

Our Ref: BEK/20771/230706-1

6 July 2023

EURO GARAGES LTD  
Euro House  
Beehive Trading Park  
Haslingden Road  
Blackburn  
BB1 2EE

Land to the North of Rhallt Lane, Welshpool - Addendum Geotechnical Assessment Letter

BEK has been commissioned by Euro Garages Limited to carry out site investigation works at the above site. This letter has been prepared to inform foundation design for the new development. The proposed development layout is presented in Annex C.

### Background

The following reports have been produced by BEK for the site:

Preliminary Risk Assessment, Report Ref: BEK-20771-1, dated October 2020

Site Investigation and Ground Assessment, Report Ref: BEK-20771-2, dated October 2020

The site investigation was carried out in October 2020, the full details of which are presented in the above report. The site investigation locations are illustrated on BEK Drawing No 20771-3, a copy of which is presented in Appendix C. Findings from the site investigation provide the basis for this geotechnical assessment herein, and the site investigation report should be read in conjunction with this letter.

### Geotechnical Assessment

The proposed mixed development consists of the construction of new retail units of single storey height and a two storey hotel building. This evaluation relates to Unit 2 of the development which encompasses a drive through coffee shop of single storey construction. It is anticipated that the new retail unit will be formed with a lightweight steel structure with associated masonry cladding and a concrete ground floor slab. The guidance given herein will therefore need to be reviewed in terms of the actual building type to be adopted, by a suitably qualified and experienced engineer.

Four window sample boreholes have been drilled at various locations across the site, the logs for these are provided in Appendix A. From the window sample logs, it can be seen that the site is mostly covered by made ground, of varying depths of between 0.05 m and



1.4 m. The fill is made up of grass, topsoil and rootlets, with brick and sand/gravel fill materials. Beneath the fill at Boreholes WS1 and WS4, stiff clay extends to the base of the boreholes. At Boreholes WS3 and WS4, there is a band of clayey sands with gravel, which extend to depths of 1 m and 1.5 m respectively. Under the clayey sands at Boreholes WS3 and WS34 is stiff clay, which extends to the base of the boreholes.

Groundwater was not encountered at any of the borehole locations. It is possible that bedrock may have been encountered at a depth of 2.15 m in Borehole WS3 as the probe had refusal at this depth.

Standard Penetration Tests (SPT) were conducted in the boreholes, starting at a depth of 2 m and repeated at 1 m levels from 2 m onwards. The SPT results are summarised in Table 1 below:

Location	Depth of Test (m)			
	2 - 2.45	3 - 3.45	4 - 4.45	5 - 5.45
WS1	44	27	30	42
WS3	>50	-	-	-
WS4	26	25	41	40
WS5	11	18	31	44

Table 1: Window Sample SPT Results

Clay samples were taken from Borehole WS3. Atterberg tests were undertaken in the laboratory conditions to determine the plasticity index of the clay, the results are presented in Annex B. The modified plasticity index for each sample was calculated in accordance with NHBC guidance and summarised in Table 2 below:

Location	Depth (m)	Plasticity Index (P.I.)	Retained 425 Sieve	Passing 425 Sieve	Modified P.I. (%)
WS3	2	29	15 %	85 %	24.7

Table 2: Plasticity Results

The plasticity results indicate that the underlying clays can be categorised as medium volume change potential. Foundation formation depths should therefore be taken based on medium volume change potential, requiring a footing depth of 0.9 m below existing or proposed ground level, whichever is the lower, in areas where clay soils are present. Clay heave potential must be considered as part of the foundation design and must be appraised in accordance with NHBC Ch.4.2 requirements.

### Assessment and Conclusions

Underlying stiff clay soils have been encountered at depths of between 0.9 m and 1.5 m below existing ground level. Above the clays are fills and potential re-worked soils. Fill and reworked soil is unsuitable to sustain loadings from structures, so foundations must be



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taken to depths where the clays have been encountered. It is possible that bedrock has been encountered at a depth of 2.15 m in one area, however this is unlikely to have an effect on foundation type. The geotechnical data obtained from the borehole SPT readings taken, indicate that bearing capacities on the clays are of a minimum capacity of 100 kN/m<sup>2</sup> at bearing depth.

We understand that the proposed restaurant building is likely be formed from lightweight roofing supported on a steel frame, with lightweight cladding and masonry walling elements. This is likely to generate localised point loads of up to 200 kN and foundation line loadings of between 20-30 kN/m, which indicates that pad foundations and strip footings would be suitable to the underlying clay strata. Should soft clays be encountered at formation depth, it is recommended that the formation of footings extended down to clays of suitable strength is encountered, with the over-dig backfilled with lean mix concrete.

As stiff clays have not been encountered within 600 mm of the surface, ground bearing slabs are considered to be unsuitable for the proposed building. All floor slabs should be suspended, formed onto foundations for main walls or dwarf walls, constructed to support the slab.

Local trees may have a bearing on the proposed building foundations and ground floor slab, which will need to be appraised by the foundation designer. Formation levels must be designed to comply with LABC requirements and NHBC Ch.4.2 guidance.


All foundation designs must be reviewed and designed by a suitably qualified design engineer. The above advice is based upon the ground condition information obtained during the survey. The design engineer must satisfy themselves that the information meets with their design requirements.

#### *Concrete Classification*

As per the site investigation report, the recommendations for concrete classification for the site is DS-1 AC-1.

I trust this above is satisfactory. Please call me should you have any questions.

Yours sincerely,

  
**Michael Buckley**

*BSC (Hons) MSc MEnvSci CEnv*



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ANNEX A

Borehole Logs





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<b>PROJECT NUMBER</b> 20771 <b>PROJECT NAME</b> Land to the North of Rhallt Lane <b>CLIENT</b> Euro Garages Ltd	<b>DATE</b> Saturday 3rd October 2020 <b>DRILLING METHOD</b> Window Sample Borehole <b>BOREHOLE NO</b> WS1 <b>SHEET</b> 1/4
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<b>COMPLETION</b>	<b>CASING</b> uPVC	<b>SCREEN</b> uPVC Factory Slotted
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**COMMENTS** Borehole Dry.

DEPTH (m)	DEPTH (m)	DEPTH (m)	DEPTH (m)	DEPTH (m)	Material Description	DEPTH (m)
0.5	0.3 D=0.3 m				Roots/leaves overlying black fine to coarse sand and gravel	0.5
1	1.0 D=1.0 m				Stiff brown sandy silty clay with rare fine to medium gravel	1
1.5					Stiff grey sandy clay	1.5
2	2 - 2.45	SPT (C) N=44	9,10/11,10,11,12			2
2.5						2.5
3	3 - 3.45	SPT (C) N=27	11,9/10,4,6,7			3
3.5						3.5
4	4 - 4.45	SPT (C) N=30	4,5/6,7,8,9			4
4.5						4.5
5	5 - 5.45	SPT (C) N=42	9,10/11,11,9,11			5
5.5					Termination Depth at: 5.45 m	5.5
6						6
6.5						6.5



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<b>PROJECT NUMBER</b> 20771 <b>PROJECT NAME</b> Land to the North of Rhallt Lane <b>CLIENT</b> Euro Garages Ltd	<b>DATE</b> Saturday 3rd October 2020 <b>DRILLING METHOD</b> Window Sample Borehole <b>BOREHOLE NO</b> WS3 <b>SHEET</b> 2/4
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<b>COMPLETION</b>	<b>CASING</b> uPVC	<b>SCREEN</b> uPVC Factory Slotted
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**COMMENTS** Borehole Dry.

						Material Description		
0.5	0.5	D=0.5 m				Rootlets/leaves Light brown/cream fine to coarse clayey sand with frequent fine to coarse gravel and rare rootlets (possibly re-worked)	0.5	
1						Stiff grey very dry sandy clay	1	
1.5	1.7	D=1.7 m					1.5	
2	1.7 - 2.15	B=2.0m	50 for no movement				2	
2.5						Termination Depth at: 5.45 m	2.5	
3							3	
3.5							3.5	
4							4	
4.5							4.5	
5							5	
5.5							5.5	
6							6	
6.5							6.5	



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<b>PROJECT NUMBER</b> 20771 <b>PROJECT NAME</b> Land to the North of Rhalt Lane <b>CLIENT</b> Euro Garages Ltd	<b>DATE</b> Saturday 3rd October 2020 <b>DRILLING METHOD</b> Window Sample Borehole <b>BOREHOLE NO</b> WS4 <b>SHEET</b> 3/4
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<b>COMPLETION</b>	<b>CASING</b> uPVC	<b>SCREEN</b> uPVC Factory Slotted
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**COMMENTS** Borehole Dry.

DEPTH (M)	DEPTH (M)	SPT (C) N	SPT (C) N	WATER	BOREHOLE LOG	Material Description	ADDITIONAL OBSERVATIONS	DEPTH (M)
					X X X X	Rootlets/leaves		
0.5					O O O O	Dense cream/grey/light brown fine to coarse clayey sand with gravel and rare rootlets(possibly re-worked)		0.5
1	1.0	D=1.0 m			O O O O			1
1.5					O O O O	Stiff brown dry sandy clay		1.5
2	2.0- 2.45	SPT (C) N=26	6,5/6,5,7,8		O O O O			2
2.5					O O O O			2.5
3	3 - 3.45	SPT (C) N=25	8,7/6,7,6,6		O O O O			3
3.5					O O O O			3.5
4	4 - 4.45	SPT (C) N=41	8,9/10,11,11,9		O O O O			4
4.5					O O O O			4.5
5	5 - 5.45	SPT (C) N=40	9,9/9,10,11,10		O O O O			5
5.5						Termination Depth at: 5.45 m		5.5
6								6
6.5								6.5



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<b>PROJECT NUMBER</b> 20771	<b>DATE</b> Saturday 3rd October 2020
<b>PROJECT NAME</b> Land to the North of Rhallt Lane	<b>DRILLING METHOD</b> Window Sample Borehole
<b>CLIENT</b> Euro Garages Ltd	<b>BOREHOLE NO</b> WS5
	<b>SHEET</b> 4/4

<b>COMPLETION</b>	<b>CASING</b> uPVC	<b>SCREEN</b> uPVC Factory Slotted
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**COMMENTS** Borehole Dry.

DEPTH (m)	DEPTH (m)	DEPTH (m)	DEPTH (m)	DEPTH (m)	DEPTH (m)	DEPTH (m)	DEPTH (m)
0.5	0.5	D=0.5 m			Rootlets/leaves Brown clayey sand with rare fine to medium gravel of brick fragments (topsoil)		0.5
1.5					Firm to stiff brown silty sandy clay		1.5
2.0	2.0- 2.45	SPT (C) N=11	2,2/2,3,3,3				2.0
3.0	3 - 3.45	SPT (C) N=18	3,3/4,4,5,5				3.0
4.0	4 - 4.45	SPT (C) N=31	6,6/7,7,8,9				4.0
5.0	5 - 5.45	SPT (C) N=44	7,8/9,10,12,13				5.0
5.5					Termination Depth at: 5.45 m		5.5
6.0							6.0
6.5							6.5





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## ANNEX B

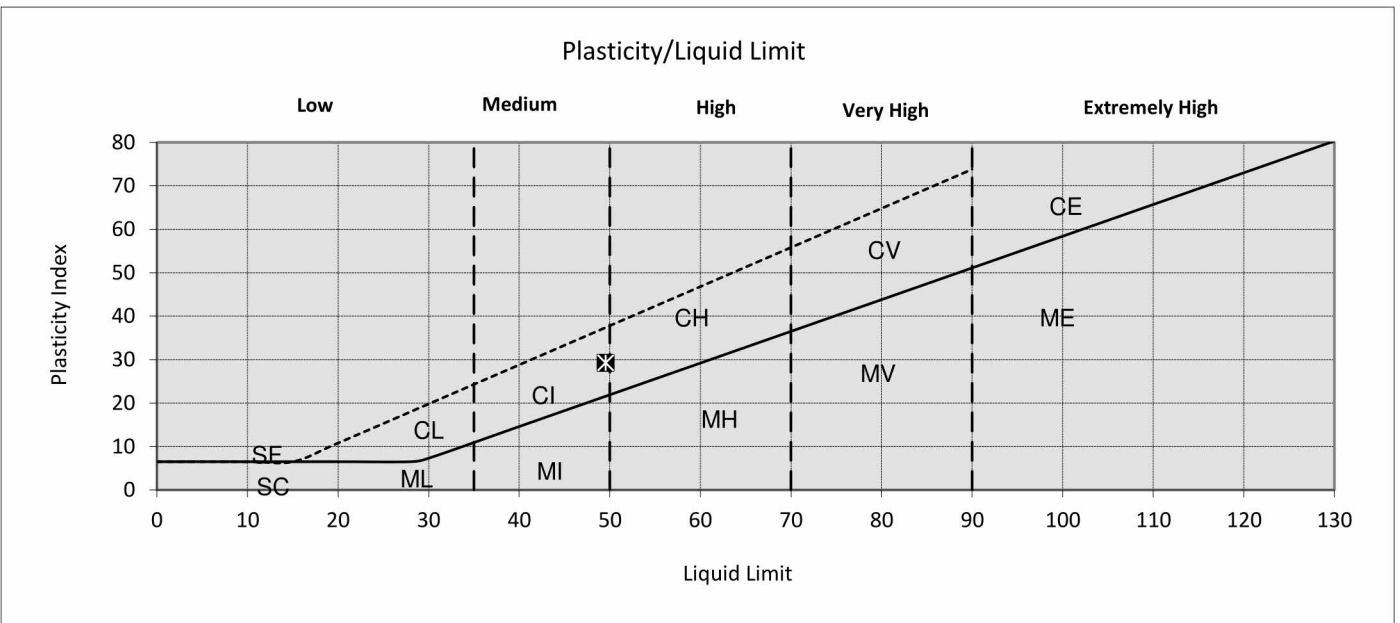
### Geotechnical Test Results



**LABORATORY TEST REPORT**  
**LIQUID & PLASTIC LIMIT TESTS BS 1377: Part 2: 1990 CI 4.4,5.3**

<b>Site Ref.:</b>	Welshpool	<b>Job No.:</b>	34790
<b>Client:</b>	Bek Enviro Ltd	<b>Lab Ref No.:</b>	34790/62
<b>Originator:</b>	<b>Michael Buckley</b>	<b>Sample Ref.:</b>	WS3 (2 m)
		<b>Date Received:</b>	14/10/2020
		<b>Date Tested:</b>	19/10/2020
		<b>Date Reported:</b>	20/10/2020

Sampling Certificate	Yes
Sampled By	Client
Sample Type	Bulk
Sample Preparation Method	As Received
MATERIAL	<b>Brown mottled CLAY</b>
Retained 425 micron (%)	<b>15.0</b>
Natural Moisture Content (%)	<b>27</b>
Liquid Limit (single point)(%)	<b>50</b>
Plastic Limit (%)	<b>20</b>
Plasticity Index	<b>29</b>



**Approved Signature**  
 James Fisher Testing Services Ltd  
 Karl Monks, Lab and Insitu Manager





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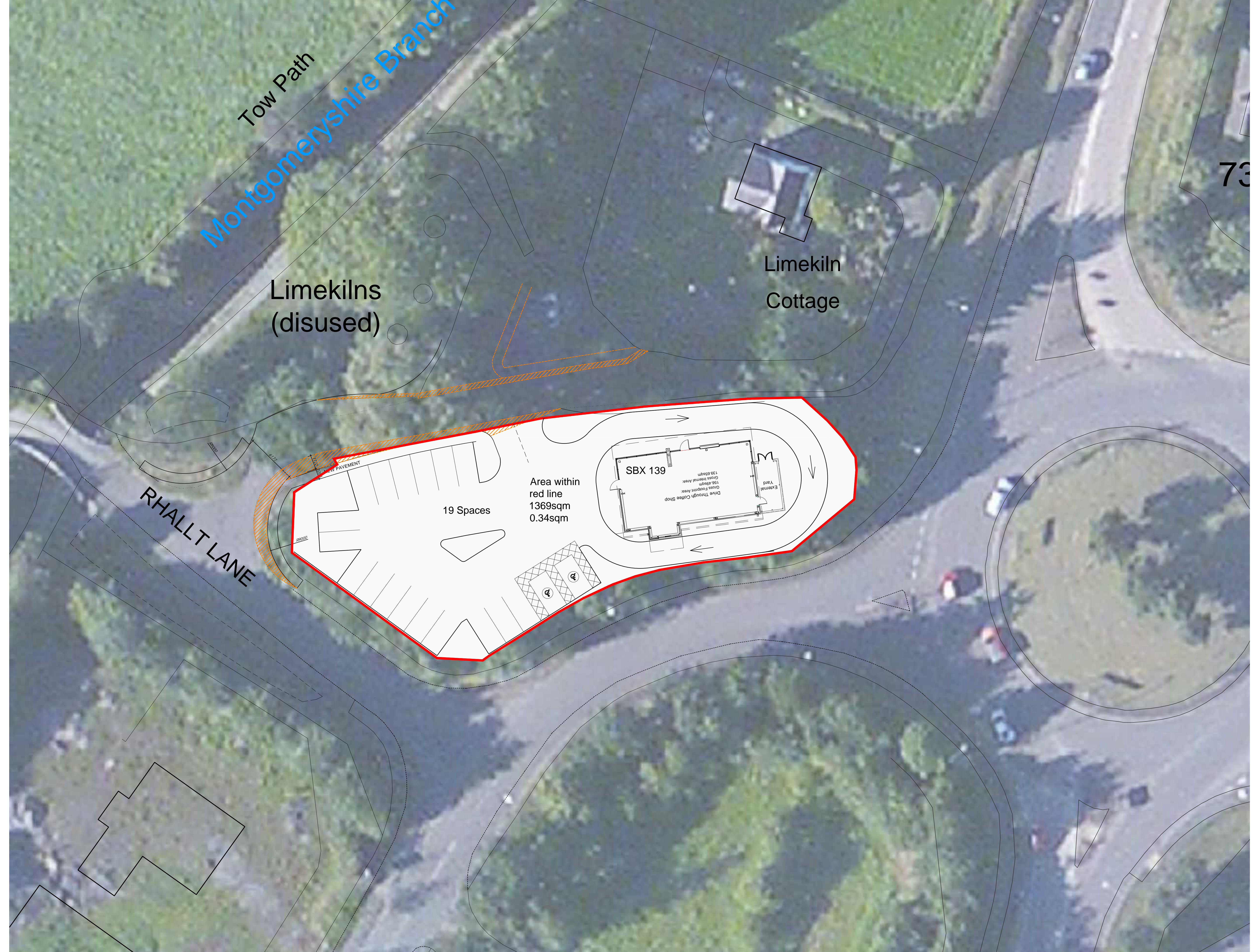
**01254 377622**

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ANNEX C

Drawings





Tow Path

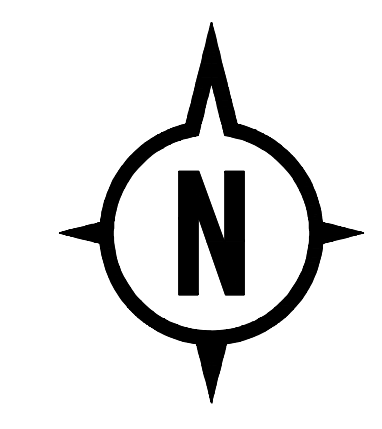
Montgomeryshire Branch

Limekilns  
(disused)

Limekiln  
Cottage

RHALLT LANE

73



SCHEME SUBJECT TO TRACKING ANALYSIS  
AND TOPOGRAPHICAL SURVEY

PAVEMENT

19 Spaces

Area within  
red line  
1369sqm  
0.34sqm

SBX 139

139.66sqm  
Gross Internal Area  
156.48sqm  
Gross Floorplate Area  
Drive Through Coffee Shop

External  
Yard

- B 03.09.20 SITE ACCESS AND BOUNDARY UPDATED ACCORDING TO VENDOR'S SCHEME
  - A 19.08.20 BOUNDARY UPDATED TO MATCH VENDOR SCHEME
- REVISIONS

CLIENT EURO GARAGES LTD

PROJECT BUTTINGTON CROSS  
RHALLT LANE  
WELSHPOOL  
SY21 9JP

TITLE FEASIBILITY

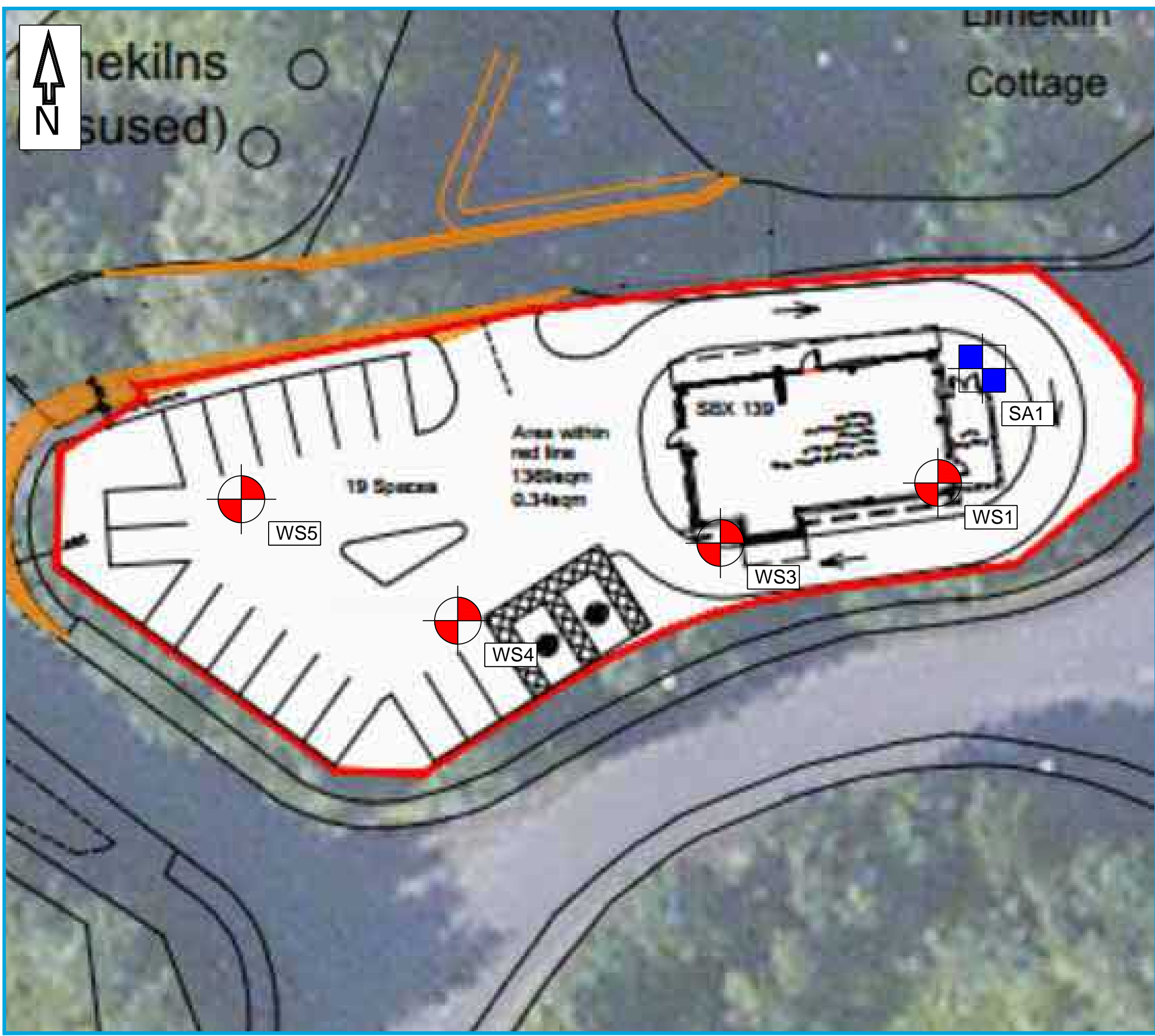
DATE 08.07.20

SCALE 1:250 @ A1




JOB ID 1772

DWG 3b





### LEGEND

-  SITE BOUNDARY
-  BEK WINDOW SAMPLE BOREHOLE
-  INFILTRATION TEST LOCATION

REV	DESCRIPTION	DATE	BY



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CLIENT. 

JOB TITLE.  
 LAND TO THE NORTH OF  
 RHALLT LANE, WELSHPOOL

DRAWING TITLE.  
 SITE INVESTIGATION  
 LOCATION PLAN

SCALE @ A3. NTS	DRAWN BY. D.E.	APPROVED BY. M.B.	DATE. 08/10/20
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DRAWING No. 20771-3	REV. -
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