



29<sup>th</sup> June 2020

Our Ref: 252380-L01 (00)

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**For the attention of Mr Paul Smith**

**RE: WYKHAM LANE, BODICOTE INFILTRATION TESTING**

Dear Paul,

Further to your recent instructions, RSK have carried out in-situ soakaway tests in order to support the discharging of outline planning conditions and provide information for the design of civil infrastructure for the proposed residential development at the above site. This letter presents a factual summary of the work undertaken, and is subject to RSK's service constraints, a copy of which is presented as Appendix A. The location of the site is shown in Figure 1.

**1. SITE INVESTIGATION METHODOLOGY**

The investigation and the soil descriptions were carried out in accordance with 'BS 5930:2015. Code of Practice for Site Investigations' (BSI, 2015); and the testing was undertaken in general accordance with Building Research Establishment (BRE) DG365.

Construction of the soakaways and subsequent testing was undertaken between the 18<sup>th</sup> May and 2<sup>nd</sup> June 2020, with a return to site to complete further tests and reinstate the soakaway pits between the 22<sup>nd</sup> and 24<sup>th</sup> June 2020. Each test location was set out by GPS to co-ordinates provided by the client on the figure "Setting Out For Infiltration Testing" ref.957-07-101 Rev A, dated April 2020. Each trial pit location was scanned using a Cable Avoidance Tool (CAT) and corresponding signal generator prior to excavation. A total of 41no. trial pits were excavated to the approximate base level specified on the setting out figure using a JCB 3CX excavator. Each pit was filled with gravel for soakaway testing with a slotted pipe installed for monitoring purposes.

The trial pits were infilled with clean water supplied by a towable bowser, and water level measurements were taken at regular intervals using a dip meter. Three tests were undertaken within each pit where infiltration rates allowed.

A plan showing the test locations is presented as Figure 2.



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The trial pit was excavated and logged by a suitably qualified engineer. A photographic record of the works undertaken is presented within Appendix B, and the trial pit logs are presented as Appendix C.

## 2. SOAKAWAY TEST RESULTS

As outlined in BRE DG365, the soil infiltration rate of the soils can be calculated from the time taken for the water level to fall from 75% to 25% effective storage depth in the soakage trial pit, using the following calculation:

$$f = \frac{V_{p75-25}}{as_{50} \times tp_{75-25}}$$

where:

$f$  = soil infiltration rate

$V_{p75-25}$  = the effective storage volume of water in the soakage trial pit between 75% and 25% effective storage depth

$as_{50}$  = the internal surface area of the soakage trial pit up to 50% effective storage depth and including the base area

$tp_{75-25}$  = the time for the water to fall from 75% to 25% effective storage depth

Table 1 summarises the testing undertaken, and the infiltration rates recorded. The test certificates are presented in full within Appendix D.

**Table 1: Summary of infiltration test results**

Location	Soakaway response zone (m bgl)	Stratum	Infiltration value	
			Test No.	Result (m/s)
IT1	0.25m – 1.01m	Marlstone Rock Formation	1	5.29x10 <sup>-4</sup>
			2	4.15x10 <sup>-4</sup>
			3	3.49x10 <sup>-4</sup>
IT2	0.25m – 0.99m	Marlstone Rock Formation	1	1.44x10 <sup>-4</sup>
			2	1.33x10 <sup>-4</sup>
			3	1.27x10 <sup>-4</sup>
IT3	0.15m – 0.66m	Marlstone Rock Formation	1	7.88x10 <sup>-4</sup>
			2	5.99x10 <sup>-4</sup>
			3	4.90x10 <sup>-4</sup>
IT4	0.18m – 0.61m	Marlstone Rock Formation	1	4.17x10 <sup>-4</sup>

Location	Soakaway response zone (m bgl)	Stratum	Infiltration value	
			Test No.	Result (m/s)
			2	2.56x10 <sup>-4</sup>
			3	1.98x10 <sup>-4</sup>
IT5	0.19m – 0.62m	Marlstone Rock Formation	1	2.51x10 <sup>-4</sup>
			2	2.14x10 <sup>-4</sup>
			3	1.98x10 <sup>-4</sup>
IT6	0.22m – 0.98m	Marlstone Rock Formation	1	5.15x10 <sup>-4</sup>
			2	4.11x10 <sup>-4</sup>
			3	4.57x10 <sup>-4</sup>
IT7	1.14m – 1.28m	Marlstone Rock Formation	1	N/A – Unable to calculate infiltration rate due to rapid draining of pit
			2	N/A – Unable to calculate infiltration rate due to rapid draining of pit
			3	2.83x10 <sup>-3</sup>
IT8	0.32m – 1.40m	Marlstone Rock Formation	1	7.73x10 <sup>-4</sup>
			2	6.35x10 <sup>-4</sup>
			3	5.22x10 <sup>-4</sup>
IT9	0.23m – 0.88m	Marlstone Rock Formation	1	7.09x10 <sup>-4</sup>
			2	4.72x10 <sup>-4</sup>
			3	4.02x10 <sup>-4</sup>
IB1	0.29m – 1.01m	Marlstone Rock Formation	1	2.56x10 <sup>-4</sup>
			2	2.28x10 <sup>-4</sup>
			3	1.60x10 <sup>-4</sup>
IB2	0.20m – 0.89m	Marlstone Rock Formation	1	2.54x10 <sup>-4</sup>
			2	1.89x10 <sup>-4</sup>
			3	1.62x10 <sup>-4</sup>

Location	Soakaway response zone (m bgl)	Stratum	Infiltration value	
			Test No.	Result (m/s)
IB3	0.19m – 0.53m	Marlstone Rock Formation	1	1.26x10 <sup>-3</sup>
			2	6.67x10 <sup>-4</sup>
			3	6.21x10 <sup>-4</sup>
IB4	0.20m – 0.75m	Marlstone Rock Formation	1	9.80x10 <sup>-5</sup>
			2	7.66x10 <sup>-5</sup>
			3	7.17x10 <sup>-5</sup>
IB5	0.30m – 0.80m	Marlstone Rock Formation	1	9.61x10 <sup>-4</sup>
			2	6.04x10 <sup>-4</sup>
			3	5.08x10 <sup>-4</sup>
IB7	1.12m – 1.76m	Marlstone Rock Formation	1	5.29x10 <sup>-4</sup>
			2	2.61x10 <sup>-4</sup>
			3	2.42x10 <sup>-4</sup>
IB8	0.45m – 1.01m	Marlstone Rock Formation	1	8.17x10 <sup>-4</sup>
			2	6.26x10 <sup>-4</sup>
			3	8.54x10 <sup>-4</sup>
IB9	0.25m – 0.58m	Marlstone Rock Formation	1	7.41x10 <sup>-4</sup>
			2	5.39x10 <sup>-4</sup>
			3	4.31x10 <sup>-4</sup>
IB10	0.26m – 0.61m	Marlstone Rock Formation	1	4.47x10 <sup>-4</sup>
			2	2.02x10 <sup>-4</sup>
			3	2.07x10 <sup>-4</sup>
IB11	0.24m – 0.68m	Marlstone Rock Formation	1	4.85x10 <sup>-4</sup>
			2	1.23x10 <sup>-4</sup>
			3	9.72x10 <sup>-5</sup>

Location	Soakaway response zone (m bgl)	Stratum	Infiltration value	
			Test No.	Result (m/s)
SA1	0.28m – 0.84m	Marlstone Rock Formation	1	$7.26 \times 10^{-4}$
			2	$5.17 \times 10^{-4}$
			3	$4.53 \times 10^{-4}$
SA2	0.96m – 1.79m	Marlstone Rock Formation	1	$7.51 \times 10^{-4}$
			2	$6.18 \times 10^{-4}$
			3	$5.84 \times 10^{-4}$
SA3	0.27m – 0.98m	Marlstone Rock Formation	1	$3.67 \times 10^{-4}$
			2	$2.25 \times 10^{-4}$
			3	$2.16 \times 10^{-4}$
SA4	0.45m – 0.98m	Marlstone Rock Formation	1	$1.09 \times 10^{-3}$
			2	$6.58 \times 10^{-4}$
			3	$4.77 \times 10^{-4}$
SA5	0.53m – 1.28m	Marlstone Rock Formation	1	$2.14 \times 10^{-3}$
			2	$1.01 \times 10^{-3}$
			3	$8.23 \times 10^{-4}$
SA6	0.30m – 1.15m	Marlstone Rock Formation	1	$8.43 \times 10^{-4}$
			2	$6.88 \times 10^{-4}$
			3	$5.52 \times 10^{-4}$
SA11	0.31m – 0.87m	Marlstone Rock Formation	1	$1.87 \times 10^{-3}$
			2	$1.22 \times 10^{-3}$
			3	$1.10 \times 10^{-3}$
SA12	1.26m – 1.46m	Marlstone Rock Formation	1	$1.96 \times 10^{-4}$
			2	$2.26 \times 10^{-4}$
			3	$2.11 \times 10^{-4}$
SA13	0.44m – 1.53m	Marlstone Rock Formation	1	$1.09 \times 10^{-3}$
			2	$7.55 \times 10^{-4}$

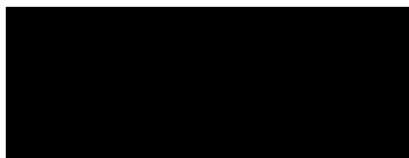
Location	Soakaway response zone (m bgl)	Stratum	Infiltration value	
			Test No.	Result (m/s)
			3	7.58x10 <sup>-4</sup>
SA14	0.23m – 0.99m	Marlstone Rock Formation	1	5.10x10 <sup>-4</sup>
			2	3.05x10 <sup>-4</sup>
			3	2.96x10 <sup>-4</sup>
SA15	0.59m – 1.26m	Marlstone Rock Formation	1	6.80x10 <sup>-3</sup>
			2	2.10x10 <sup>-3</sup>
			3	3.10x10 <sup>-3</sup>
SUD1	0.18m - 0.64m	Marlstone Rock Formation	1	4.05x10 <sup>-4</sup>
			2	1.91x10 <sup>-4</sup>
			3	1.52x10 <sup>-4</sup>
SUD2	0.18m – 0.64m	Marlstone Rock Formation	1	4.05x10 <sup>-4</sup>
			2	1.91x10 <sup>-4</sup>
			3	1.52x10 <sup>-4</sup>
SUD3	0.22m – 1.00m	Dyrham Formation	1	1.23x10 <sup>-5</sup>
			2	2.81x10 <sup>-6</sup>
			3	3.93x10 <sup>-6</sup>
SUD4	0.18m – 1.13m	Dyrham Formation	1	1.53x10 <sup>-5</sup>
			2	2.06x10 <sup>-5</sup>
			3	2.34x10 <sup>-5</sup>
*SUD4B	0.89m – 2.11	Dyrham Formation	1	8.38x10 <sup>-7</sup>
			2	2.75x10 <sup>-7</sup>
			3	1.28x10 <sup>-6</sup>
SUD5	0.22m – 2.19m	Dyrham Formation	1	3.02x10 <sup>-6</sup>
			2	3.59x10 <sup>-6</sup>
			3	3.42x10 <sup>-6</sup>

Location	Soakaway response zone (m bgl)	Stratum	Infiltration value	
			Test No.	Result (m/s)
SUD6	0.23m – 1.60m	Dyrham Formation	1	9.20x10 <sup>-5</sup>
			2	7.07x10 <sup>-5</sup>
			3	6.95x10 <sup>-5</sup>
*Extra position due to initial incorrect setting out of SUD4 position				
POR1	0.17m – 0.63m	Marlstone Rock Formation	1	8.11x10 <sup>-4</sup>
			2	5.00x10 <sup>-4</sup>
			3	4.90x10 <sup>-4</sup>
POR2	0.26m – 0.59m bgl	Marlstone Rock Formation	1	1.88x10 <sup>-3</sup>
			2	1.70x10 <sup>-3</sup>
			3	1.44x10 <sup>-3</sup>
POR3	0.23m – 0.70m	Marlstone Rock Formation	1	2.30x10 <sup>-3</sup>
			2	1.67x10 <sup>-3</sup>
			3	1.67x10 <sup>-3</sup>
POR4	0.09m – 0.57m	Marlstone Rock Formation	1	4.02x10 <sup>-4</sup>
			2	3.64x10 <sup>-4</sup>
			3	3.15x10 <sup>-4</sup>

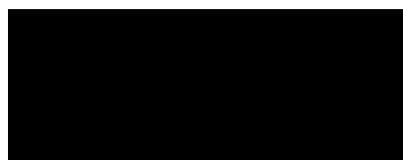
We trust that the above and enclosed information is of assistance. Please do not hesitate to contact the undersigned should you have any comments or require any further information.

Yours sincerely

**for RSK Environment Limited - Geosciences**



**Ben Sowden**  
**Geoenvironmental engineer**  
 (Author)



**Mark Steward**  
**Director**  
 (Technical reviewer)

**ENC.**

**FIGURES**

- |          |                             |
|----------|-----------------------------|
| Figure 1 | Site location plan          |
| Figure 2 | Soakaway test location plan |

**APPENDICES**

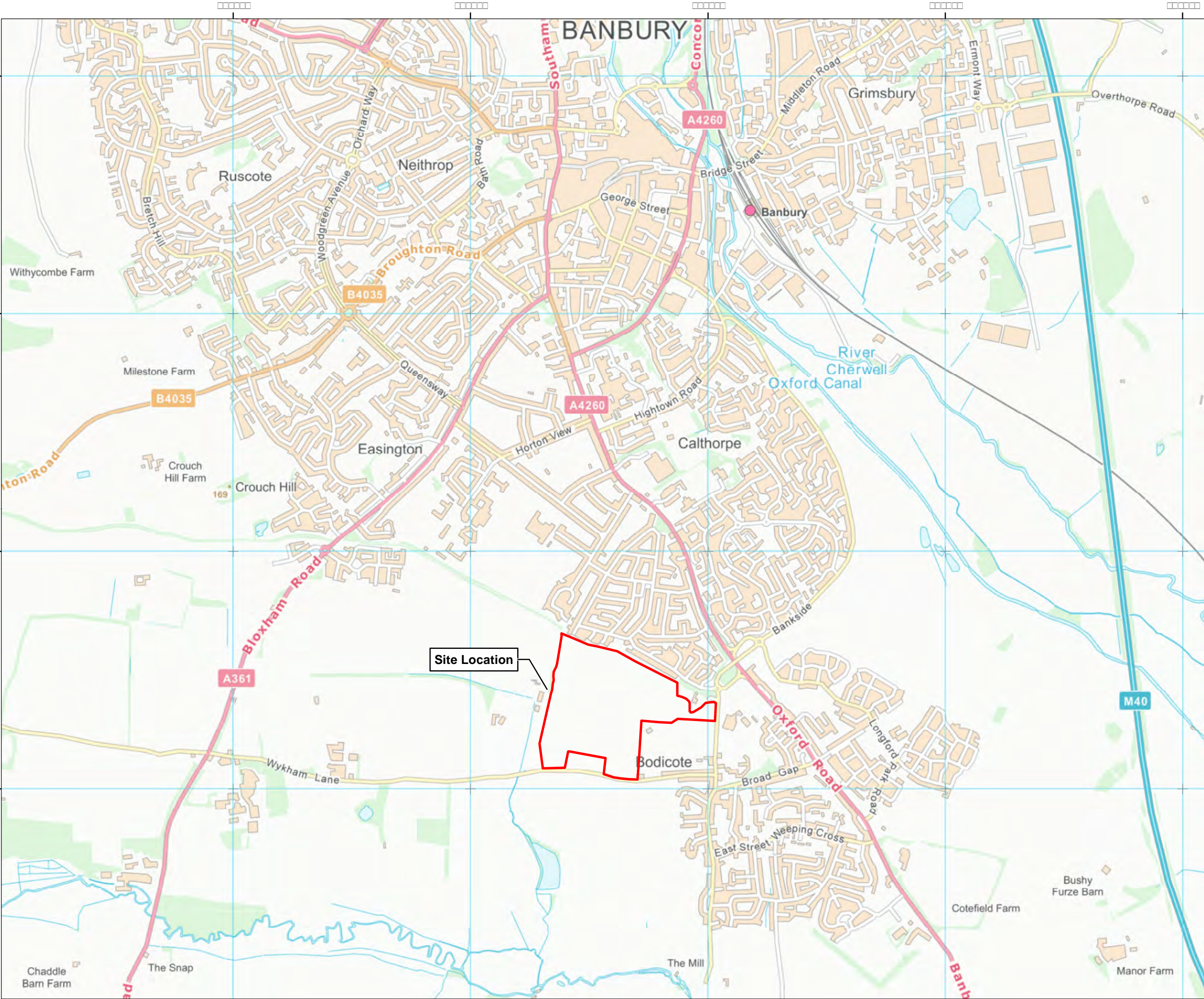
- |            |                           |
|------------|---------------------------|
| Appendix A | Service constraints       |
| Appendix B | Photographic records      |
| Appendix C | Trial pit logs            |
| Appendix D | In-situ test certificates |



## FIGURES

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Legend:  
[Red outline] Site Location

Map Data:  
Source: Ordnance Survey  
Date: 01/01/2023  
Scale: 1:50,000

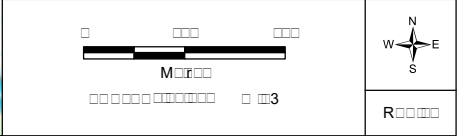


Rev	Date	Description	Drn	Chk	App

Wykam Lane, Bodicote



Project:  
Client:  
Address:





[illegible]



## APPENDIX A

# SERVICE CONSTRAINTS

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1. This report and the site investigation carried out in connection with the report (together the "Services") were compiled and carried out by RSK Environment Limited (RSK) for Barratt Homes Mercia & David Wilson Homes Mercia (the "Client") in accordance with the terms of a contract [RSK Environment Standard Terms and Conditions] between RSK and the Client, dated 29<sup>th</sup> April 2020. The Services were performed by RSK with the reasonable skill and care ordinarily exercised by an environmental consultant at the time the Services were performed. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the Client.
2. Other than that, expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services.
3. Unless otherwise agreed in writing, the Services were performed by RSK exclusively for the purposes of the Client. RSK is not aware of any interest of or reliance by any party other than the Client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent or condone any party other than the client relying upon the Services. Should this report or any part of this report, or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and RSK disclaims any liability to such parties. **Any such party would be well advised to seek independent advice from a competent environmental consultant and/or lawyer.**
4. It is RSK's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances by the client without RSK's review and advice shall be at the client's sole and own risk. Should RSK be requested to review the report after the date of this report, RSK shall be entitled to additional payment at the then existing rates or such other terms as agreed between RSK and the client.
5. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the report in the future shall be at the Client's own and sole risk. Should RSK be requested to review the report in the future, RSK shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between RSK and the client.
6. The observations and conclusions described in this report are based solely upon the Services which were provided pursuant to the agreement between the Client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, RSK did not seek to evaluate the presence on or off the site of asbestos, invasive plants, electromagnetic fields, lead paint, heavy metals, radon gas or other radioactive or hazardous materials, unless specifically identified in the Services.
7. The Services are based upon RSK's observations of existing physical conditions at the Site gained from a visual inspection of the site together with RSK's interpretation of information, including documentation, obtained from third parties and from the Client on the history and usage of the site, unless specifically identified in the Services or accreditation system (such as UKAS ISO 17020:2012 clause 7.1.6):
  - a. The Services were based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely.

- b. The Services were limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the visual inspection.
- c. The Services did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services.

RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK and including the doing of any independent investigation of the information provided to RSK save as otherwise provided in the terms of the contract between the Client and RSK.

- 8. The intrusive environmental site investigation aspects of the Services are a limited sampling of the site at pre-determined locations based on the known historic / operational configuration of the site. The conclusions given in this report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent of the limited area depends on the properties of the materials adjacent and local conditions, together with the position of any current structures and underground utilities and facilities, and natural and other activities on site. In addition, chemical analysis was carried out for a limited number of parameters (as stipulated in the scope between the client and RSK, based on an understanding of the available operational and historical information) and it should not be inferred that other chemical species are not present.
- 9. Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan but is (are) used to present the general relative locations of features on, and surrounding, the site. Features (intrusive and sample locations etc) annotated on site plans are not drawn to scale but are centred over the approximate location. Such features should not be used for setting out and should be considered indicative only.
- 10. The comments given in this report and the opinions expressed are based on the ground conditions encountered during the site work and on the results of tests made in the field and in the laboratory. However, there may be conditions pertaining to the site that have not been disclosed by the investigation and therefore could not be taken into account. In particular, it should be noted that there may be areas of made ground not detected due to the limited nature of the investigation or the thickness and quality of made ground across the site may be variable. In addition, groundwater levels and ground gas concentrations and flows, may vary from those reported due to seasonal, or other, effects and the limitations stated in the data should be recognised.
- 11. Asbestos is often observed to be present in soils in discrete areas. Whilst asbestos-containing materials may have been locally encountered during the fieldworks or supporting laboratory analysis, the history of brownfield and demolition sites indicates that asbestos fibres may be present more widely in soils and aggregates, which could be encountered during more extensive ground works.
- 12. Unless stated otherwise, only preliminary geotechnical recommendations are presented in this report and these should be verified in a Geotechnical Design Report, once proposed construction and structural design proposals are confirmed.