
87605-3	WS104	0.30	N	
87605-5	WS105	0.40	N	
87605-6	WS105	1.20	N	
87605-7	WS107	0.15	N	
87605-8	WS107	0.80	N	
87605-9	WS108	0.20	N	
87605-10	WS110	0.10	N	



LABORATORY REPORT



4043

Contract Number: PSL20/3782

Report Date: 12 August 2020

Client's Reference: 4000417

Client Name: Swan Environmental Services Ltd
Offices 24/25 The Rear Walled Garden
The Nostell Estate
Nostell
Wakefield
WF4 1AB

For the attention of: Charlotte Radiven

Contract Title: Windy Arbor

Date Received: 28/7/2020

Date Commenced: 28/7/2020

Date Completed: 12/8/2020

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson
(Director)

A Watkins
(Director)

R Berriman
(Quality Manager)

—
(Senior Technician)

S Eyre
(Senior Technician)

S Royle
(Laboratory Manager)

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

[illegible]

 PSL Professional Soils Laboratory	Windy Arbor
	Contract No:
	PSL20/3782
	Client Ref:
4000417	

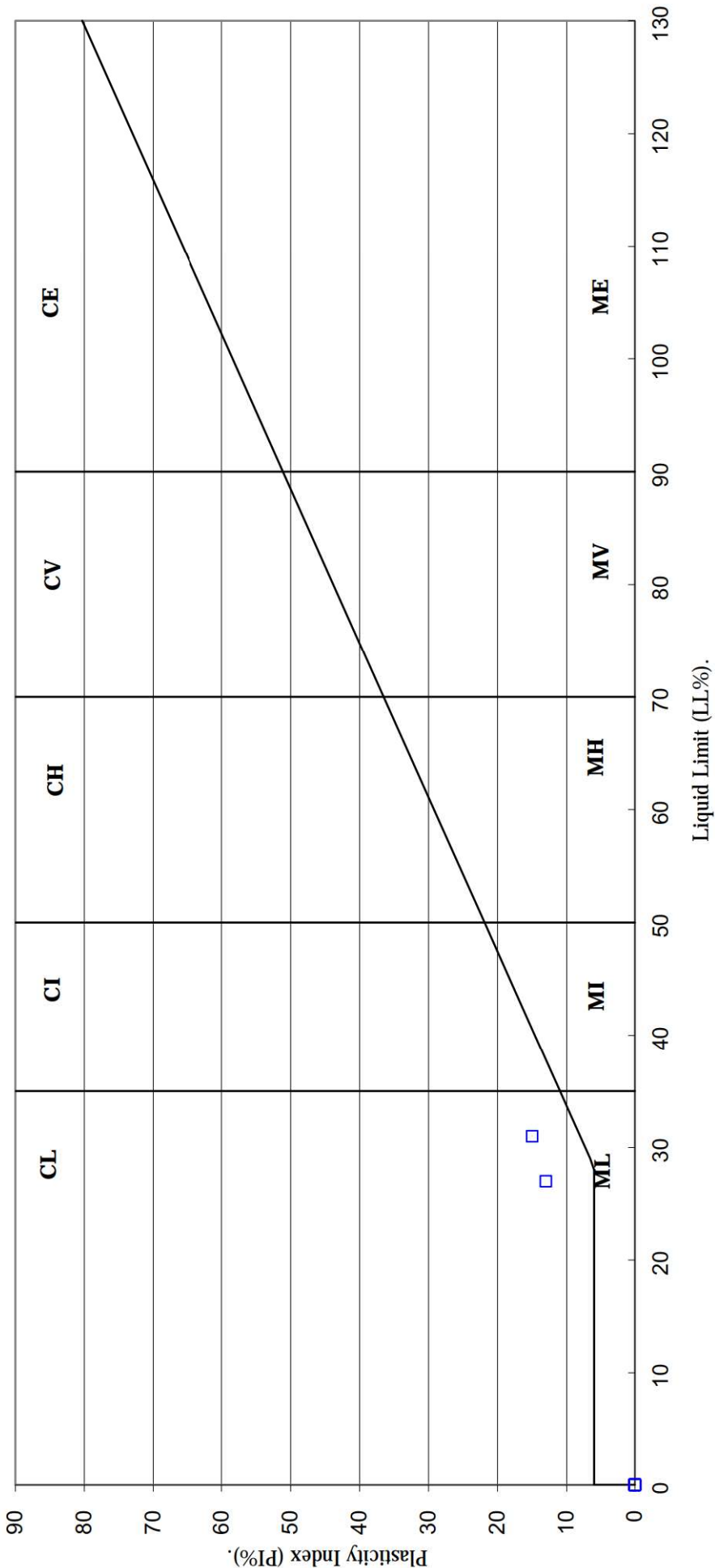
(BS1377 : PART 2 : 1990)

SYMBOLS: NP : Non Plastic

* : Liquid Limit and Plastic Limit Wet Sieved.

	Windy Arbor
	Contract No:
	PSL20/3782
	Client Ref:
4000417	

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



4043



Professional Soils Laboratory

Windy Arbor

Contract No:
PSL20/3782
Client Ref:
4000417

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

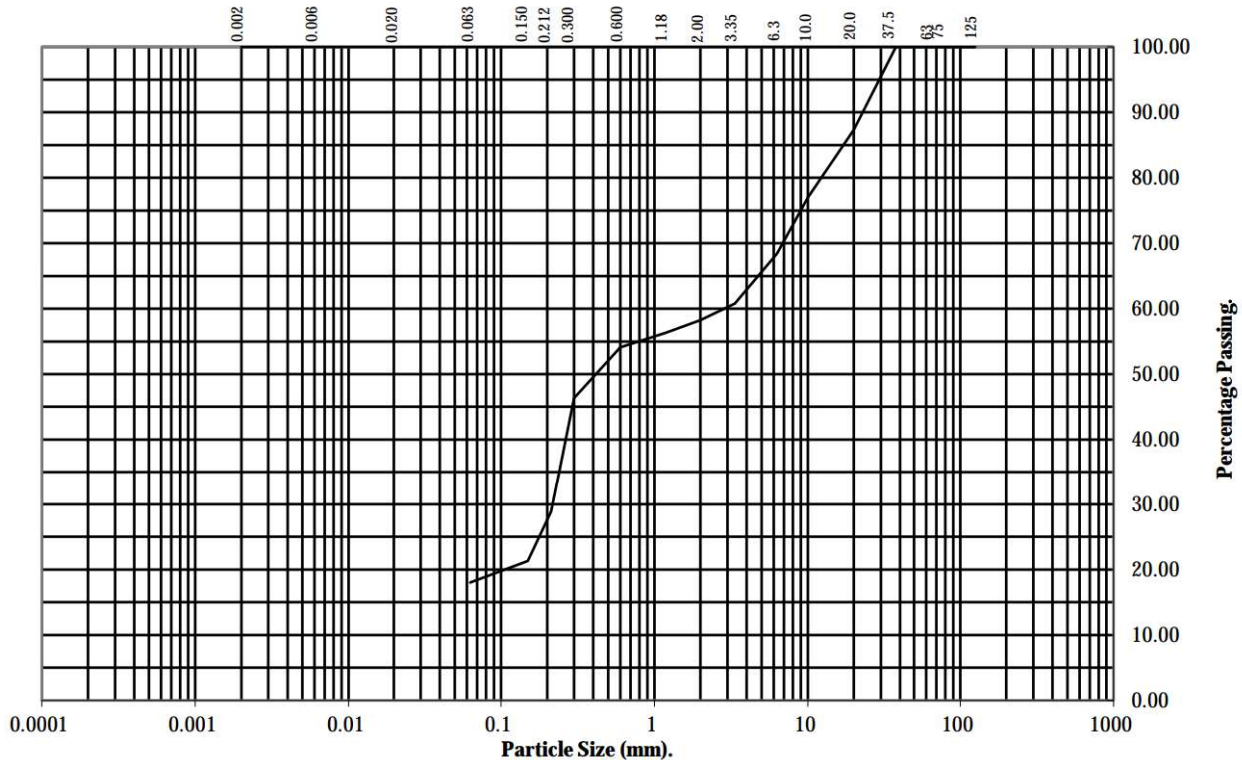
Hole Number: **WS104**

Top Depth (m): **2.00**

Sample Number:

Base Depth(m): **2.45**

Sample Type: **D**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	87
10	77
6.3	68
3.35	61
2	58
1.18	56
0.6	54
0.3	46
0.212	29
0.15	21
0.063	18

Soil Fraction	Total Percentage
Cobbles	0
Gravel	42
Sand	40
Silt/Clay	18

Remarks:

See Summary of Soil Descriptions



PSL
Professional Soils Laboratory

Windy Arbor

Contract No:
PSL20/3782
Client Ref:
4000417



ANALYTICAL TEST REPORT

Contract no: 87923
Contract name: Windy Arbor
Client reference: PSL20/3782
Clients name: Professional Soils Laboratory
Clients address: 5/7 Hexthorpe Road
Doncaster
DN4 0AR

Samples received: 31 July 2020
Analysis started: 31 July 2020
Analysis completed: 07 August 2020
Report issued: 07 August 2020

Notes: Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.
All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
This report shall not be reproduced except in full, without prior written approval.
Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

Key: U UKAS accredited test
M MCERTS & UKAS accredited test
\$ Test carried out by an approved subcontractor
I/S Insufficient sample to carry out test
N/S Sample not suitable for testing

Approved by:

Customer Support Here

Chemtech Environmental Limited

SOILS

Lab number			87923-1	87923-2
Sample id			WS106	WS109
Depth (m)			1.45	2.45
Date sampled			28/07/2020	28/07/2020
Test	Method	Units		
pH	CE004 ^U	units	5.0	7.8
Magnesium (2:1 water soluble)	CE061	mg/l Mg	2.3	5.0
Chloride (2:1 water soluble)	CE049 ^U	mg/l Cl	1.7	2.5
Nitrate (2:1 water soluble)	CE049 ^U	mg/l NO ₃	3.5	<1
Sulphate (2:1 water soluble)	CE061 ^U	mg/l SO ₄	17	<10
Sulphate (total)	CE154	mg/kg SO ₄	<100	<100
Sulphur (total)	CE127	mg/kg S	<100	<100

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE004	pH	Based on BS 1377, pH Meter	As received	U	-	units
CE061	Magnesium (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry		1	mg/l Mg
CE049	Chloride (2:1 water soluble)	Aqueous extraction, IC-COND	Dry	U	1	mg/l Cl
CE049	Nitrate (2:1 water soluble)	Aqueous extraction, IC-COND	Dry	U	1	mg/l NO ₃
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	U	10	mg/l SO ₄
CE154	Sulphate (total)	Acid extraction, ICP-MS	Dry		100	mg/kg SO ₄
CE127	Sulphur (total)	Acid extraction, ICP-MS	Dry		100	mg/kg S

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments

Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.

For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.

Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
87923-1	WS106	1.45	N	
87923-2	WS109	2.45	N	

INFILTRATION RESULTS

The average infiltration rate for each trial pit is provided in Table 1 below. The infiltration rates were calculated in accordance with the following BRE procedure:

$$\text{Soil infiltration rate} = \frac{V_{p75-25}}{ap_{50} \times tp_{75-25} \times 60}$$

Where:

V_{p75-25} = Effective storage volume of water in the trial pit between 75% and 25% effective depth.

ap₅₀ = Internal surface area of the trial pit up to 50% effective depth and including the base area.

tp₇₅₋₂₅ x 60 = Time for the water level to fall from 75% to 25% effective depth.

Table 1: Summary of Infiltration Rate (m/s)

Location	Depth (m)	Material	Test Type	Soil Infiltration Rate (m/s)
TP/SA103	2.50	(Weathered) SANDSTONE (Arisings described as dense greyish orangish brown very sandy gravelly sub angular becoming angular COBBLES)	BRE365 Infiltration	3.07E-05
TP/SA104	2.30			2.99E-05
*TP/SA110	3.00	(Weathered) MUDSTONE (Arisings described as dense greyish brown very sandy gravelly sub angular becoming angular COBBLES)		2.34E-06

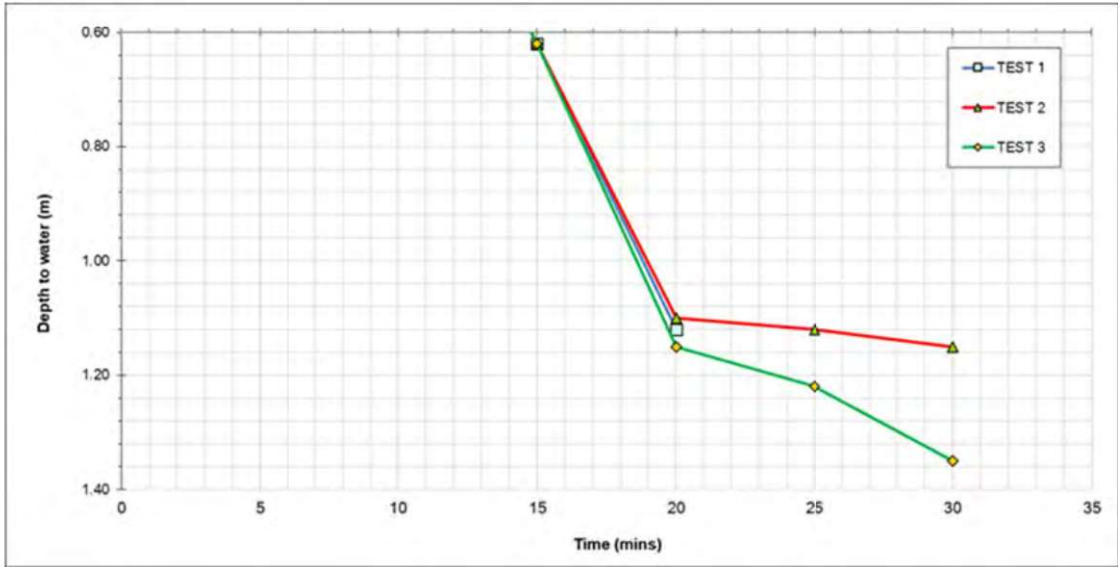
*The tests were abandoned at trail pit 110 due to the existing water levels resulting and resulting slow infiltration.

1.1 TP/103 Results

Testing of the generally granular material in TP/SA103 to the north east of the site produced design infiltration rates of **3.07E-05**. This rate is deemed unsuitable for surface water drainage design.

A graph demonstrating the design infiltration rate is presented below.

INFILTRATION GRAPH

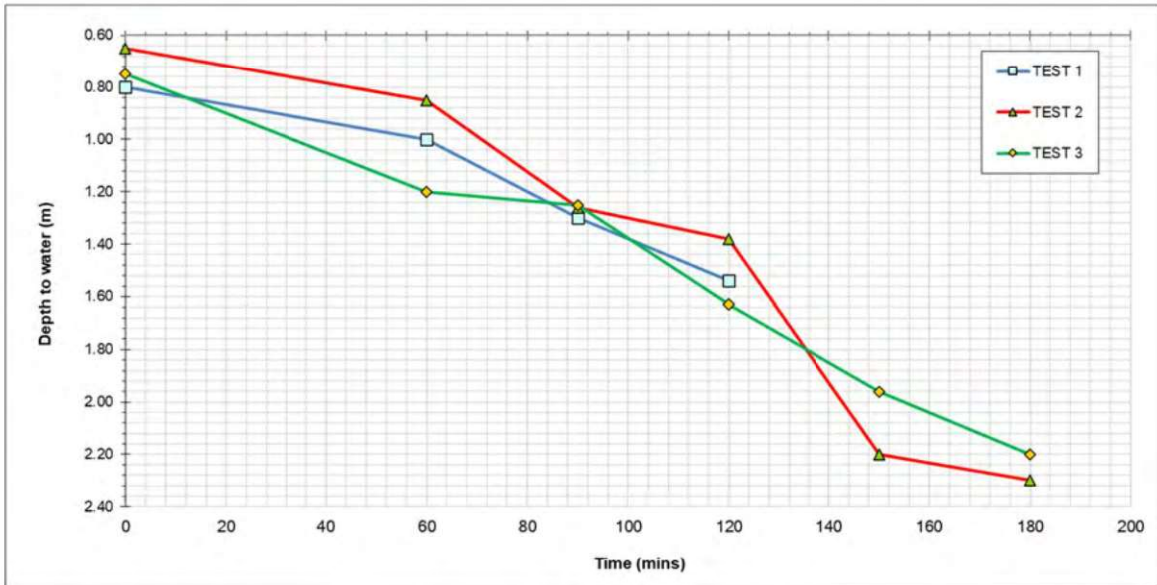


1.2 TP104 Results

Testing of the generally granular material in TP/SA104 to the north of the site produced design infiltration rates of **2.99E-05**. This rate is deemed suitable for surface water drainage design.

A graph demonstrating the design infiltration rate is presented below.

INFILTRATION GRAPH



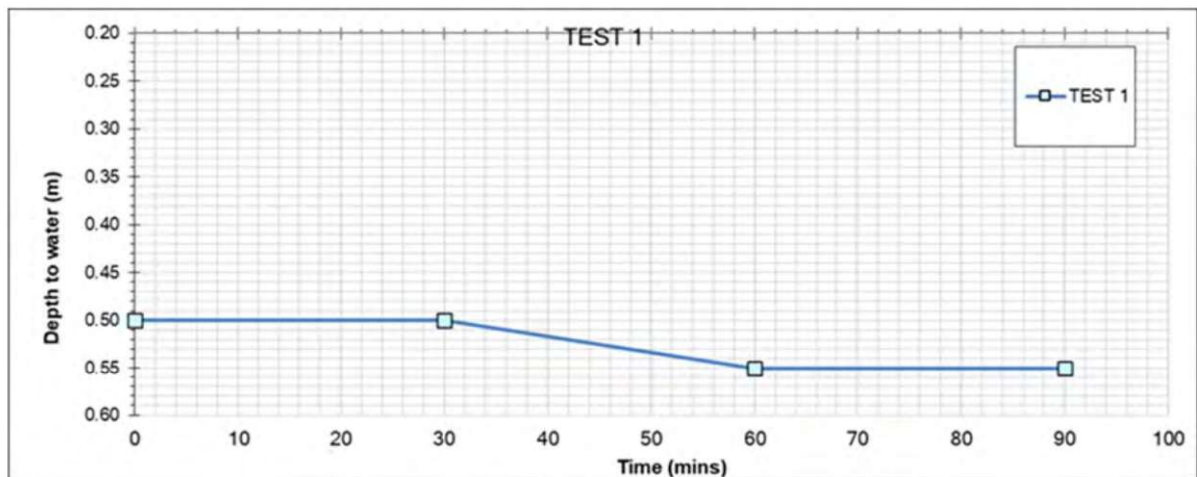
Windy Arbor, Whiston
BRE365 Infiltration Testing

4.3 TP110 Results

Testing of the granular in TP/SA110 to the mid-east of the site produced design infiltration rates of **2.34E-06**. This rate is deemed suitable for surface water drainage design though is relatively slower than those tests performed to the north of the site.

A graph demonstrating the design infiltration rate is presented below.

INFILTRATION GRAPH

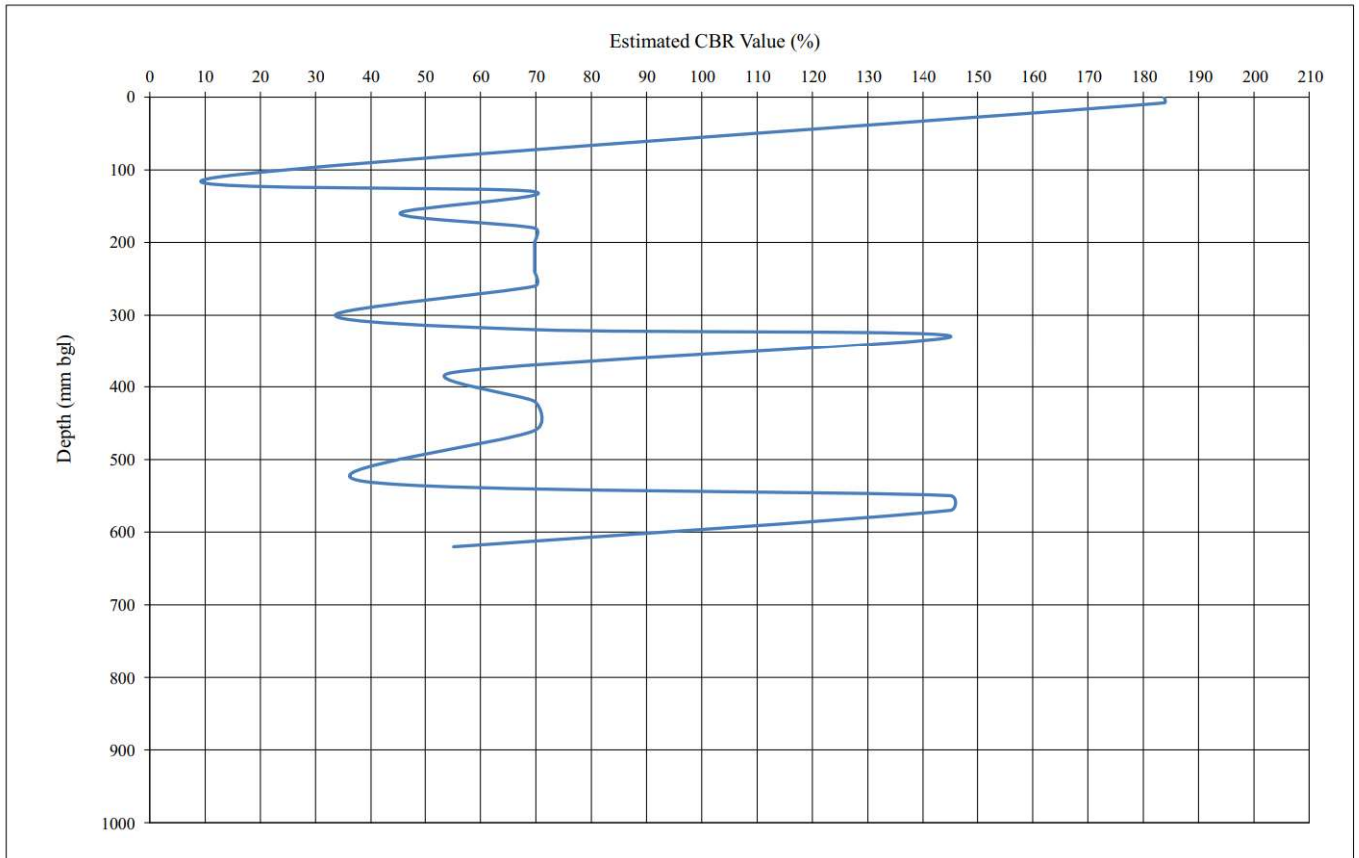


Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)

In Accordance with TRL Report 587(2003) and PR/INT/277/04

Site Name	Windy Arbor	Test Date:	18.07.20
Site Ref	100417	Test Location:	dcp1
Initial Depth	0 mm	Test No.:	1 of 5
Final Depth	600 mm	Undertaken By:	CR

Estimated California Bearing Ratio Graph



Start Depth (mm bgl)	Finish Depth (mm bgl)	No. of Blows	Blows Per Layer	DCP mm/Blows	Average CBR Value (%)
0	150	15	15	10	26
150	250	40	25	4	70
250	600	120	80	4	63

Average estimated CBR value of 70% between 0.15m - 0.25m bgl

Comments

Compressed due to excavator and current entrance to site.	
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Site Engineer:	Date:	Checked and Approved By:	Date:
C.Radiven	18.07.20	J.Devlin	12/08/2020

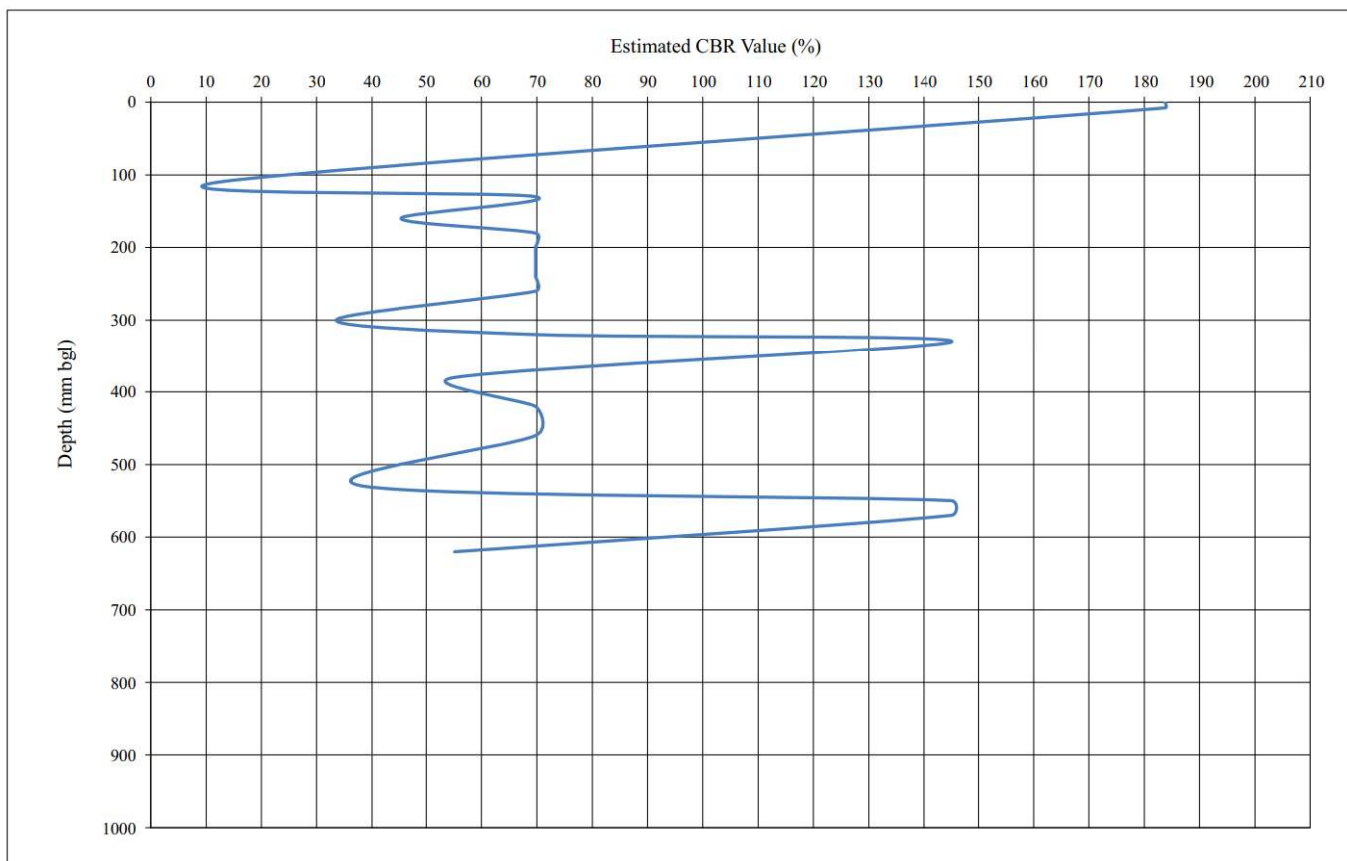
Location
dcp1

Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)

In Accordance with TRL Report 587(2003) and PR/INT/277/04

Site Name	Windy Arbor	Test Date:	18.07.20
Site Ref	100417	Test Location:	dcp2
Initial Depth	0 mm	Test No.:	20F5
Final Depth	600 mm	Undertaken By:	CR

Estimated California Bearing Ratio Graph



Start Depth (mm bgl)	Finish Depth (mm bgl)	No. of Blows	Blows Per Layer	DCP mm/Blows	Average CBR Value (%)
0	400	70	70	6	48
400	500	90	20	5	55
500	600	120	30	3	85

Average estimated CBR value of 55% between 0.40m - 0.50m bgl

Comments

Compressed due to excavator and current entrance to site.

Site Engineer:	Date:	Checked and Approved By:	Date:
C.Radiven	18.07.20	J.Devlin	12/08/2020

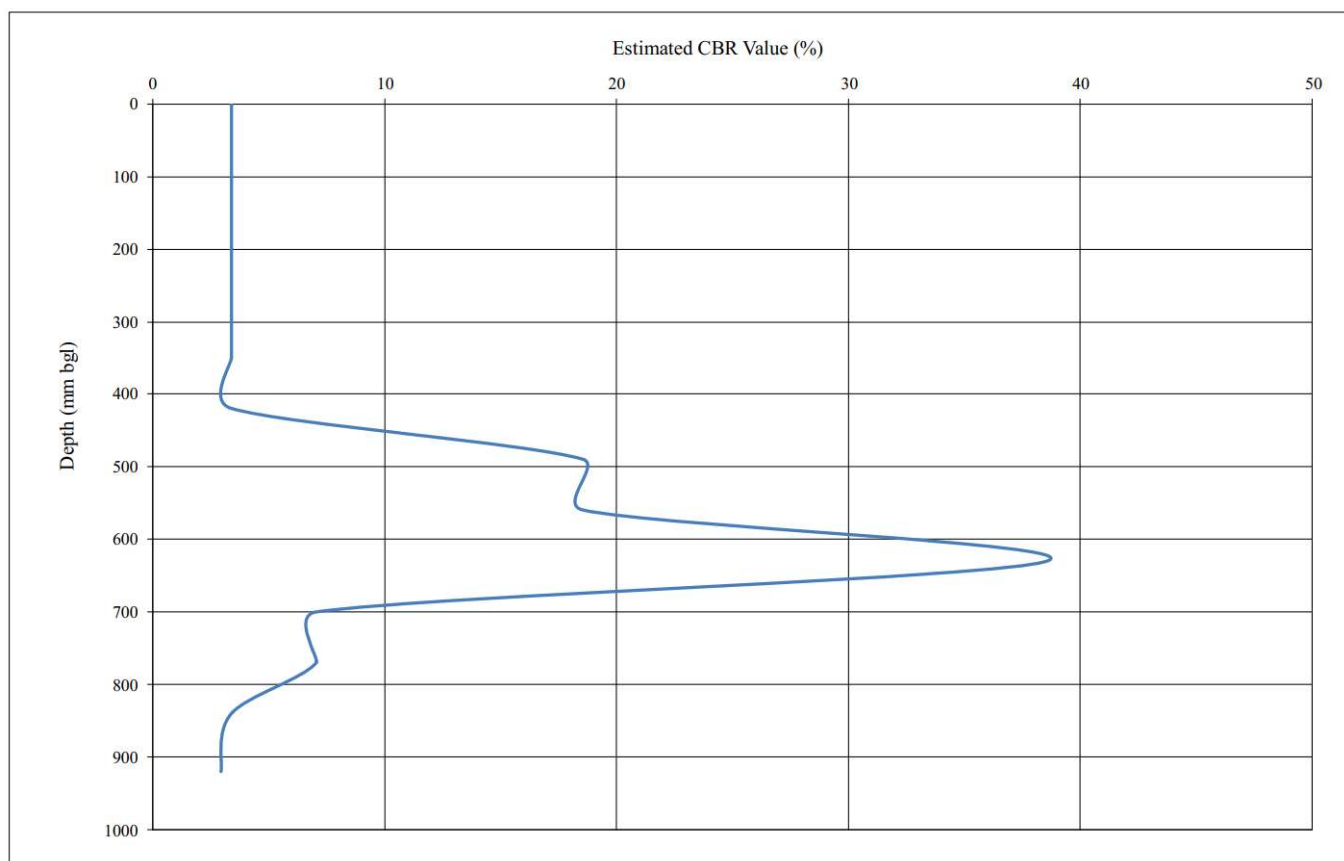
Location
dcp2

Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)

In Accordance with TRL Report 587(2003) and PR/INT/277/04

Site Name	Windy Arbor	Test Date:	18.07.20
Site Ref	100417	Test Location:	dcp3
Initial Depth	0 mm	Test No.:	30F5
Final Depth	990 mm	Undertaken By:	CR

Estimated California Bearing Ratio Graph



Start Depth (mm bgl)	Finish Depth (mm bgl)	No. of Blows	Blows Per Layer	DCP mm/Blows	Average CBR Value (%)
0	300	4	4	75	3
300	700	28	24	17	15
700	990	32	4	73	3

Average estimated CBR value of 15% between 0.30m - 0.70m bgl

Comments

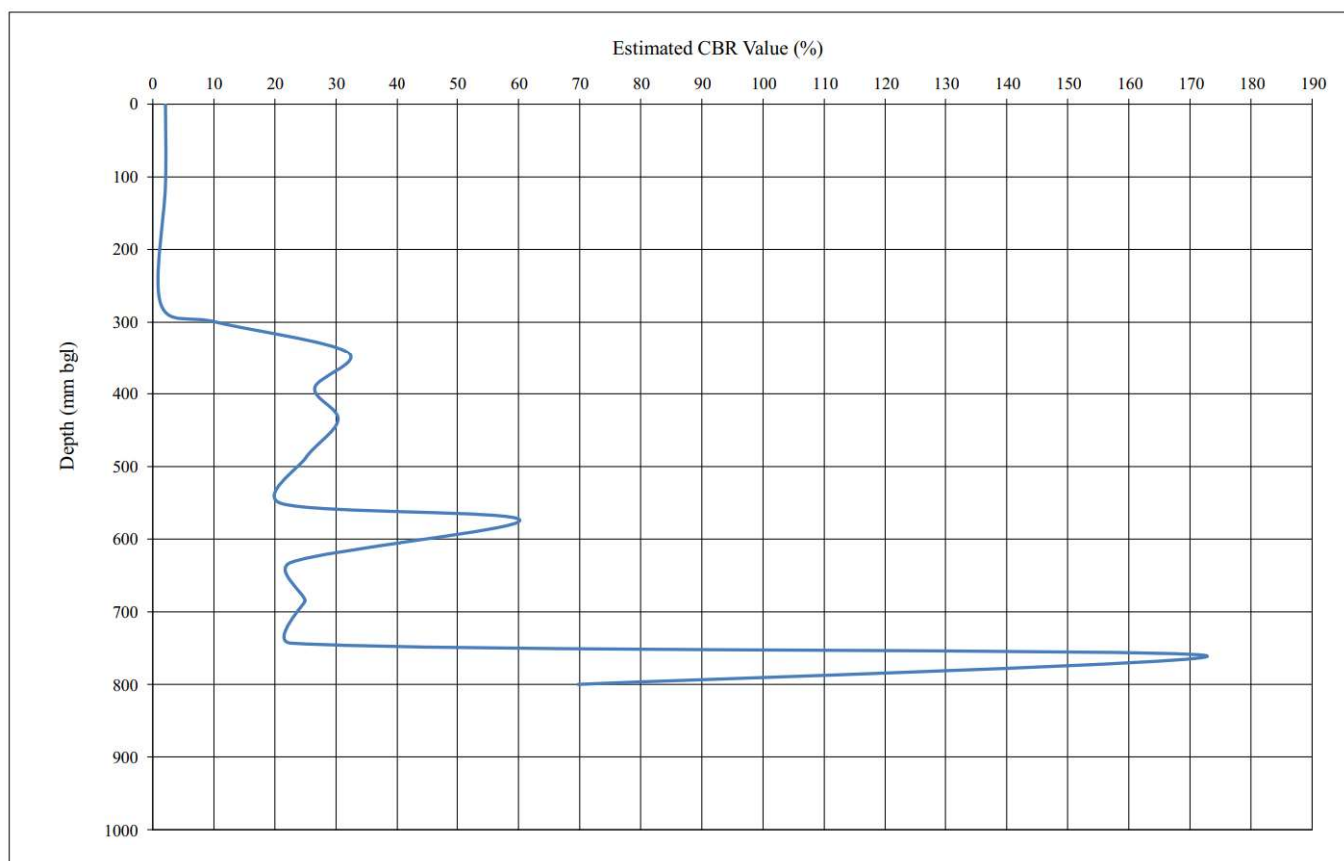
Site Engineer:	Date:	Checked and Approved By:	Date:	Location
C.Radiven	18.07.20	J.Devlin	12/08/2020	dcp3

Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)

In Accordance with TRL Report 587(2003) and PR/INT/277/04

Site Name	Windy Arbor	Test Date:	18.07.20
Site Ref	100417	Test Location:	dcp4
Initial Depth	0 mm	Test No.:	40F5
Final Depth	800 mm	Undertaken By:	CR

Estimated California Bearing Ratio Graph



Start Depth (mm bgl)	Finish Depth (mm bgl)	No. of Blows	Blows Per Layer	DCP mm/Blows	Average CBR Value (%)
0	400	13	13	31	8
400	600	33	20	10	26
600	800	68	35	6	48

Average estimated CBR value of 26% between 0.40m - 0.60m bgl

Comments

Site Engineer:	Date:	Checked and Approved By:	Date:
C.Radiven	18.07.20	J.Devlin	12/08/2020

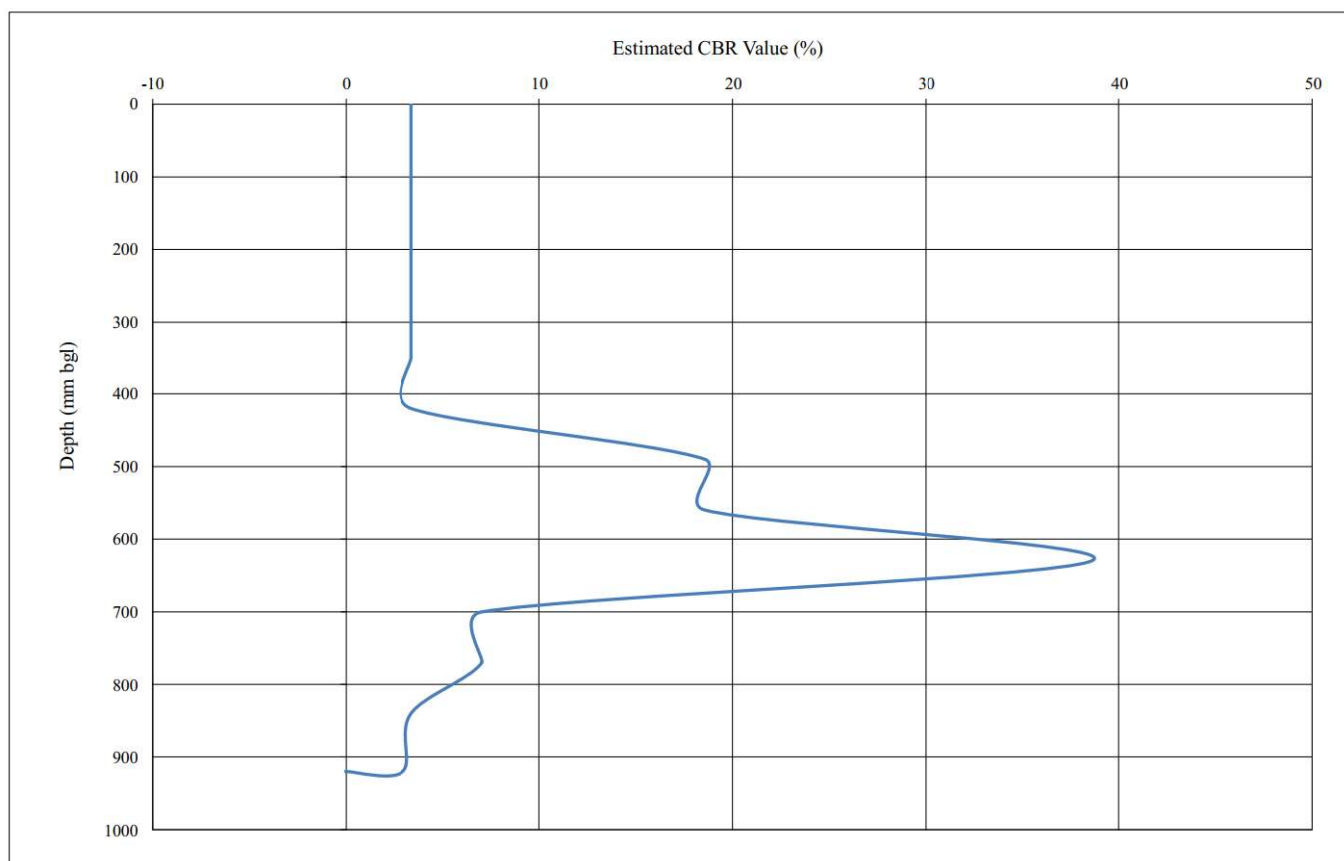
Location
dcp4

Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)

In Accordance with TRL Report 587(2003) and PR/INT/277/04

Site Name	Windy Arbor	Test Date:	18.07.20
Site Ref	100417	Test Location:	dcp5
Initial Depth	0 mm	Test No.:	50F5
Final Depth	1 mm	Undertaken By:	CR

Estimated California Bearing Ratio Graph



Start Depth (mm bgl)	Finish Depth (mm bgl)	No. of Blows	Blows Per Layer	DCP mm/Blows	Average CBR Value (%)
0	400	5	5	80	3
400	1000	57	52	12	23

Average estimated CBR value of 23% between 0.40m - 1.00m bgl

Comments

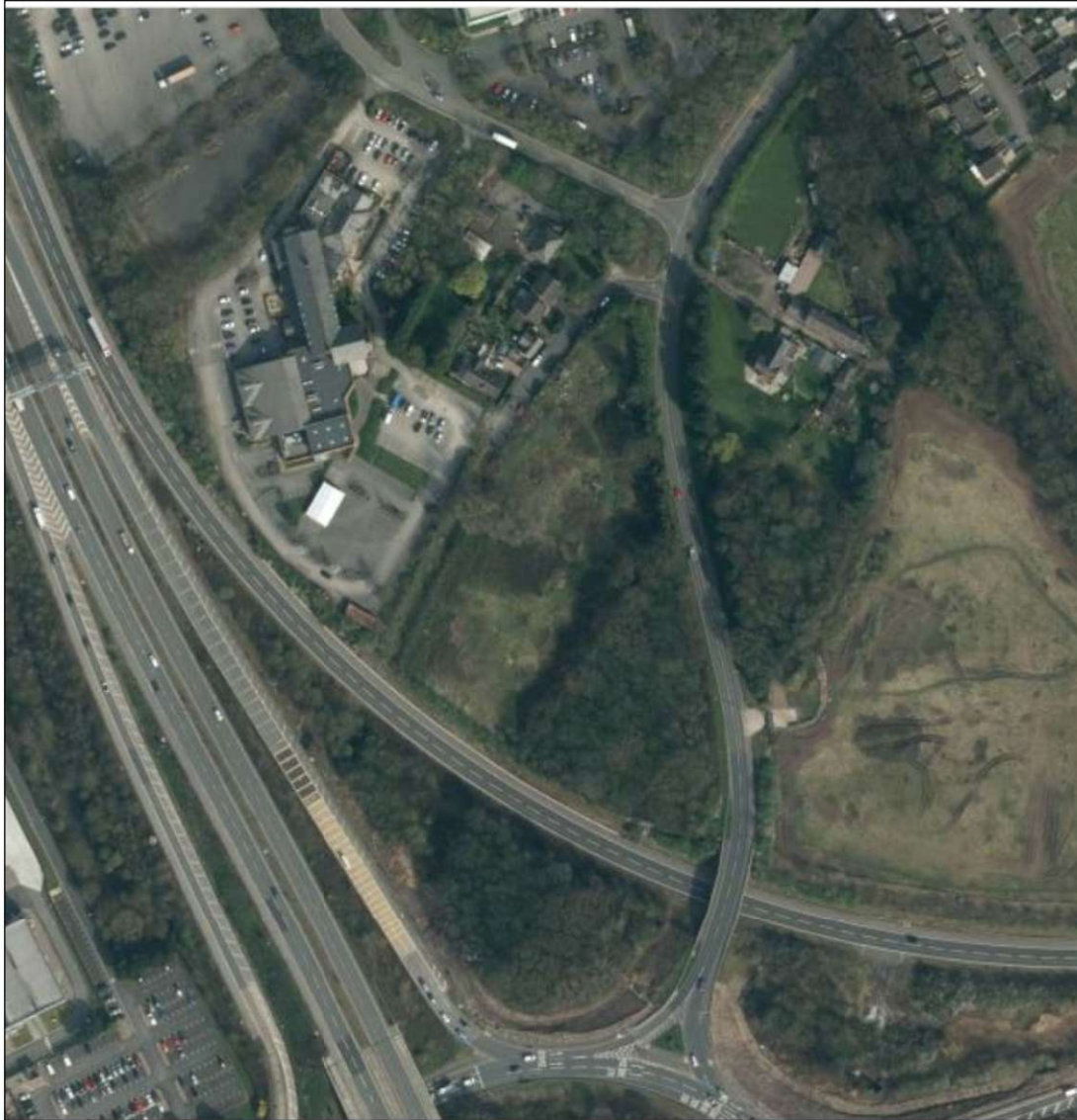
Site Engineer:	Date:	Checked and Approved By:	Date:
C.Radiven	18.07.20	J.Devlin	12/08/2020

Location
dcp5



Remediation Strategy

Windy Arbor



<i>Issue number:</i>	<i>1</i>
<i>Report status:</i>	<i>Version 1</i>
<i>Date:</i>	<i>January 2022</i>



Issued by: Swan Environmental Services Ltd
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Contact: Mike Hughes

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Revision history				
Issue No.	Date	Revision detail	By	Competence
1	24 th January 2022	Issue copy for LPA comment	G. Anderson	BSc Hons

Quality Assurance		
Date	Checked by	Position
26 th January 2022	C. Radiven	Associate Director
Date	Authorised By	Position
27 th January 2022	P. Clarke	Director