



Ground Condition Consultants

HOME FARM, HEDGE END

MINERAL EXTRACTION STUDY

JANUARY 2023

Prepared for
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VERSION CONTROL

Project Name Home Farm – MES

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Mineral Extraction Study	
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Version	Date	Description
1.0	24.01.2023	Mineral Extraction Study

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1. INTRODUCTION

1.1 INSTRUCTION

Ground Condition Consultants Ltd. (GCC) was commissioned by Wykeham Homes in January 2023 to undertake a Mineral Extraction Study on the site at Home Farm, St Johns Road, Hedge End, SO30 4DF.

It is noted by reference to the Hampshire Online Minerals Consultation Map, that the site does not fall within a safeguarded area, but is within a Minerals and Waste Consultation Area (MWCA) for Superficial Sand and Gravel, related to River Terrace Deposits.

The brief was to undertake an assessment of viability of mineral extraction at the site to support the development and in line with the local planning policy.

This report is prepared in line with the agreed brief and is subject to the report conditions shown in Appendix 1.

1.2 PROPOSED USE

It is currently understood that the site is to be redeveloped for residential use with private gardens.

1.3 REPORT SCOPE AND LIMITATIONS

This report is based upon a review of readily available historical and current information and the recent site investigation data detailed herein. Data obtained from ground investigations is noted to represent points, however the area proposed for development is considered to be suitably well covered by investigation for the purposes of this study and findings broadly as anticipated from review of available records.

The recommendations and opinions expressed in this report are based on the strata observed in the exploratory holes and results of the in-situ and laboratory tests undertaken in the course of recent investigation of the site. GCC takes no responsibility for conditions that have not been revealed by the exploratory holes, or which occur between them.

The information contained in this report is intended for the use of Wykeham Homes and GCC can take no responsibility for the use of this information by any other party or for uses other than that described in this report.

2. SITE MODEL

2.1 SITE LOCATION AND DESCRIPTION

The site is located to the northwest of Home Farm, which in turn is located to the northwest of St John's Road, Hedge End, Hampshire, SO30 4DF (approx. grid ref: 448237, 112095). The site comprised a grass covered field, generally sloping down from the northwest (approx. 73mAOD) to southeast (approx. 62mAOD) then rising again with a steep embankment along the southeast edge of the site (approx. 65.5mAOD), creating bowl type area in the eastern half of the site. The site as a whole is circa 135m in length and 60m in width, tapering to the north west. Access to the site is via a track in the south of the site, off Home Farm.

The site is bounded to the northeast, northwest and southwest by wooded areas with the M27 motorway approximately 40m beyond to the west. The southeast boundary of the site is formed by a fence line separating the site from a recently constructed residential development that fronts the new road of Home Farm.

The residential development to the southeast of the site is understood to have been constructed in approximately 2019. A review of documents held on the planning portal for the adjacent development, including topographical surveys, indicates that the original ground profile was reduced by approximately 1-3m to form the development platform for the new houses. At this time soils, understood to be site won, were placed on the subject site across the base of the bowl feature, which is the area now proposed for development.

2.2 DOCUMENTATED GROUND CONDITIONS

Ground conditions recorded in readily available sources are summarised below.

2.2.1. Geology

Reference to the British Geological Survey (BGS) Map extracts (see Desk Top Study) indicates the site to overlie bedrock geology of the Wittering Formation (clay, silt and sand) with superficial River Terrace Deposits (sand and gravel) overlying the Wittering formation in the northwest (higher elevation) of the site.

Topographical survey records indicate that approximately 2m of Made Ground/reworked natural soil may be present beneath the east of the site.

The proposed development is situated over the area of Made Ground, which in turn overlies the Wittering Formation. The proposed development does not extend into the northwest of the site, where the geological maps indicate the River Terrace Deposits are situated.

2.3 PROVEN GROUND CONDITIONS

Ground conditions encountered during the site investigation were broadly in agreement with those presented in the published literature and comprised Topsoil and Made Ground overlying Wittering Formation. Variations in strata thicknesses are summarised in Table 4.1 and engineering logs are presented in Appendix 2.

Table 4.1. Summary of encountered ground conditions

Location	Topsoil/Made Ground		Wittering Formation	
	From (mbgl)	Thickness (m)	From (mbgl)	Thickness (m)
WS101	GL	1.10	1.10	>4.25
WS102	GL	1.40	1.40	>1.80
WS103	GL	2.20	2.20	>3.25
WS104	GL	1.90	1.90	>2.55
WS105	GL	2.00	2.00	>1.60
HP101	GL	>0.50	N/E	
HP102	GL	>0.50	N/E	
SA101	GL	2.30	2.30	>1.05
SA102	GL	0.80	0.80	>0.80

2.3.1. Topsoil/Made Ground

Topsoil/Made Ground was encountered in all of the investigation locations across the site. The only locations where these material were present without anthropogenic inclusions was HP102, where the Topsoil extended to greater than 0.5mbgl.

Made Ground was encountered in the remainder of the locations and comprised reworked Wittering Formation Silt and Clay with occasions brick fragments and organic matter and pockets of Sand. This Made Ground attained a maximum proven thickness of 2.2m (WS103) and is anticipated to taper towards the peripheries of the development area.

2.3.2. Wittering Formation

The Wittering Formation was encountered beneath the Topsoil or Made Ground in all of the boreholes at between 1.1mbgl and 2.3mbgl with a proven thickness of greater than 4.25m, forming the basal stratum in all of these locations. This Formation was not encountered in the hand excavated trial pits.

The Wittering Formation comprised medium dense to very dense orange brown, yellow and grey thinly laminated Sand, locally overlain by 0.4-1.4m of dark brown and orange brown sandy Silt/Clay.

The Sand of the Wittering Formation formed the basal layer of the investigation and resulted in refusal in the majority of the windowless sample borehole locations.

2.4 GROUNDWATER CONDITIONS

Groundwater was not encountered in any of the investigation locations and the monitoring wells in all 5no boreholes were monitored to be dry on the 6th December 2022. However, groundwater was recorded on the 6th January at between ground level and 5.11mbgl, indicating highly variable conditions and possibly pockets of perched groundwater.

3. PLANNING POLICY

Relevant Planning Policy can be split into National and Local policy, as follows.

3.1 NATIONAL PLANNING POLICY FRAMEWORK

The National Planning Policy Framework (NPPF), last updated in 2021, sets out governments planning policy for England, including those specific to use of minerals (Chapter 17). NPPF includes notes, among others, that policies should:

- *Safeguard mineral resources by defining Mineral Safeguarding Areas and Mineral Consultation Areas, and adopt appropriate policies so that known locations of specific minerals resources of local and national importance are not sterilised by non-mineral development where this should be avoided (whilst not creating a presumption that the resources defined will be worked);*
- *set out policies to encourage the prior extraction of minerals, where practical and environmentally feasible, if it is necessary for non-mineral development to take place;*
- *Local planning authorities should not normally permit other development proposals in Mineral Safeguarding Areas if it might constrain potential future use for mineral working.*
- *maintaining landbanks of at least 7 years for sand and gravel and at least 10 years for crushed rock, whilst ensuring that the capacity of operations to supply a wide range of materials is not compromised.*

3.2 HAMPSHIRE POLICY

3.2.1. Hampshire Minerals and Waste Plan

Carrying the core policies of the NPPF into local policy, Hampshire adopted the Hampshire Minerals and Waste Plan (HMWP), October 2013. Policy 15: Safeguarding – mineral resources states:

Hampshire's sand and gravel (sharp sand and gravel and soft sand), silica sand and brick-making clay resources are safeguarded against needless sterilisation by non-minerals development, unless 'prior extraction' takes place.

Safeguarded mineral resources are defined by a Mineral Safeguarding Area illustrated on the Policies Map.

Development without the prior extraction of mineral resources in the Mineral Safeguarding Area may be permitted if:

- a. it can be demonstrated that the sterilisation of mineral resources will not occur; or*
- b. it would be inappropriate to extract mineral resources at that location, with regards to the other policies in the Plan; or*
- c. the development would not pose a serious hindrance to mineral development in the vicinity; or*
- d. the merits of the development outweigh the safeguarding of the mineral.*

It is also noted that the HMWP sets out various other policies applicable to the selection of sites for mineral extraction, including potential impacts to atmosphere, land and water, human health and nuisance factors; among others. Reference under Policy 10: Protecting public health, safety and amenity, includes the following:

It is standard practice in Hampshire for operational mineral extraction and inert waste recycling sites to have a minimum buffer zone of 100 metres, where appropriate, from the nearest sensitive human receptors, such as homes and schools, though this distance will be reviewed on a case-by-case basis.

- 3.2.2. Hampshire Guide for local planning authorities, developers and other interested parties
- Hampshire subsequently produced a Supplementary Planning Document (SPD) for Minerals and Waste Safeguarding in Hampshire, in addendum to the Minerals and Waste Plan, February 2016. In relation to Policy 15 of the HMWP the SPD adds the following points:

The starting assumption is that large scale extraction should take place. However, it will be up to the developer to justify why this is not practicable or why a lower level of extraction (medium to smaller scale or incidental) should be accepted by the MWPA.

Larger scale extraction: There may be an opportunity to extract the full mineral resource or a significant proportion. This will be the option most favoured by the MWPA as it will maximise the extraction of the resource and avoid its sterilisation. However, there will be no presumption that the mineral will be worked in full. Extraction would likely be a separate activity to the nonminerals-or-waste development and may include restoration of the land to make it suitable for future non-minerals-or-waste development.

Medium to smaller scale extraction: Where there is no opportunity for a more comprehensive extraction of the mineral resources present, it may be possible to conduct prior extraction as an integral part of the development (such as during the preparation of the land for the development). The material could then either be processed and used on site or exported to a suitable site.

Incidental extraction: Any preparation of the site for the development may result in the extraction of suitable mineral that could be processed and used on site. This is the minimum level of prior extraction that the MWPA would seek as part of any non-minerals-or-waste development in the MWCA, as these activities are likely to occur with any relevant proposed development. This may include excavating the foundations and footings or landscaping works associated with the development.

The Hampshire Authorities also promote this approach for sites outside the MWCA whenever suitable mineral resources are found, subject to amenity issues.

4. LOCAL MINERAL WORKING

4.1 LOCAL AGGREGATE ASSESSMENT, 2022

Hampshire, Portsmouth, Southampton, New Forest National Park and South Downs National Park produced a Local Aggregate Assessment (LAA) in August 2022. The document summarises trends in the sales of locally won minerals in the form of soft sand, sharp sand and gravel, all sand and gravel, recycled secondary aggregates and marine sand and gravel.

The LAA indicates that at the time of writing, twelve permitted quarries were operational within Hampshire, with Geology providing minerals sold as sharp sand and gravel, soft sand and silica sand.

In summary the landbank (referred to in NPPF) for combined aggregates are noted to be 10.43 years, which is in excess of the NPPF 7 year requirement. However, it is noted that for soft sand on its own the landbank does not meet the 7 year requirement.

5. DISCUSSION

5.1 GEOLOGICAL SUITABILITY

The site is located within a consultation area relating to River Terrace Deposits.

The site model for the site area proposed for development is noted to comprise a covering of Made Ground, up to 2.2m in thickness, thought to largely comprise re-worked, locally won soils, with a proportion of anthropogenic materials, overlying the natural deposits of the Wittering Formation. River Terrace Deposits are recorded in the north-west of the site, however these have not been encountered by intrusive investigations to date and are therefore not considered to overlap with the area of proposed development, situated at the base of the bowl, in the south east of the site.

The Made Ground and underlying Wittering Formation are considered unlikely to be suitable for excavation and utilisation as aggregates without screening and washing due to the varied presence of clay, silt and sand and for the Made Ground, varied presence of organic soils/debris and anthropogenic artefacts. This is likely to make recovery less economic and less sustainable.

5.2 HYDROGEOLOGICAL SUITABILITY

Investigations and monitoring to date, generally indicate groundwater to be variable, ranging from greater than 5.0m below ground level (bgl) to resting at ground level. Whilst this would not preclude the extraction of minerals at the site, the site would need to be restored prior to development, which would necessitate the import of clean materials to an engineered specification. It is considered that this would reduce the viability of extraction.

5.3 GEOGRAPHIC SUITABILITY

It is noted that the site is fringed by mature trees to the southwest, northwest and northeast and residential houses in the southeast and presently forms a bowl feature. It is considered of low likelihood that mineral extraction would be granted permission in the vicinity of the mature woodland, where River Terrace Deposits are likely to be present, as excavation in this area may be detrimental to the woodland and would require steepening of the existing slope. Notwithstanding this, the site is presently accessed via the small residential estate and it is considered that traffic related to extraction would not be permitted via this route.

Furthermore, as noted in Section 3.2.1 of this study, the HMWP indicates that standard practice would not promote the extraction of minerals within a 100m buffer of residential properties or other such sensitive land uses.

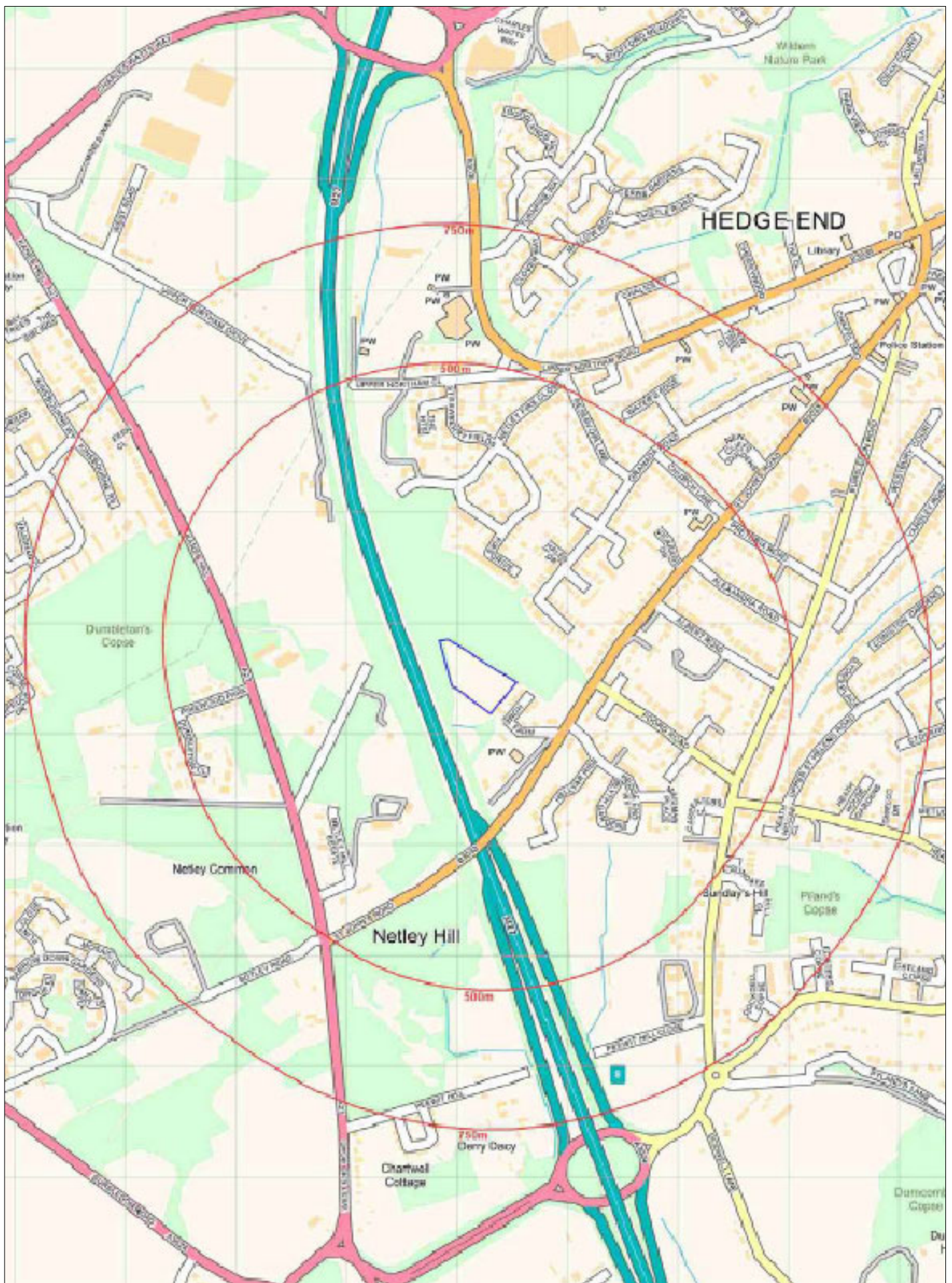
In this case, were a 100m buffer to be applied, the majority of the site would fall within the 100m buffer from existing residential development. The only area of the site outside this buffer would be a small triangular area, approximately 40m long and 30m wide, at its widest, located at the top of the existing slope. This small triangular area is potentially underlain by River Terrace Deposits, but is bounded by woodland on two sides, further limiting the extent of accessible River Terrace Deposits.

6. CONCLUSION

The area of the site proposed for built development has been proven to not be underlain by the River Terrace Deposits, the subject deposit of the MWCA in which the site falls. As such, it is considered that the proposed development would not result in sterilisation of mineral sharp sand or sand and gravel resource.

Noting that the HMWP promotes assessment of resource even where not identified under MWCAs, it is considered, given the geological and hydrogeological model and geography of the site, that large scale or medium to smaller scale extraction (as outlined in the SPD) are not feasible. It is therefore concluded that incidental extraction, as promoted by the SPD, should be implemented during construction, where recovered soils are geotechnically and environmentally suitable for such purposes.

FIGURE 1: SITE LOCATION PLAN



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ask@groundcc.co.uk www.groundcc.co.uk

client
WYKEHAM HOMES
site
HOME FARM, HEDGE END
title
SITE LOCATION PLAN

scale	NTS	drawn by	AP	checked by	RP
date	17 NOV 2022	job no	J22-077		
drawing number	FIGURE 1			rev.	-

FIGURE 2: SITE INVESTIGATION PLAN



Ground Condition Consultants Ltd
10 Waldegrave Close Southampton SO19 9RY
Telephone 07971 450113
ask@groundcc.co.uk www.groundcc.co.uk

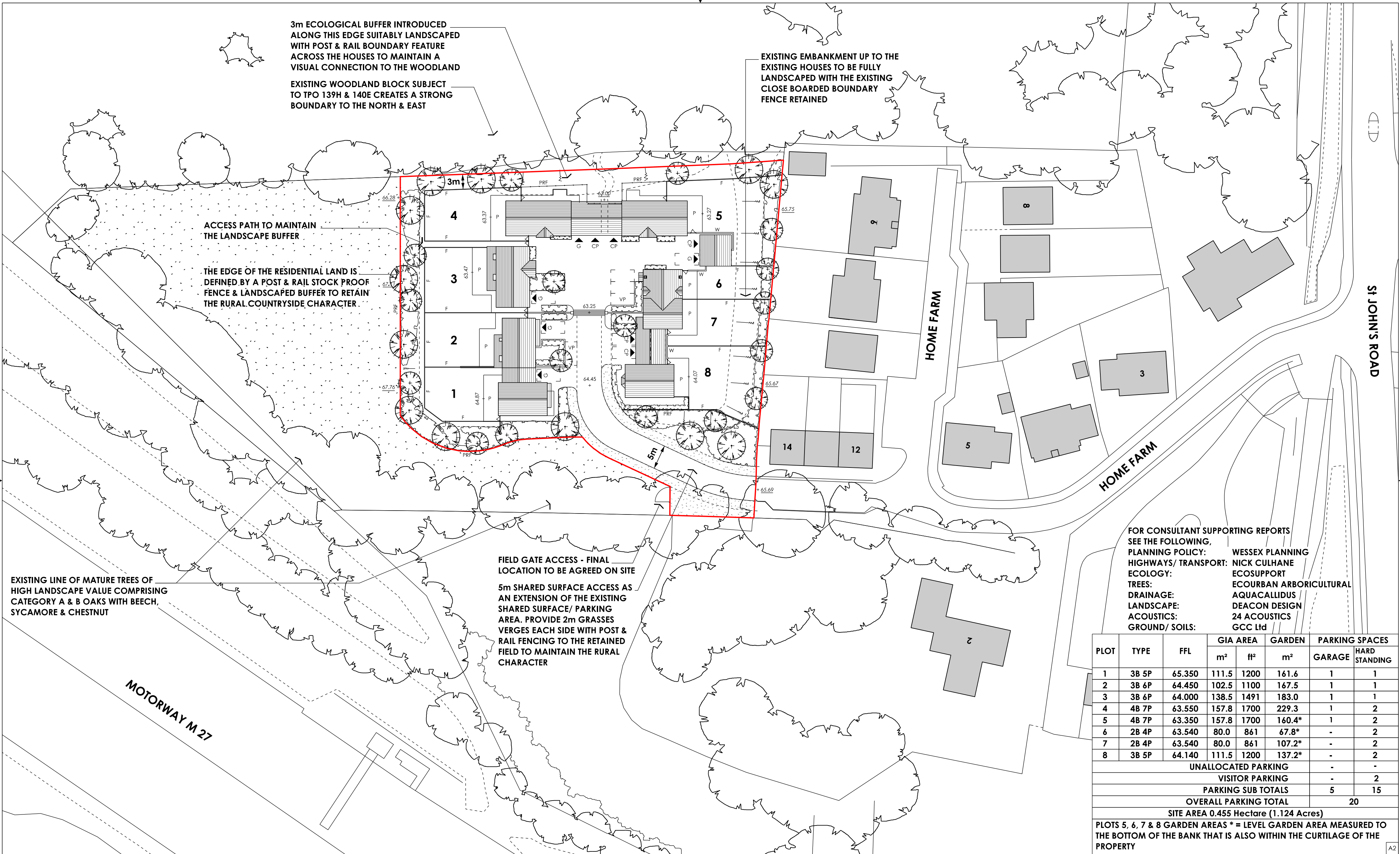
client
WYKEHAM HOMES

site
HOME FARM, HEDGE END

title
SITE INVESTIGATION PLAN

scale	NTS	drawn by	DP	checked by	RP
date	06 DEC 2022	job no	J22-077		
drawing number	FIGURE 2			rev.	2

FIGURE 3: PROPOSED DEVELOPMENT PLAN



FOR CONSULTANT SUPPORTING REPORTS
SEE THE FOLLOWING,
PLANNING POLICY: WESSEX PLANNING
HIGHWAYS/ TRANSPORT: NICK CULHANE
ECOLOGY: ECOSUPPORT
TREES: ECOURBAN ARBORICULTURAL
DRAINAGE: AQUACALLIDUS
LANDSCAPE: DEACON DESIGN
ACOUSTICS: 24 ACOUSTICS
GROUND/ SOILS: GCC Ltd

PLOT	TYPE	FFL	GIA AREA		GARDEN	PARKING SPACES	
			m²	ft²	m²	GARAGE	HARD STANDING
1	3B 5P	65.350	111.5	1200	161.6	1	1
2	3B 6P	64.450	102.5	1100	167.5	1	1
3	3B 6P	64.000	138.5	1491	183.0	1	1
4	4B 7P	63.550	157.8	1700	229.3	1	2
5	4B 7P	63.350	157.8	1700	160.4*	1	2
6	2B 4P	63.540	80.0	861	67.8*	-	2
7	2B 4P	63.540	80.0	861	107.2*	-	2
8	3B 5P	64.140	111.5	1200	137.2*	-	2
UNALLOCATED PARKING						-	-
VISITOR PARKING						-	2
PARKING SUB TOTALS						5	15
OVERALL PARKING TOTAL						20	
SITE AREA 0.455 Hectare (1.124 Acres)							
PLOTS 5, 6, 7 & 8 GARDEN AREAS * = LEVEL GARDEN AREA MEASURED TO THE BOTTOM OF THE BANK THAT IS ALSO WITHIN THE CURTILAGE OF THE PROPERTY							

A2

PROPOSED HEDGE/ SHRUB PLANTING - SEE LANDSCAPE DESIGN FOR DETAILS

PROPOSED NEW TREE - SEE LANDSCAPE DESIGN FOR DETAILS

EXISTING TREES

P

GATE

BRICK WALL

1.8m TIMBER FENCE

PRF

+ 63.95

+ 63.95

TIMBER POST & RAIL FENCE WITH STOCK PROOF MESH

2m WIDE GRASSED SERVICE MARGIN

EXISTING GROUND LEVEL

PROPOSED LEVEL

GARAGE INTERNAL DIMENSION MIN 6 x 3 m

OPEN SIDED CAR PORT

HARDSTANDING PARKING SPACE

VISITOR PARKING SPACE

NORTH

POPE PRIESTLEY ARCHITECTS

ARCHITECTURE | TOWN PLANNING | URBAN DESIGN

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SCALE BAR 10mm INTERVALS WHEN PRINTED AT TRUE SCALE

SCALE 1: 500

DATE 03.04.2023

AUTHOR JT

CHECK DP

HOME FARM HEDGE END HAMPSHIRE SO30 4DF

SITE LAYOUT

DRAWING STATUS PLANNING ISSUE

DRAWING NO. PP1433/ 101

REVISION P1

APPENDIX 1: REPORT CONDITIONS

This report is produced solely for the benefit of **Wykeham Homes** and no liability is accepted for any reliance placed on it by any other party unless specifically agreed in writing otherwise.

This report refers, within the limitations stated, to the condition of the Site at the time of the inspections. No warranty is given as to the possibility of future changes in the condition of the Site.

This report is based on a visual Site inspection, study of readily accessible referenced historical records, information supplied by those parties noted in the text and preliminary discussions with local and Statutory Authorities. Some of the opinions are based on unconfirmed data and information and are presented in good faith without exhaustive clarification. Where ground contamination is suspected but no physical Site test results are available to confirm this, the report must be regarded as initial advice only, and further assessment should be undertaken prior to detailed activities related to the Site. Where test results undertaken by others have been made available these can only be regarded as a limited sample. The possibility of the presence of contaminants, not revealed by this research cannot be discounted.

Whilst confident in the findings detailed within this report because there are no exact UK definitions of these matters, being subject to risk analysis, we are unable to give categorical assurances that they will be accepted by Authorities or Funds etc. without question, as such bodies may have unpublished, often more stringent objectives. This report is prepared for the proposed uses stated in the report and should not be used in a different context without reference to Ground Condition Consultants Ltd. In time improved practices or amended legislation may necessitate a re-assessment.

The report is necessarily limited to those aspects of land contamination specifically reported on and no liability is accepted for any other aspect especially concerning gradual or sudden pollution incidents that may occur. The opinions expressed cannot be absolute due to the limitations of time and resources within the context of the agreed brief and the possibility of unrecorded previous use and abuse of the Site and adjacent Sites. The report concentrates on the Site as defined in the report and provides an opinion on surrounding Sites. If migrating pollution or contamination (past or present) exists this can only practically be better assessed following extensive on and off Site intrusive investigations and monitoring.

APPENDIX 2: ENGINEERING LOGS

BOREHOLE LOG WS101

PROJECT NUMBER J22-077
PROJECT NAME Home Farm
CLIENT Wykeham Homes
ADDRESS Southampton
DATE 29/11/2022

DRILLING COMPANY Oakland SI
DRILLING METHOD Dynamic Sampling
DRILLING RIG Terrier
LOGGED BY DP

CASING None

COMMENTS Groundwater not encountered. Location terminated at 5.35m

Samples	SPT N	Water	Depth (m)	Graphic Log	Material Description	Well Installation
			0.2		Soft dark brown sandy slightly gravelly SILT with rootlets. Gravel is fine to medium sub angular to sub rounded flint. (TOPSOIL)	
ES - 0.30-0.50			0.4		Soft locally firm melange of grey and light brown sandy slightly gravelly SILT/CLAY with occasional red brick fragments, organic remains and pockets of silty fine to medium sand. Gravel is fine to medium occasionally coarse sub angular to rounded flint. (MADE GROUND)	
B - 0.50-1.00			0.6			
			0.8			
D - 1.00	N = 5		1			
ES - 1.10-1.30	(1,1/1,1,1,2)		1.2		Very soft dark brown sandy slightly gravelly organic SILT with frequent organic debris. Sand is fine. (RELIC TOPSOIL)	
			1.4		Very soft to soft brown sandy SILT with occasional roots. Sand is fine. (WITTERING FORMATION)	
			1.6			
			1.8			
D - 2.00	N = 14		2		Soft orange brown sandy SILT. Silt is fine. (WITTERING FORMATION)	
	(2,2/2,3,4,5)		2.2			
			2.4			
B - 2.50-3.00			2.6		Medium dense to dense orange brown thinly laminated fine SAND and silty fine sand. (WITTERING FORMATION)	
			2.8			
D - 3.00	N = 60		3		Dense to very dense yellow to grey and pale brown fine SAND. (WITTERING FORMATION)	
B - 3.00-3.90	(7,10/13,15,15,17)		3.2			
			3.4			
			3.6			
			3.8			
D - 3.90	N = 51		4			
	(9,11/11,11,13,16)		4.2			
			4.4			
			4.6			
			4.8			
D - 4.90	N = 46		5			
	(7,9/11,10,11,14)		5.2			
			5.4		Location terminated at 5.35m.	

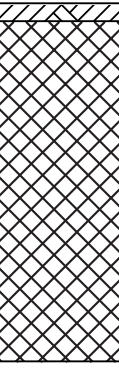
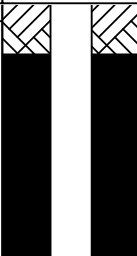
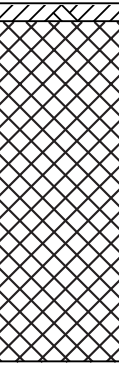
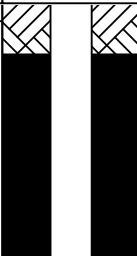
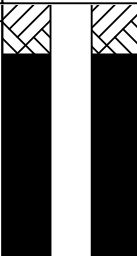
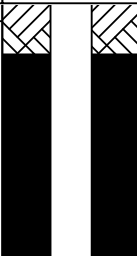
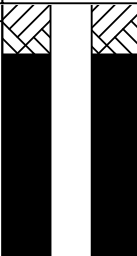
BOREHOLE LOG WS102

PROJECT NUMBER J22-077
PROJECT NAME Home Farm
CLIENT Wykeham Homes
ADDRESS Southamton
DATE 29/11/2022

DRILLING COMPANY Oakland SI
DRILLING METHOD Dynamic Sampling
DRILLING RIG Terrier
LOGGED BY DP

CASING None

COMMENTS Groundwater not encountered. Location terminated at 3.20m

Samples	SPT N	Water	Depth (m)	Graphic Log	Material Description	Well Installation
ES - 0.10-0.30			0.2		Soft dark brown sandy slightly gravelly SILT with rootlets. Gravel is fine to medium sub angular to sub rounded flint. (TOPSOIL)	
			0.4		Soft melange of grey and light brown sandy slightly gravelly SILT/CLAY with occasional red brick fragments, organic remains and pockets of silty fine to medium sand. Gravel is fine to medium occasionally coarse sub angular to rounded flint. (MADE GROUND)	
U - 0.50-1.0			0.6			
D - 1.00	N = 4 (1,1/1,1,1,1)		1			
			1.2			
			1.4		Soft dark brown slightly sandy slightly gravelly SILT with common organic material (RELIC TOPSOIL)	
ES - 1.50-1.60			1.6		Soft to firm sandy slightly gravelly SILT/CLAY. Gravel is fine to medium sub angular to rounded flint. (WITTERING FORMATION)	
			1.8			
D - 2.00			2		Dense to very dense orange brown to yellow brown slightly silty fine to medium SAND. Locally thinly laminated.	
B - 2.00-2.60	N = 39 (2,5/7,9,11,12)		2.2			
			2.4			
			2.6			
D - 2.60	N = 84 (8,13/,15,19,25,23)		2.8			
			3			
			3.2		Location terminated at 3.20m.	
			3.4			
			3.6			
			3.8			
			4			
			4.2			
			4.4			
			4.6			
			4.8			
			5			
			5.2			
			5.4			

BOREHOLE LOG WS103

PROJECT NUMBER J22-077
PROJECT NAME Home Farm
CLIENT Wykeham Homes
ADDRESS Southampton
DATE 29/11/2022

DRILLING COMPANY Oakland SI
DRILLING METHOD Dynamic Sampling
DRILLING RIG Terrier
LOGGED BY DP

CASING None

COMMENTS Groundwater not encountered. Location terminated at 5.45m

Samples	SPT N	Water	Depth (m)	Graphic Log	Material Description	Well Installation
ES - 0.00-0.05			0.2		Soft dark brown sandy slightly gravelly SILT with rootlets. Gravel is fine to medium sub angular to sub rounded flint. (TOPSOIL)	
			0.4		Soft to firm melange of grey and light brown sandy slightly gravelly SILT/CLAY with occasional red brick fragments, organic remains and pockets of silty fine to medium sand. Gravel is fine to medium occasionally coarse sub angular to rounded flint. (MADE GROUND)	
			0.6			
			0.8			
D - 1.00	N = 4 (1,1/1,1,1,1)		1			
			1.2			
			1.4			
U - 1.50-2.00			1.6			
			1.8			
			2			
D - 2.00	N = 7 (2,1/1,1,2,3)		2.2		Loose dark grey brown silty fine to medium SAND (RELIC TOPSOIL)	
			2.4		Loose orange brown silty fine to medium SAND (WITTERING FORMATION)	
			2.6			
B - 2.70-4.00			2.8		Dense to very dense orange brown to yellow grey fine to medium SAND with occasional thin laminations. (WITTERING FORMATION)	
			3			
D - 3.00	N = 33 (4,6/6,8,9,10)		3.2			
			3.4			
			3.6			
			3.8			
			4			
D - 4.00	N = 62 (7,11/15,17,17,18)		4.2			
			4.4			
			4.6			
			4.8			
			5			
D - 5.00	N = 39 (7,9/9,10,10,10)		5.2			
			5.4			
					Location terminated at 5.45m.	

BOREHOLE LOG WS104

PROJECT NUMBER J22-077
PROJECT NAME Home Farm
CLIENT Wykeham Homes
ADDRESS Southampton
DATE 29/11/2022

DRILLING COMPANY Oakland SI
DRILLING METHOD Dynamic Sampling
DRILLING RIG Terrier
LOGGED BY DP

CASING None

COMMENTS Groundwater not encountered. Location terminated at 4.45m

Samples	SPT N	Water	Depth (m)	Graphic Log	Material Description	Well Installation
ES - 0.40-0.50			0.2		Soft brown to dark brown sandy gravelly SILT with rootlets. Gravel is fine to medium sub angular to sub rounded flint. (TOPSOIL)	
			0.4		Very soft to soft brown to light brown melange of sandy gravelly SILT/CLAY and silty gravelly fine sand. Gravel is fine to medium sub angular to sub rounded flint and occasional red brick and concrete fragments. (MADE GROUND)	
			0.6			
			0.8			
D - 1.00	N = 2 (0,0/0,1,0,1)		1			
			1.2			
			1.4			
			1.6			
ES - 1.80-1.90			1.8		Loose to very loose light bluish grey and orange silty fine SAND (MADE GROUND)	
			2			
D - 2.00	N = 4 (0,1/0,1,1,2)		2.2		Very soft dark brown sandy slightly gravelly SILT. Gravel is fine to medium sub angular to rounded flint. Frequent plant remains and organic materials. (RELIC TOPSOIL)	
			2.4			
U - 2.50-3.00			2.6		Firm orange brown sandy SILT/CLAY (WITTERING FORMATION)	
			2.8			
D - 3.00	N = 27 (2,3/4,6,8,9)		3			
			3.2			
B - 3.30-4.00			3.4		Dense to very dense orange brown to yellow brown slightly silty fine SAND (WITTERING FORMATION)	
			3.6			
			3.8			
			4			
	N = 68 (7,13/16,16,17,19)		4.2			
			4.4			
			4.6		Location terminated at 4.45m.	
			4.8			
			5			
			5.2			
			5.4			

BOREHOLE LOG WS105

PROJECT NUMBER J22-077
PROJECT NAME Home Farm
CLIENT Wykeham Homes
ADDRESS Southampton
DATE 29/11/2022

DRILLING COMPANY Oakland SI
DRILLING METHOD Dynamic Sampling
DRILLING RIG Terrier
LOGGED BY DP

CASING None

COMMENTS Groundwater not encountered. Location terminated at 3.60m

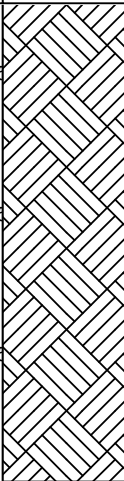
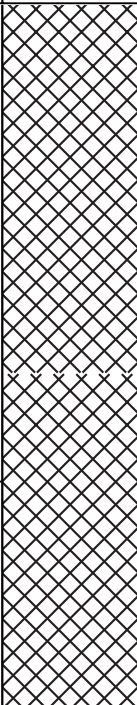
Samples	SPT N	Water	Depth (m)	Graphic Log	Material Description	Well Installation
			0.2		Soft brown to dark brown sandy gravelly SILT with rootlets. Gravel is fine to medium sub angular to sub rounded flint. (TOPSOIL)	
ES - 0.30-0.40			0.4		Soft grey brown and orange brown melange of sandy slightly gravelly SILT and silty sand. Gravel is fine to medium sub angular to sub rounded flint. Geotextile scrap noted at 0.40m. Occasional pockets of dark brown sandy gravelly SILT and occasional fragments of red brick. Rare concrete fragments. (MADE GROUND)	
			0.6			
			0.8			
D - 1.00	N = 2 (0,0/1,0,1,0)		1			
			1.2			
			1.4			
			1.6			
			1.8			
D - 2.00	N = 6 (1,1/2,2,1,1)		2		Loose yellow grey fine SAND (WITTERING FORMATION)	
			2.2			
			2.4		Loose orange brown silty fine SAND (WITTERING FORMATION)	
			2.6			
B - 2.80-3.60			2.8		Very dense yellow grey to orange brown laminated silty and slightly silty fine SAND. (WITTERING FORMATION)	
D - 3.00	N = 62 (6,10/10,15,16,21)		3			
			3.2			
			3.4			
			3.6		Location terminated at 3.60m.	
			3.8			
			4			
			4.2			
			4.4			
			4.6			
			4.8			
			5			
			5.2			
			5.4			

TRIAL PIT LOG HP101

PROJECT NUMBER J22-077	EXCAVATION TYPE Hand Tools
PROJECT NAME Home Farm	LOGGED BY DP
CLIENT Wykeham Homes	
ADDRESS Southamton	
DATE 29/11/2022	

STABILITY Good

COMMENTS Backfilled with arisings

Samples	Test	Water	Depth (m)	Graphic Log	Material Description	BACKFILL
ES - 0.40-0.50			0.05		Soft brown to dark brown sandy slightly gravelly SILT with rootlets. Gravel is fine to medium sub angular to sub rounded flint. (TOPSOIL)	
			0.1			
			0.15			
			0.2			
			0.25			
			0.3			
			0.35			
			0.4			
			0.45			
			0.5			
			0.55			
			0.6			
			0.65			
			0.7			
			0.75			
			0.8			
			0.85			
			0.9			
			0.95			
					Location terminated at 0.50m.	

TRIAL PIT LOG HP102

PROJECT NUMBER J22-077	EXCAVATION TYPE Hand Tools
PROJECT NAME Home Farm	LOGGED BY DP
CLIENT Wykeham Homes	
ADDRESS Southamton	
DATE 29/11/2022	

STABILITY Good

COMMENTS Backfilled with arisings

Samples	Test	Water	Depth (m)	Graphic Log	Material Description	BACKFILL
			0.05		Soft brown to dark brown sandy slightly gravelly SILT with rootlets. Gravel is fine to medium sub angular to sub rounded flint. (TOPSOIL)	
			0.1			
			0.15			
ES - 0.20-0.30			0.2			
			0.25			
			0.3			
			0.35			
			0.4			
			0.45			
			0.5			
			0.55		Location terminated at 0.50m.	
			0.6			
			0.65			
			0.7			
			0.75			
			0.8			
			0.85			
			0.9			
			0.95			

APPENDIX 3: GROUNDWATER AND GROUND GAS MONITORING RESULTS

GROUND GAS AND GROUNDWATER MONITORING RESULTS



SITE/REF: Home Farm						General Site comments	
DATE: 29/11/2022		1... of1...					
OPERATOR(S): DP							
Ambient Conditions:		Barometric Pressure (mb)	CH ₄ (%v/v)	CO ₂ (%v/v)	O ₂ (%v/v)		PID (ppm)
Before Monitoring							EQUIPMENT
After Monitoring							
Atmospheric Pressure Trend:							
Ground Conditions:		Dip metre					
Weather Conditions:							

Ground Gas Note: "0" readings to be recorded as instrument detection limit

Borehole ID	Time	Flow (l/hr)	Relative Pressure (mb)	Steady CH ₄ (%v/v)	CO ₂ (%v/v)	O ₂ (%v/v)	Peak CH ₄ (%v/v)	% of Lower Explosive Limit	CO (ppm)	H ₂ S (ppm)	Balance (%)	PID (ppm)	Response Zone		Response Strata	Gas screening value CH ₄	Gas screening value CO ₂
													From (mbgl)	To (mbgl)			

Groundwater

Borehole ID	Standing Water Level (mbgl)	Installation Base Dip (mbgl)	Free Phase LNAPL Thickness (m)	Free Phase DNAPL Thickness (m)	Water Quality Indicators					Well Volume (l)	Purge Volume (l)	Comments (samples)
					Eh	EC	pH	DO	Temp			
WS101	Dry	5.18										
WS102	Dry	3.18										
WS103	Dry	5.29										
WS104	4.16	4.19										
WS105	Dry	3.53										

Well volume (l) = (3.14 x (hole diameter (m)/2)² x (base dip (m) - standing water level (m)))x1000 (2l/m in 50mm well) Gas screening value = gas concentration (%) x gas flow rate (l/hr)

%v/v - Percentage volume by total volume; mbgl - metres below ground level; ppm - parts per million; mb - milibars; l/hr - litres per hour; wv - water vial; gb - 1l glass bottle; pb - 1l plastic bottle

GROUND GAS AND GROUNDWATER MONITORING RESULTS



SITE/REF: Home Farm						General Site comments	
DATE: 06/12/2022		1... of1...					
OPERATOR(S): RP							
Ambient Conditions:		Barometric Pressure (mb)	CH ₄ (%v/v)	CO ₂ (%v/v)	O ₂ (%v/v)		PID (ppm)
Before Monitoring							EQUIPMENT
After Monitoring							
Atmospheric Pressure Trend:							
Ground Conditions:		Dip metre					
Weather Conditions:							

Ground Gas Note: "0" readings to be recorded as instrument detection limit

Borehole ID	Time	Flow (l/hr)	Relative Pressure (mb)	Steady CH ₄ (%v/v)	CO ₂ (%v/v)	O ₂ (%v/v)	Peak CH ₄ (%v/v)	% of Lower Explosive Limit	CO (ppm)	H ₂ S (ppm)	Balance (%)	PID (ppm)	Response Zone		Response Strata	Gas screening value CH ₄	Gas screening value CO ₂
													From (mbgl)	To (mbgl)			

Groundwater

Borehole ID	Standing Water Level (mbgl)	Installation Base Dip (mbgl)	Free Phase LNAPL Thickness (m)	Free Phase DNAPL Thickness (m)	Water Quality Indicators					Well Volume (l)	Purge Volume (l)	Comments (samples)
					Eh	EC	pH	DO	Temp			
WS101	Dry	5.18										
WS102	Dry	3.18										
WS103	Dry	5.29										
WS104	4.16	4.19										
WS105	Dry	3.53										

Well volume (l) = $(3.14 \times (\text{hole diameter (m)}/2)^2 \times (\text{base dip (m)} - \text{standing water level (m)})) \times 1000$ (2l/m in 50mm well)

Gas screening value = gas concentration (%) x gas flow rate (l/hr)

%v/v - Percentage volume by total volume; mbgl - metres below ground level; ppm - parts per million; mb - milibars; l/hr - litres per hour; wv - water vial; gb - 1l glass bottle; pb - 1l plastic bottle

GROUND GAS AND GROUNDWATER MONITORING RESULTS



SITE/REF: Home Farm						General Site comments MG - Made Ground WF - Wittering Formation			
DATE: 14/12/2022		1... of1...							
OPERATOR(S): DP									
Ambient Conditions:		Barometric Pressure (mb)	CH ₄ (%v/v)	CO ₂ (%v/v)	O ₂ (%v/v)				PID (ppm)
Before Monitoring		1000	0.0	0.0	20.1				
After Monitoring									
Atmospheric Pressure Trend:							EQUIPMENT		
Ground Conditions:		Firm, frozen, locally slightly soft					Instrument / Model Type		
Weather Conditions:		very cold but clear					Serial Number		
							Comments		
							Dip metre		

Ground Gas Note: "0" readings to be recorded as instrument detection limit

Borehole ID	Time	Flow (l/hr)	Relative Pressure (mb)	Steady CH ₄ (%v/v)	CO ₂ (%v/v)	O ₂ (%v/v)	Peak CH ₄ (%v/v)	% of Lower Explosive Limit	CO (ppm)	H ₂ S (ppm)	Balance (%)	PID (ppm)	Response Zone		Response Strata	Gas screening value CH ₄	Gas screening value CO ₂
													From (mbgl)	To (mbgl)			
WS101		0.0		0.0	0.3	19.8	0.0			0	79.9		1.00	5.20	MG,WF	0.0001	0.0003
WS102		0.0		0.0	2.4	19.0	0.0			0	78.6		1.00	3.20	MG,WF	0.0001	0.0024
WS103		0.0		0.0	0.7	19.8	0.0			0	79.5		1.00	5.30	MG,WF	0.0001	0.0007
WS104		0.0		0.0	2.2	18.1	0.0			0	79.7		1.00	4.20	MG,WF	0.0001	0.0022
WS105		0.1		0.0	3.6	17.5	0.0			0	79.0		1.00	3.60	MG,WF	0.0001	0.0036

Groundwater

Borehole ID	Standing Water Level (mbgl)	Installation Base Dip (mbgl)	Free Phase LNAPL Thickness (m)	Free Phase DNAPL Thickness (m)	Water Quality Indicators					Well Volume (l)	Purge Volume (l)	Comments (samples)
					Eh	EC	pH	DO	Temp			
WS101	Dry	5.18										
WS102	Dry	3.18										
WS103	Dry	5.29										
WS104	4.15	4.19										
WS105	Dry	3.53										

Well volume (l) = (3.14 x (hole diameter (m)/2)² x (base dip (m) - standing water level (m)))x1000 (2l/m in 50mm well)

Gas screening value = gas concentration (%) x gas flow rate (l/hr)

%v/v - Percentage volume by total volume; mbgl - metres below ground level; ppm - parts per million; mb - milibars; l/hr - litres per hour; wv - water vial; gb - 1l glass bottle; pb - 1l plastic bottle

GROUND GAS AND GROUNDWATER MONITORING RESULTS



SITE/REF: Home Farm						General Site comments MG - Made Ground WF - Wittering Formation			
DATE: 06/01/2023		1... of1...							
OPERATOR(S): RP									
Ambient Conditions:		Barometric Pressure (mb)	CH ₄ (%v/v)	CO ₂ (%v/v)	O ₂ (%v/v)	PID (ppm)			
Before Monitoring							EQUIPMENT		
After Monitoring									
Atmospheric Pressure Trend:									
Ground Conditions:		Firm, locally slightly soft					Dip metre		
Weather Conditions:									

Ground Gas Note: "0" readings to be recorded as instrument detection limit

Borehole ID	Time	Flow (l/hr)	Relative Pressure (mb)	Steady CH ₄ (%v/v)	CO ₂ (%v/v)	O ₂ (%v/v)	Peak CH ₄ (%v/v)	% of Lower Explosive Limit	CO (ppm)	H ₂ S (ppm)	Balance (%)	PID (ppm)	Response Zone		Response Strata	Gas screening value CH ₄	Gas screening value CO ₂
													From (mbgl)	To (mbgl)			

Groundwater

Borehole ID	Standing Water Level (mbgl)	Installation Base Dip (mbgl)	Free Phase LNAPL Thickness (m)	Free Phase DNAPL Thickness (m)	Water Quality Indicators					Well Volume (l)	Purge Volume (l)	Comments (samples)
					Eh	EC	pH	DO	Temp			
WS101	5.11	5.18										
WS102	1.6	3.18										
WS103	5.1	5.25										
WS104	2.01	4.16										
WS105	GL	3.53										

Well volume (l) = $(3.14 \times (\text{hole diameter (m)}/2)^2 \times (\text{base dip (m)} - \text{standing water level (m)})) \times 1000$ (2l/m in 50mm well)

Gas screening value = gas concentration (%) x gas flow rate (l/hr)

%v/v - Percentage volume by total volume; mbgl - metres below ground level; ppm - parts per million; mb - milibars; l/hr - litres per hour; wv - water vial; gb - 1l glass bottle; pb - 1l plastic bottle