

Miller Homes
Lapwing House,
Peel Avenue,
Calder Park,
Wakefield,
WF2 7UA

PR/AJK/47055/004

For the attention of Mr S Maw

18 July 2022

Dear Stuart

Former Wombwell High School, Gypsy Lane, Wombwell
Report on Soakaway Testing

We write to collate and discuss the results of soakaway testing undertaken on the above site previously. Testing has been undertaken on three occasions by Eastwood Consulting Engineers and others with varying results.

The site is that of the former Wombwell High School, located to the north of Gypsy Lane and to the south of Roebuck Street in Wombwell, Barnsley. The site has an area of around 7.5 hectares, and is centred around grid reference 440279 402404. The school buildings were located in the north west of the site, with the remaining majority of the land comprising terraced playing fields, covered with grass and soft landscaping. The school occupied the site between approximately 1920 and 2015.

Geological mapping indicates the site to be underlain by strata of the Pennine Middle Coal Measures. The Oaks Rock sandstone is indicated to underlie the entire site. This is described by the British Geological Survey as a soft, fine-grained, thick-bedded sandstone, with intercalated shale lenses.

The previous infiltration testing undertaken during site investigation works are discussed below.

Eastwood Consulting Engineers is a trading name of Eastwood and Partners (Consulting Engineers) Limited
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Hamson Barron Smith Ground Investigation Report

The initial site investigation for the site was prepared by Hamson Barron Smith (HBS) in May 2018, report reference 23-24-18-1-6003/GIR1. The report was prepared for the original site vendor, Barnsley Metropolitan Borough Council and included soakaway testing in four locations across the site. Tests were undertaken in trial pits TP3, TP5, TP14 and TP16, which were widely spaced across the site in the west, north, south and east respectively.

The results of the testing were variable. TP3 encountered a “weathered siltstone” bedrock. Only one test was completed in this location, which recorded an infiltration rate of 6×10^{-6} m/sec. TP5 also recorded a low infiltration rate of 6.1×10^{-6} m/sec in the single test which was undertaken, with the bedrock being described as a very sandy, clayey gravel of sandstone with occasional clay horizons. Both tests recorded good initial flows out of the test pit for the first part of the tests, before slowing significantly in the later stages, indicating a potential silting of the water pathways through the surrounding bedrock.

TP16 encountered sandstone bedrock, recovered a tabular gravel and cobbles. Two tests were completed in this pit, the first giving an infiltration rate of 17×10^{-6} m/sec, and the second giving a slightly improved infiltration rate of 26×10^{-6} m/sec.

TP14 encountered made ground (reworked sandstone gravel) overlying sandstone bedrock, recovered as coarse gravel and cobbles. This pit performed the best, with three tests being completed, providing infiltration rates of 300×10^{-6} m/sec, 140×10^{-6} m/sec and 96×10^{-6} m/sec respectively. Some silting up of the strata is indicated to have occurred, with the successively slower rates. However, the majority of the water within each test was within the granular made ground, and therefore is likely to have accelerated the test due to the increased permeability of the fill.

Eastwood & Partners Soakaway Investigation

Eastwood & Partners (now trading as Eastwood Consulting Engineers) undertook further infiltration testing on the site in December 2018. Nine further pits were excavated across the site, four on the upper western plateau, three on the central plateau, and two on the lowest, eastern plateau. The findings were presented in Letter Report reference PR/AJK/SAE/43497-001.

The ground conditions recorded generally comprised a variable thickness of made ground (described as sandy clay with gravel/cobbles of sandstone) overlying sandstone bedrock,

mainly recovered as sand and gravel, but occasionally encountered as hard sandstone through which no further excavation could be undertaken.

Four of the trial pits had three tests completed within them, three had two repeated tests, and two only had one test attempted.

The calculated infiltration rates from each test are summarised in the table below:

Soakaway	Test Material	BRE365 Soil Infiltration Rate (x10 ⁻⁶) m/s
SA1 Test 1	Reworked clay over sand and gravel	34
SA1 Test 2		69
SA1 Test 3		47
SA2	Reworked clay over sandstone at base	0
SA3 Test 1	Sand and gravel	360
SA3 Test 2		240
SA3 Test 3		310
SA4 Test 1	Reworked clay over sand and gravel	21
SA4 Test 2		25
SA5 Test 1	Reworked clay over sand and gravel	45
SA5 Test 2		18
SA6 Test 1	Sand and gravel over sandstone	220
SA6 Test 2		120
SA6 Test 3		120
SA7 Test 1	Gravel over sandstone	33
SA7 Test 2		17
SA8	Reworked clay over sandstone	0
SA9 Test 1	Reworked clay over sandstone	98
SA9 Test 2		64
SA9 Test 3		61

Most locations showed a reduction in the infiltration rate during the second and third tests, where completed. The exception to this was SA1, where the rates in the second and third tests were higher than during the first. This pit was located in the east of the site in the lowest plateau. It is also to be noted that SA2, also located in this area, but to the north of SA1, recorded an infiltration rate of zero. SA2 recorded hard sandstone at the base of the test pit, whereas SA1 had more weathered material.

Eastwood Consulting Engineers Supplementary Ground Investigation

ECE attended site in April 2022 on behalf of Miller Homes. Two additional soakaway pits were undertaken in the west of the site. One of these, SA01 towards the southern corner of the site, encountered a mudstone/shale material below 1.8 m of made ground. The test in this location was undertaken within the shale strata, and this failed to drain by any significant amount. A

BRE365 infiltration rate could not be calculated, but an average infiltration rate of 0.72×10^{-6} m/sec was determined for the test.

SA02 was undertaken further toward the north of the site, and encountered weathered sandstone bedrock, recovered from the ground as a sandy gravel. Two tests were completed in this pit, with infiltration rates (in accordance with BRE 365) of 56×10^{-6} m/sec and 40×10^{-6} m/sec being calculated respectively. A reduction in infiltration rate was again noted during the second test, most likely due to silt ingress into the various water pathways through the sandstone.

Discussion of Results

The testing undertaken during all three ground investigations noted above, indicates that the ground beneath the site offers very variable rates of infiltration.

Some areas of the site, where shale/mudstone or hard sandstone are unsuitable for infiltration, and where tests were undertaken in such materials, flow rates of between zero and 6×10^{-6} m/sec were generally recorded. Such areas were encountered in the south west, north east, and north of the site.

Elsewhere, deep made ground was present. This tended to be in the east of the various plateaus cut across the site, where excavated sandstone has been used as part of a cut/fill earthworks to create the current level playing fields. Although the made ground offered fairly good infiltration rates, it is not recommended that this material is targeted as a soakaway medium post development of the site, as inundation settlement may occur where repeated discharge of water into concentrated areas around soakaway chambers may wash out finer particles, leading to settlement of the surface. This is not desirable, as the soakaways are likely to be positioned beneath private gardens, driveways or close to roads. This therefore rules out the use of soakaway drainage across a significant area of the site, as soakaways would need to be unviably deep to keep water below the base of the made ground. At such depths, it is likely that harder bedrock would be encountered, which would be anticipated to reduce the infiltration rates below acceptable levels, as demonstrated in a number of tests across the site.

In the areas of the site where the infiltration rates recorded during the tests were satisfactory, the repeated tests in most cases showed a reduction in the soakaway rate. This is expected to be caused by the washing out of silt and other finer particles into the pore spaces which allow water to pass through the various materials. The Oaks Rock sandstone is recorded as being fine grained, and therefore there is significant potential for this continued washing out to occur

over the lifetime of the soakaway, which may mean that the effectiveness of the soakaways will reduce over time.

There is also potential for the re-emergence of water, due to the site levels. The strata are indicated by geological maps to dip towards the north east at a shallow angle. The land also falls in this direction, meaning that groundwater flow would tend to be towards the lower, northern end of the site. Water flows from soakaway structures with shallow invert levels on the upper plateaus may likely emerge from the lower sections of the existing plateau embankments into the properties below. As discussed above, deeper invert levels are more likely to encounter hard bedrock, which offers only low infiltration rates.

Therefore, based in the above and due to the significant variability of the infiltration rates offered by the natural ground on the site, it is recommended that piped drainage is utilised for the development. Significant amounts of on-site attenuation will be required, and it is likely that the regulators will restrict any discharge to greenfield run off rates, given the lack of previous development of much of the land and the time which has now elapsed since demolition of the school buildings.

The HBS report states that the nearest surface water feature to the site is a disused canal, some 225 m north east of the site. This is separated from the site by previously developed lane owned by third parties, and therefore it will not be possible to drain the site to this water course.

It will therefore be the intention to drain the site into the public sewer. Yorkshire Water plans indicate surface water sewers to be present in Lundhill Road, to the south of the site, which may serve as a suitable discharge point, subject to regulatory agreement.

We trust that the above information will meet with your approval. Please do not hesitate to contact us if you have any comments or queries.

Yours sincerely



Andrew Kerslake
Technical Director

Enc. HBS Exploratory Hole Location plan, Drawing No: HBS-DR-G-(00)-002 P1
ECE Exploratory Hole Location plan, Drawing No: 47055/001A



KEY

- TRIAL PIT (TP)
- BOREHOLE (WS)
- TRADITIONAL FOUNDATIONS
LIKELY TO BE SUITABLE
- TRADITIONAL FOUNDATIONS MAY
BE POSSIBLE
- TRADITIONAL FOUNDATIONS
UNLIKELY TO BE SUITABLE
- SITE BOUNDARY (INDICATIVE)

NOTES

DRAWING EDITED FROM HAMSON
BARRON SMITH LTD'S DRAWING
'WOMBWELL REDEVELOPMENT -
EXPLORATORY HOLE LOCATION
PLAN' (DWG NO. 23-24-18-1-6003
D01.

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P1	AH	JUN18				
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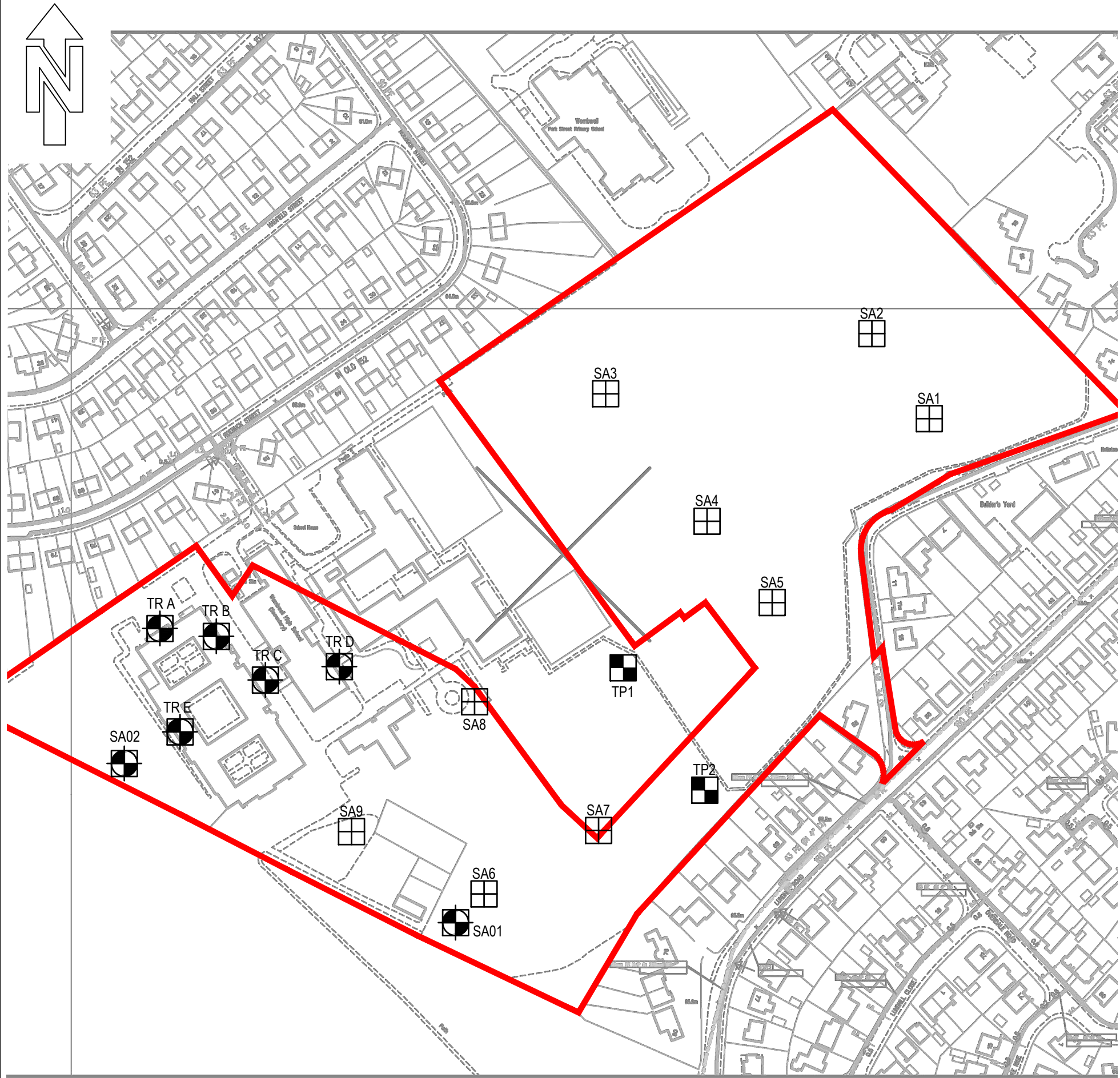
CLIENT BARNESLEY COUNCIL
PROJECT WOMBWELL REDEVELOPMENT

TITLE EXPLORATORY HOLE AND FOUNDATION ZONE SITE PLAN

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SCALES NTS	DISCIPLINE GEO	PROJECT NUMBER 18-1-6003
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INFORMATION WITHIN THIS DRAWING IS NOT NECESSARILY PRODUCED TO SCALE.
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KEY:

- Approximate location of trial pits excavated by Eastwood and Partners on 18.12.18 on behalf of Premier Construction Northern Ltd.
- Approximate location of soakaway excavated by Eastwood and Partners between 17.12.18 and 18.12.18 on behalf of Premier Construction Northern Ltd.
- Approximate location of trial pit / soakaway excavated by Eastwood Consulting Engineers on 08.04.22 on behalf of Miller Homes.
- Site Boundary

A	First Issue.			
REV	DESCRIPTION	SIG	CHK	DATE

MILLER HOMES

WOMBWELL HIGH SCHOOL, GYPSY LANE, WOMBWELL

EXPLORATORY HOLE LOCATION PLAN

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SCALE WHEN PLOTTED AT A3 1:2000			DRAWING STATUS INFORMATION	
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