

SOAKAGE TESTING AND GROUNDWATER MONITORING

AT

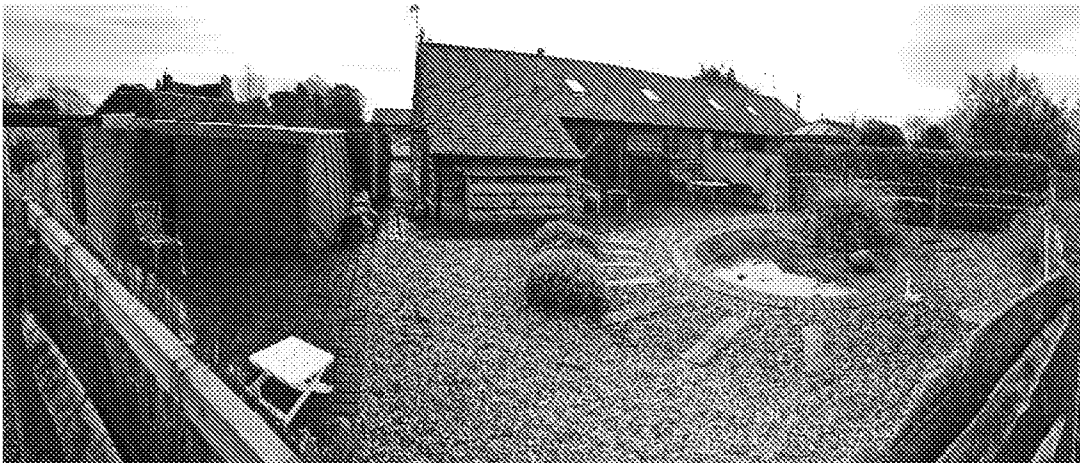
NORTON DAIRY, OLD DAIRY LANE, NORTON

FOR

IAN LISSAMORE

G6429

07 January 2021



Ground Management Ltd
Civil and Geotechnical Engineering Services

DOCUMENT CONTROL

Report Title: Soakage Testing and Groundwater Monitoring
Norton Dairy, Old Dairy Lane, Norton PO20 3AF

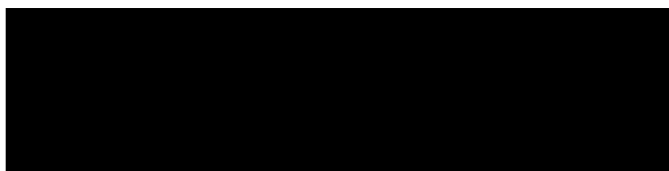
Report No./ Issue: G6429-01/1

Report Status: Issued for Client Comment

Distribution: Ian Lissamore PDF copy 07 January 2021

Prepared by: Alistair Tyler BSc MSc DIC CEng MICE

Signed:



Ground Management Ltd Robin Hill Farm Clay Lane Fishbourne Chichester West Sussex PO18 8AB



CONTENTS

- 1.0 Introduction
- 2.0 Proposed Development
- 3.0 General Description of Site and Surrounding Area
- 4.0 Geology
- 5.0 Site History
- 6.0 Details of the Ground Investigation
- 7.0 Ground and Groundwater Conditions
- 8.0 Discussion and Recommendations

- Figure 1: Site Location Plan
- Figure 2: Existing Site Layout
- Figure 3: Proposed Development
- Figure 4: Exploratory Hole Location Plan

- Exploratory Hole Logs: Borehole BH1
Trial Pit TP1

Infiltration Test Results

1.0 INTRODUCTION

- 1.1 Ground Management Ltd have undertaken a preliminary ground investigation at the Norton Dairy, Old Dairy Lane, Norton to collect information on ground conditions relevant to drainage of proposed extensions to the development.
- 1.2 The work included a brief desk study, site visit for borehole excavation and standpipe installation together with hand excavation of a trial pit for large scale soakage testing.
- 1.3 The exploratory holes allowed assessment of ground conditions and collection of samples. The standpipe will enable ongoing monitoring of groundwater level.
- 1.4 This report provides a record of the investigation and its findings together with brief discussion and recommendations to assist drainage design.
- 1.5 Recommendations are based on the conditions revealed by the investigation. Should the proposed development change or ground conditions be found to vary from those previously revealed they should be reported to a geotechnical engineer to consider the significance.
- 1.6 A contamination assessment has not been requested or carried out.
- 1.7 The work was carried out on behalf of Ian Lissamore and nothing in this report confers or purports to confer on any third party, any benefit or any right to enforce any term of this report pursuant to the Contract (Rights of Third Parties) Act 1999.

2.0 PROPOSED DEVELOPMENT

- 2.1 The proposed development comprises a small extension on the west side of the existing building and addition of a linked car port / garage and veranda to the north as shown on plans submitted for planning approval, an extract of which is presented on the attached Figure 3.

3.0 GENERAL DESCRIPTION OF SITE AND SURROUNDING AREA

- 3.1 The site is located to the north west of Norton as indicated on Figure 1. The National Grid Reference for the site is SU 92788 06497 approximately and the nearest postcode is PO20 3AF.
- 3.2 The site comprises a semi detached bungalow formed within part of a converted farm building, together with garden and driveway areas as indicated on the attached Figure 2.
- 3.3 Existing surfacing includes concrete slab, block paving, gravel drive and loose gravel across most of the rear garden. A covered storage area / car port stands on the concrete slab at the north end of the plot and there is a shallow lined pond in the centre of the rear garden.
- 3.4 Ground levels across the field to the west, at the rear of the site, slope down towards the south. The site is relatively flat and there is a slight fall eastwards along the adjacent Old Dairy Lane out towards Norton Lane to the east. Ground levels are not recorded on the site plans but the 1:25,000 Ordnance Survey mapping indicates maximum slopes of about 1:15 the 15m AOD contour just south of the site.
- 3.5 The garden area is enclosed by a brick wall and fence with a hedge along the boundary with the neighbour's garden to the south.
- 3.6 The mapping shows a number of minor watercourses draining south across lower lying areas from about 500m to the west, south and south east of the site. There are small isolated ponds in the vicinity of the site, the closest on the slope 200m north west of the site.
- 3.7 The Client advised that historically there was an occasion when surface water runoff was reported to flow close to or through the site and consequently during conversion to residential use the floor level of the development was raised for protection against such flows.
- 3.8 Underground service plans were not available however the Client advised there were no services beneath the area of the proposed investigation. As a further precaution prior to excavation of the site plans were obtained from SSN, BT and SGN; none of the records showed any mains beneath the area of investigation.

4.0 GEOLOGY

- 4.1 The 1:50,000 British Geological Survey of England and Wales Sheet 317/332, “Chichester and Bognor” dated 1996 indicates the site to be underlain by Head Gravel (clayey gravel, locally chalky) over the Reading Formation comprising mainly clays with locally silt and sand.
- 4.2 Aeolian Deposits (Brickearth), typically a silty clay, is shown mapped extensively to the east of the site.
- 4.3 The solid geology are indicated to have a southerly dip and the boundary between the Reading Formation and the underlying Chalk undulates east west about 200m north of the site. Raised Storm Beach Deposits are shown distributed along a similar east – west alignment.
- 4.4 A report prepared by the Institute of Geological Sciences, titled Mineral Assessment Report 138 “Sand and Gravel Resources SU80, 90 Chichester and Bognor Regis, Sussex” includes an exploratory hole referenced BH 90NW67 located 200m south west of the site and recording :

Head Gravel	0m to 4.0m
Raised Beach Deposits	to 8.5m
Woolwich and Reading Formation	to > 10.0m

5.0 SITE HISTORY

- 5.1 Historical Ordnance Survey maps have been viewed online.
- 5.2 The earliest map viewed, dated 1875-6, shows the site to be within an open field that extends to the west. There are farm buildings to the east and a small orchard just to the north.
- 5.3 The subsequent map dated 1897 shows a farm building appearing on the site. A well is indicated in the orchard to the north and pumps are shown at several properties in Norton and across the fields to the north west. There is also a small pond to the north west.
- 5.4 There are no significant changes to the site or surrounding area on the 1912 and 1937 maps other than increasing development in Norton and a windpump shown to the north east beyond Norton House
- 5.5 The most recent map viewed dated 1975 shows additional buildings on and around the site now named as Norton Farm. The orchard has been removed from the land north of the site and farm buildings named as East Norton Farm have appeared.
- 5.6 The Client advised that prior to recent conversion the building on the site was a milking parlour with the cattle yard on the west side.

6.0 DETAILS OF THE GROUND INVESTIGATION

- 6.1 The ground investigation fieldwork comprised the exploratory holes indicated on Figure 4 and described below. The scope and location were selected to target the possible soakaway position within an open area in the rear garden.
- 6.2 The work was carried out on 16 December 2020 and included a borehole, referenced as BH1, to a depth of 3m using hand held window sampling equipment, and a hand dug trial pit, referenced as TP1 to a depth of 0.95m.
- 6.3 The holes allowed the ground profile to be examined and recorded and a 19mm diameter standpipe was installed within the completed borehole for monitoring of groundwater level.
- 6.4 A large scale soakage test was carried out in TP1 in accordance with BRE 365 including 3 refills of the test pit. Results of the tests are appended.
- 6.5 A shear vane test was conducted on the window sample extracted from the cohesive strata at shallow depth.
- 6.6 The exploratory holes were logged in general accordance with BS5930:1999 Code of Practice for Site Investigation. The sampling referencing and the results of the insitu testing are presented on the appended logs.
- 6.7 Selected samples were taken from the exploratory holes to be available should laboratory testing be required.

7.0 GROUND AND GROUNDWATER CONDITIONS

- 7.1 Descriptions of the soils encountered are presented on the attached exploratory hole logs. The findings can be summarised as follows:

Strata	Thickness (m)	Depth to base of strata (m bgl)
Loose Gravel Surfacing	0.1 – 0.15	0.1 – 0.15
MADE GROUND of soft to firm silty clay with some gravel of flint, brick and chalk.	0.4	0.5 – 0.55
Firm silty CLAY with some flint gravel.	>0.4 – 1.1	> 0.95 – 1.5
Well graded flint GRAVEL with a little slightly sandy silty clay	>1.5	>3.0

- 7.2 Groundwater was not observed during excavation. A monitoring visit on 24/12/20 that followed a period of significant rainfall recorded water level at 2.15m below ground level. Subsequent regular monitoring up to 3/1/21 by the Client has recorded a water level 3.15m below ground level. Ongoing monitoring will assist interpretation.

- 7.3 An assessment of the large scale soakage test results are appended and a summary is presented in the table below:

Trial Pit	Pit Dimensions LxWxD (metres)	Test No.	Water Level at start of test (mm below ground level)	Duration of test (mins)	Fall of water level during test (mm)	Infiltration Coefficient (m/s)
TP1	0.3 x 1.0 x 0.95	1	370	20	480	1.9×10^{-4}
		2	95	30	755	1.0×10^{-4}
		3	75	58	775	5.9×10^{-5}
		4	55	81	795	4.5×10^{-5}

8.0 DISCUSSION AND RECOMMENDATIONS

8.1 Ground and groundwater conditions

8.1.1 Ground conditions revealed by this investigation generally confirm the anticipated geology of Head Gravel with a surface covering of Made Ground and intervening silty clay consistent with the Aeolian Deposits shown to be present locally. The exploratory holes were of insufficient depth to encounter the underlying Reading Formation.

8.1.2 Highest groundwater level was recorded at 2.15m bgl on 24/12/20.

8.1.3 It should be assumed that there will be seasonal variation of the groundwater level and it should be expected to rise in response to rain. The installed standpipe will allow ongoing monitoring of the groundwater levels to investigate these effects.

8.2 Excavations

8.2.1 Shallow excavations above the water table have a reasonable prospect of the sides standing vertically in the short term but where expected to remain open for any length of time or if greater than 1.2m deep and are to be entered by personnel will need support.

8.2.2 Deep excavations extending below the groundwater within the gravel strata may not be required but if they are necessary may be problematic and require specialist dewatering techniques.

8.3 Drainage

8.3.1 Based on the results of the soakage tests an infiltration coefficient of 4.5×10^{-5} m/s may be adopted for the design of a shallow soakaway at the location of TP1.

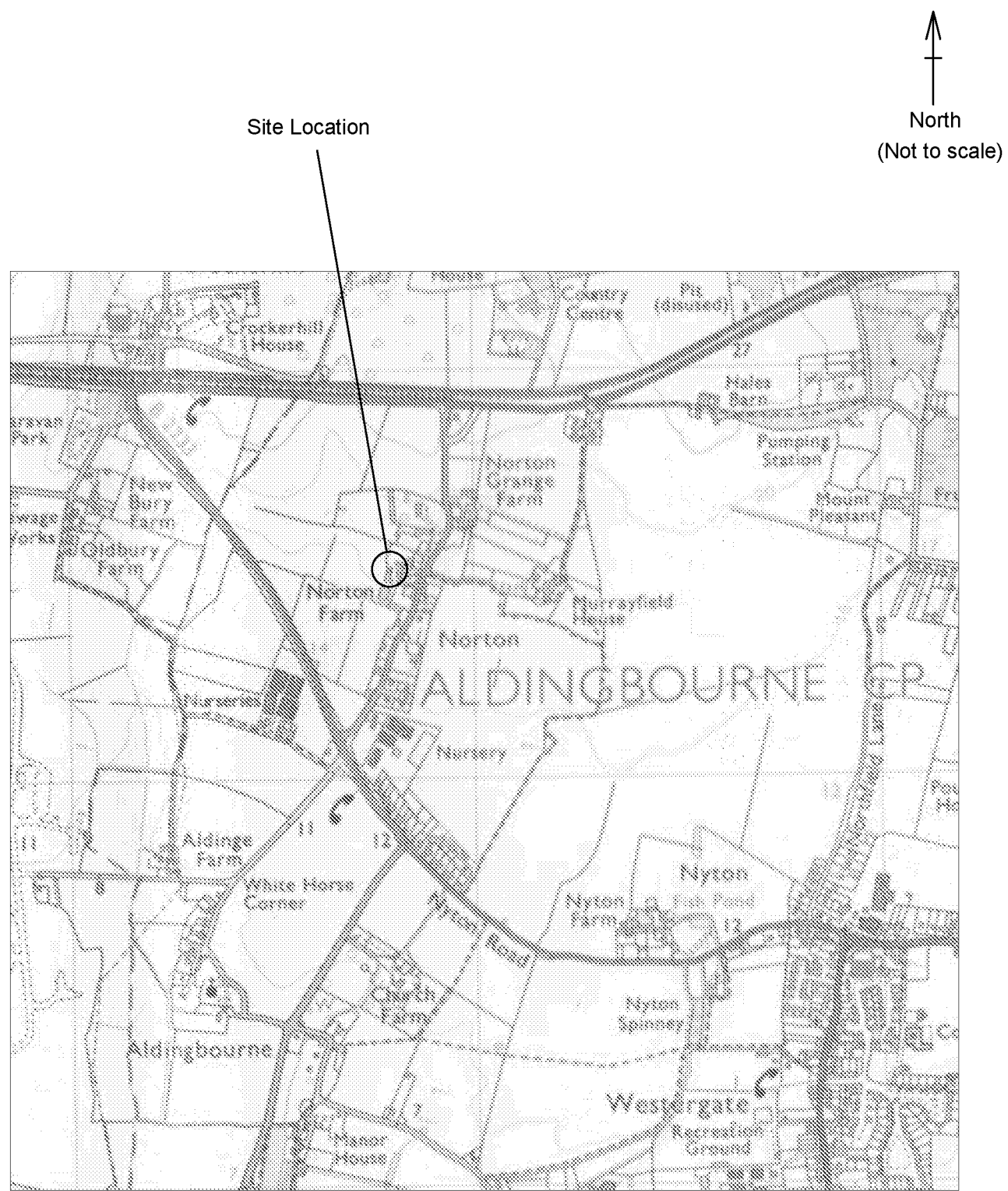
8.3.2 Confirmatory tests should be conducted if soakaways are to be located in differing ground conditions elsewhere on the site.

8.3.3 Given the reported historical occurrence of surface water runoff in the vicinity of the site it is emphasised that the drainage design should include provision in consideration of exceedance with a flow route to convey surface water around the building.

8.4 **Underground Services**

- 8.4.1 It is recommended that all available information on the location of underground services should be referenced prior to further excavation of the site.
- 8.4.2 Any redundant drainage pipework and chambers should be removed or properly filled / grouted. Any soakaways serving the existing surface water and roof drains should be located to establish if they will impact on the foundation design.
- 8.4.3 Should land drains be encountered during excavation and construction they should be diverted around the works to allow continued performance.

Ground Management Ltd Civil and Geotechnical Engineering Services	Robin Hill Farm, Clay Lane, Fishbourne CHICHESTER, West Sussex PO18 8AB	PROJECT NO: G6429
		FIGURE REF: Figure 1
PROJECT: Norton Dairy, Old Dairy Lane Norton PO20 3AF	PREPARED: AJHT	
SECTION: Preliminary Ground Investigation	CHECKED: AJHT	
TITLE: Site Location Plan	DATE: Dec 2020	



Ground Management Ltd

Civil and Geotechnical Engineering Services

Robin Hill Farm, Clay Lane, Fishbourne
CHICHESTER, West Sussex PO18 8AB

PROJECT NO: G6429

FIGURE REF: Figure 2

PROJECT: Norton Dairy, Old Dairy Lane Norton PO20 3AF

PREPARED: AJHT

SECTION: Preliminary Ground Investigation

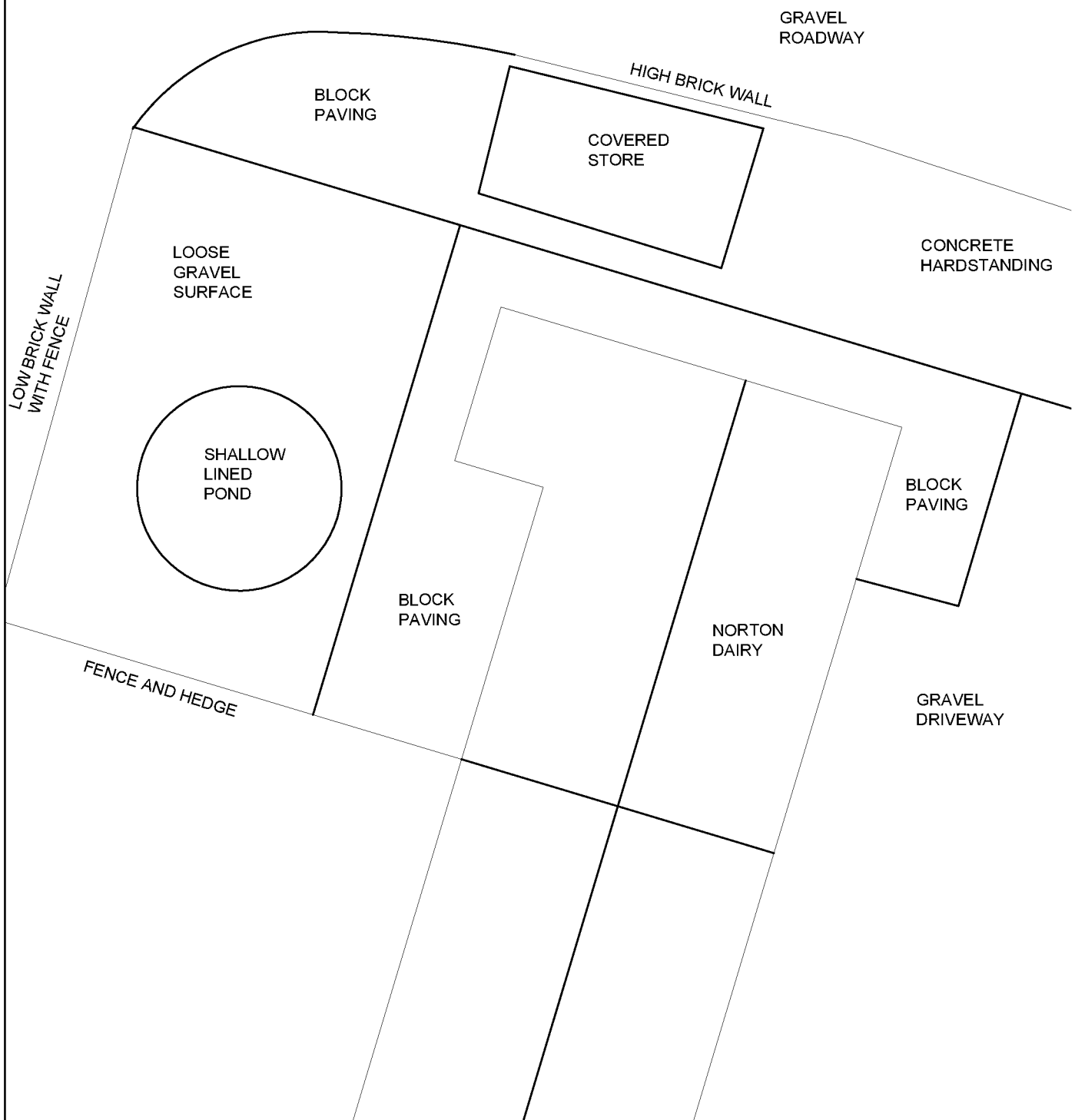
CHECKED: AJHT

TITLE: Existing Site Layout - Sketch Plan

DATE: Dec 2020

LAYOUT SHOWN IS INDICATIVE ONLY (NOT TO SCALE)

North
(Approx)



Ground Management Ltd

Civil and Geotechnical Engineering Services

Robin Hill Farm, Clay Lane, Fishbourne
CHICHESTER, West Sussex PO18 8QB

PROJECT NO: G6429

FIGURE REF: Figure 3

PROJECT: Norton Dairy, Old Dairy Lane Norton PO20 3AF

PREPARED: AJHT

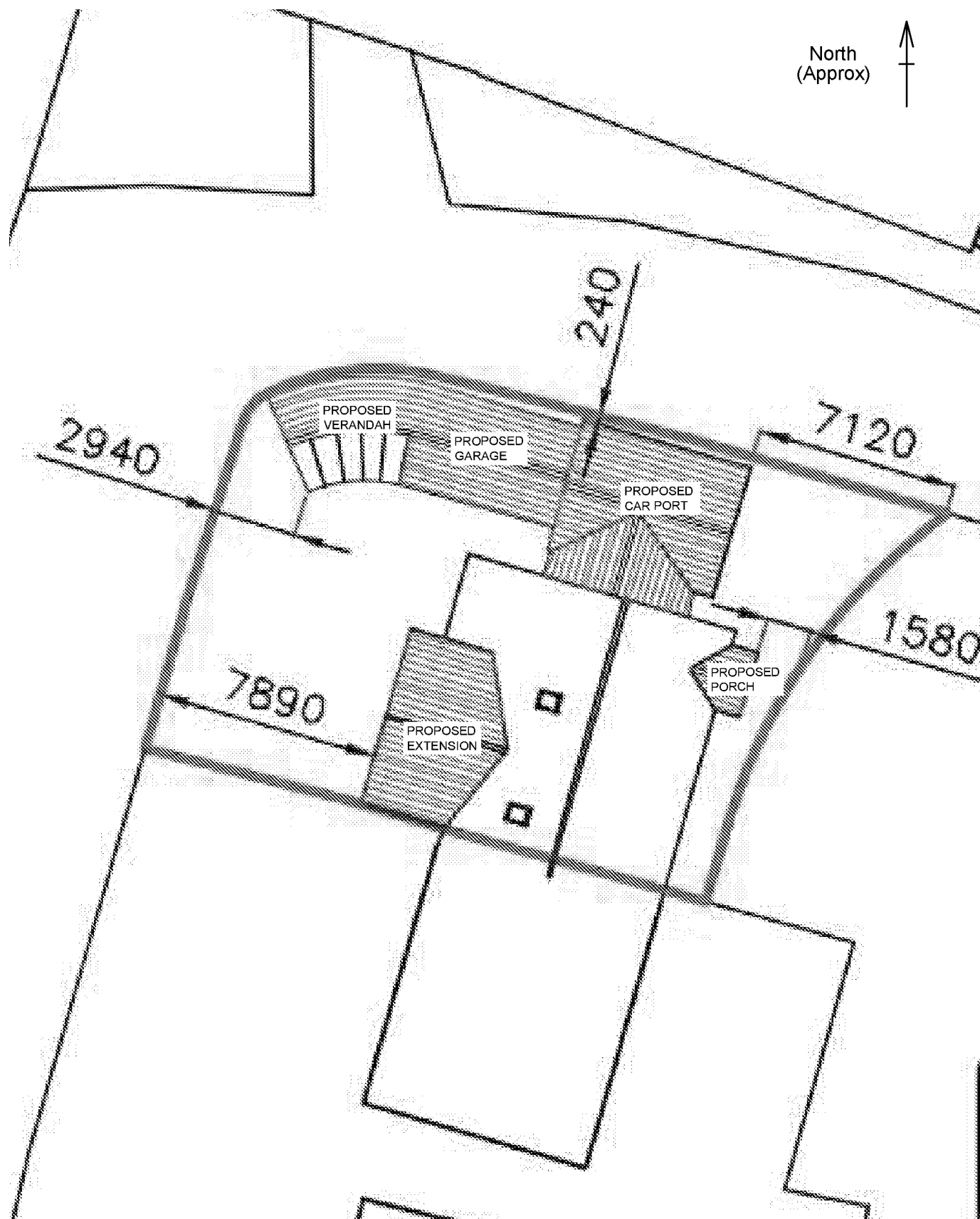
SECTION: Preliminary Ground Investigation

CHECKED: AJHT

TITLE: Proposed Development

DATE: Dec 2020

North
(Approx)



Based on Planning drawing prepared by Client's Architect

Ground Management Ltd

Civil and Geotechnical Engineering Services

Robin Hill Farm, Clay Lane, Fishbourne
CHICHESTER, West Sussex PO18 8AB

PROJECT NO: G6429

FIGURE REF: Figure 4

PROJECT: Norton Dairy, Old Dairy Lane Norton PO20 3AF

PREPARED: AJHT

SECTION: Preliminary Ground Investigation

CHECKED: AJHT

TITLE: Exploratory Hole Location Plan

DATE: Dec 2020

(HOLE LOCATIONS ARE INDICATIVE ONLY UNLESS DIMENSIONED)

North
(Approx)



GRAVEL
ROADWAY

BLOCK
PAVING

HIGH BRICK WALL

COVERED
STORE

LOOSE
GRAVEL
SURFACE

SHALLOW
LINED
POND

TP1



BH1



BLOCK
PAVING

NORTON
DAIRY

FENCE AND HEDGE

Ground Management Ltd

Civil and Geotechnical Engineering Services

Robin Hill Farm Clay Lane Fishbourne
CHICHESTER West Sussex PO18 8AB

Site

Norton Dairy, Old Dairy Lane, Norton PO20 3AF

Number
BH1

Excavation Method Hand held window sampler	Dimensions 80mm to 1.00m 60mm to 2.00m 50/40 to 3.00m	Ground Level (mOD)	Client Ian Lissamore	Job Number G6429
	Location See Location Plan	Dates 16/12/2020	Engineer	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.40-0.75	D1				(0.40)	(Gravel surfacing removed - see remarks) MADE GROUND of brown silty clay with some coarse medium and fine gravel of flint brick and chalk. ... locally slightly silty sand pocket		
0.75-1.50	D2				0.40 (0.35)	Firm orange brown fine silty CLAY with occasional medium and fine flint gravel		
1.50-2.40	D3				0.75 (0.75)	Firm orange brown slightly sandy SILT/CLAY with some coarse medium and fine subangular flint gravel		
2.40-2.70	D4				1.50 (0.90)	Well graded orange brown slightly sandy slightly silty clayey GRAVEL of coarse medium and fine subangular to angular flint		
					2.40 (0.30)	Firm orange brown / yellow brown slightly silty CLAY with a little fine and medium angular flint gravel		
					2.70 (0.30)	Well graded coarse medium and fine angular flint GRAVEL with a little yellow brown silty clay		
					3.00	Complete at 3.00m		

Remarks

Borehole has been logged and samples referenced from ground surface after removal of 100mm coarse subangular flint gravel on woven geotextile above subangular medium gravel.
Groundwater was not encountered
Borehole remained open during excavation
19mm dia standpipe installed on completion : 2m slotted with geosock and gravel surround, 1m plain including 0.5m bentonite pellet seal

Scale (approx)
1:25

Logged By
AT

Figure No.
G6429.BH1

Ground Management Ltd

Civil and Geotechnical Engineering Services

Robin Hill Farm Clay Lane Fishbourne
CHICHESTER West Sussex PO18 8AB

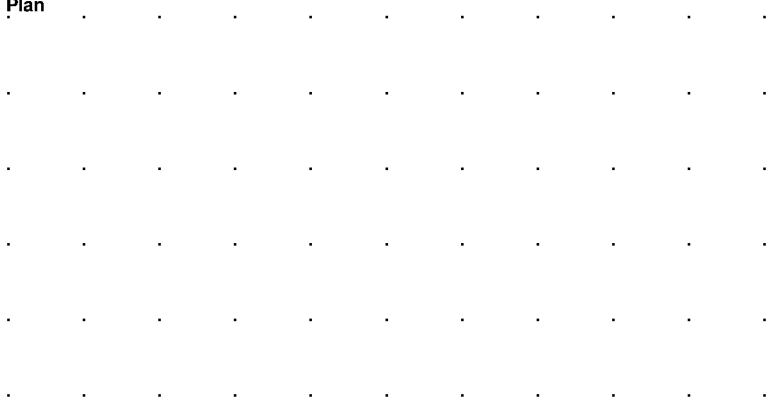
Site

on Dairy, Old Dairy Lane, Norton PO20 3AF

**Trial Pit
Number
TP1**

Excavation Method Hand Dug Trial Pit	Dimensions 0.3m x 1.0m	Ground Level (mOD)	Client Ian Lissamore	Job Number G6429
	Location See Location Plan	Dates 16/12/2020	Engineer	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.80	D1				0.10 (0.20)	Coarse rounded and subangular gravel on woven geotextile above subangular to angular medium gravel		
					0.30 (0.20)	MADE GROUND of brown / orange brown firm silty clay with a little gravel and cobble size flint and occasionally brick		
					0.50 (0.20)	MADE GROUND / reworked brown silty clay with some gravel and cobble size flint and brick		
					(0.45)	Firm orange brown silty CLAY with occasional coarse medium and fine flint gravel. Occasional fine root.		
					0.95	Complete at 0.95m		

Plan 	Remarks Groundwater was not encountered Pit sides remained stable and vertical during excavation		
	Scale (approx) 1:25	Logged By AT	Figure No. G6429.TP1

