Soil Environment Services Ltd

ELECTRICAL RESISTIVITY SURVEY

Rogers Geotechnical Services Ltd

Lenzing Fibers Grimsby Ltd

Celebrating 20 years delivering SOIL SURVEY

Soil Environment Services Ltd
May 2020

Our Ref: SES/RGS/LF/#1 **Date: 01st May 2020**

Client:

Rogers Geotechnical Services Ltd
Barncliffe Business Park
Near Bank
Shelley
West Yorkshire
HD8 8LU

ELECTRICAL RESISTIVITY SURVEY

Lenzing Fibers Grimsby Ltd
Energy Park Way, Grimsby

A report prepared on behalf of ***Soil Environment Services*** by:

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1. INSTRUCTION

Soil Environment Services Ltd have been instructed by Rogers Geotechnical Services Limited to undertake a ground electrical resistivity (ER) survey at Lenzing Fibers Grimsby Ltd (Drawing 1).

2. METHODOLOGY

2.1 ER testing

The survey uses the Wenner four point method with a Martindale E1610 earth tester. Serial number: 115681704.

The survey was carried out on the 24th April 2020. The ground surface was very dry to 0.5 m depth.

Steel spikes were inserted to ~ 10 cm depth below the made ground surface. In areas with concrete surface chains were laid onto the surface and wetted with salty water to give a good connection.

The test lines were carried out in the locations marked on Drawing 1.

The Electrical Resistivity was measured at the following depths:

Transect 1: 1.0, 2.0, 5.0, 10.0, 20.0 and 33.0 m
Transect 2: 1.0, 2.0, 5.0, 10.0, 20.0 and 33.0 m
Transect 3: 1.0, 2.0, 5.0, 10.0, 20.0 and 33.0 m
Transect 4: 1.0, 2.0, 5.0, 10.0 and 20.0 m (33.0 m was not measured due to a water course to the South West and dense vegetation to the North restricting access)

2.2 Specifications

Maximum Current	2kΩ typical on 20Ω range
Spike* dimensions	10 mm square x 500 mm
Spike Resistance	5kΩ typical on 200Ω range 50kΩ typical on 2000Ω range
Maximum Potential	2.2kΩ typical on 20Ω range
Spike Resistance	22kΩ typical on 200Ω range 52kΩ typical on 2000Ω range
Maximum Output Voltage:	30V rms
Response Time:	3secs nominal
Voltage Withstand:	240V AC between any two terminals
Temperature Coefficient:	±0.05%/°C
Interference:	Interference voltages of 5V rms nominal 50/60Hz in the potential circuit will not affect the reading by more than ±0.5%
Earth Resistance Ranges	
Range:	0 to 20Ω in steps of 0.01Ω 0 to 200Ω in steps of 0.1Ω 0 to 2000Ω in steps of 1Ω
Accuracy:	2% of reading ±2 digit Total service error ±5% of reading ±2 digit
Test Current:	10mA a.c. rms nominal on 20Ω range 1mA a.c. rms nominal on 200Ω range 0.1mA a.c. rms nominal on 2000Ω range
Test Frequency:	128Hz nominal

*Load conductor

3. RESULTS

3.1 ER testing

The ER testing was completed (results below) at locations as detailed on Drawing 1. All results are synonymous with the mapped strata to depth.

Table 1. Transect 1

Test line 1.	L = 100 m	Reading	Resistivity
Spacing	Depth	Ohm	Ohm m
33.0	33.0	0.58	120.28
20.0	20.0	0.07	8.80
10.0	10.0	0.08	5.03
5.0	5.0	0.97	30.48
2.0	2.0	1.94	24.38
1.0	1.0	6.19	38.90

Table 2. Transect 2

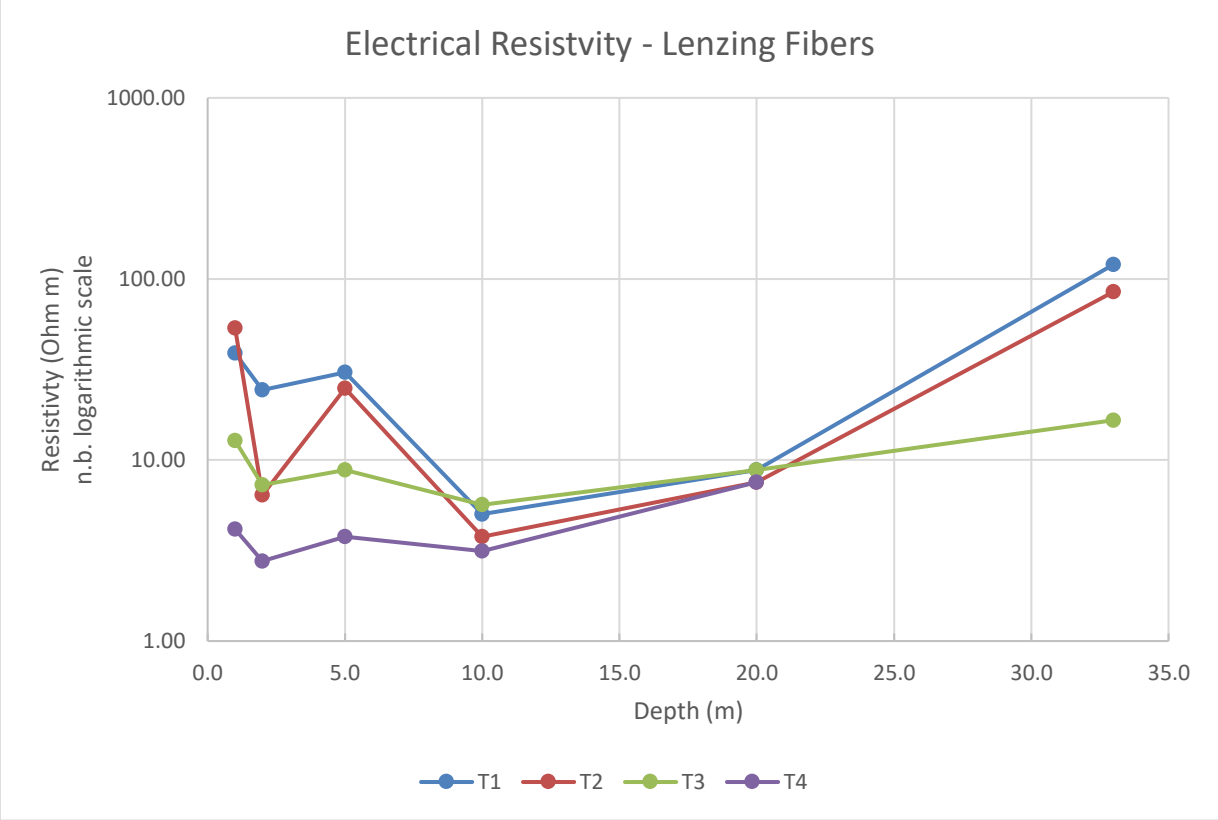
Test line 2.	L = 100 m	Reading	Resistivity
Spacing	Depth	Ohm	Ohm m
33.0	33.0	0.41	85.02
20.0	20.0	0.06	7.54
10.0	10.0	0.06	3.77
5.0	5.0	0.79	24.82
2.0	2.0	0.51	6.41
1.0	1.0	8.50	53.41

Table 3. Transect 3

Test line 3.	L = 100 m	Reading	Resistivity
Spacing	Depth	Ohm	Ohm m
33.0	33.0	0.08	16.59
20.0	20.0	0.07	8.80
10.0	10.0	0.09	5.66
5.0	5.0	0.28	8.80
2.0	2.0	0.58	7.29
1.0	1.0	2.03	12.76

Table 4. Transect 4

Test line 4.	L = 60 m	Reading	Resistivity
Spacing	Depth	Ohm	Ohm m
33	33	NA	NA
20.0	20.0	0.06	7.54
10.0	10.0	0.05	3.14
5.0	5.0	0.12	3.77
2.0	2.0	0.22	2.76
1.0	1.0	0.66	4.15


Electrical Resistvity - Lenzing Fibers
1000.00
100.00
10.00
1.00
Resistivty (Ohm m)
n.b. logarithmic scale
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
Depth (m)
T1
T2
T3
T4

4. SITE STRATA & POSSIBLE INTERFERENCE

Site strata as mapped by the BGS.
Superficial Deposits: Tidal Flat Deposits - Clay And Silt. Superficial Deposits formed up to 2 million years ago in the Quaternary Period. Local environment previously dominated by shorelines (U).

Bedrock Geology: Flamborough Chalk Formation - Chalk. Sedimentary Bedrock formed approximately 72 to 86 million years ago in the Cretaceous Period. Local environment previously dominated by warm chalk seas.

Surrounding BGS listed boreholes mapped:
Alluvium: 0 to ~10 m bgl.
Glacial till: ~10 to ~22 m bgl
Chalk: ~22 to ~73 m bgl

Interference

Some anomalies may be affecting measurements at this site:

1 The upper 0.5 m was very dry during testing.

2 Transect 1 was located in the vicinity of a number of concrete pads and on a road with sub-base. This will have affected the resistance at shallow depths.

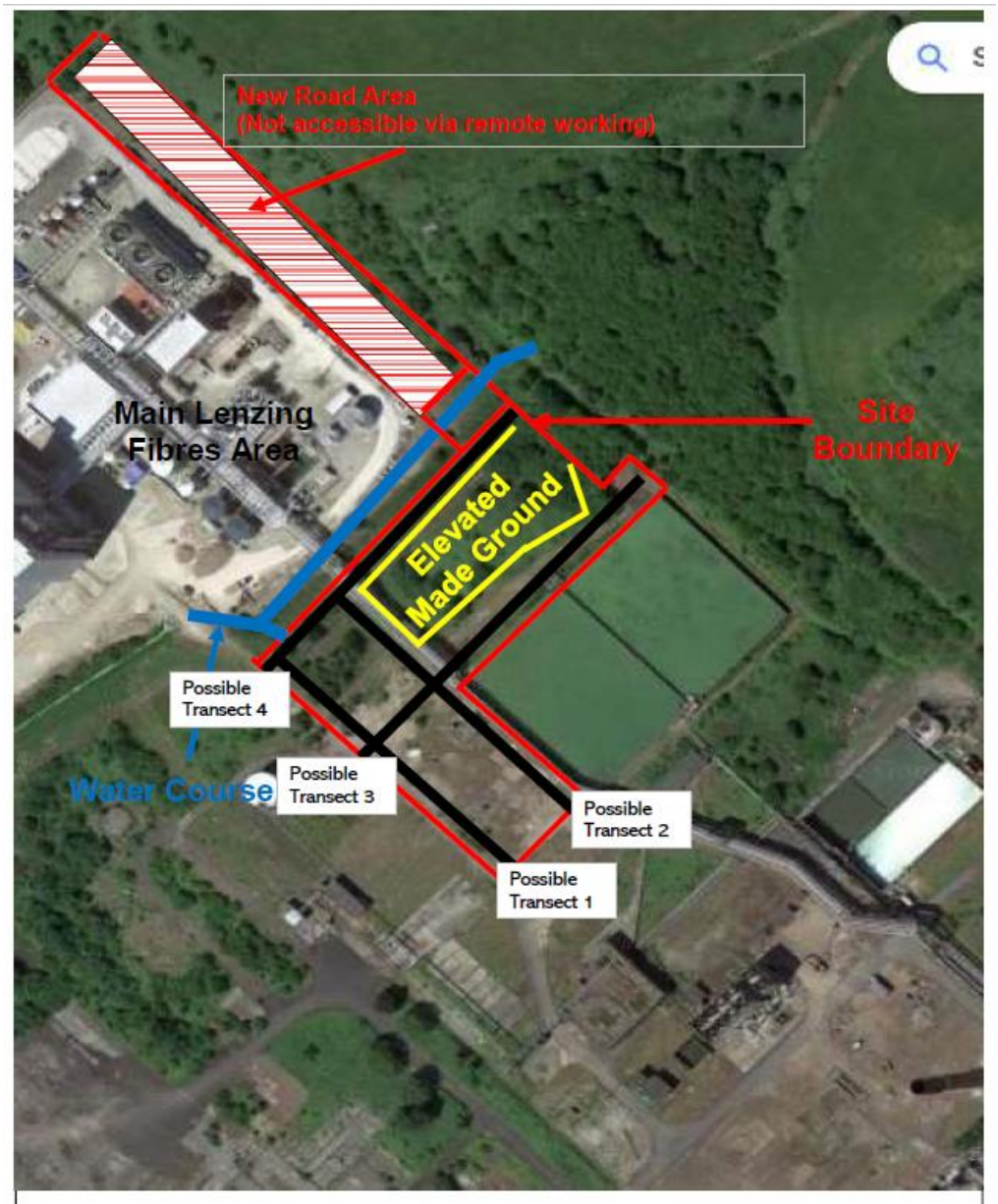
3 Transect 2 was located above a network of underground pipes and cables. This may affect resistivity at shallow depths and hence the elevated value at 1 m depth.

4 Saltwater intrusion may be affecting lower depths. Transect 3 and 4 extended perpendicular to and a further 80 m towards the coast than transect 1 and 2. Transect 3 was found to have lower resistance at depth within the chalk, saltwater intrusion may be the possible cause.

Drawing 1

Survey Locations

NOTES: Drawing supplied by Rodgers Geotechnical Services Ltd	Soil Environment Services	
	Drawing Number	1
	Drawing Title:	Survey locations
	Scale:	NA
	Date	24/4/20



Plan not to scale and investigation positions approximated from site operative's notes.

Title: **Preliminary Investigation Location Plan**

Rogers Geotechnical Services Ltd	Site Name: Lenzing Fibres	Job No: C177/19/E/269