



Redrow Homes South Midlands

Drainage Explanatory Note

Land between Royston Road and Cambridge Road, Barkway

September 2025

1. Introduction

- 1.1 This note supports an application made under Section 73 ('S.73') of the Town and Country Planning Act 1990 (as amended), which seeks to vary the wording of condition 20 of outline planning permission reference 18/01502/OP.

- 1.2 Condition 20 currently states:

'The development permitted by this planning permission shall be carried out in accordance with the approved Flood Risk Assessment carried out by Ardent Consulting reference 163461-02a dated June 2018. The surface water drainage scheme should include;

- 1. Implementation of the appropriate drainage strategy based on infiltration into using appropriate above ground SuDS measures and indicated on Surface Water Drainage drawing.*
- 2. Provision of storage to ensure no increase in surface water run-off volumes for all rainfall events up to and including the 1 in 100 year + 40% climate change event.*

The mitigation measures shall be fully implemented prior to full site occupation and in accordance with the timing / phasing arrangements embodied within the scheme, or within any other period as may subsequently be agreed, in writing, by the local planning authority.

Reason: To reduce the risk of flooding to the proposed development and future occupants.'

- 1.3 The need to vary this condition has been discussed with Officers during negotiation of application references 24/01994/S73 (now withdrawn) and 24/01883/RM.

2 Proposal

- 2.1 It is proposed that the wording of condition 20 be amended to the following. However, should the Local Planning Authority consider that alternative wording would be more appropriate, we would welcome discussion with Officers regarding this.

Notwithstanding the surface water drainage strategy set out within the approved Flood Risk Assessment (Ardent Consulting, reference 163461-02a dated June 2018), prior to commencement of development a detailed surface water drainage scheme shall be submitted to and approved in writing by the Local Planning Authority. The surface water drainage scheme shall include:

- 1. Implementation of the appropriate drainage strategy based on infiltration into using appropriate above ground SuDS measures; and*
- 2. Provision of storage to ensure no increase in surface water run-off volumes for all rainfall events up to and including the 1 in 100 year + 40% climate change event.*

The surface water drainage scheme shall be fully implemented prior to full site occupation and in accordance with the timing / phasing arrangements embodied within the scheme, or within any other period as may subsequently be agreed, in writing, by the local planning authority.

Reason: To reduce the risk of flooding to the proposed development and future occupants.

3 Rationale

- 3.1 Further to the ongoing discussions in respect of the above applications, it has been established that the surface water drainage strategy set out in the approved Flood Risk Assessment by Ardent Consulting Engineers ref: 163461-02a dated June 2018 ('the OPP FRA'), and secured by condition 20 of the outline planning permission, would be challenging to implement and that a more preferable solution has been identified.
- 3.2 The drainage strategy within the OPP FRA indicated the use of infiltration basins to allow the disposal of surface water from the site. This was based on infiltration testing undertaken by Green Earth Management Company (GEMCo) in February 2017. This testing concluded that shallow infiltration was unsuitable given the presence of shallow clay deposit but recommended depths of 2.4m would provide rates in the order of 10-6 m/sec.
- 3.3 As part of ongoing Ground Investigation Assessment and due diligence undertaken by Redrow Homes following purchase of the site, an additional investigation was undertaken by RPS which included trial holes, boreholes and borehole soakaway testing (Ref: BMK23256_Barkway Ground Conditions Report, dated 13 May 2024). A copy of this report is provided at Appendix A.
- 3.4 The conclusion of the investigation was that shallow soakage rates up to 5m in depth would be very poor due to the extent of clay within the material. Beyond 5m the clay content reduced significantly and the infiltration potential increased, therefore infiltration by deep

bore soakage was recommended. The other major conclusion was that the location of the chalk varied across the site and this variance was very acute in some locations. Therefore, locations of infiltration systems would need to be carefully considered against the trial hole data obtained.

- 3.5 A recent scheme located to the south of the proposed development site (reference 18/00919/DOC) has similarly utilised a deep bore soakage disposal method.
- 3.6 Following the conclusion of this recent RPS ground investigation, it is clear that the outline drainage strategy would not generate a suitable surface water disposal system and an alternative solution is required.
- 3.7 Redrow now proposes that the proposed development utilise infiltration through deep bore soakaways as the primary method of surface water disposal for the site. The proposed drainage strategy has been developed to utilise a storage system of balancing ponds located strategically around the development and in similar locations to the outline design, albeit the final design of these basins would be subject to discharge through the requirements of condition 20 and as part of any reserved matters application for layout. The water from these balancing ponds would be directed towards borehole soakaways located in the chalk to disperse the water and infiltrate to the ground.
- 3.8 Environment Agency consent will be sought for this disposal method, via the water quality permitting scheme.
- 3.9 A detailed drainage design has been submitted as part of reserved matters consent application reference 24/01883/RM, and the Lead Local Flood Authority ('LLFA') has raised no objections to the revised surface water drainage scheme proposals (Appendix B). The scheme would adequately ensure that surface water resulting from the development would be adequately managed such that it does not pose a risk of flooding either on, or off-site and the scheme. The revised drainage scheme would accord with the requirements of Policy NE8 of the adopted North Hertfordshire Local Plan 2011-2031.
- 3.10 In addition, the LLFA raised no objections to the suggested condition wording amendment as proposed in the, now withdrawn, earlier S73 application (Appendix C).

**REDROW HOMES
LAND OFF ROYSTON ROAD, BARKWAY, HERTS**

Ground Conditions Report

BMK23256



13 May 2024

Document Status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
01	Draft	Peter Atkinson	Matt Flowers	Matt Flowers	13.05.2024

Approval for issue

Matt Flowers



13.05.2024

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1.0 INTRODUCTION

1.1 Commissioning

RPS Consulting UK & Ireland were commissioned by Redrow Homes to review existing ground investigations and undertake further site works in order to produce a Ground Conditions Report for a parcel of land off the Royston Road, Barkway, Hertfordshire. The further works were specifically designed to assess likely foundations for the proposed development and parameters for stormwater soakaway design.

The site is to be developed for low-rise residential housing.

1.2 Objectives

This objective of this report is:

- To summarise investigations and testing undertaken (including by others) at the site.
- To provide a summary of findings for the main purposes of design of foundations and stormwater disposal.

1.3 Scope of works

The following investigations have been undertaken at the site:

- A walkover survey of the site.
- A review of previous investigations undertaken on behalf of the site vendor by Gemco in 2023.
- Review of published geological information for the site and local area.
- Trial pits across the site logged by an experienced geotechnical engineer.
- Soakaway infiltration tests in boreholes.

Relevant information is reproduced from the above sources as necessary.

2.0 SITE DETAILS

2.1 Site location

Site name	Land off Royston Road, Barkway, North Hertfordshire
Postcode	SG8 8BU (Royston Road site entrance)
National Grid Reference (centre of site)	538525 236180

Table 1 – site location details

2.2 Site Description

The site boundary is shown in Appendix A.

The site covers around 8 hectares and consists of part of one large field and all of an adjoining smaller field – the two fields are separated by a bridleway and hedgerow.

Ground levels fall gently from approximately 146m AOD in the north west to 136m AOD in the south east.

The field boundaries consist of hedgerows with trees.

2.3 Surrounding land uses

North	Further agricultural farmland
East	A cricket ground, woodland and farmland
West	Low-rise housing and farmland
South	Housing and the village of Barkway

Table 2 – surrounding land uses

2.4 Development plans

The preliminary proposed layout of the site is shown in Appendix A. The development is to consist of around 140 low-rise residential dwellings with garages, car parking and private front and rear gardens. Access to the site will be off the Royston Road in the west and the Cambridge Road in the east.

Stormwater attenuation ponds will be located in the central area and the north east of the site.

It is not anticipated that there will need to be significant change to ground levels across the site (other than to form the stormwater ponds) although some local regrading is anticipated.

3.0 SITE INVESTIGATIONS

3.1 Previous Investigations

The site has been subject to Phase I and Phase II investigations by Gemco and also a Flood Risk Assessment which included the findings of infiltration testing - on behalf of the vendors on the basis that the site would be developed for low-rise housing. Relevant reports are:

- *Phase I/II Geoenvironmental Assessment, Land West of Cambridge Road, Barkway*, by Gemco, dated December 2023.
- *Flood Risk Assessment, Land Adjacent to Royston Road, Barkway*, by Ardent Consulting Engineers, dated June 2018.

The following works were undertaken on the site as part of the above assessments.

Investigation	Description	Purpose
Desk Study	An assessment of the site history and its geological and environmental setting.	To assess likely ground conditions and constraints
Site Walkover	Inspection of the site surface	To assess the sites general physical condition
Trial Pits	19 trial pits were formed to 2.25-3.15m depth with insitu testing and sampling undertaken	To investigate shallow soils across the site
Window Sample Boreholes	12 window sampler boreholes were undertaken to 2.6-5.0m depth with insitu testing and sampling undertaken	To investigate soils across the site to greater depth than the trial pits
Gas monitoring	Gas monitoring was undertaken in 6 window sampler boreholes	To assess presence of hazardous ground gases
Laboratory testing	Geotechnical and chemical testing undertaken on representative soil samples	To characterise soils and assess any contamination
Soakage Infiltration Tests in Pits	Infiltration tests were undertaken in 3 pits in the western half of the site and in 3 pits within the eastern boundary	To assess ground permeability for possible soakaway design
Soakage Infiltration Tests in Boreholes	Infiltration tests were undertaken in 2 boreholes in the south east corner of the site	To assess deep ground permeability for possible soakaway design

Table 3 – scope of previous investigations

From the above investigations the following findings, conclusions and recommendations were made:

- The site has a history of use as farmland only.
- No significant ground contamination was identified on site.
- The site geology is indicated to be a superficial cover of the Lowestoft Formation (Glacial Till) over bedrock of the Lewes Nodular/Seaford Chalk Formation which is a Principal aquifer.
- The site is confirmed by trial pits and boreholes to be underlain by firm to stiff clay over chalk bedrock. The depth to chalk is highly variable.
- Made ground considered unsuitable for use was identified at the surface in the south east associated with former farm buildings here.
- Site considered generally suitable for shallow foundations into the clay or chalk.
- Foundations placed entirely in the clay drift soils considered suitable for a bearing pressure of 100kN/m²; for foundations placed in the chalk a maximum bearing pressure of 250kN/m² may be adopted although further site investigations are recommended and all foundation excavations would need to be inspected by a 'suitably qualified professional'.
- DS-1 AC-1 conditions for buried concrete.
- Soils should be assumed of medium volume change potential according to NHBC classification.
- The infiltration tests as part of the FRA showed variable results
 - In the west of the site infiltration rates in the test pits were in the range 1.34 to 5.35x10⁻⁶ m/s.
 - In the east of the site infiltration rates in the test pits were in the range 1.11 to 4.41x10⁻⁶ m/s.
 - Infiltration rates in the boreholes in the south east were in the range 0 (zero) to 1.41x10⁻⁵ m/s.

3.2 RPS Investigations

RPS considered that further intrusive investigation at the site should be undertaken for the following purposes:

- To provide clearer and simpler guidance for the design and construction of foundations.
- To more fully investigate the feasibility of the use of soakaways constructed in the underlying chalk.

The fieldwork was undertaken Between 5 and 8 March 2024. The boreholes were undertaken by Geotechnics (of Coventry) a specialist site investigation contractor.

The following investigations were undertaken by RPS or to the requirements of RPS:

Investigation	Description	Purpose
Trial Pits	22 trial pits were formed to 1.9-3.0m depth and logged by an experienced RPS engineer	To investigate shallow soils across the site
Cable percussion boreholes and infiltration testing	3 cable percussion boreholes were drilled at site to 10.3-20.0m depth and infiltration tests undertaken	To investigate the potential for soakaways to be constructed into the chalk bedrock

Table 4 – scope of RPS siteworks

Trial pits logs are provided in Appendix ; the findings of the boreholes are presented in Appendix.

The following table summarises the findings of the boreholes and infiltration testing.

Borehole	Depth (m)	Depth to chalk (m)	Test (depth to water - m)	Time for discharge (mins)	Indicated Result (m/s)	Adjusted Result (m/s)	Comments
BH01	20	17.1	17.1-18.48	240	NR	$\sim 3.4 \times 10^{-6}$	Note 1
BH02	15.37	3.0	11.32-14.37	90	1.03×10^{-5}		Note 2
			10.96-14.31	150	2.55×10^{-5}		
			10.33-14.29	90	4.65×10^{-5}		
BH03	10.3	1.1	6.32-8.75	95	NR	$\sim 1.57 \times 10^{-5}$	Note 3
			5.93-8.85	1086	2.57×10^{-6}	1.1×10^{-5}	
			5.46-8.55	60	2.54×10^{-5}		

Table 5 – infiltration test results summary

GEOTECHNICAL REPORT

Note 1 – no result indicated as apparently less than 75% of water columns discharged but this is considered likely due to silt collection in base of the borehole. If 1m of silt is assumed in the base of the boreholes the adjusted infiltration rate results.

Note 2 – the results appear to improve with a greater column of water as this decreases the influence of silt in the base

Note 3 – initially no result as less than 75% of the water column discharged – again likely due to silt collection. The second test was left overnight and the base of the borehole remeasured and found to be at 9.5m – if this depth of hole is used for the first round the adjusted rate results. Similarly the anomalously low result for round 2 improves if the slightly reduce depth of borehole 9.28m is used.

4.0 ENGINEERING ASSESSMENT

4.1 Ground Conditions

From the recent trial pits and boreholes the following summarises the findings, conclusions and recommendations in respect of ground conditions.

- Ground conditions are generally in accordance with the anticipated geology and given the site's history of use for farmland.
- The site is underlain by a 200-330mm thick cover of dark grey clayey topsoil.
- In the south east of the site there are the remains of farm buildings and surface made ground including brick and concrete.
- The site is underlain by a firm to very stiff cover of sandy gravelly clay that varies rapidly in depth. The sand and gravel content of this material is variable locally but all pits were logged as at least firm in strength. The findings of the exploratory holes are consistent with the Lowestoft Formation.
- The site is underlain at depth by chalk. The upper surface of the chalk (and depth of the clayey glacial drift over it) changes very significantly over short distances. The chalk is shallow over much of the site (within around 1m of the surface) but there appears to be a network of buried steeply sided channels into the chalk surface and these are up to at least 17.1m deep in places (BH01). The chalk was clayey near its upper surface (at whatever depth encountered) becoming less clayey with depth and recovered as a sand or gravel.
- No groundwater was encountered in the recent trial pits or boreholes although the site surface was saturated locally – apparently where the chalk surface was deepest and the greatest cover of (impermeable) clay drift was present.
- No especially soft or highly compressible soils were encountered – other than the surface topsoil.
- All trial pit sides were stable for the period of excavation and logging.

4.2 Foundations

Ground conditions across the site are considered suitable for the use of traditional shallow spread foundations for the intended low-rise development. The following recommendations are made in respect to foundation design and construction.

- A minimum bearing pressure of 100kN/m² is recommended. For much of the site this will be conservative but adoption of this design pressure would not then be considered to require verification on site by specialist engineer.
- The surface of the bedrock chalk would appear to be steeply sloping in places and it is not considered suitable to adopt a higher bearing pressure based on foundations being entirely placed in the chalk.
- Where foundation formations are highly variable – most likely where passing from chalk to clay – it would be recommended to place reinforcing mesh to mitigate any differential settlement tendencies. Deepening foundations in an attempt to place them entirely in one soil type (the chalk) may create practical difficulties – it is not recommended.
- The chalk in particular will soften and weaken if disturbed especially in the presence of water. Foundation excavations in the chalk should be preserved dry and should generally be concreted as soon as possible.
- All foundations in proximity to trees and shrubs (existing, removed and proposed) should be designed on the basis that soils are of medium volume change potential – in accordance with NHBC Standards Chapter 4.2 recommendations.

4.3 Soakaways

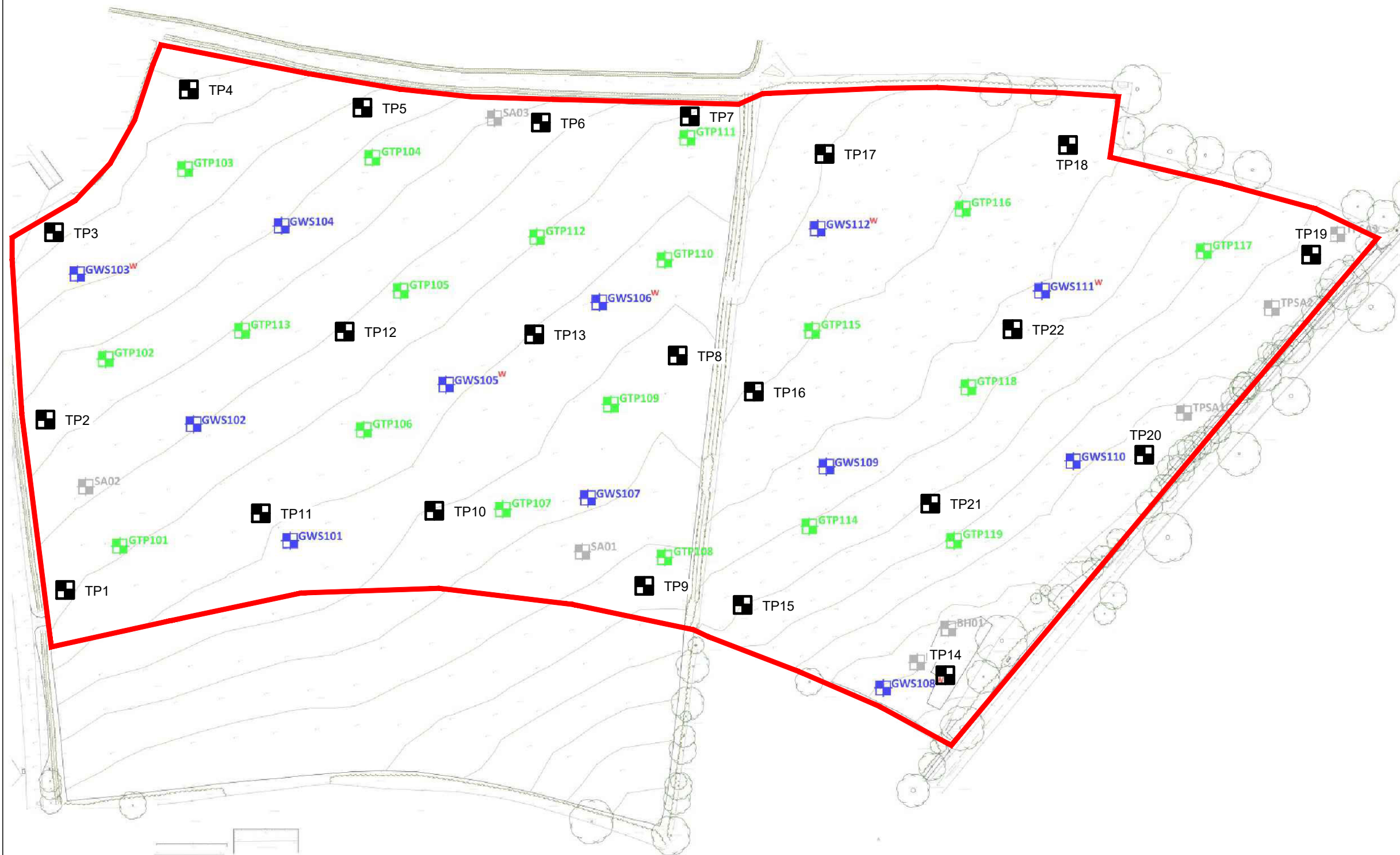
The site is considered suitable for the use of soakaways for disposal of stormwater but these will need to be designed taking account of the following factors:

- The clay drift of the Lowestoft Formation over the chalk appears essentially impermeable and is therefore not considered suitable for use for infiltration of stormwater.
- The chalk appears suitable for use for soakaways but the upper few metres of the chalk (at whatever depth) are clayey and therefore of low permeability.
- The chalk is increasingly permeable with depth below its upper surface and it is recommended therefore that any soakaways penetrate the chalk by at least say 5m. This means that soakaways will only be feasible by boreholes.
- It was apparent from site measurements that that silt/debris was collecting in the base of the boreholes and this significantly affects the results of any permeability analysis; results assuming no collection of material in the bottom of the borehole are significantly lower as the bottom of the water column is apparently not discharging at all. This does indicate that construction of the borehole soakaways will have to be undertaken with care and the design should prevent silt collection as far as possible but should assume some collection of silt in the borehole base.

- It is recommended that a design permeability of 2.5×10^{-5} m/s is assumed in the chalk from below 5m from its upper surface.
- The performance of soakaways should be confirmed on site as part of the installation process.
- It is recommended that soakaways are located at least 10m away from any buildings – in accordance with the recommendations of CIRIA 574 *Engineering in Chalk*, on the basis that the chalk is of low density.
- As the bedrock chalk is a Principal aquifer it will be necessary to obtain Environment Agency approval to the use of deep soakaways into the chalk.

APPENDIX A

DRAWINGS



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Notes

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2. If received electronically it is the recipients responsibility to print to correct scale. Only written dimensions should be used.
3. This drawing should be read in conjunction with all other relevant drawings and specifications.

KEY:

 TP1 INDICATES TRIAL PIT LOCATIONS BY RPS DATED MARCH 2024

P01	First Issue	RS	PA	05.03.24
Rev	Description	By	Apr	Date



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Client Redrow Homes

Project Royston Road,
Barkway

Title Trial Pit Location Plan

RPS Project Number	Scale @ A3	Date Created
BMK23256	N.T.S.	05 March 2024
Task Team Manager	Information Author	Task Information Manager
PA	RS	PA

Status

S2 (Suitable for Information)

Document Number Revision

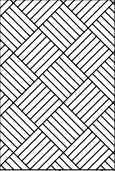
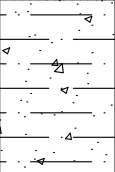
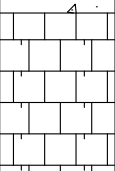
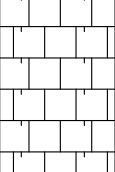
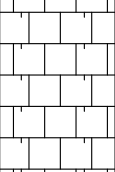
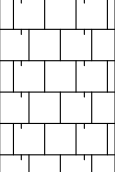
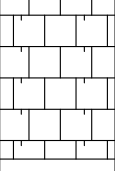
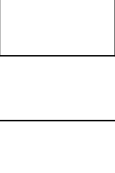
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Project Code - Originator - Vol/Sys - Level/Loc - Type - Role - Drawing Number

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APPENDIX B

RPS EXPLORATORY HOLE LOGS

 A TETRA TECH COMPANY Aurora House, Deltic Avenue, Rooksley, Milton Keynes MK13 8LD T: +44 (0)1908 669 898 E: rpsmk@rpsgroup.com			Trial Pit Log					Trial Pit ID TP1		
Project Royston Road, Barkway				Co-ords Ground Level			Date 05 March 2024			
Job No. BMK23256				Dimensions (m) 0.6 x 3.0m			Scale			
Client Redrow Homes							Logged PA			
Samples & Insitu Testing			Strata Details					Water	Backfill	
Depth (m)	Type	Testing	Level	Depth	Legend	Strata Description				
				0.33		Dark grey brown clayey TOPSOIL				
				0.75		Firm light brown sandy gravelly CLAY				
1									1	
										
										
										
2									2	
										
				2.50		CHALK recovered as very clayey gravelly Sand with occasional flint cobbles				
3									3	
Remarks										
Stability Pit sides stable.										
Groundwater None encountered.										



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Trial Pit Log

Trial Pit ID

TP2

Project
Royston Road, Barkway

Co-ords
Ground Level

Date
05 March 2024

Job No.
BMK23256

Dimensions (m)
0.6 x 3.0m

Scale

Client
Redrow Homes

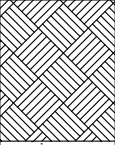
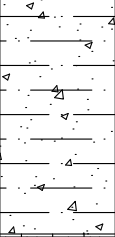
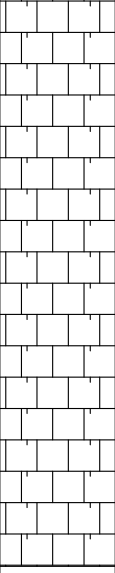
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Samples & Insitu Testing

Strata Details

Water

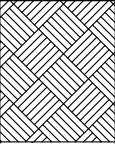
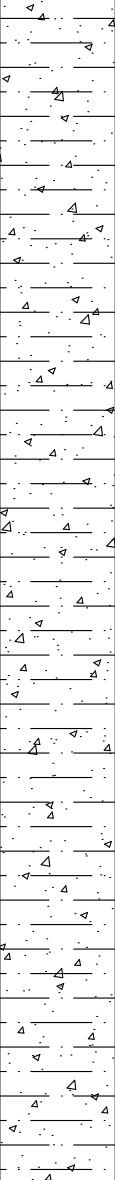
Backfill

Depth (m)	Type	Testing	Level	Depth	Legend	Strata Description	Water	Backfill
				0.30		Dark grey brown clayey TOPSOIL		
				0.80		Firm light brown gravelly CLAY. Gravel of chalked flint.		
1				2.00		CHALK very clayey gravelly sand with occasional flint gravel.	1	
2								
3								

Remarks

Stability Pit sides stable.

Groundwater None encountered.

 A TETRA TECH COMPANY Aurora House, Deltic Avenue, Rooksley, Milton Keynes MK13 8LD T: +44 (0)1908 669 898 E: rpsmks@rpsgroup.com			Trial Pit Log					Trial Pit ID TP3	
Project Royston Road, Barkway				Co-ords Ground Level			Date 05 March 2024		
Job No. BMK23256				Dimensions (m) 0.6 x 3.0m			Scale		
Client Redrow Homes							Logged PA		
Samples & Insitu Testing			Strata Details					Water	Backfill
Depth (m)	Type	Testing	Level	Depth	Legend	Strata Description			
1				0.30		Dark grey brown clayey TOPSOIL			
						Firm to stiff light brown sandy gravelly CLAY. Gravel is of chalk and flint. ...becoming stiff to very stiff with increasing gravel content below 1.5			
2									
3				2.80					
Remarks									
Stability Pit sides stable.									
Groundwater None encountered.									

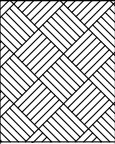
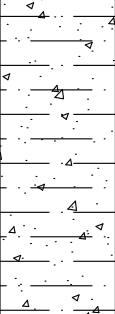
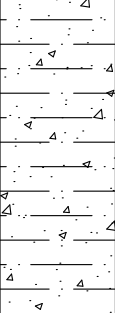
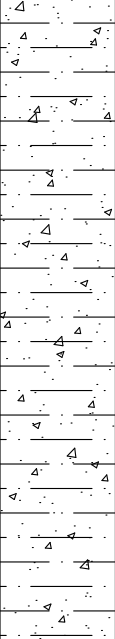


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Trial Pit Log

Trial Pit ID
TP4

Project	Royston Road, Barkway	Co-ords	Ground Level	Date	05 March 2024
Job No.	BMK23256	Dimensions (m)	0.6 x 3.0m	Scale	
Client	Redrow Homes			Logged	PA

Samples & Insitu Testing			Strata Details				Water	Backfill
Depth (m)	Type	Testing	Level	Depth	Legend	Strata Description		
				0.30		Dark grey brown clayey TOPSOIL		
1						Firm to stiff light brown sandy gravelly CLAY. Gravel is of chalk and flint.	1	
2						...becoming stiff to very stiff with increasing gravel content below 1.5	2	
3				3.00			3	

Remarks	
Stability	Pit sides stable.
Groundwater	None encountered.



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Trial Pit Log

Trial Pit ID

TP5

Project
Royston Road, Barkway

Co-ords
Ground Level

Date
05 March 2024

Job No.
BMK23256

Dimensions (m)
0.6 x 3.0m

Scale

Client
Redrow Homes

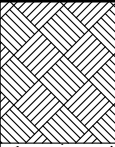
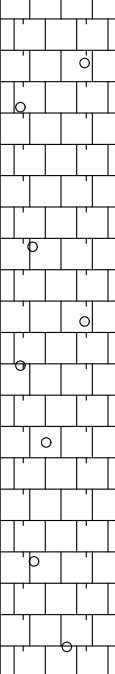
Logged
PA

Samples & Insitu Testing

Strata Details

Water

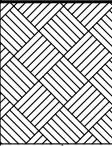
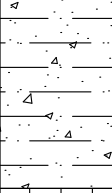
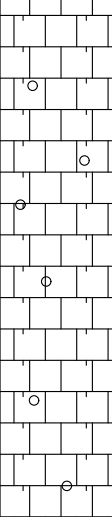
Backfill

Depth (m)	Type	Testing	Level	Depth	Legend	Strata Description	Water	Backfill
				0.30		Dark grey brown clayey TOPSOIL		
				0.50		Firm friable light brown gravelly sandy CLAY.		
1						CHALK very clayey sandy gravel with occasional flint cobbles.	1	
2				2.00			2	
3							3	

Remarks

Stability Pit sides stable.

Groundwater None encountered.

 A TETRA TECH COMPANY Aurora House, Deltic Avenue, Rooksley, Milton Keynes MK13 8LD T: +44 (0)1908 669 898 E: rpsmk@rpsgroup.com		Trial Pit Log				Trial Pit ID TP6		
Project Royston Road, Barkway			Co-ords Ground Level			Date 05 March 2024		
Job No. BMK23256			Dimensions (m) 0.6 x 3.0m			Scale		
Client Redrow Homes						Logged PA		
Samples & Insitu Testing			Strata Details				Water	Backfill
Depth (m)	Type	Testing	Level	Depth	Legend	Strata Description		
1				0.30		Dark grey brown clayey TOPSOIL		
				0.70		Firm friable light brown sandy CLAY.		
				1.80		CHALK very clayey sandy gravel with occasional flint cobbles.		
2								
3								
Remarks								
Stability Pit sides stable.								
Groundwater None encountered.								



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Trial Pit Log

Trial Pit ID

TP7

Project
Royston Road, Barkway

Co-ords
Ground Level

Date
05 March 2024

Job No.
BMK23256

Dimensions (m)
0.6 x 3.0m

Scale

Client
Redrow Homes

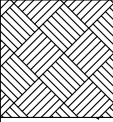
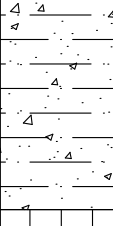
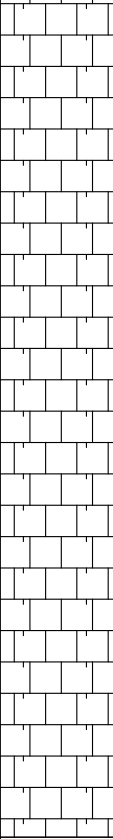
Logged
PA

Samples & Insitu Testing

Strata Details

Water

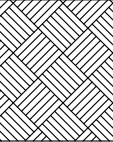
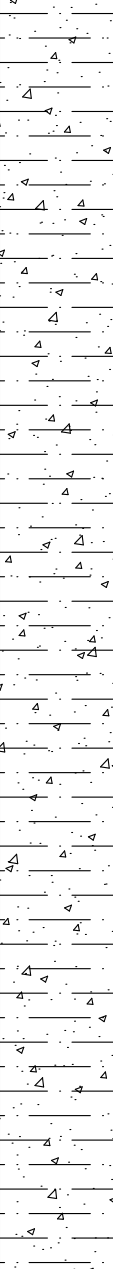
Backfill

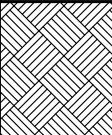
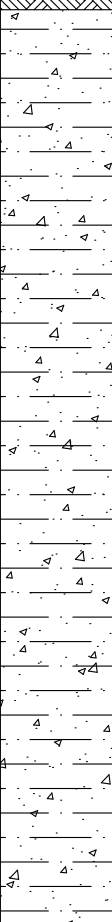
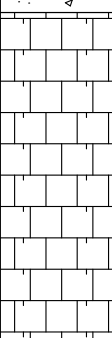
Depth (m)	Type	Testing	Level	Depth	Legend	Strata Description	Water	Backfill
				0.25		Dark grey brown clayey TOPSOIL		
				0.70		Firm dark reddish brown sandy gravelly CLAY.		
1						CHALK light cream brown clayey sandy gravel.	1	
2							2	
3				2.50			3	

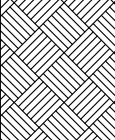
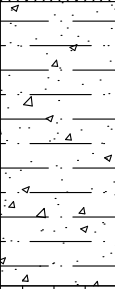
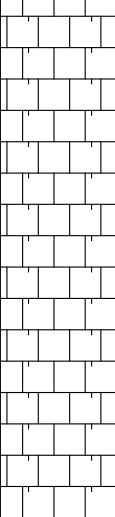
Remarks

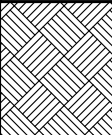
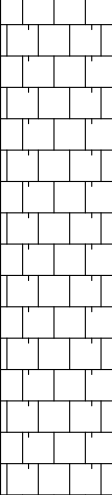
Stability Pit sides stable.

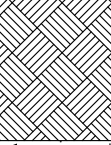
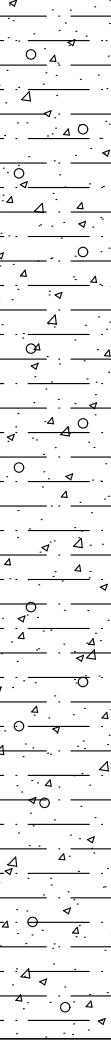
Groundwater None encountered.

rps A TETRA TECH COMPANY Aurora House, Deltic Avenue, Rooksley, Milton Keynes MK13 8LD T: +44 (0)1908 669 898 E: rpsmks@rpsgroup.com			Trial Pit Log					Trial Pit ID TP8	
Project Royston Road, Barkway				Co-ords Ground Level			Date 05 March 2024		
Job No. BMK23256				Dimensions (m) 0.6 x 3.0m			Scale		
Client Redrow Homes							Logged PA		
Samples & Insitu Testing			Strata Details					Water	Backfill
Depth (m)	Type	Testing	Level	Depth	Legend	Strata Description			
1				0.30		Dark grey brown clayey TOPSOIL			
						Stiff becoming very stiff grey brown sandy clay with increasing gravel of chalk and flint with depth.			
2									
3				3.00					
Remarks									
Stability Pit sides stable.									
Groundwater None encountered.									

 A TETRA TECH COMPANY Aurora House, Deltic Avenue, Rooksley, Milton Keynes MK13 8LD T: +44 (0)1908 669 898 E: rpsmk@rpsgroup.com		Trial Pit Log					Trial Pit ID TP9		
Project Royston Road, Barkway				Co-ords Ground Level			Date 05 March 2024		
Job No. BMK23256				Dimensions (m) 0.6 x 3.0m			Scale		
Client Redrow Homes							Logged PA		
Samples & Insitu Testing			Strata Details					Water	Backfill
Depth (m)	Type	Testing	Level	Depth	Legend	Strata Description			
1				0.30		Dark grey brown clayey TOPSOIL	1		
						Firm to stiff friable dark orange brown sandy gravelly CLAY.			
						CHALK cream sandy gravelly silt.			
2				2.25			2		
3				3.00			3		
Remarks									
Stability Pit sides stable.									
Groundwater None encountered.									

 A TETRA TECH COMPANY Aurora House, Deltic Avenue, Rooksley, Milton Keynes MK13 8LD T: +44 (0)1908 669 898 E: rpsmks@rpsgroup.com			Trial Pit Log				Trial Pit ID TP10	
Project Royston Road, Barkway			Co-ords Ground Level			Date 05 March 2024		
Job No. BMK23256			Dimensions (m) 0.6 x 3.0m			Scale		
Client Redrow Homes						Logged PA		
Samples & Insitu Testing			Strata Details				Water	Backfill
Depth (m)	Type	Testing	Level	Depth	Legend	Strata Description		
1				0.30		Dark grey brown clayey TOPSOIL		
				0.90		Firm to stiff friable light brown very sandy CLAY.		
				2.0		CHALK off-white very clay gravelly sand.		
3							3	
Remarks								
Stability Pit sides stable.								
Groundwater None encountered.								

 A TETRA TECH COMPANY Aurora House, Deltic Avenue, Rooksley, Milton Keynes MK13 8LD T: +44 (0)1908 669 898 E: rpsmks@rpsgroup.com			Trial Pit Log				Trial Pit ID TP11	
Project Royston Road, Barkway			Co-ords Ground Level			Date 05 March 2024		
Job No. BMK23256			Dimensions (m) 0.6 x 3.0m			Scale		
Client Redrow Homes						Logged PA		
Samples & Insitu Testing			Strata Details				Water	Backfill
Depth (m)	Type	Testing	Level	Depth	Legend	Strata Description		
1				0.30		Dark grey brown clayey TOPSOIL	1	
				0.75		Firm to stiff light brown very sandy gravelly CLAY.		
				1.80		CHALK off-white very clayey gravelly sand with occasional flint gravel.		
2							2	
3							3	
Remarks								
Stability Pit sides stable.								
Groundwater None encountered.								

 A TETRA TECH COMPANY Aurora House, Deltic Avenue, Rooksley, Milton Keynes MK13 8LD T: +44 (0)1908 669 898 E: rpsmks@rpsgroup.com			Trial Pit Log				Trial Pit ID TP12	
Project Royston Road, Barkway			Co-ords Ground Level			Date 05 March 2024		
Job No. BMK23256			Dimensions (m) 0.6 x 3.0m			Scale		
Client Redrow Homes						Logged PA		
Samples & Insitu Testing			Strata Details				Water	Backfill
Depth (m)	Type	Testing	Level	Depth	Legend	Strata Description		
1				0.30		Dark grey brown clayey TOPSOIL		
						Firm to stiff light grey brown sandy CLAY with much chalk gravel. ...increasing gravel at depth and with occasional chalk and flint cobbles.		
2								
3				2.50				
Remarks								
Stability Pit sides stable.								
Groundwater None encountered.								



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Trial Pit Log

Trial Pit ID

TP13

Project
Royston Road, Barkway

Co-ords
Ground Level

Date
05 March 2024

Job No.
BMK23256

Dimensions (m)
0.6 x 3.0m

Scale

Client
Redrow Homes

Logged
PA

Samples & Insitu Testing

Strata Details

Water

Backfill

Depth (m)	Type	Testing	Level	Depth	Legend	Strata Description	Water	Backfill
				0.30		Dark grey brown clayey TOPSOIL		
1						Firm to very stiff light grey brown sandy CLAY with increasing chalk and flint gravel and small cobbles with depth.	1	
2							2	
3				3.00			3	

Remarks

Stability Pit sides stable.

Groundwater None encountered.



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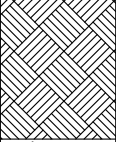
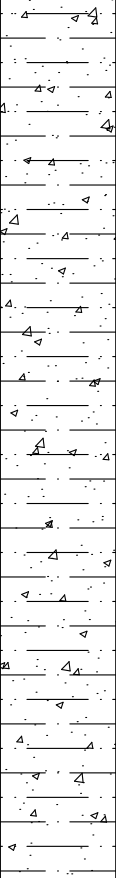
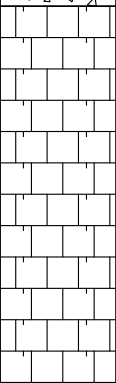
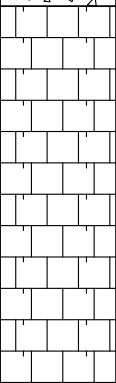
Trial Pit Log

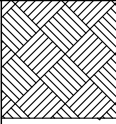
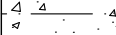
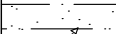
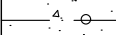
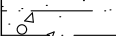
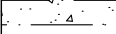
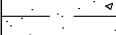
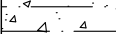
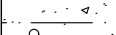
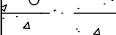
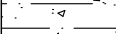
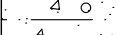
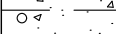
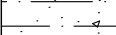
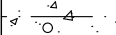
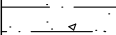
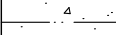
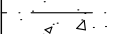
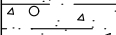
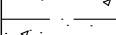
Trial Pit ID
TP14

Project	Royston Road, Barkway	Co-ords	Ground Level	Date	05 March 2024
Job No.	BMK23256	Dimensions (m)	0.6 x 3.0m	Scale	
Client	Redrow Homes			Logged	PA

Samples & Insitu Testing			Strata Details				Water	Backfill
Depth (m)	Type	Testing	Level	Depth	Legend	Strata Description		
				0.20		Dark grey MADE GROUND topsoil with brick and ash		
1						Firm to stiff light reddish brown gravelly CLAY. Gravel is of chalk and flint.	1	
2						...increasingly chalk gravel with depth.	2	
3				3.00			3	

Remarks	
Stability	Pit sides stable.
Groundwater	None encountered.

 A TETRA TECH COMPANY Aurora House, Deltic Avenue, Rooksley, Milton Keynes MK13 8LD T: +44 (0)1908 669 898 E: rpsmks@rpsgroup.com		Trial Pit Log				Trial Pit ID TP15											
Project Royston Road, Barkway			Co-ords Ground Level			Date 05 March 2024											
Job No. BMK23256			Dimensions (m) 0.6 x 3.0m			Scale											
Client Redrow Homes						Logged PA											
Samples & Insitu Testing			Strata Details				Water	Backfill									
Depth (m)	Type	Testing	Level	Depth	Legend	Strata Description											
1				0.30		Dark grey clayey TOPSOIL	1										
																	
				2						2.20		CHALK very clayey sand.					
																	
										3				3.00			
Remarks																	
Stability Pit sides stable.																	
Groundwater None encountered.																	

 A TETRA TECH COMPANY Aurora House, Deltic Avenue, Rooksley, Milton Keynes MK13 8LD T: +44 (0)1908 669 898 E: rpsmks@rpsgroup.com			Trial Pit Log					Trial Pit ID TP16	
Project Royston Road, Barkway				Co-ords Ground Level			Date 05 March 2024		
Job No. BMK23256				Dimensions (m) 0.6 x 3.0m			Scale		
Client Redrow Homes							Logged PA		
Samples & Insitu Testing			Strata Details					Water	Backfill
Depth (m)	Type	Testing	Level	Depth	Legend	Strata Description			
1				0.25		Dark grey clayey TOPSOIL			
									
									
									
									
									
									
									
									
									
2				2.50		Stiff to very stiff light grey brown sandy gravelly CLAY with occasional flint and chalk cobbles.			
									
									
									
									
									
									
									
									
									
3									
Remarks									
Stability Pit sides stable.									
Groundwater None encountered.									



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Trial Pit Log

Trial Pit ID

TP17

Project **Royston Road, Barkway**

Co-ords
Ground Level

Date 05 March 2024

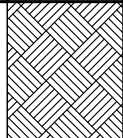
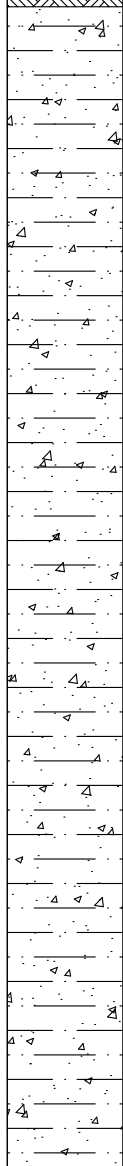
Job No. BMK23256

Dimensions (m) 0.6 x 3.0m

Scale

Client Redrow Homes

Logged PA

Samples & Insitu Testing			Strata Details				Water	Backfill
Depth (m)	Type	Testing	Level	Depth	Legend	Strata Description		
				0.30		Dark grey clayey TOPSOIL		
1						Stiff to very stiff light grey brown very sandy gravelly CLAY. ...increasing flint and chalk gravel with depth.	1	
2							2	
3				2.75			3	

Remarks

Stability Pit sides stable.

Groundwater None encountered.



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Trial Pit Log

Trial Pit ID

TP18

Project
Royston Road, Barkway

Co-ords
Ground Level

Date
05 March 2024

Job No.
BMK23256

Dimensions (m)
0.6 x 3.0m

Scale

Client
Redrow Homes

Logged
PA

Samples & Insitu Testing

Strata Details

Water

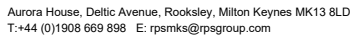
Backfill

Depth (m)	Type	Testing	Level	Depth	Legend	Strata Description	Water	Backfill
				0.25		Dark grey clayey TOPSOIL		
1						Stiff to very stiff light grey brown very sandy gravelly CLAY. ...increasing flint and chalk gravel with depth.	1	
2							2	
3				2.50			3	

Remarks

Stability Pit sides stable.

Groundwater None encountered.



Trial Pit ID

Project **Royston Road, Barkway**

Co-ords
Ground Level

Date 05 March 2024

Job No. BMK23256

Dimensions (m) 0.6 x 3.0m

Scale

Client Redrow Homes

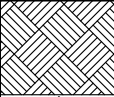
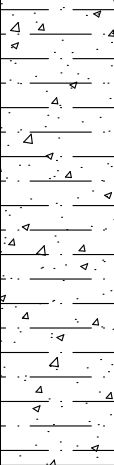
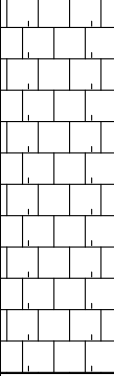
Logged PA

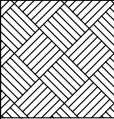
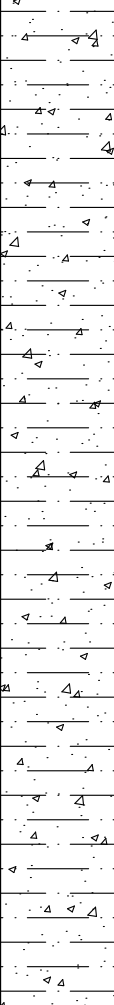
Stiff to very stiff dark reddish brown sandy
gravelly CLAY.

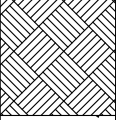
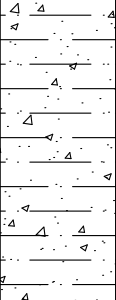
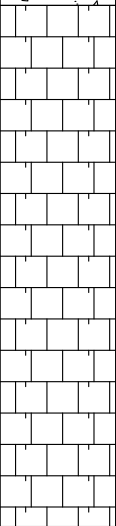
...becoming light grey brown with increasing
gravel of chalk.

Stability Pit sides stable.

Groundwater None encountered.

 A TETRA TECH COMPANY Aurora House, Deltic Avenue, Rooksley, Milton Keynes MK13 8LD T: +44 (0)1908 669 898 E: rpsmk@rpsgroup.com			Trial Pit Log				Trial Pit ID TP20	
Project Royston Road, Barkway			Co-ords Ground Level			Date 05 March 2024		
Job No. BMK23256			Dimensions (m) 0.6 x 3.0m			Scale		
Client Redrow Homes						Logged PA		
Samples & Insitu Testing			Strata Details				Water	Backfill
Depth (m)	Type	Testing	Level	Depth	Legend	Strata Description		
1				0.20		Dark grey clayey TOPSOIL	1	
						Stiff to very stiff dark brown sandy gravelly CLAY.		
2				1.20		CHALK off-white clayey sandy gravel.	2	
3				2.00			3	
Remarks								
Stability Pit sides stable.								
Groundwater None encountered.								

 A TETRA TECH COMPANY Aurora House, Deltic Avenue, Rooksley, Milton Keynes MK13 8LD T: +44 (0)1908 669 898 E: rpsmks@rpsgroup.com			Trial Pit Log				Trial Pit ID TP21						
Project Royston Road, Barkway			Co-ords Ground Level			Date 05 March 2024							
Job No. BMK23256			Dimensions (m) 0.6 x 3.0m			Scale							
Client Redrow Homes						Logged PA							
Samples & Insitu Testing			Strata Details				Water	Backfill					
Depth (m)	Type	Testing	Level	Depth	Legend	Strata Description							
1				0.25		Dark grey clayey TOPSOIL	1						
					Stiff dark reddish brown sandy gravelly CLAY. ...with small pockets of sandy chalk.								
				2								2	
				3								3	
				Remarks									
				Stability	Pit sides stable.								
				Groundwater	None encountered.								

 A TETRA TECH COMPANY Aurora House, Deltic Avenue, Rooksley, Milton Keynes MK13 8LD T: +44 (0)1908 669 898 E: rpsmk@rpsgroup.com			Trial Pit Log					Trial Pit ID TP22	
Project Royston Road, Barkway				Co-ords Ground Level			Date 05 March 2024		
Job No. BMK23256				Dimensions (m) 0.6 x 3.0m			Scale		
Client Redrow Homes							Logged PA		
Samples & Insitu Testing			Strata Details					Water	Backfill
Depth (m)	Type	Testing	Level	Depth	Legend	Strata Description			
1				0.25		Dark grey clayey TOPSOIL			
				0.90		Stiff reddish brown sandy gravelly CLAY.			
				2.00		CHALK very clayey gravelly sand with occasional flint gravel.			
3							3		
Remarks									
Stability Pit sides stable.									
Groundwater None encountered.									

APPENDIX C

FACTUAL REPORT BY GEOTECHNICS



Ground Investigation

at

Barkway

Project No: PC248721
Client: Redrow Homes
Engineer: RPS
Date: April 2024

Factual Report

Head Office

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Leeds, LS15 8GB
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Geotechnics Limited

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APPENDIX 2	Site Location Plan
APPENDIX 3	Site Photographs
APPENDIX 4	Borehole Records
APPENDIX 5	Exploratory Hole Location Plan
APPENDIX 6	Soakaway Test Results
APPENDIX 7	Investigation Techniques and General Notes



1.0 INTRODUCTION

A limited geotechnical investigation was undertaken by Geotechnics Limited at the site of a proposed housing development off Royston Road, Barkway, Hertfordshire. The investigation was carried out to the instructions of the Engineer, RPS on behalf of the Client, Redrow Homes. This report describes the work undertaken and presents the data obtained.

2.0 OBJECT AND SCOPE OF THE INVESTIGATION

The object of the investigation was to obtain information on the ground and groundwater conditions relating to design of proposed Sustainable Drainage Systems (SuDS) as part of a future housing development within the limitations posed by exploratory hole numbers, locations, depths, methods adopted and the scope of approved in situ and laboratory testing. The Brief for the project is included in Appendix 1. The investigation comprised cable percussive boreholes and in situ tests. A Factual Report was also commissioned.

3.0 PRESENTATION

A description of the site and a summary of the procedures followed during the investigation process are presented in Sections 4 to 6. The factual data so obtained are presented in Appendices 2 to 6 of this report. Attention is drawn to the General Notes and Investigation Procedures presented in Appendix 7 to aid an understanding of the procedures followed and the context in which the report should be read.

The report is presented in electronic PDF format with the data in electronic format in accordance with "The Electronic Transfer of Geotechnical Data from Ground Investigations" published by the AGS (the AGS Format) are presented separately as a digital file.

4.0 THE SITE

4.1 Location

The site is located on the northern fringes of village of Barkway, approximately 5.5km south east of Royston and 14km east-north east of Letchworth Garden City, between Royston Road and Cambridge Road. The approximate Ordnance Survey National Grid Reference for the centre of the site is TL 385 362 and an extract from the relevant 1:50,000 Scale O.S. Map (Sheet No. 154) is included as Appendix 2.

4.2 Description

The site is approximately rectangular in shape and covers an area of about 7.9 ha. The site comprises two agricultural fields with a hedgerow dividing the two and a mix of hedgerows and trees forming the site boundaries. The site is relatively flat, with a gentle slope down to the east. At the time of fieldwork, the western field was bare earth and the eastern field was short grass.

Photographs of the site taken during the fieldwork are presented in Appendix 3.

4.3 Site Geology

The 1:50,000 scale map published by the British Geological Survey, Sheet 221 dated 1995, shows the site to be underlain by superficial deposits comprising Till (now named as the Lowestoft Formation; chalky till, together with outwash sands and gravels, silts and clays) over bedrock of the Upper Chalk of Upper Cretaceous age which is now called the Lewes Nodular Chalk Formation and Seaford Chalk Formation (Undifferentiated). The map indicates that the Till includes chalk rafts.

4.4 Hydrogeology

The DEFRA Magic website and BGS website, accessed on the 12th March 2024, shows the superficial deposits to be a Secondary (Undifferentiated) Aquifer and the chalk bedrock to be a Principal Aquifer.

5.0 PROCEDURE

5.1 Commissioning

The work was awarded following submission of a proposal for ground investigation of the site in accordance with the Engineer's requirements (see Appendix 1).

5.2 General

The procedures followed in this site investigation are based on BS 5930: 2015+A1:2020 – Code of Practice for Site Investigations. The soils and rocks encountered have been described in accordance with BS5930:2015+A1:2020, BS EN ISO 14688-1:2018, BS EN ISO 14689:2018 and CIRIA Report C574. The Cable Percussive Borehole Records are included in Appendix 4 and their approximate positions are shown on the Exploratory Hole Location Plan in Appendix 5.

The Exploratory Hole locations were specified by the Engineer. The co-ordinates and levels shown on the Exploratory Hole Records were measured using a Leica GPS survey device. The depths quoted on the exploratory hole records are in metres below ground level.

At each exploratory hole location an inspection pit was excavated using hand tools to a depth of 1.20m below ground level to check for the presence of underground services. Prior to and on completion of the excavation, the location was scanned using a cable avoidance tool (CAT).

5.3 Boreholes

Three (3 No.), 200mm diameter boreholes (numbered BH01 to BH03) were sunk by Cable Percussion Tool techniques to depths varying between 10.00 and 20.00m below ground level. The work was carried out between the 4th and 7th March 2024.

The Engineer instructed that no samples were to be recovered from the boreholes. However, representative disturbed D samples were taken at regular intervals to assist in the description of the recovered soils. No groundwater was encountered during the drilling operations. It should be noted that the addition of water to the borehole as part of the

drilling process may have masked the presence of groundwater in the borehole. Where water was added it has been noted on the Borehole Records.

On completion, the boreholes were backfilled with arisings.

5.4 Borehole Soakaway

Three (3 No.) soakaway tests were carried out in each of the boreholes at the depths 10.00 to 20.00m bgl as instructed by the Engineer. The tests were undertaken in approximate accordance with the method given in BRE Digest 365 "Soakaway Design", 2016. Following the test procedures in the Digest the tests were repeated three times in BH02 and BH03.

The test in BH01 was only completed once. Due slow soakage of water from the borehole, the test was left overnight. The following morning the borehole was dry but had collapsed back to a depth of 18.82m or had silted up overnight. On the instruction of the Engineer, the test was abandoned.

The results of the borehole soakaway tests are presented in Appendix 6.

6.0 LABORATORY TESTING

6.1 Geotechnical

No geotechnical testing was requested or scheduled as part of this investigation.

6.2 Contamination

No geo-environmental testing was requested or scheduled as part of this investigation.

Prepared by:

Will Allaway
BSc (Hons) MEnvSC CEnv
Senior Engineer

Reviewed by:

Trevor Hardie
BSc, MSc, DIC, MICE, CEng
Chief Geotechnical Engineer

APPENDIX 1

The Brief

From: Steven Chapman <SChapman@geotechnics.co.uk>
Sent on: Thursday, February 15, 2024 9:58:20 AM
To: Neil Griffiths <ngriffiths@geotechnics.co.uk>; Nick Hutt <NHutt@geotechnics.co.uk>
Subject: FW: SITE AT BARKWAY, NORTH HERTS

Nick won't have had the delight of a Peter Atkinson enquiry yet – always full of detail....

Who fancies this one.

Regards,

Steven Chapman
Regional Operations Manager
Office Tel: 02476 694664 Direct Line: 07799 888363

From: Peter Atkinson <Peter.Atkinson@rpsgroup.com>
Sent: Thursday, February 15, 2024 9:45 AM
To: Steven Chapman <SChapman@geotechnics.co.uk>
Cc: Rob Webster <RWebster@geotechnics.co.uk>
Subject: SITE AT BARKWAY, NORTH HERTS

Morning Steve

Hope you are well. I likely have to get on with a couple of investigations – both for Redrow Homes.

Firstly this site is on the chalk and we are looking to do some boreholes and soakaway tests within these to see if feasible for stormwater disposal.

Could you prepare me a quote with an indication of likely lead-in time for:

Lets say up to 4 boreholes and lets do them at a slightly increased dia to give best chance of soakage – 200mm or 250mm

Say to 15m depth

Can you include the water tanker. We would use Wilsons of Wallington who are 5 mins away.

If you could give me some rates for sampling and testing also and installs should we decide

Site is a greenfield farmland site so clean but with no welfare or water etc.

Thanks

Peter

Peter Atkinson
Associate Director - Structural Engineering
RPS | Consulting UK & Ireland
Aurora House, Deltic Avenue,
Rooksley,
Milton Keynes, MK13 8LD, United Kingdom
T +44 1908 669 898 **M** 07596 579 891
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Temporary change to RPS Group email addresses

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- During this period our emails will be sent from @rps.tetrattech.com
- You will still be able to contact us using @rpsgroup.com



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RPS Group Limited web link: <http://www.rpsgroup.com>

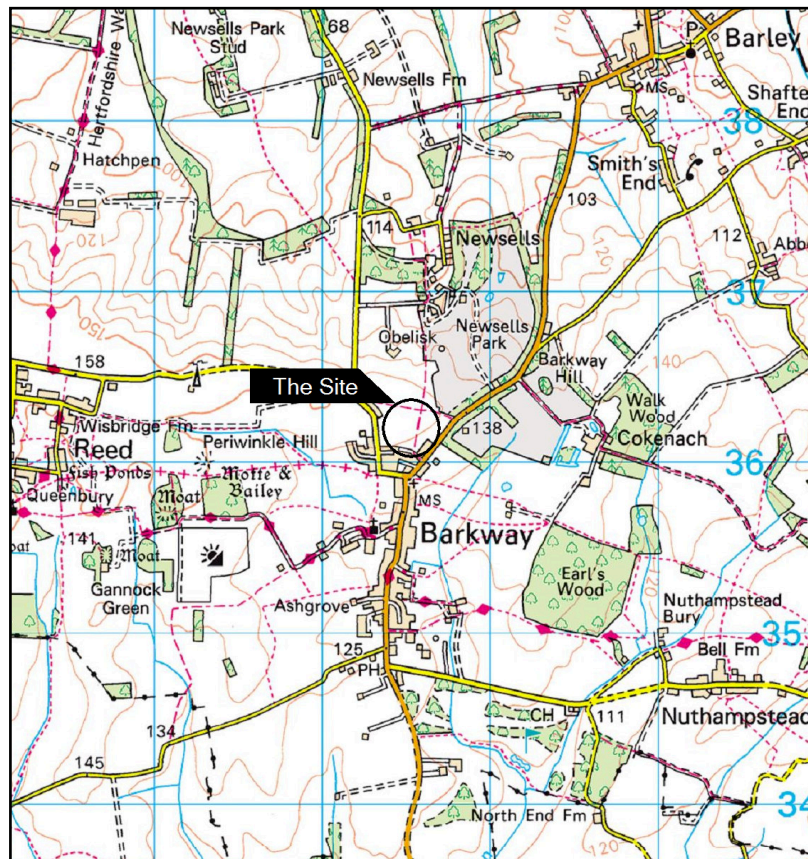


Borehole location plan Redrow Homes, Barkway

APPENDIX 2

Site Location Plan

Site Location Plan



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APPENDIX 3

Site Photographs

01 - Site Entrance Facing East



02 - BH01 Facing West



03 - BH02 Facing West



04 - BH03 Facing West



APPENDIX 4

Borehole Records

BOREHOLE RECORD - Cable Percussion

Project		Barkway		Engineer		RPS		Project No.		PC248721	
Client		RPS		National Grid Coordinates		538542.2 E 236298.2 N		Borehole		BH01	
								Ground Level		142.10 m OD	

Sampling			Properties			Strata				Scale 1:50	
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w(%)	SPT N	Description	Depth	Legend	Level (m OD)		
0.00 - 0.30	D					TOPSOIL: Soft brown slightly sandy slightly gravelly clay with occasional rootlets. Gravel is angular to subrounded fine to coarse of flint and chalk. Soft light brown, slightly sandy slightly gravelly calcareous CLAY. Gravel is angular to subrounded fine to coarse of chalk and flint.	0.30		141.80		
0.30 - 1.00	D										
1.00 - 2.00	D										
2.00 - 3.00	D										
3.00 - 4.00	D					Between 3.00-4.00m, no flint gravel.					
4.00 - 5.00	D										
5.00 - 6.00	D					From 5.00m, clay becomes soft to firm.					
6.00 - 7.00	D										
7.00 - 8.00	D										
8.00 - 9.00	D										
9.00 - 10.00	D					Between 9.00-10.00m, no flint gravel.					
10.00 - 11.00	D										

Boring				Progress				Groundwater							
Depth	Hole Dia.	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater	
		Inspection Pit Cable Percussion	LC/BB LC/BB	0.00			04/03/24	08:00							
				16.00	1.50	Dry	04/03/24	16:00							
				16.00	1.50	Dry	05/03/24	08:00							
				20.00	1.50	Dry	05/03/24	18:00							

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
No geotechnical /environmental samples were required by the Client.
Soakaway Tests undertaken on completion of borehole.
D samples taken for identification purposes.
No groundwater encountered during boring.
Water added to assist boring from GL-20.00m
Borehole backfilled with arisings on completion.
Logged in accordance with BS5930:2015 + A1:2020

Logged by

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Sheet 1 of 2

05/04/2024

GEOTECHNICS

BOREHOLE RECORD - Cable Percussion

Project	Barkway	Engineer	RPS	Project No.	PC248721
Client	RPS	National Grid Coordinates	538542.2 E 236298.2 N	Borehole	BH01
				Ground Level	142.10 m OD

Sampling			Properties			Strata		Scale 1:50	
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w(%)	SPT N	Description	Depth	Legend	Level (m OD)
11.00 - 12.00	D								
12.00 - 13.00	D								
13.00 - 14.00	D								
14.00 - 15.00	D								
15.00 - 16.00	D								
16.00 - 17.00	D								
17.00 - 18.00	D					CHALK recovered as cream mottled light brown slightly gravelly slightly sandy SILT. Gravel is weak medium density, cream with occasional black specks and subangular to subrounded fine to coarse. With angular to subangular fine to coarse gravel of flint.	17.10		125.00
18.00 - 19.00	D					CHALK recovered as slightly sandy silty subangular GRAVEL. Clasts are moderately weak, medium to high density, white with many black specks. Matrix is white.	18.00		124.10
19.00 - 20.00	D					Below 19.00m, with angular coarse gravel of flint.			
						End of Borehole	20.00		122.10

Boring				Progress					Groundwater				
Depth	Hole Dia.	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed

BOREHOLE RECORD - Cable Percussion

Project		Barkway		Engineer		RPS		Project No.		PC248721	
Client		RPS		National Grid Coordinates		538529.8 E 236153.3 N		Borehole		BH02	
								Ground Level		140.30 m OD	

Sampling			Properties			Strata				Scale 1:50	
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w(%)	SPT N	Description	Depth	Legend	Level (m OD)		
0.00 - 0.50	D					TOPSOIL: Soft brown slightly sandy slightly gravelly clay with occasional rootlets. Gravel is angular fine to coarse flint.					
0.50 - 1.00	D					Soft to firm light brown lightly sandy gravelly calcareous CLAY. Gravel is angular to subrounded fine to coarse chalk and flint.	0.50			139.80	
2.00 - 3.00	D					Between 2.00 to 3.00m, becoming slightly gravelly with a low cobble content of angular to sub-rounded flint.					
3.00 - 4.00	D					CHALK recovered as cream mottled light brown slightly sandy slightly gravelly SILT. Gravel is weak, low density with occasional black specks and subangular.	3.00			137.30	
4.00 - 5.00	D					CHALK recovered as white slightly sandy gravelly SILT. Gravel is weak, medium density, white with some black specks and subangular.	4.00			136.30	
5.00 - 6.00	D										
6.00 - 7.00	D										
7.00 - 8.00	D					CHALK recovered as slightly sandy silty subangular GRAVEL. Clasts are moderately weak, medium to high density, subangular to subrounded white with many black specks. Matrix is white.	7.00			133.30	
8.00 - 9.00	D										
9.00 - 10.00	D										
10.00 - 11.00	D										

Boring				Progress				Groundwater						
Depth	Hole Dia.	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
		Inspection Pit	LC/BB	0.00	0.00	Dry	06/03/24	08:00						
		Cable Percussion	LC/BB	11.00	1.50	Dry	06/03/24	18:00						
				11.00	1.50	Dry	07/03/24	08:00						
				15.37	1.50	Dry	07/03/24	18:00						

Remarks

 Inspection pit hand excavated to 1.20m depth and no services were found.
No geotechnical /environmental samples were required by the Client.
Soakaway Tests undertaken on completion of borehole.
D samples taken for identification purposes.
No groundwater encountered during boring.
Water added to assist boring from GL-15.37m
Borehole backfilled with arisings on completion.
Logged in accordance with BS5930:2015 + A1:2020

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Sheet 1 of 2

05/04/2024

 GEOTECHNICS

BOREHOLE RECORD - Cable Percussion

Project		Barkway		Engineer		RPS		Project No.		PC248721	
Client		RPS		National Grid Coordinates		538529.8 E 236153.3 N		Borehole		BH02	
								Ground Level		140.30 m OD	

Sampling			Properties			Strata							Scale 1:50	
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w(%)	SPT N	Description	Depth	Legend	Level (m OD)					
11.00 - 12.00	D													
12.00 - 13.00	D													
13.00 - 14.00	D													
14.00 - 15.00	D													
End of Borehole							15.37		124.93					

Boring				Progress					Groundwater					
Depth	Hole Dia.	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater

Remarks



Symbols and abbreviations are explained on the accompanying key sheets.
All dimensions are in metres.

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Sheet 2 of 2

05/04/2024

 GEOTECHNICS

Logged in accordance with BS5930:2015 + A1:2020

BOREHOLE RECORD - Cable Percussion

Project		Barkway		Engineer		RPS		Project No.		PC248721	
Client		RPS		National Grid		538747.5 E 236268.8 N		Borehole		BH03	
				Coordinates				Ground Level		139.50 m OD	

Sampling			Properties			Strata			Scale 1:50		
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w(%)	SPT N	Description	Depth	Legend	Level (m OD)		
0.00 - 0.30	D					MADE GROUND: Soft brown slightly sandy, slightly gravelly clay with occasional rootlets. Gravel is angular to subrounded fine to coarse flint and brick. Soft light brown slightly sandy slightly gravelly calcareous CLAY with occasional rootlets. Gravel is angular to subrounded fine to coarse chalk and flint.	0.30		139.20		
0.30 - 1.10	D						1.10		138.40		
1.10 - 2.00	D					CHALK recovered as white, slightly sandy slightly gravelly SILT. Gravel is low density subangular with occasional black specks with angular to subangular fine to coarse flint. Between 1.10 to 1.50m gravel of chalk is white in a cream, matrix mottled light brown in places. Between 3.40 to 4.00m matrix is orangish brown. Clasts of chalk are cream subangular to subrounded fine to coarse with rare gravel of angular to subangular fossiliferous limestone clast.					
2.00 - 3.00	D										
3.00 - 4.00	D										
4.00 - 5.00	D										
5.00 - 6.00	D					CHALK recovered as white slightly sandy silty subangular GRAVEL. Clasts are moderately weak, medium to high density, white subangular with many black specks. Matrix is white. Occasional angular to subangular fine to coarse gravel of flint.					
6.00 - 7.00	D						6.00	133.50			
7.00 - 8.00	D										
8.00 - 9.00	D										
9.00 - 10.00	D										

Boring				Progress				Groundwater						
Depth	Hole Dia.	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
10.30	0.15	Inspection Pit Cable Percussion	LC/BB LC/BB	0.00 10.30	1.50	Dry	06/03/24 06/03/24	08:00 18:00						

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
No geotechnical /environmental samples were required by the Client.
Soakaway Tests undertaken on completion of borehole.
D samples taken for identification purposes.
No groundwater encountered during boring.
Water added to assist boring from GL-10.30m
Borehole backfilled with arisings on completion.
Logged in accordance with BS5930:2015 + A1:2020

Logged by

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Sheet 1 of 2

05/04/2024

GEOTECHNICS

BOREHOLE RECORD - Cable Percussion

Project		Barkway		Engineer		RPS		Project No.		PC248721	
Client		RPS		National Grid Coordinates		538747.5 E 236268.8 N		Borehole		BH03	
								Ground Level		139.50 m OD	

Sampling			Properties			Strata			Scale 1:50		
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w(%)	SPT N	Description			Depth	Legend	Level (m OD)
						End of Borehole			10.30		129.20

Boring				Progress					Groundwater					
Depth	Hole Dia.	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater

Remarks



Symbols and abbreviations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged by

Checked by

Figure

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Sheet 2 of 2

05/04/2024



GEOTECHNICS

Logged in accordance with BS5930:2015 + A1:2020

APPENDIX 5

Exploratory Hole Location Plan



Legend

 Locations of CP



Phone:
Email:

Engineer:
RPS
Client:
Redrow Homes
Project:
Barkway

Drawing Title:
Exploratory Hole Location Plan

Scale:
1:2000 at A3

Date:
14/03/2024

Project No.:
PC248721

**Exploratory Hole
Location Plan**

APPENDIX 6

Soakaway Test Results

INSITU TESTING - Soakaway Test

Form INS010 Rev 2

Project Barkway

Borehole No. BH01

Test No 1

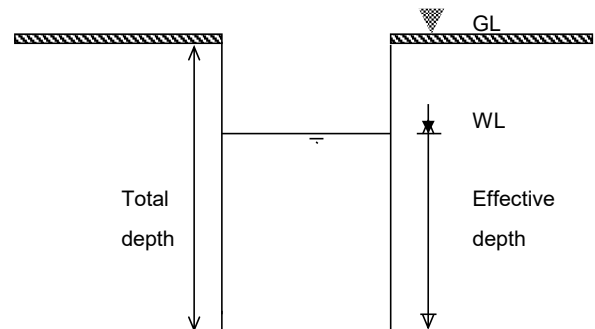
Project No PC248721

Date 05/03/2024

Client Redrow Homes

ELAPSED TIME (mins)	DEPTH of water below ground level (m)	HEAD (m)	HEAD (%)
0.00	17.10	2.90	100.00
0.50	17.11	2.89	99.66
1.00	17.12	2.88	99.31
1.50	17.12	2.88	99.31
2.00	17.13	2.87	98.97
2.50	17.16	2.84	97.93
3.00	17.20	2.80	96.55
3.50	17.22	2.78	95.86
4.00	17.24	2.76	95.17
5.00	17.30	2.70	93.10
6.00	17.33	2.67	92.07
7.00	17.37	2.63	90.69
8.00	17.40	2.60	89.66
9.00	17.43	2.57	88.62
10.00	17.45	2.55	87.93
15.00	17.56	2.44	84.14
20.00	17.65	2.35	81.03
25.00	17.71	2.29	78.97
30.00	17.79	2.21	76.21
45.00	17.92	2.08	71.72
60.00	18.01	1.99	68.62
90.00	18.16	1.84	63.45
120.00	18.29	1.71	58.97
150.00	18.37	1.63	56.21
180.00	18.42	1.58	54.48
210.00	18.46	1.54	53.10
240.00	18.48	1.52	52.41

BOREHOLE SOAKAWAY



Borehole diameter = 0.200 m

Borehole depth = 20.000 m

Effective depth (Head of Water) = 2.900 m

Initial depth from GL	=	17.100m	
% of effective depth	Head (m)	Depth from GL (m)	Time (mins)
75%	2.175	17.825	
25%	0.725	19.275	
Vp75-25	=	m ³	
ap50	=	m ²	
tp75-25	=	min	
Soil Infiltration, f	=	* m/sec	

Sheet 1 of 2

Remarks Infiltration Rate not estimated as test curve did not cross 25% of the Effective Depth.

GEOTECHNICS

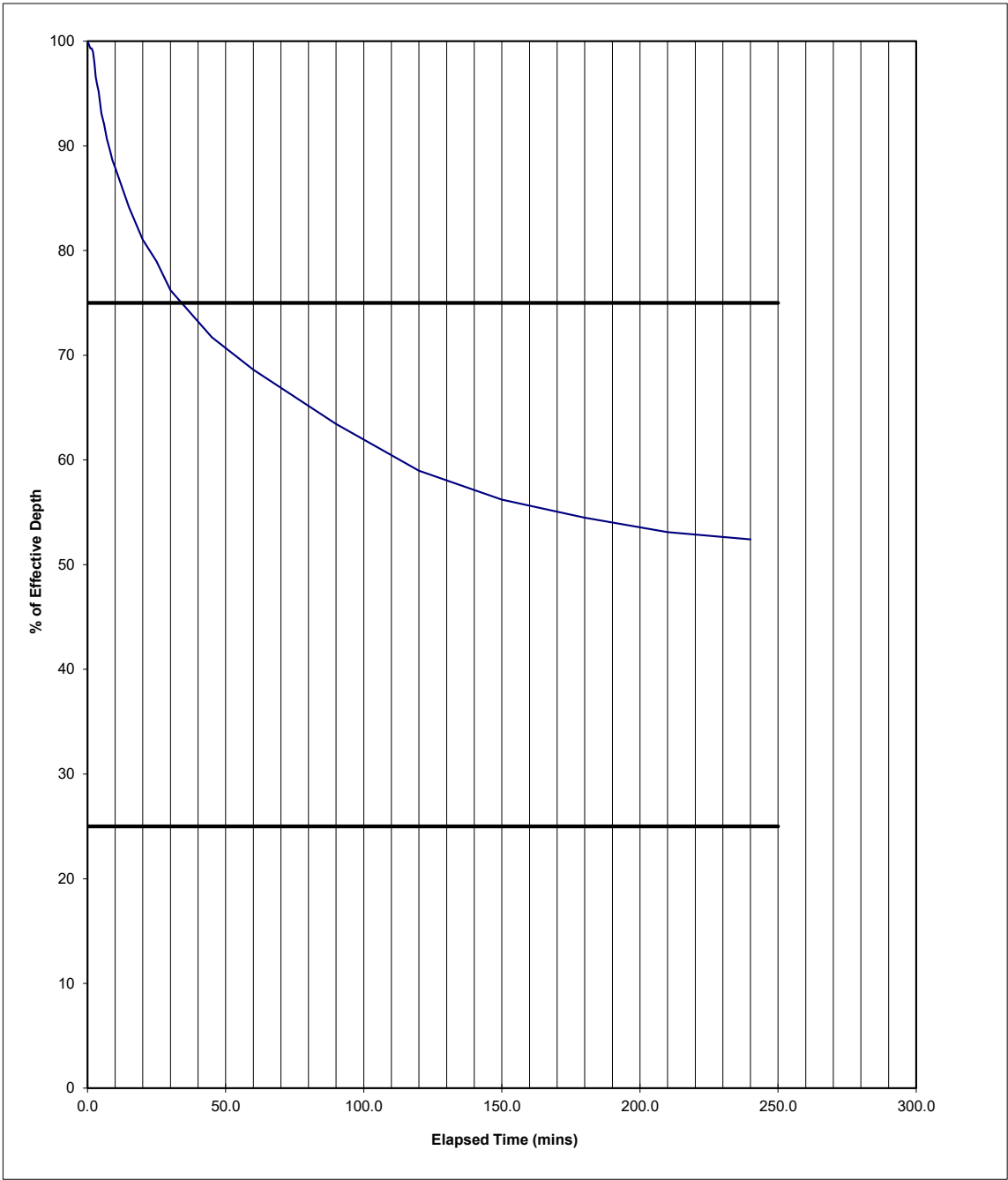
INSITU TESTING - Soakaway Test

Form INS010 Rev 2

Project Barkway

Client Redrow Homes

Borehole No. BH01
Test No 1
Project No PC248721
Date 05/03/2024



tp75	=
tp25	=

Remarks Infiltration Rate not estimated as test curve did not cross 25% of the Effective Depth.

INSITU TESTING - Soakaway Test

Form INS010 Rev 2

Project Barkway

Borehole No.

BH02

Test No

1

Project No

PC248721

Date

07/03/2024

Client

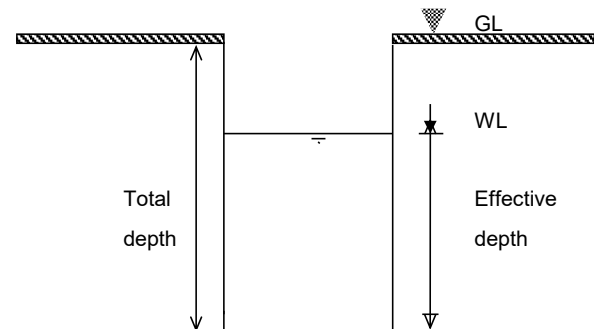
Redrow Homes

ELAPSED TIME (mins)	DEPTH of water below ground level (m)	HEAD (m)	HEAD (%)
0.00	11.32	4.05	100.00
0.50	11.63	3.74	92.35
1.00	11.81	3.56	87.90
1.50	12.00	3.37	83.21
2.00	12.14	3.23	79.75
2.50	12.26	3.11	76.79
3.00	12.40	2.97	73.33
3.50	12.51	2.86	70.62
4.00	12.62	2.75	67.90
5.00	12.81	2.56	63.21
6.00	12.96	2.41	59.51
7.00	13.11	2.26	55.80
8.00	13.24	2.13	52.59
9.00	13.37	2.00	49.38
10.00	13.47	1.90	46.91
15.00	13.83	1.54	38.02
20.00	14.02	1.35	33.33
25.00	14.16	1.21	29.88
30.00	14.22	1.15	28.40
45.00	14.29	1.08	26.67
60.00	14.33	1.04	25.68
90.00	14.37	1.00	24.69

Depth to top of Granular Fill if used (m bgl) = x

Porosity of Gravel Fill if used (%) = x

BOREHOLE SOAKAWAY



Borehole diameter = 0.200 m

Borehole depth = 15.370 m

Effective depth (Head of Water) = 4.050 m

Initial depth from GL	=	11.320m	
% of effective depth	Head (m)	Depth from GL (m)	Time (mins)
75%	3.038	12.333	2.75
25%	1.013	14.358	82.00
Vp75-25	=	0.064	m ³
ap50	=	1.304	m ²
tp75-25	=	79.250	min
Soil Infiltration, f	=	1.03E-05	m/sec

Sheet 1 of 2

Remarks

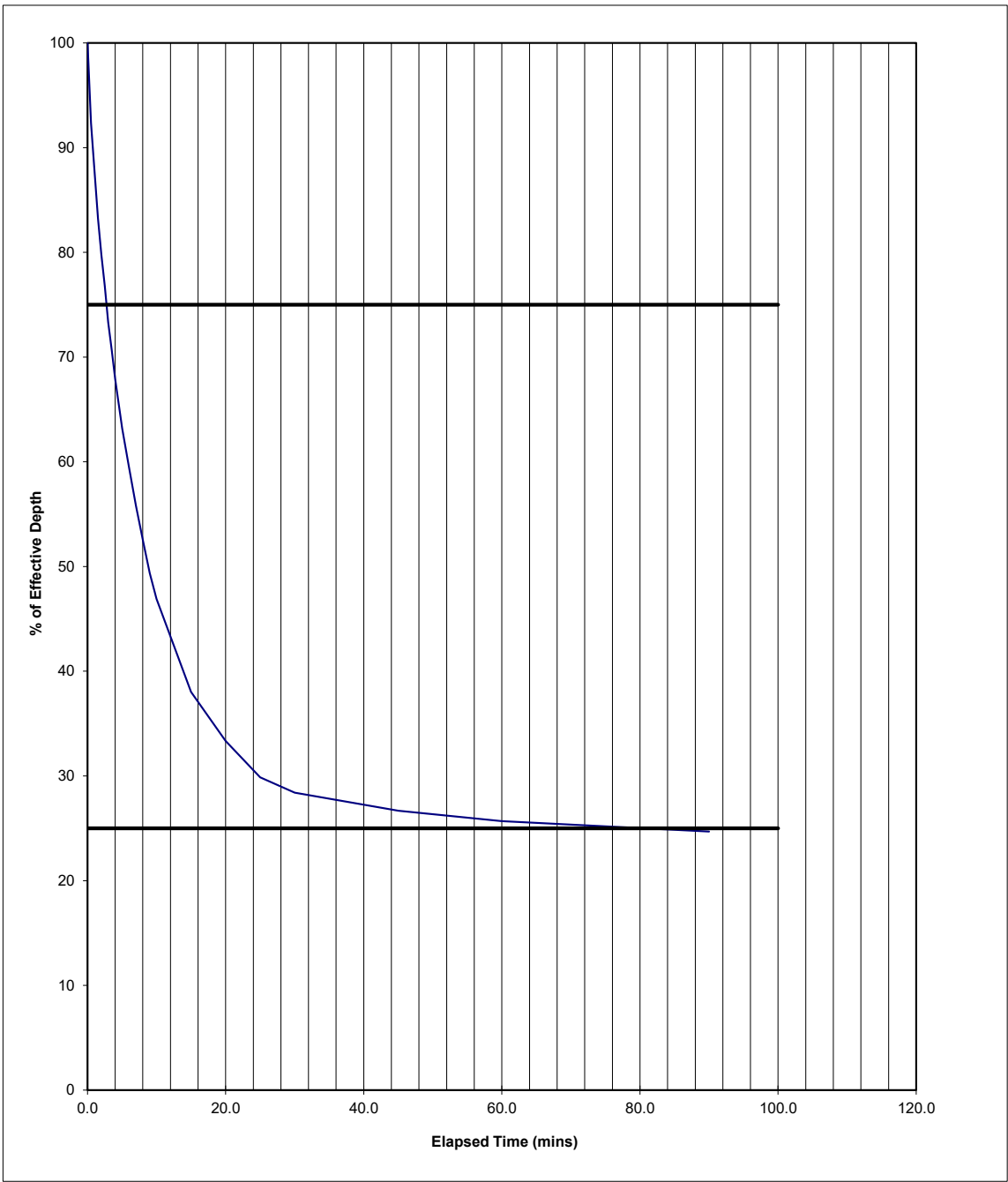
INSITU TESTING - Soakaway Test

Form INS010 Rev 2

Project Barkway

Client Redrow Homes

Borehole No. BH02
Test No 1
Project No PC248721
Date 07/03/2024



tp75	=	2.75
tp25	=	82.00

Remarks

INSITU TESTING - Soakaway Test

Form INS010 Rev 2

Project Barkway

Borehole No. BH02

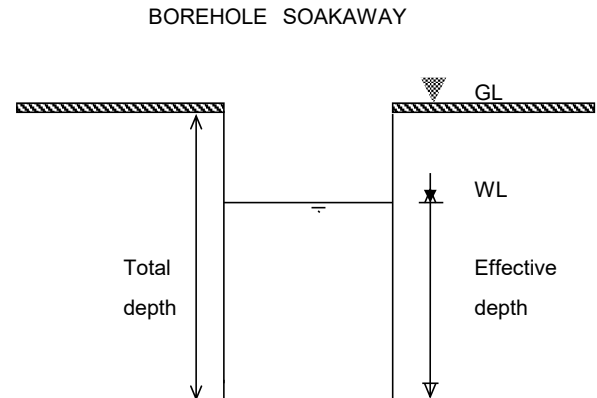
Test No 2

Project No PC248721

Date 07/03/2024

Client Redrow Homes

ELAPSED TIME (mins)	DEPTH of water below ground level (m)	HEAD (m)	HEAD (%)
0.00	10.96	4.33	100.00
0.50	11.17	4.12	95.15
1.00	11.34	3.95	91.22
1.50	11.50	3.79	87.53
2.00	11.62	3.67	84.76
2.50	11.73	3.56	82.22
3.00	11.80	3.49	80.60
3.50	11.92	3.37	77.83
4.00	12.01	3.28	75.75
5.00	12.16	3.13	72.29
6.00	12.32	2.97	68.59
7.00	12.43	2.86	66.05
8.00	12.55	2.74	63.28
9.00	12.66	2.63	60.74
10.00	12.76	2.53	58.43
15.00	13.17	2.12	48.96
20.00	13.50	1.79	41.34
25.00	13.70	1.59	36.72
30.00	13.89	1.40	32.33
45.00	14.15	1.14	26.33
60.00	14.24	1.05	24.25
90.00	14.27	1.02	23.56
120.00	14.30	0.99	22.86
150.00	14.31	0.98	22.63



Borehole diameter = 0.200 m

Borehole depth = 15.290 m

Effective depth (Head of Water) = 4.330 m

Initial depth from GL	=	10.960m	
% of effective depth	Head (m)	Depth from GL (m)	Time (mins)
75%	3.248	12.043	4.00
25%	1.083	14.208	36.00
Vp75-25	=	0.068	m ³
ap50	=	1.392	m ²
tp75-25	=	32.000	min
Soil Infiltration, f	=	2.55E-05	m/sec

Depth to top of Granular Fill if used (m bgl) = x

Porosity of Gravel Fill if used (%) = x

Sheet 1 of 2

Remarks

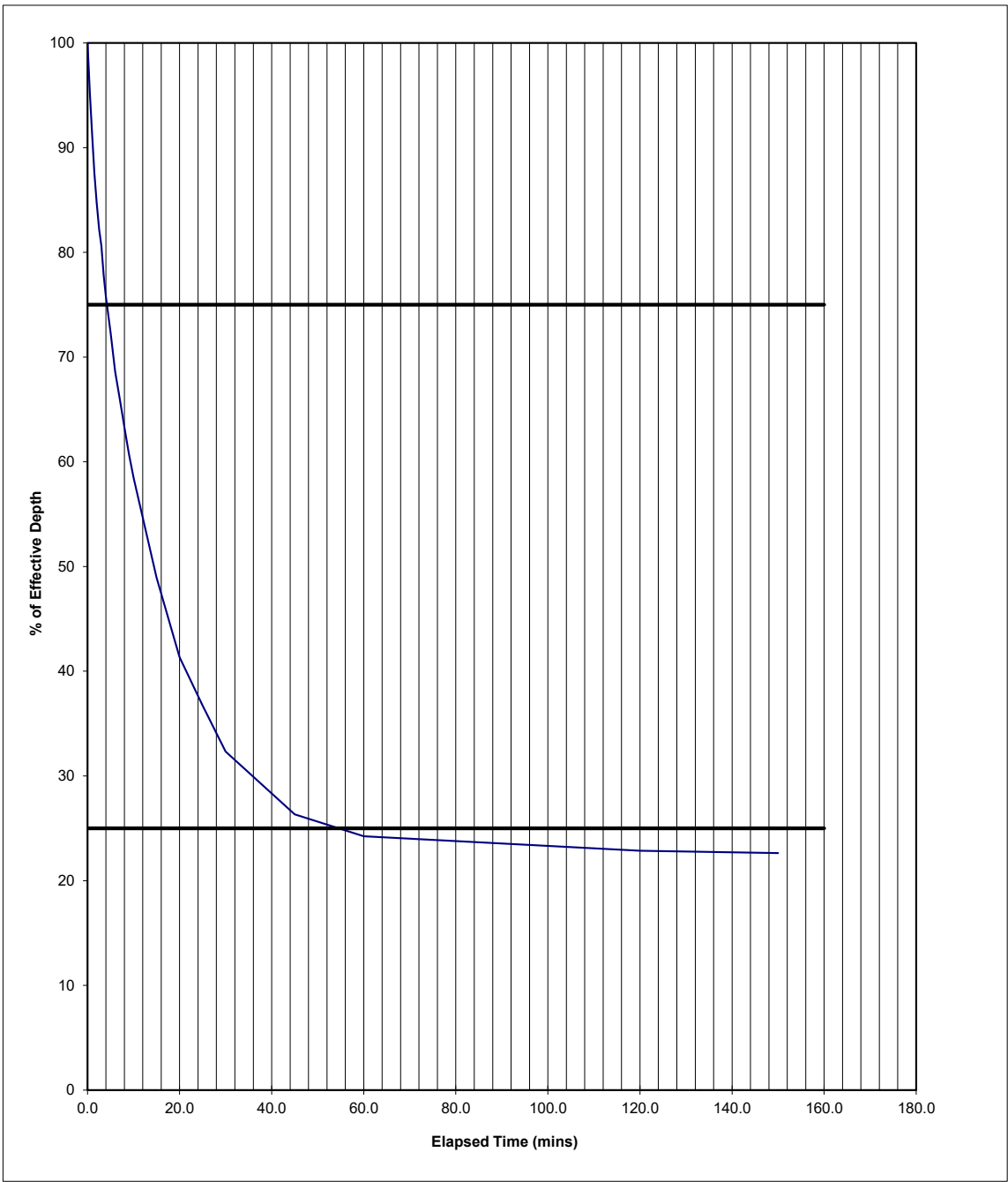
INSITU TESTING - Soakaway Test

Form INS010 Rev 2

Project Barkway

Client Redrow Homes

Borehole No. BH02
Test No 2
Project No PC248721
Date 07/03/2024



tp75	=	4.00
tp25	=	36.00

Remarks

INSITU TESTING - Soakaway Test

Form INS010 Rev 2

Project Barkway

Borehole No. BH02

Test No 3

Project No PC248721

Date 08/03/2024

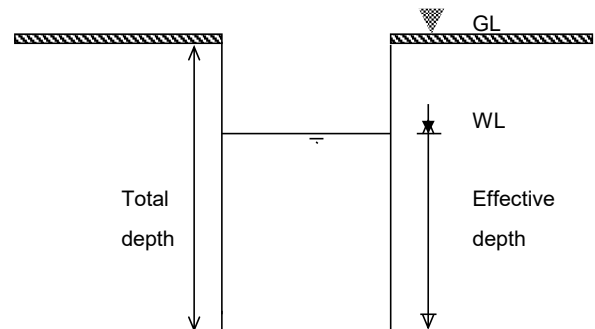
Client Redrow Homes

ELAPSED TIME (mins)	DEPTH of water below ground level (m)	HEAD (m)	HEAD (%)
0.00	10.33	4.13	100.00
0.50	10.60	3.86	93.46
1.00	10.79	3.67	88.86
1.50	11.02	3.44	83.29
2.00	11.21	3.25	78.69
2.50	11.38	3.08	74.58
3.00	11.51	2.95	71.43
3.50	11.62	2.84	68.77
4.00	11.71	2.75	66.59
5.00	11.92	2.54	61.50
6.00	12.11	2.35	56.90
7.00	12.26	2.20	53.27
8.00	12.38	2.08	50.36
9.00	12.50	1.96	47.46
10.00	12.62	1.84	44.55
15.00	13.08	1.38	33.41
20.00	13.44	1.02	24.70
25.00	13.65	0.81	19.61
30.00	13.87	0.59	14.29
45.00	14.12	0.34	8.23
60.00	14.23	0.23	5.57
90.00	14.29	0.17	4.12

Depth to top of Granular Fill if used (m bgl) = x

Porosity of Gravel Fill if used (%) = x

BOREHOLE SOAKAWAY



Borehole diameter = 0.200 m

Borehole depth = 14.460 m

Effective depth (Head of Water) = 4.130 m

Initial depth from GL	=	10.330m	
% of effective depth	Head (m)	Depth from GL (m)	Time (mins)
75%	3.098	11.363	2.50
25%	1.033	13.428	20.00
Vp75-25	=	0.065	m ³
ap50	=	1.329	m ²
tp75-25	=	17.500	min
Soil Infiltration, f	=	4.65E-05	m/sec

Remarks

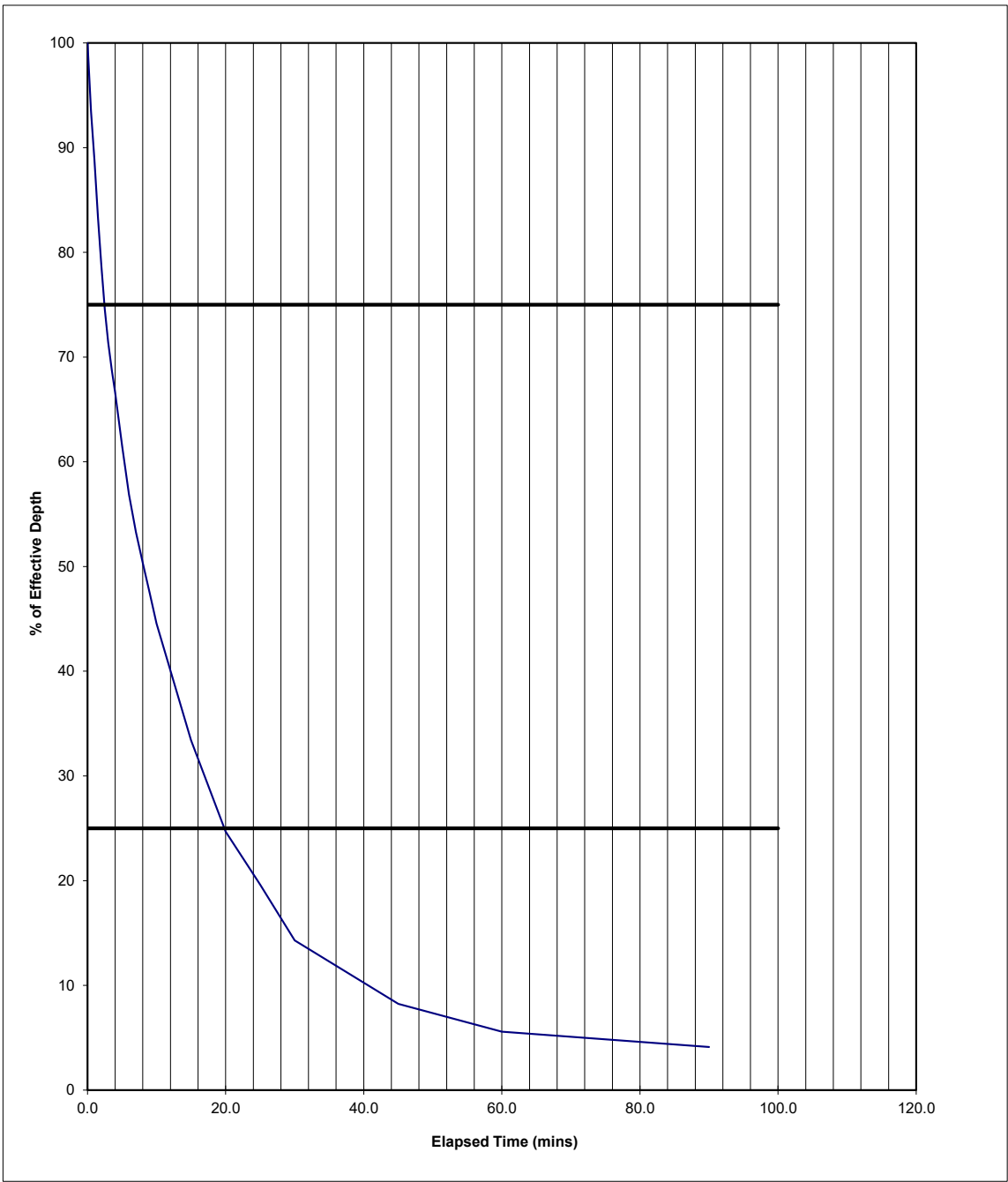
INSITU TESTING - Soakaway Test

Form INS010 Rev 2

Project Barkway

Client Redrow Homes

Borehole No. BH02
Test No 3
Project No PC248721
Date 08/03/2024



tp75	=	2.50
tp25	=	20.00

Remarks

INSITU TESTING - Soakaway Test

Form INS010 Rev 2

Project Barkway

Borehole No. BH03

Test No 1

Project No PC248721

Date 06/03/2024

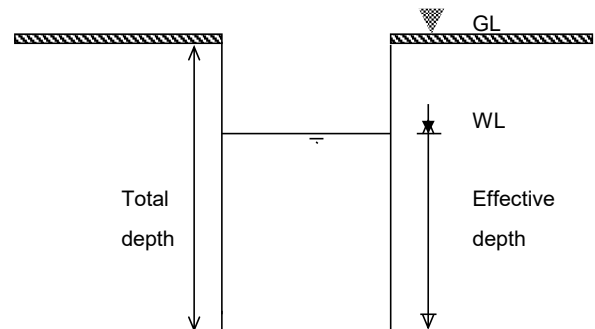
Client Redrow Homes

ELAPSED TIME (mins)	DEPTH of water below ground level (m)	HEAD (m)	HEAD (%)
0.00	6.32	3.98	100.00
0.50	6.55	3.75	94.22
1.00	6.69	3.61	90.70
1.50	6.85	3.45	86.68
2.00	6.97	3.33	83.67
2.50	7.08	3.22	80.90
3.00	7.24	3.06	76.88
3.50	7.28	3.02	75.88
4.00	7.36	2.94	73.87
5.00	7.46	2.84	71.36
6.00	7.59	2.71	68.09
7.00	7.70	2.60	65.33
8.00	7.78	2.52	63.32
9.00	7.87	2.43	61.06
10.00	7.92	2.38	59.80
15.00	8.00	2.30	57.79
20.00	8.39	1.91	47.99
25.00	8.49	1.81	45.48
30.00	8.59	1.71	42.96
45.00	8.70	1.60	40.20
60.00	8.73	1.57	39.45
95.00	8.75	1.55	38.94

Depth to top of Granular Fill if used (m bgl) = x

Porosity of Gravel Fill if used (%) = x

BOREHOLE SOAKAWAY



Borehole diameter = 0.200 m

Borehole depth = 10.300 m

Effective depth (Head of Water) = 3.980 m

Initial depth from GL	=	6.320m	
% of effective depth	Head (m)	Depth from GL (m)	Time (mins)
75%	2.985	7.315	
25%	0.995	9.305	
Vp75-25	=	m ³	
ap50	=	m ²	
tp75-25	=	min	
Soil Infiltration, f	=	* m/sec	

Sheet 1 of 2

Remarks Infiltration Rate not estimated as test curve did not cross 25% of the Effective Depth.

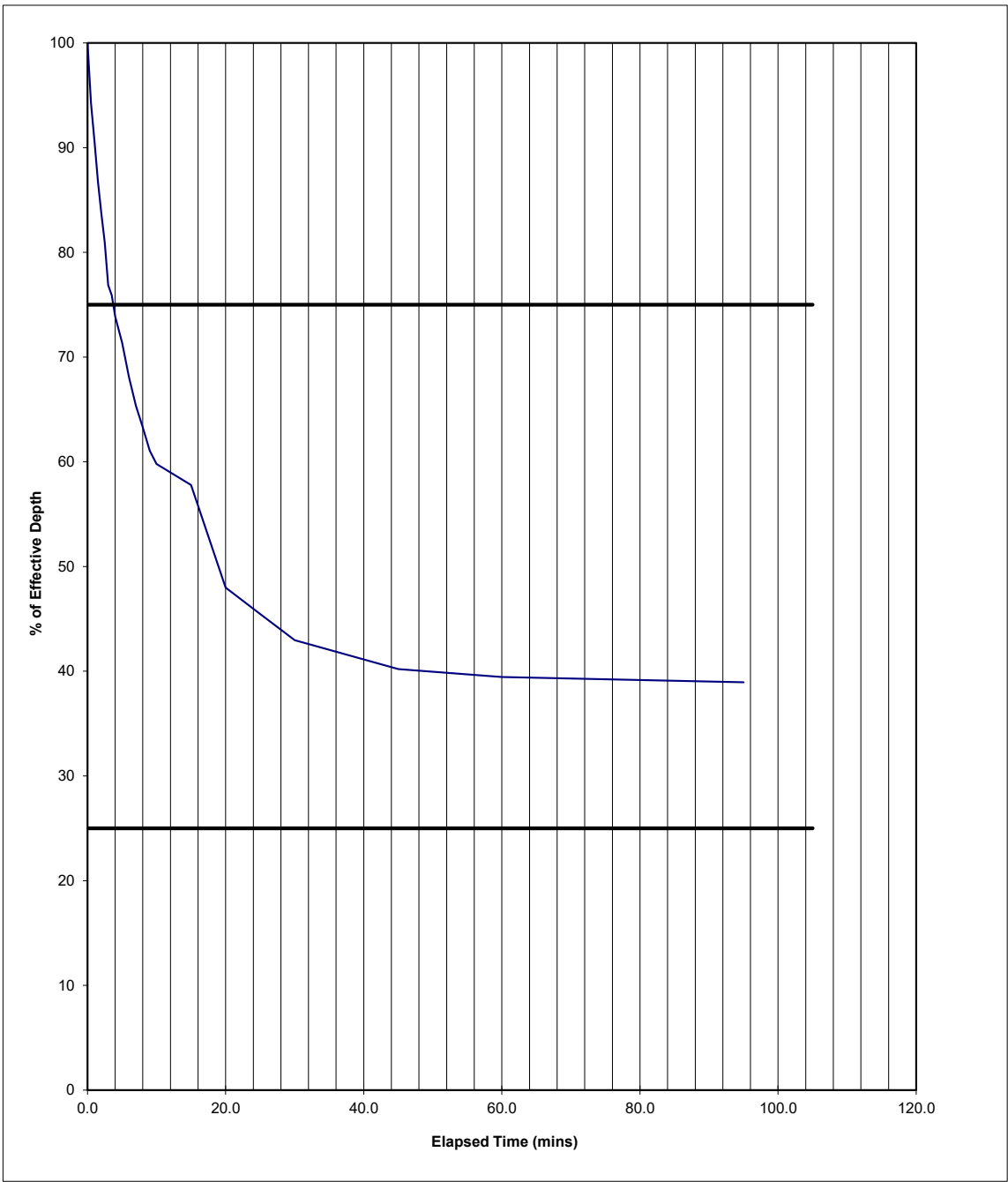
INSITU TESTING - Soakaway Test

Form INS010 Rev 2

Project Barkway

Client Redrow Homes

Borehole No. BH03
Test No 1
Project No PC248721
Date 06/03/2024



tp75	=
tp25	=

Remarks Infiltration Rate not estimated as test curve did not cross 25% of the Effective Depth.

INSITU TESTING - Soakaway Test

Form INS010 Rev 2

Project Barkway

Borehole No.

BH03

Test No

2

Project No

PC248721

Date

06/03/2024

Client

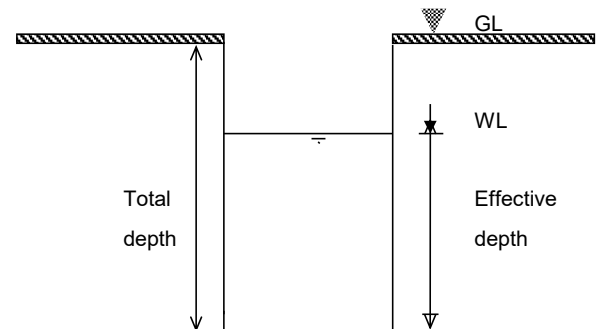
Redrow Homes

ELAPSED TIME (mins)	DEPTH of water below ground level (m)	HEAD (m)	HEAD (%)
0.00	5.93	3.57	100.00
0.50	6.20	3.30	92.44
1.00	6.28	3.22	90.20
1.50	6.39	3.11	87.11
2.00	6.47	3.03	84.87
2.50	6.53	2.97	83.19
3.00	6.62	2.88	80.67
3.50	6.70	2.80	78.43
4.00	6.80	2.70	75.63
5.00	6.92	2.58	72.27
6.00	7.04	2.46	68.91
7.00	7.15	2.35	65.83
8.00	7.24	2.26	63.31
9.00	7.32	2.18	61.06
10.00	7.39	2.11	59.10
15.00	7.63	1.87	52.38
20.00	7.81	1.69	47.34
25.00	7.94	1.56	43.70
30.00	8.11	1.39	38.94
45.00	8.35	1.15	32.21
60.00	8.46	1.04	29.13
105.00	8.52	0.98	27.45
1086.00	8.85	0.65	18.21

Depth to top of Granular Fill if used (m bgl) = x

Porosity of Gravel Fill if used (%) = x

BOREHOLE SOAKAWAY



Borehole diameter = 0.200 m

Borehole depth = 9.500 m

Effective depth (Head of Water) = 3.570 m

Initial depth from GL	=	5.930m	
% of effective depth	Head (m)	Depth from GL (m)	Time (mins)
75%	2.678	6.823	4.00
25%	0.893	8.608	320.00
Vp75-25	=	0.056	m ³
ap50	=	1.153	m ²
tp75-25	=	316.000	min
Soil Infiltration, f	=	2.57E-06	m/sec

Remarks

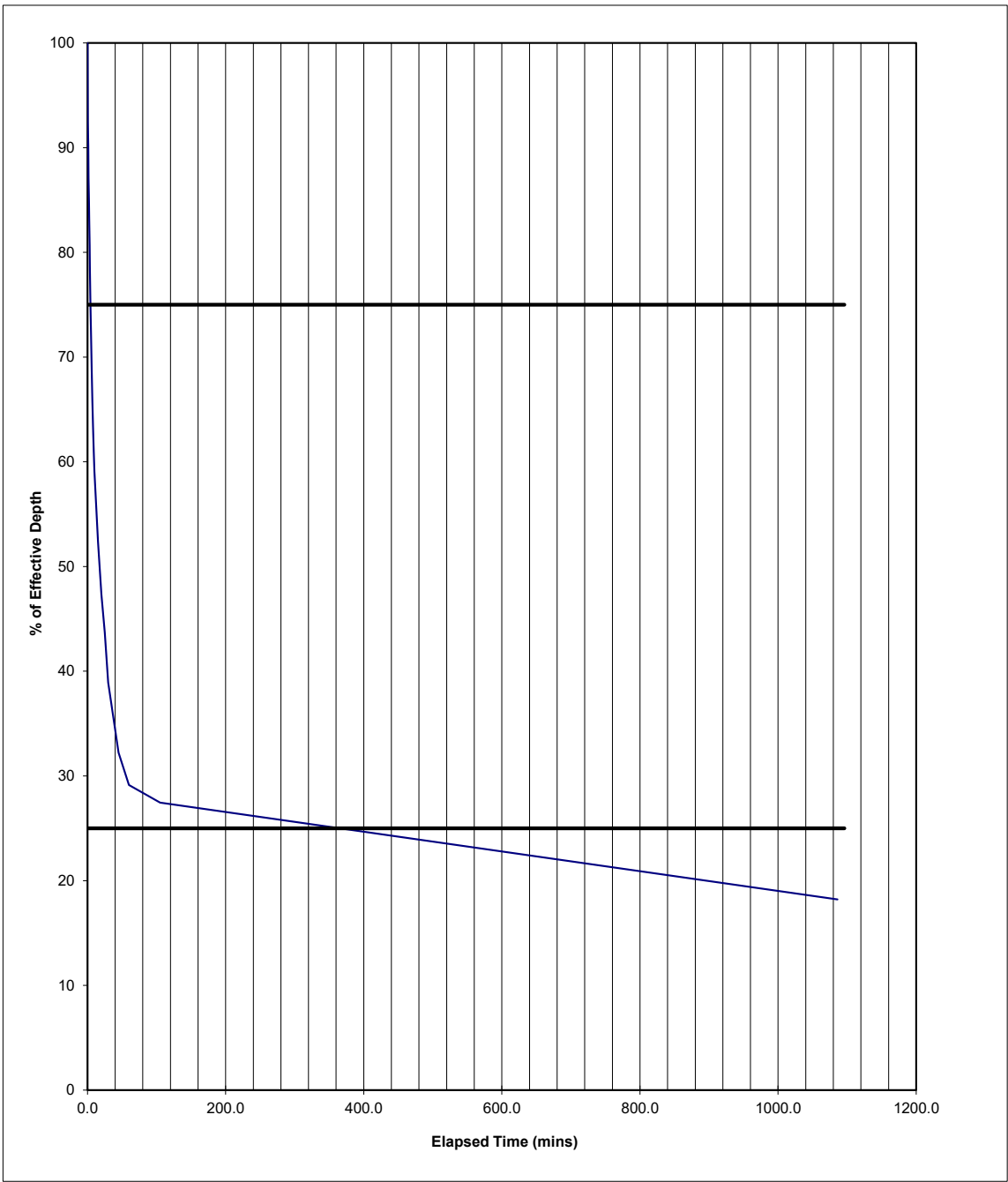
INSITU TESTING - Soakaway Test

Form INS010 Rev 2

Project Barkway

Client Redrow Homes

Borehole No. BH03
Test No 2
Project No PC248721
Date 06/03/2024



tp75	=	4.00
tp25	=	320.00

Remarks

INSITU TESTING - Soakaway Test

Form INS010 Rev 2

Project Barkway

Borehole No. BH03

Test No 3

Project No PC248721

Date 07/03/2024

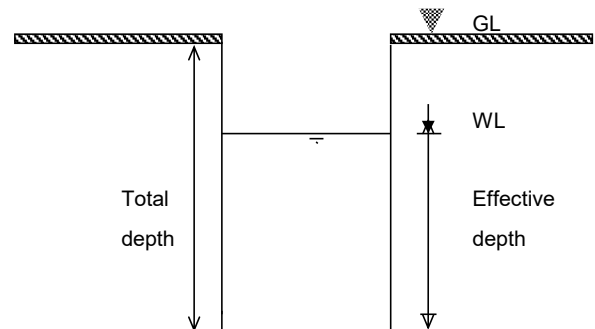
Client Redrow Homes

ELAPSED TIME (mins)	DEPTH of water below ground level (m)	HEAD (m)	HEAD (%)
0.00	5.46	3.82	100.00
0.50	5.72	3.56	93.19
1.00	5.90	3.38	88.48
1.50	6.02	3.26	85.34
2.00	6.13	3.15	82.46
2.50	6.26	3.02	79.06
3.00	6.36	2.92	76.44
3.50	6.44	2.84	74.35
4.00	6.51	2.77	72.51
5.00	6.69	2.59	67.80
6.00	6.82	2.46	64.40
7.00	6.96	2.32	60.73
8.00	7.10	2.18	57.07
9.00	7.21	2.07	54.19
10.00	7.31	1.97	51.57
15.00	7.66	1.62	42.41
20.00	7.90	1.38	36.13
25.00	8.07	1.21	31.68
30.00	8.26	1.02	26.70
45.00	8.47	0.81	21.20
60.00	8.55	0.73	19.11

Depth to top of Granular Fill if used (m bgl) = x

Porosity of Gravel Fill if used (%) = x

BOREHOLE SOAKAWAY



Borehole diameter = 0.200 m

Borehole depth = 9.280 m

Effective depth (Head of Water) = 3.820 m

Initial depth from GL	=	5.460m	
% of effective depth	Head (m)	Depth from GL (m)	Time (mins)
75%	2.865	6.415	3.00
25%	0.955	8.325	35.00
Vp75-25	=	0.060	m ³
ap50	=	1.232	m ²
tp75-25	=	32.000	min
Soil Infiltration, f	=	2.54E-05	m/sec

Sheet 1 of 2

Remarks

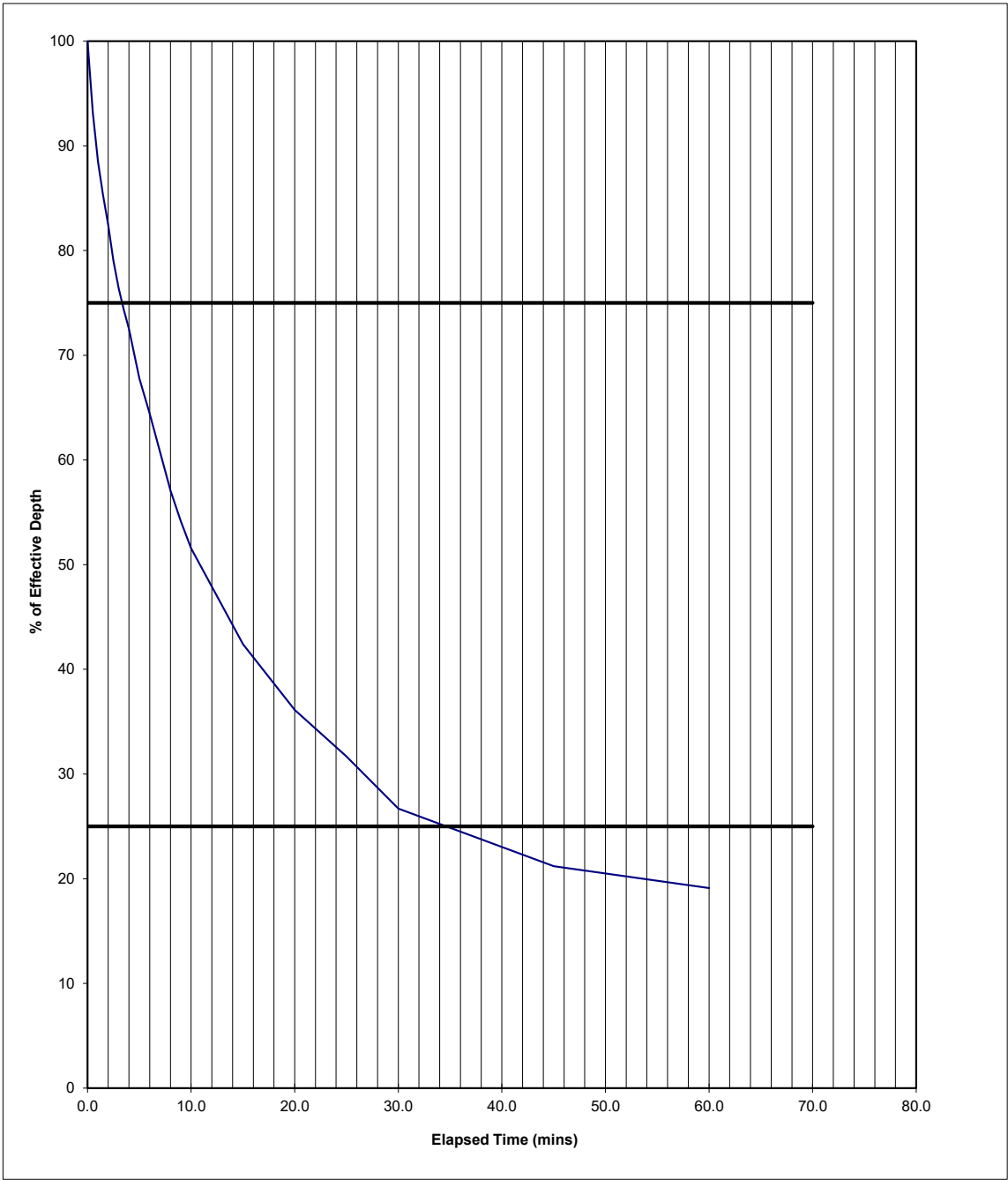
INSITU TESTING - Soakaway Test

Form INS010 Rev 2

Project Barkway

Client Redrow Homes

Borehole No. BH03
Test No 3
Project No PC248721
Date 07/03/2024



tp75	=	3.00
tp25	=	35.00

Remarks

APPENDIX 7

Investigation Techniques and General Notes

INTRODUCTION

The following brief review of Ground Investigation techniques, generally used as part of most Site Investigations in the UK, summarises their methodology, advantages and limitations. Detailed descriptions of the techniques are available and can be provided on request. This review should be read in conjunction with the accompanying General Notes.

TRIAL PITS

The trial pit is amongst the simplest yet most effective means of identifying shallow ground conditions on a site. Its advantages include simplicity, speed, potential accuracy and cost-effectiveness. The trial pit is most commonly formed using a back-acting excavator which can typically determine ground conditions to some 4 metres below ground level. Hand excavation is often used to locate, expose and detail existing foundations, features or services. In general, it is difficult to extend pits significantly below the water table in predominantly granular soils, where flows can cause instability. Unless otherwise stated, the trial pits will not have been provided with temporary side support during their construction. Under such circumstances, entrance into the pit is not permitted and hence observations will have been made from the ground surface and samples taken from the excavator bucket.

Where access for personnel is required to allow close observation of the exposed strata, the taking of samples and the carrying out of in situ tests, the sides of the trial pits (Observation Pits in BS 5930:2015) will be made safe using temporary supports or the sides battered back to a stable angle. Some limited access to such Trial Pits (Observation Pits) at depths less than 1m may be allowed in stable conditions or where the sides are benched or battered back to a safe angle.

Trends in strata type, level and thickness can be determined, shear surfaces identified and the behaviour of plant, excavation sides and excavated materials can be related to the construction process. They are particularly valuable in land slip investigations. Some types of in situ test can be undertaken in such pits and large disturbed or block samples obtained.

CABLE PERCUSSION BORING

The light Cable Percussion technique of soft ground boring, typically at a diameter of 150mm, is a well-established simple and flexible method of boring vertical holes and generally allows data to be obtained in respect of strata conditions other than rock. A tubular cutter (for cohesive soils) or shell with a flap valve (for granular soils) is repeatedly lifted and dropped using a winch and rope operating from an "A" frame. Soil which enters these tools is regularly removed and either sampled for subsequent examination or test, or laid to one side for later removal off site and licensed disposal or, if permitted by the Client, use as backfill. Steel casing will have been used to prevent collapse of the borehole sides where necessary. A degree of disturbance of soil and mixing of layers is inevitable and the presence of very thin layers of different soils within a particular stratum may not be identified. Changes in strata type can only be detected on recognition of a change in soil samples at the surface, after the interface has been passed. For the foregoing reasons, depth measurements should not be considered to be more accurate than 0.10 metre. The technique can determine ground conditions to depths in excess of 30 metres under suitable circumstances and usually causes less surface disturbance than trial pitting.

In cohesive soils cylindrical samples are retrieved by driving or pushing in 100mm nominal diameter tubes. In soft soils, piston sampling or vane testing may be undertaken. In granular soils and often in cohesive materials, in situ Standard Penetration Tests (SPT's) are performed. The SPT records the number of standard blows required to drive a 50mm diameter open or cone ended probe for 300mm after an initial 150mm penetration. A modified method of recording is used in denser strata. Small disturbed samples are obtained throughout.

ROTARY DRILLING

Rotary Drilling to produce cores by rotating an annular diamond-impregnated tube or barrel into the ground is the technique most appropriate to the forming of site investigation boreholes through rock or other hard strata. It has the advantage of being able to be used vertically or at an angle. Core diameters of less than 100mm are most common for site investigation purposes. Core is normally retrieved in plastic lining tubes. A flushing fluid such as air, water or foam is used to cool the bit and carry cuttings to the surface. Depths in excess of 60 metres can be achieved under suitable circumstances using rotary techniques, with minimal surface disturbance.

Examination of cores allows detailed rock description and generally enables angled discontinuity surfaces to be observed. However, vertical holes do not necessarily reveal the presence of vertical or near-vertical fissures or joint discontinuities. The core type and/or techniques used will depend on the ground conditions. Where open hole rotary drilling is employed, descriptions of strata result from examination at the surface of small particles ejected from the borehole in the flushing medium. In consequence, no indication of fissuring, bedding, consistency or degree of weathering can be obtained.

DYNAMIC SAMPLING

This technique involves the driving of an open-ended tube into the ground and retrieval of the soil which enters the tube. It was previously called window or windowless sampling. The term "window sample" arose from the original device which had a "window" or slot cut into the side of the tube through which samples were taken. This was superseded by the use of a thin-walled plastic liner to retrieve the soil sample from within a sampler (windowless sampling) which has a solid wall. Line diameters range from 36 to 86mm. Such samples can be used for qualitative logging, selection of samples for classification and chemical analysis and for obtaining a rudimentary assessment of strength.

Driving devices can be hand-held or machine mounted and the drive tubes are typically in 1m lengths. Depending on the type of rig used, the hole formed can be cased to prevent collapse of the borehole sides. Where the type of rig does not allow the insertion of casing, the success of this technique can be limited when soils and groundwater conditions are such that the sides of the hole collapse on withdrawal of the sampler. Obstructions within the ground, the density of the material or its strength can also limit the depth and rate of penetration of this light-weight investigation technique. Nevertheless, it is a valuable tool where access is constrained such as within buildings or on embankments. Depths of up to 10m can be achieved in suitable circumstances depending on the rig type but depths of 5m to 6m are more common.

EXPLORATORY HOLE RECORDS

The data obtained by these techniques are generally presented on Trial Pit, Borehole, Drillhole or Dynamic Sample Records. The descriptions of strata result from information gathered from a number of sources which may include published geological data, preliminary field observations and descriptions, in situ test results, laboratory test results and specimen descriptions. A key to the symbols and abbreviations used accompanies the records. The descriptions on the exploratory hole records accommodate but may not necessarily be identical to those on any preliminary records or the laboratory summaries.

The records show ground conditions at the exploratory hole locations. The degree to which they can be used to represent conditions between or beyond such holes, however, is a matter for geological interpretation rather than factual reporting and the associated uncertainties must be recognised.

DYNAMIC PROBING

This technique typically measures the number of blows of a standard weight falling over a standard height to advance a cone-ended rod over sequential standard distances (typically 100mm). Some devices measure the penetration of the probe per standard blow. It is essentially a profiling tool and is best used in conjunction with other investigation techniques where site-specific correlation can be used to delineate the distribution of soft or loose soils or the upper horizon of a dense or strong layer such as rock.

Both machine-driven and hand-driven equipment is available, the selection depending upon access restrictions and the depth of penetration required. It is particularly useful where access for larger equipment is not available, disturbance is to be minimised or where there are cost constraints. No samples are recovered and some techniques leave a sacrificial cone head in the ground. As with other lightweight techniques, progress is limited in strong or dense soils. The results are presented both numerically and graphically. Depths of up to 10m are commonly achieved in suitable circumstances.

The hand-driven DCP probing device has been calibrated by the Highways Agency to provide a profile of CBR values over a range of depths.

INSTRUMENTATION

The most common form of instrument used in site investigation is either the standpipe or else the standpipe piezometer which can be installed in investigation holes. They are used to facilitate monitoring of groundwater levels and water sampling over a period of time following site work. Normally a standpipe would be formed using rigid plastic tubing which has been perforated or slotted over much of its length whilst a standpipe piezometer would have a filter tip which would be placed at a selected level and the hole sealed above and sometimes below to isolate the zone of interest. Groundwater levels are determined using an electronic "dip meter" to measure the depth to the water surface from ground level. Piezometers can also be used to measure permeability. They are simple and inexpensive instruments for long term monitoring but response times can limit their use in tidal areas and access to the ground surface at each instrument is necessary. Remote reading requires more sophisticated hydraulic, electronic or pneumatic equipment.

Settlement can be monitored using surface or buried target plates whilst lateral movement over a range of depths is monitored using slip indicator or inclinometer equipment.

1. The report is prepared for the exclusive use of the Client named in the document and copyright subsists with Geotechnics Limited. Prior written permission must be obtained to reproduce all or part of the report. It is prepared on the understanding that its contents are only disclosed to parties directly involved in the current investigation, preparation and development of the site.
2. Further copies may be obtained with the Client's written permission, from Geotechnics Limited with whom the master copy of the document will be retained.
3. The report and/or opinion is prepared for the specific purpose stated in the document and in relation to the nature and extent of proposals made available to Geotechnics Limited at that time. Re-consideration will be necessary should those details change. The recommendations should not be used for other schemes on or adjacent to the site without further reference to Geotechnics Limited.
4. The assessment of the significance of the factual data, where called for, is provided to assist the Client and their Engineer and/or Advisers in the preparation of their designs.
5. The report is based on the ground conditions encountered in the exploratory holes together with the results of field and laboratory testing in the context of the proposed development. The data from any commissioned desk study and site reconnaissance are also drawn upon. There may be special conditions appertaining to the site, however, which are not revealed by the investigation and which may not be taken into account in the report.
6. Methods of construction and/or design other than those proposed by the designers or referred to in the report may require consideration during the evolution of the proposals and further assessment of the geotechnical and any geoenvironmental data would be required to provide discussion and evaluations appropriate to these methods.
7. The accuracy of results reported depends upon the technique of measurement, investigation and test used and these values should not be regarded necessarily as characteristics of the strata as a whole (see accompanying notes on Investigation Techniques). Where such measurements are critical, the technique of investigation will need to be reviewed and supplementary investigation undertaken in accordance with the advice of the Company where necessary.
8. The samples selected for laboratory test are prepared and tested in accordance with the relevant Clauses and Parts of BS EN ISO 17892 and BS 1377 Parts 1 to 8, where appropriate, in Geotechnics Limited's UKAS accredited Laboratory, where possible. A list of tests is given.
9. Tests requiring the use of another laboratory having UKAS accreditation where possible are identified.
10. Any unavoidable variations from specified procedures are identified in the report.
11. Specimens are cut vertically, where this is relevant and can be identified, unless otherwise stated
12. All the data required by the test procedures are recorded on individual test sheets but the results in the report are presented in summary form to aid understanding and assimilation for design purposes. Where all details are required, these can be made available.
13. Whilst the report may express an opinion on possible configurations of strata between or beyond exploratory holes, or on the possible presence of features based on either visual, verbal, written, cartographical, photographic or published evidence, this is for guidance only and no liability can be accepted for its accuracy.
14. The Code of Practice for Ground Investigations – BS 5930:2015 calls for man-made soils to be described as Anthropogenic Ground with soils placed in an un-controlled manner classified as Made Ground and soils placed in a controlled manner as Fill. In view of the difficulty in always accurately determining the origin of man-made soils in exploratory holes, Geotechnics Limited classify such materials as Made Ground. Where soils can be clearly identified as being placed in a controlled manner then further classification of the soils as Fill has been added to the Exploratory Hole Records.
15. Classification of man-made soils is based on the inspection of retrieved samples or exposed excavations. Where it is obvious that foreign matter such as paper, plastic or metal is present, classification is clear. Frequently, however, for man-made soils that arise from the adjacent ground or from the backfilling of excavations, their visual characteristics can closely resemble those of undisturbed ground. Other evidence such as site history, exploratory hole location or other tests may need to be drawn upon to provide clarification. For these reasons, classification of soils on the exploratory hole records as either Made Ground or naturally occurring strata, the boundary between them and any interpretation that this gives rise to should be regarded as provisional and subject to re-evaluation in the light of further data.
16. The classification of materials as Topsoil is generally based on visual description and should not be interpreted to mean that the material so described complies with the criteria for Topsoil used in BS 3882:2015. Specific testing would be necessary where such a definition is a requirement.
17. Ground conditions should be monitored during the construction of the works and the report should be re-evaluated in the light of these data by the supervising geotechnical engineers.
18. Any comments on groundwater conditions are based on observations made at the time of the investigation, unless specifically stated otherwise. It should be noted, however, that the observations are subject to the method and speed of boring, drilling or excavation and that groundwater levels will vary due to seasonal or other effects.
19. Any bearing capacities for conventional spread foundations which are given in the report and interpreted from the investigation are for bases at a minimum depth of 1m below finished ground level in naturally occurring strata and at broadly similar levels throughout individual structures, unless otherwise stated. Typically they are based on serviceability criteria taking account of an assessment of the shear strength and/or density data obtained by the investigation. The foundations should be designed in accordance with the good practice embodied in BS 8004:2015 - Foundations, supplemented for housing by NHBC Standards. Foundation design is an iterative process and bearing pressures may need adjustment or other measures may need to be taken in the context of final layouts and levels prior to finalisation of proposals.
20. Unless specifically stated, the investigation does not take account of the possible effects of mineral extraction or of gases from fill or natural sources within, below or outside the site.
21. The costs or economic viability of the proposals referred to in the report, or of the solutions put forward to any problems encountered, will depend on very many factors in addition to geotechnical or geoenvironmental considerations and hence their evaluation is outside the scope of the report.

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Lead Local Flood Authority
Post Point CHN 215
Hertfordshire County Council
Farnham House, Six Hills Way
Stevenage, Hertfordshire SG1 2ST
www.hertfordshire.gov.uk

Contact Flood Risk Management Team
Email FRMConsultations@hertfordshire.gov.uk

Date 21 March 2025

Dear Ben

RE: 24/01883/RM – Reserved Matters application in respect of the approved planning permission REF: 18/01502/OP – Land between Royston Road and Cambridge Road, Barkway

Thank you for your consultation on the above site, received on 6 September 2024. We have reviewed the application as submitted and wish to make the following comments.

This application is for the approval of reserved matters comprising: details of the siting, design and external appearance of the development, and the landscaping of the site in respect of the approved outline planning permission ref: 18/01502/OP for the development of 140 dwellings and a new shop on the land between Royston Road and Cambridge Road, Barkway.

We previously responded on the 3 October 2024, objecting to a higher volume of attenuation required, discharge rate of the strategy, reasoning for elements changing and half drain down times of features on site. We have reviewed the updated documentation (Technical Note, dated 2 December 2024, REF 4929/002/TN01 REV B) and have **no objection** to this reserved matters application. Our technical review is outlined below.

The technical review includes:

1. The technical note outlines the method behind the basin calculations. The parameters are correct, and justification has been clearly outlined for the changes made on site. This includes but is not limited to the freeboard, the basin storage requirements, the soakaways required for each network and the max depth / slope sides of the basin. The alternative drainage strategy is now sufficient in detail. **No further information is required.**

2. The technical response confirms that discharging to a surface water sewer is not being taken forward. The alternative strategy outlines discharge to deep bore soakaways. The pollution measures (Reno Mattress filter drain) have been outlined clearly in the technical note. **No further information is required.**
3. The alternative drainage strategy has now had sufficient detail provided. **No further information is required.**

Informative

Please note if, you the Local Planning Authority review the application and decide to grant planning permission, notify the us (the Lead Local Flood Authority), by email at FRMConsultations@hertfordshire.gov.uk.

Yours sincerely

Ellie

Ellie Miller
SuDS and Watercourses Support Officer
Environment & Transport and Sustainable Growth

Annex

The following documents have been reviewed, which have been submitted to support the application;

- Drainage Technical Note, prepared by Robert West, 2 December 2024, REF 4929/002/ TN01 – Rev B
- Barkway Drainage Technical Note for the proposed development at Land between Royston Road, prepared by Redrow, August 2024
- Drainage Maintenance Strategy for the proposed development at Land between Royston Road, prepared by Robert West, August 2024, REF 4929/002/001 – REV 1
- Proposed Drainage – Sheet 1 for the proposed development at Land between Royston Road, prepared by Robert West, August 2024, REF 4929-002-5001-P03
- Proposed Drainage – Sheet 2 for the proposed development at Land between Royston Road, prepared by Robert West, August 2024, REF 4929-002-5002-P04
- Proposed Drainage – Sheet 3 for the proposed development at Land between Royston Road, prepared by Robert West, August 2024, REF 4929-002-5003-P03
- Proposed Drainage – Sheet 4 for the proposed development at Land between Royston Road, prepared by Robert West, August 2024, REF 4929-002-5004-P03
- Proposed Drainage – Sheet 5 for the proposed development at Land between Royston Road, prepared by Robert West, August 2024, REF 4929-002-5005-P04
- Proposed Drainage – Sheet 6 for the proposed development at Land between Royston Road, prepared by Robert West, August 2024, REF 4929-002-5006-P03

Appendix C

Growth & Environment



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Local Planning Authority
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Council Offices
Gernon Road
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Growth and Environment
Hertfordshire County Council
Post Point CHN 215
Farnham House,
Six Hills Way, Stevenage
HERTFORDSHIRE, SG1 2ST
www.hertfordshire.gov.uk**

Contact: Flood Risk Management Team
Email: FRMConsultations@hertfordshire.gov.uk

Date 02 July 2025

Dear Ben,

RE: 24/01994/S73 – Variation of wording to Condition 3 and Condition 20 of planning permission 18/01502/OP granted on 25.07.2023 – Land Between Royston Road And Cambridge Road, Barkway, Hertfordshire

Thank you for your consultation on the above site, received on 06 June 2025. We have reviewed the application as submitted and wish to make the following comments.

This is a Variation of Condition wording for Condition 3 (Approved Plans) and Condition 20 (Flood Risk Assessment). As condition 3 is not within the remit of the LLFA, we have no further comment. However, condition 20 is reviewed as follows:

The current condition is worded as follows: *'The development permitted by this planning permission shall be carried out in accordance with the approved Flood Risk Assessment carried out by Ardent Consulting reference 163461-02a dated June 2018. The surface water drainage scheme should include;*

- 1. Implementation of the appropriate drainage strategy based on infiltration into using appropriate above ground SuDS measures and indicated on Surface Water Drainage drawing.*
- 2. Provision of storage to ensure no increase in surface water run-off volumes for all rainfall events up to and including the 1 in 100 year + 40% climate change event.*

The mitigation measures shall be fully implemented prior to full site occupation and in accordance with the timing / phasing arrangements embodied within the scheme, or within any other period as may subsequently be agreed, in writing, by the local planning authority.

Reason: *To reduce the risk of flooding to the proposed development and future occupants.'*

The reason for this variation of condition is to alter the drainage strategy in light of shallow infiltration being precluded by site geology. The updated drainage strategy will come at a later stage as part of a reserved matters application. We appreciate the suggested revised condition and have **no objection** to the variation of Condition 20. Condition 20 should be varied as follows:

'Notwithstanding the surface water drainage strategy set out within the approved Flood Risk Assessment (Ardent Consulting, reference 163461-02a dated June 2018), prior to commencement of development a detailed surface water drainage scheme shall be submitted to and approved in writing by the Local Planning Authority. The surface water drainage scheme shall include:

- 1. Implementation of the appropriate drainage strategy based on infiltration into using appropriate above ground SuDS measures; and*
- 2. Provision of storage to ensure no increase in surface water run-off volumes for all rainfall events up to and including the 1 in 100 year + 40% climate change event.*

The surface water drainage scheme shall be fully implemented prior to full site occupation and in accordance with the timing / phasing arrangements embodied within the scheme, or within any other period as may subsequently be agreed, in writing, by the local planning authority.

Reason: *To reduce the risk of flooding to the proposed development and future occupants'.*

Informative

Please note if, you the Local Planning Authority review the application and decide to grant planning permission, notify the us (the Lead Local Flood Authority), by email at FRMConsultations@hertfordshire.gov.uk.

Yours sincerely

Ellie

Ellie Miller
SuDS and Watercourses Support Officer
Growth and Environment

Annex

The following documents have been reviewed.

- Report: S73 Letter for Condition 20, prepared by Redrow, 23 May 2025