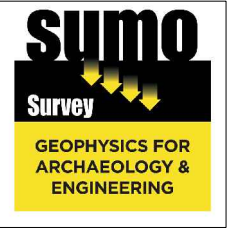
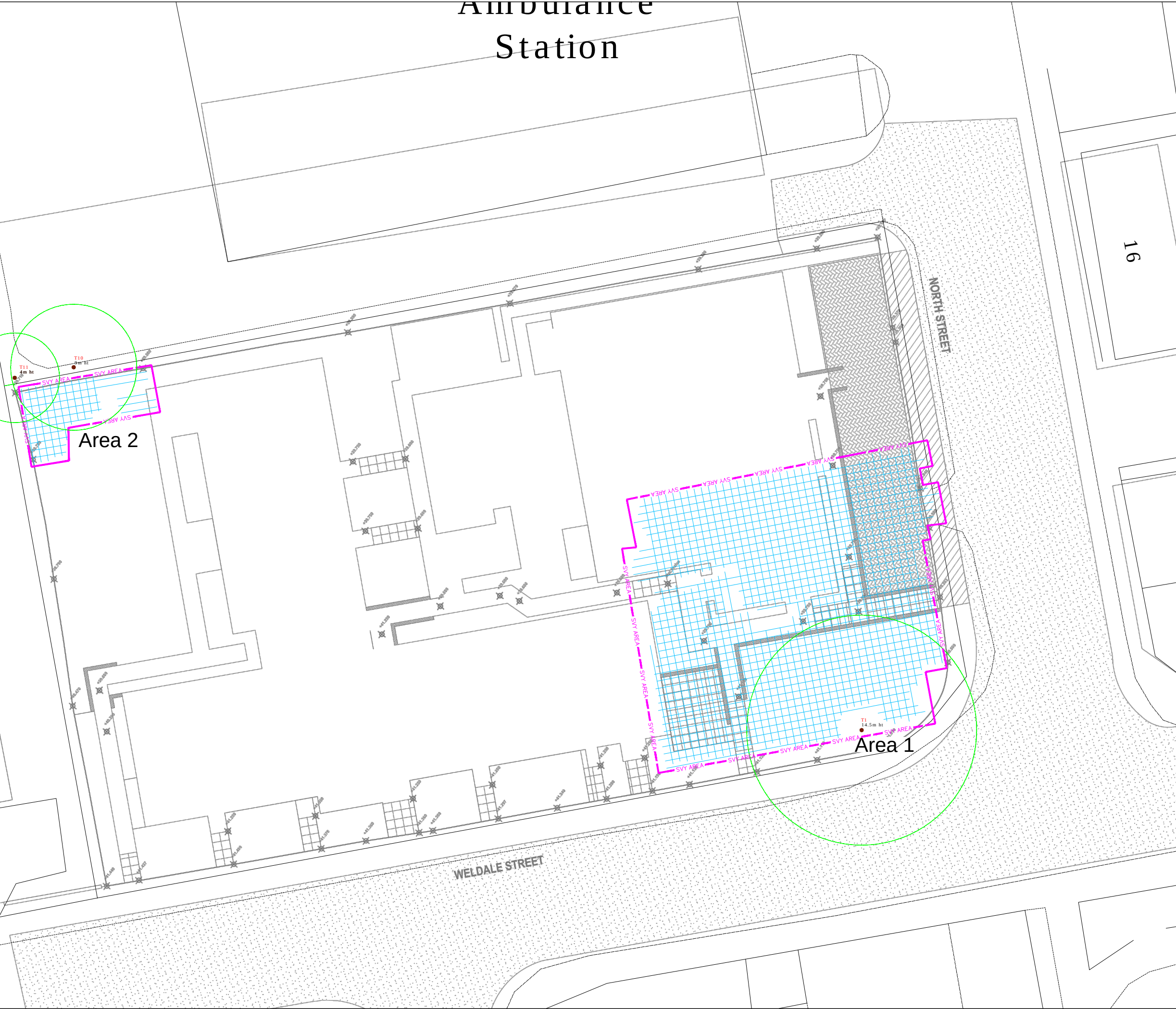




 Site Location	
Reproduced from Ordnance Survey's 1:25 000 map of 1998 with the permission of the controller of Her Majesty's Stationery Office. Crown Copyright reserved. Licence No: 100018665	
	
Title: Site Location Diagram	
Client: Beard Construction	
Project: SUMO-02541 North Street, Reading	
Scale: 0 metres 1000 1:25000 @ A3	Fig No: 01
Survey date March 2021	Drawn by MUK
Checked by SDH	



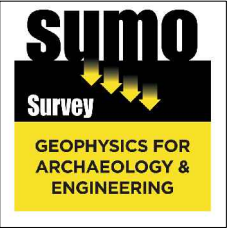
KEY



Survey area



Radar traverse



Title: Location of Survey Area and GPR Profiles

Client: Beard Construction

Project: SUMO-02541 North Street, Reading

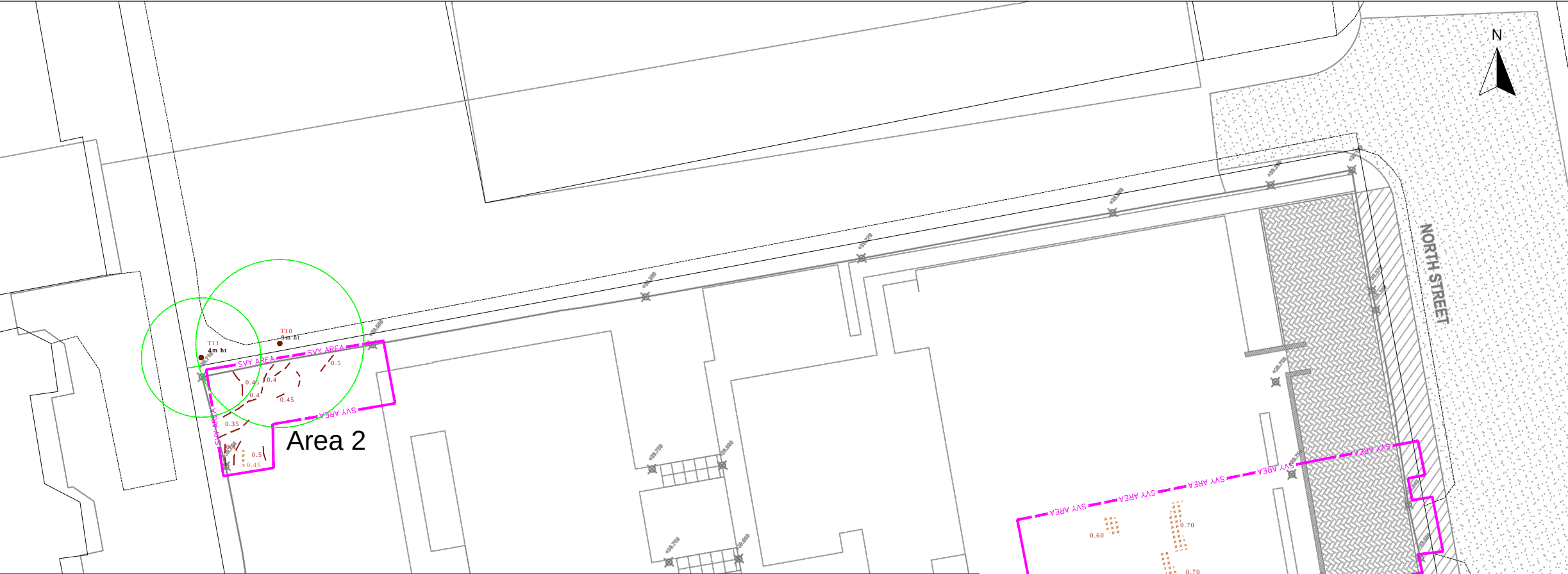
Scale: 0 metres 12.5
1:250 @ A3

Fig No: 02

Survey date
March 2021

Drawn by
MUK

Checked by
SDH



A Ground Penetrating Radar (GPR) survey was conducted at a site in North Street, Reading, Berkshire. The survey investigated two areas on the site. The survey objective was to look for evidence of tree roots. It was not possible to use the preferred system for this application (Mala MIRA high density array) due to unsuitable ground conditions on the site. Consequently, a GSSI Dual Frequency (DF) Radar was used instead in conjunction with 300MHz and 800MHz antennae, giving a depth of penetration of approximately 1.5 and 0.8 metre. An orthogonal grid of profiles was carried out in the survey areas at a spacing of 0.5 metres, subject to available access.

Most ground conditions contain electrically contrasting layers, which produce reflection events on the Ground Probing Radar (GPR) profiles. Features such as soil or fill boundaries provide the background signals around unusual features such as voids or tree roots. Processing and interpretation procedures are designed to separate the reflections into various target categories, and then map the different reflection types on to a plan diagram. This process involves the interpretation of each individual radar profile from a DF system, followed by an areal interpretation of all the radar profiles.

The confidence levels placed on a plan interpretation depend on the spacing of the survey grid. A target such as a tree root must be intersected by at least one radar profile to be detected. Ideally, the profile spacing should allow any target to be intersected by several profiles. Features identified across several profiles are interpolated in areas where the data is well constrained. However, due to the unpredictable growth patterns of tree roots, it can be problematic interpolating individual tree roots across adjacent radar profiles.

The general distribution of interpreted tree root anomalies in the two areas investigated is presented in Figures 3 and Figure 4 together with example radargrams. Data interpretation identified three significant categories of reflection targets:

- i) Possible tree roots
- ii) Disturbed ground
- iii) Anomalous layer

i) Possible tree roots

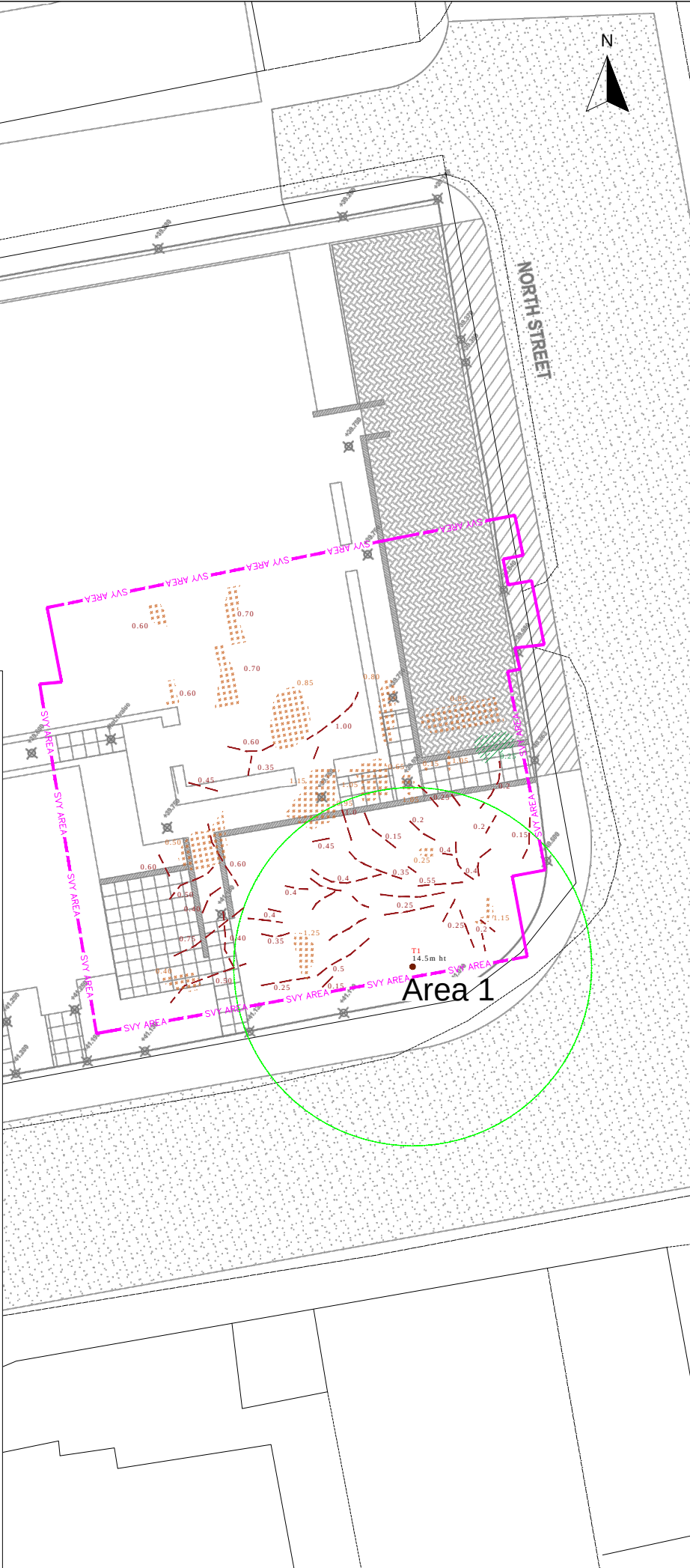
A radar profile orthogonal or at a high angle to a length of tree root typically produces a moderate amplitude, steeply curved or hyperbolic reflection response which should be discernible against background reflections. The tree root position is located at the apex of the hyperbola. At low angles of intersection between survey lines and tree roots, the resultant planar reflection response is more ambiguous and can be difficult to identify. The possible tree root anomalies are weak and uncertain and can sometimes be confused with reflections from boulders and rubble blocks. Some examples of this reflection type are given in Example Radargram 1-6.

ii) Disturbed ground

Areas of disturbed ground generally appear as zones of moderate amplitude, irregular, reflections displaying broken layering. In some cases, a more chaotic internal structure may be evident, resulting from interaction between individual reflections. Disturbed ground can be caused by backfilled excavations, localised variations in ground composition, and in some cases dense clumps of tree roots that cannot be individually identified. Some examples of disturbed ground are shown in Example Radargrams 1 and 3.

iii) Anomalous layer

Anomalous layers occur as well defined, fairly high amplitude, planar, typically sub-horizontal reflections, with weak evidence of edge scattering. Anomalous layers are associated with distinct compositional layers in the subsurface that may correspond to old floor surfaces, discrete compositional layers or planar constructed features such as remnant foundations. Some examples of this reflection type are given in Example Radargram 4.



The performance of the technologies employed in non-invasive surveys can be adversely affected by factors outside of Sumo's control. Whilst Sumo uses all due diligence and reasonable endeavours it does not warrant that 100% detection can be achieved. Irrespective of the information provided by a geophysical survey, any ground works should be undertaken with extreme caution.

KEY

Possible tree roots

Disturbed ground

Anomalous layer

0.3

Depth to the top of the feature (in m)

sumo

Survey

GEOPHYSICS FOR
ARCHAEOLOGY &
ENGINEERING

Title:

GPR Survey Plan Interpretation

Client:

Beard Construction

Project:

SUMO-02541 North Street, Reading

Scale:

0metres12.5

1:250 @ A3

Fig No:

03

Survey date

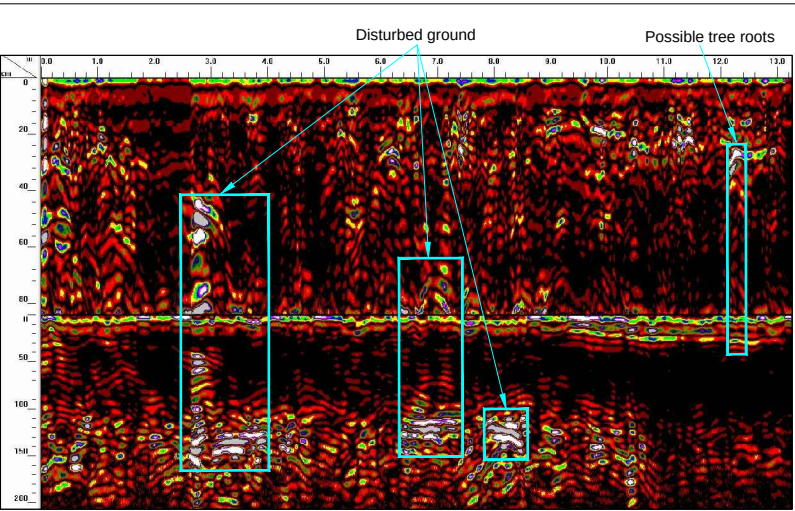
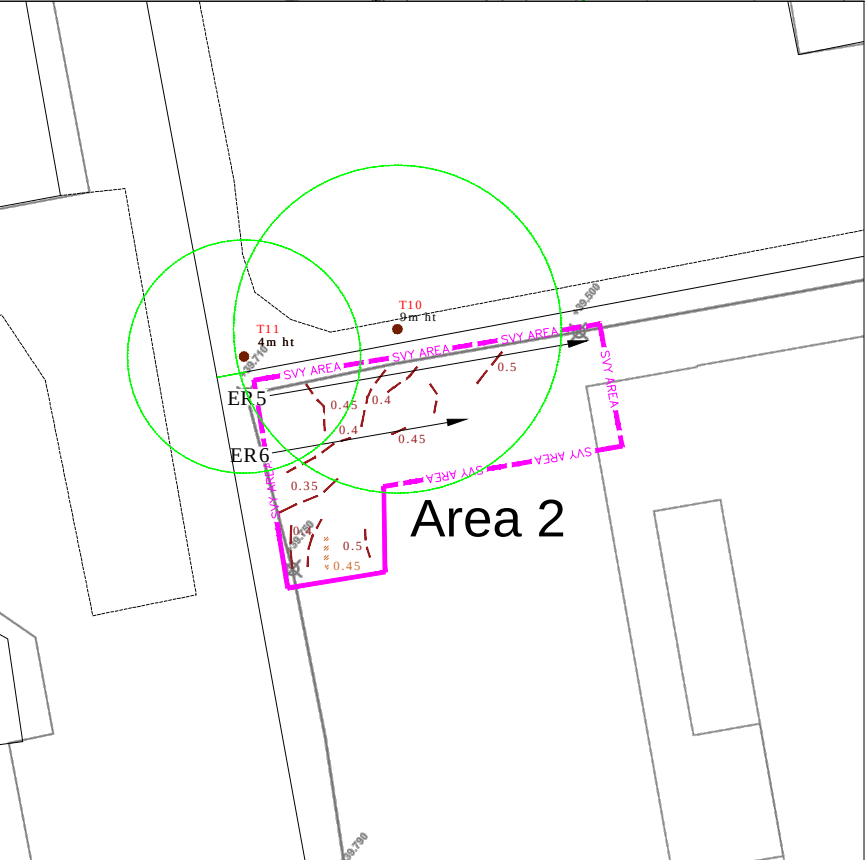
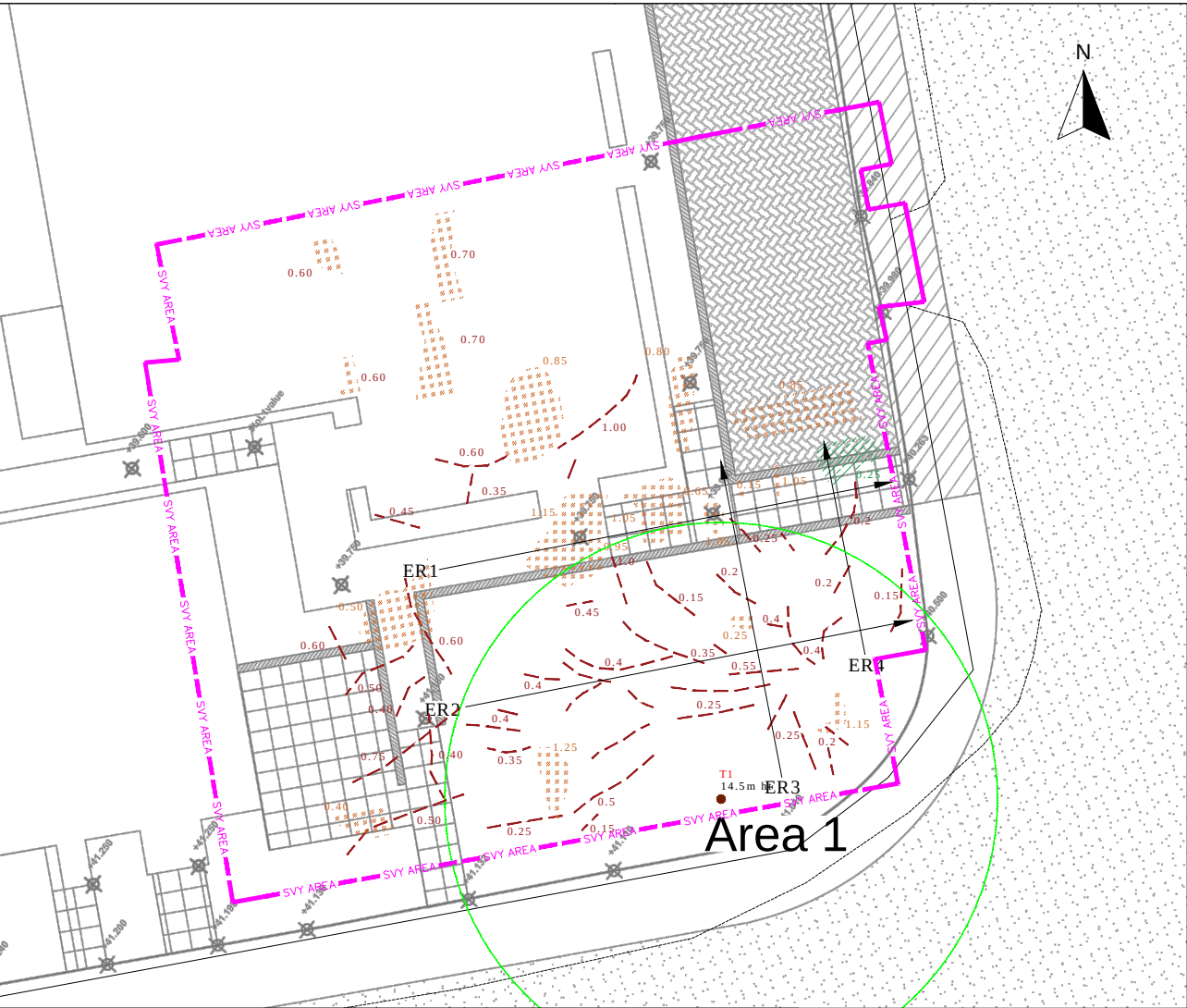
March 2021

Drawn by

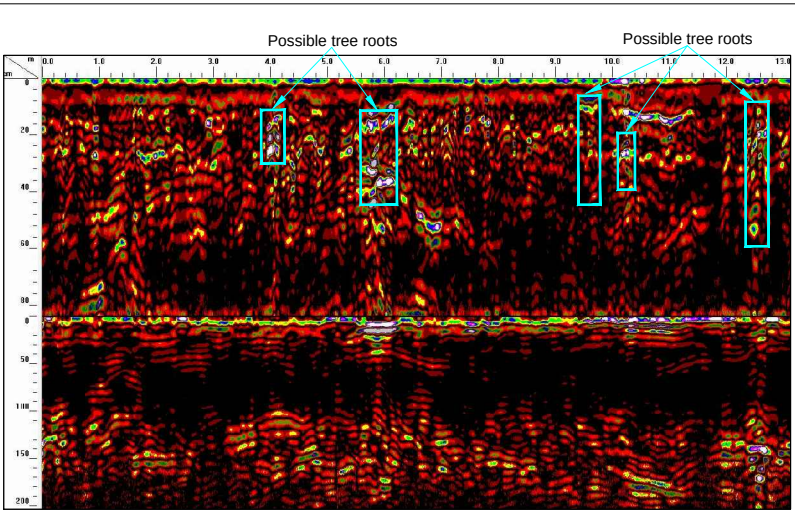
MUK

Checked by

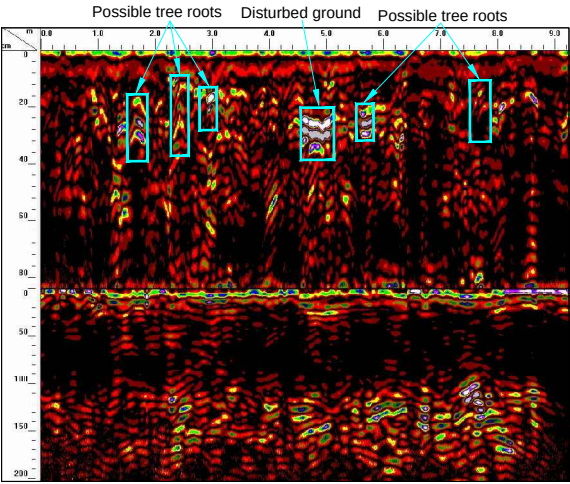
SDH



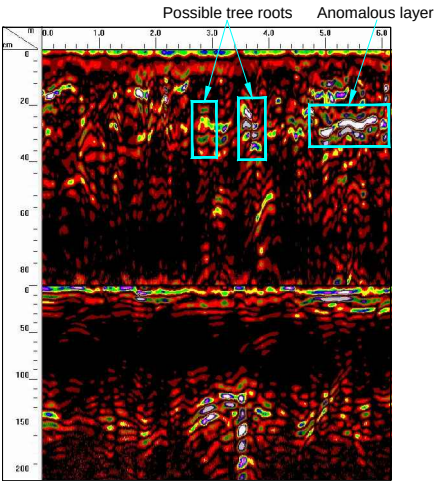
Example Radargram 1.
Disturbed ground and possible tree roots.



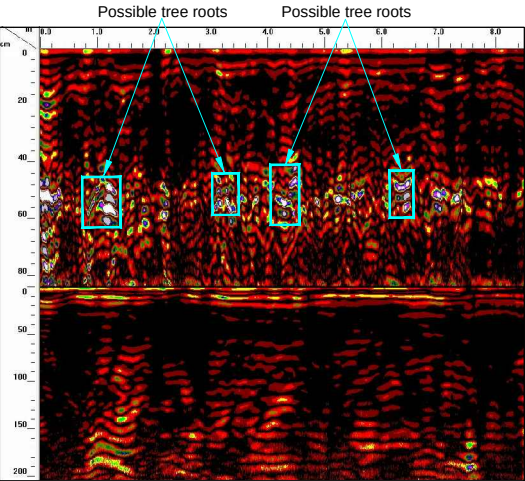
Example Radargram 2.
Possible tree roots.



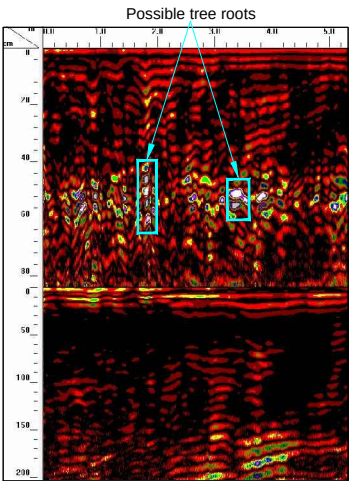
Example Radargram 3.
Disturbed ground and possible tree roots.



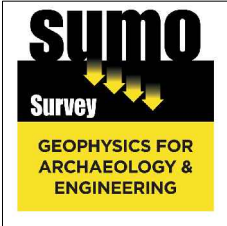
Example Radargram 4.
Possible tree roots and anomalous layer.



Example Radargram 5.
Possible tree roots.



Example Radargram 6.
Possible tree roots.

KEY		
	Possible tree roots	
	Disturbed ground	
	Anomalous layer	
0.3	Depth to the top of the feature (in m)	
	Example radargram	
		
Title: GPR Survey Plan Interpretation with Example Radargrams		
Client: Beard Construction		
Project: SUMO-02541 North Street, Reading		
Scale:  1:100 @ A3		Fig No: 04
Survey date March 2021	Drawn by MUK	Checked by SDH

The performance of the technologies employed in non-invasive surveys can be adversely affected by factors outside of **Sumo's** control. Whilst Sumo uses all due diligence and reasonable endeavours it does not warrant that 100 % detection can be achieved. Irrespective of the information provided by a geophysical survey, any ground works should be undertaken with extreme caution.

Dual Frequency GSSI radar is collected with 300MHz and 800MHz antennae simultaneously. The example radargrams show data from both frequencies. The top section shows the high frequency (800MHz) data, while the bottom section shows the low frequency (300MHz) data.