

Pippins, Yapton Lane, Walberton,
BN18 0AS

Provision of an additional 3 No. residential mobile homes.

Planning permission: WA/59/19/PL

Condition Numbers: 5

Surface Water Drainage

Condition 5 – Surface Water Drainage

Condition 5 states:

Development shall not commence, other than works of site survey and investigation, until full details of the proposed surface water drainage scheme have been submitted to and approved in writing by the Local Planning Authority. The design should follow the hierarchy of preference for different types of surface water drainage disposal systems as set out in Approved Document H of the Building Regulations, and the recommendations of the SuDS Manual produced by CIRIA. Winter groundwater monitoring to establish highest annual ground water levels and winter Percolation testing to BRE 365, or similar approved, will be required to support the design of any Infiltration drainage. No building / No part of the extended building shall be occupied until the complete surface water drainage system serving the property has been implemented in accordance with the agreed details and the details so agreed shall be maintained in good working order in perpetuity.

Response:

Attached to this response is a detailed report on the surface water drainage scheme which has been informal agreed with Arun DC drainage officers prior to the submission of this formal application to discharge the aforementioned conditions.

SOAKAGE TESTING AND GROUNDWATER MONITORING

AT

PIPPINS, YAPTON LANE

FOR

MR LEN AYRES

G6406

30 June 2020



Ground Management Ltd

Civil and Geotechnical Engineering Services

DOCUMENT CONTROL

Report Title: Soakage Testing and Groundwater Monitoring
Pippins, Yapton Lane

Report No./ Issue: G6406-01/1

Report Status: Issued for Client Comment

Distribution: Mr Len Ayres PDF copy 30 June 2020
Mr Stephen Jupp

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 Details of the Ground Investigation
- 6.0 Ground and Groundwater Conditions
- 7.0 Discussion and Recommendations

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

Exploratory Hole Logs: BH1 and TP1

Soakage Test Results

Groundwater Monitoring

1.0 INTRODUCTION

- 1.1 Ground Management Ltd have undertaken a preliminary ground investigation and soakage testing at Pippins, Yapton Lane, to collect information on ground conditions relating to the drainage for a proposed addition of residential mobile homes.
- 1.2 The work included a brief desk study, site walkover, shallow borehole by window sampling and hand excavated trial pit for large scale soakage testing.
- 1.3 The exploratory holes allowed assessment of ground conditions and a standpipe was installed in the completed borehole to allow monitoring of groundwater level.
- 1.4 This report provides a record of the investigation and its findings together with discussion and recommendations to assist with 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 The work was carried out on behalf of Mr Len Ayres 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 the extension of an existing residential development with the addition of three residential mobile homes and parking areas as indicated on plans submitted to the Local Authority Planning Department, an extract of which is presented on the attached Figure 3.
- 2.2 As indicated on the plan, a narrow strip along the west side of the garden will be taken to provide vehicular access to the development.

3.0 GENERAL DESCRIPTION OF SITE AND SURROUNDING AREA

- 3.1 The site is located to the rear of the house Pippins, on the west side of Yapton Lane between Walberton and Yapton on land behind Lagnersh House on the north side of Lower Bognor Road in Lagness approximately 1km north west of Bognor Regis as indicated on Figure 1. The National Grid Reference for the site is SU 97740 05096 approximately and the nearest postcode is BN18 0AS.
- 3.2 The existing site layout is indicated on the block plan submitted to the Local Authority Planning Department, an extract of which is presented as Figure 2.
- 3.3 The new residential mobile homes will be located in the grass area behind the house. Existing ground levels across the area of the proposed development appear to have been reduced by a previous topsoil strip and are about 300mm below the level of the adjacent garden.
- 3.4 The ground level on the site appear to fall slightly to the west but otherwise the site and surrounding area are reasonably flat. By reference to the Ordnance Survey 1:25,000 mapping is above the 10m AOD contour with spot level locally in Yapton Lane shown to be at 11m AOD.
- 3.5 There are no open watercourses on the site.
- 3.6 There are no trees or bushes on the proposed area of development. There is a hedge along the top of a raised bank that runs along the western boundary and various mature trees and bushes beyond the fence to the north of the site.
- 3.7 Plans obtained from SSEN indicate an electrical supply across the west side of the site between the main that runs along the north of the site and the on site distribution box. The Client advised of a water supply pipe that runs through the site from Yapton Lane in the direction of Far Plants to the west, the precise location was unclear, possibly on the south side of the house.

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 Aeolian Deposits (Brickearth), typically a silty clay, over London Clay.
- 4.2 By interpretation of the mapping it is noted that the strata described above are likely to be intervened by Head Gravel, typically a clayey gravel, and Raised Beach Deposits comprising sands and gravels.
- 4.3 The mapping shows the site to be on the line of the Chichester Syncline, an east – west dip in the folding of the solid geology.

5.0 DETAILS OF THE GROUND INVESTIGATION

- 5.1 The ground investigation fieldwork commenced on 20 February 2020 with a shallow borehole, referenced as BH1, excavated by driven tube / window sampling to examine the ground profile and install a standpipe. Following a brief period of groundwater monitoring, a shallow trial pit, referenced as TP1, was excavated by hand for soakage testing.
- 5.2 The exploratory holes were located in the general area of the proposed development whilst avoiding buried services. The hole locations are indicated on Figure 4.
- 5.3 Trial pit TP1 was excavated to a depth 0.45m below ground level and large scale soakage testing was carried out within the pit in accordance with BRE365. Monitoring of the tests and refilling of the pit continued over the following days and was completed on 2/3/20.
- 5.4 The exploratory holes were logged in general accordance with BS5930:1999 Code of Practice for Site Investigation.

6.0 GROUND AND GROUNDWATER CONDITIONS

- 6.1 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)*
Soft to firm silty CLAY with occasional gravel	0.9	0.9
Well graded GRAVELS with a little slightly sandy silty clay	1.6	2.5
Slightly silty fine to medium SAND	>0.5	>3.0

*Note: Depth is referenced to current ground level that has been previously reduced by approximately 300mm.

- 6.2 Groundwater was observed during excavation of BH1 as moderate inflow and water level was noted to rise to 0.40m bgl shortly after excavating the hole to a depth of 3.0m
- 6.3 Monitoring of the standpipes from 20/2/20 to 17/3/20 recorded variation in groundwater level between 0.3m and 0.64m bgl. Groundwater level responded to rainfall which was noted to be very heavy at times during the monitoring period.
- 6.4 A summary of the results of the large scale soakage tests conducted within pit TP1 are 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	0.45 x 1.05 x 0.45	1	45	209	385	1.4×10^{-5}
		2	35	206	280	8.50×10^{-6}
		3	50	255	355	1.2×10^{-5}

7.0 DISCUSSION AND RECOMMENDATIONS

7.1 Ground and groundwater conditions

- 7.1.1 Ground conditions revealed by this investigation generally confirm the anticipated geology of Aeolian Deposits (Brickearth) above Head Gravel and Raised Beach Deposits. The investigation did not extend to sufficient depth to encounter the underlying solid geology, expected to be the London Clay.
- 7.1.2 The near surface strata comprise silty clay underlain by well graded gravels with a little sandy silty clay.
- 7.1.3 Seepage was noted into the 3m deep BH1 and monitoring of the standpipe from 20/2/20 to 17/3/20 recorded variations in groundwater levels between 0.3m and 0.64m bgl.
- 7.1.4 Seasonal variation of the groundwater level is expected and it should be assumed that groundwater level could rise in response to rain. It is noted however that the monitoring was carried out during a period of high rainfall and when groundwater was considered to be high.

7.2 Drainage

- 7.2.1 The results of the soakage tests derived relatively low permeability with infiltration coefficients ranging from 8.5×10^{-6} m/s to 1.4×10^{-5} m/s.
- 7.2.2 It is recommended that preliminary design of shallow soakaways or other infiltration features for disposal of surface water adopts a relatively conservative value for the infiltration coefficient of 8.5×10^{-6} m/s.
- 7.2.3 Given the observed groundwater levels rose to within 0.3m of ground level any infiltration drainage will need to comprise a thin plate soakaway such as can be provided by permeable paving. It is noted the current site level has been reduced by about 0.3m and it is recommended that the opportunity should be taken to increase soakaway storage potential by returning final levels to the original.
- 7.2.4 The vehicular areas around the existing mobile homes comprises a gravel surfacing that the client advised drains well with no significant drainage issues. Visits to site during periods of heavy rain confirmed this.

PROJECT: Pippins, Yapton Lane

PREPARED: AJHT

SECTION: Preliminary Ground Investigation

CHECKED: AJHT

TITLE: Site Location Plan

DATE: Mar 2020

Site Location

North
(Not to scale)



Ground Management Ltd

Civil and Geotechnical Engineering Services

Robin Hill Farm, Clay Lane, Fishbourne
CHICHESTER, West Sussex PO18 8AB
Phone/Fax: 01243 575073

PROJECT NO: G6406

FIGURE REF: Figure 2

PROJECT: Pippins, Yapton Lane

PREPARED: AJHT

SECTION: Preliminary Ground Investigation

CHECKED: AJHT

TITLE: Existing Site Layout

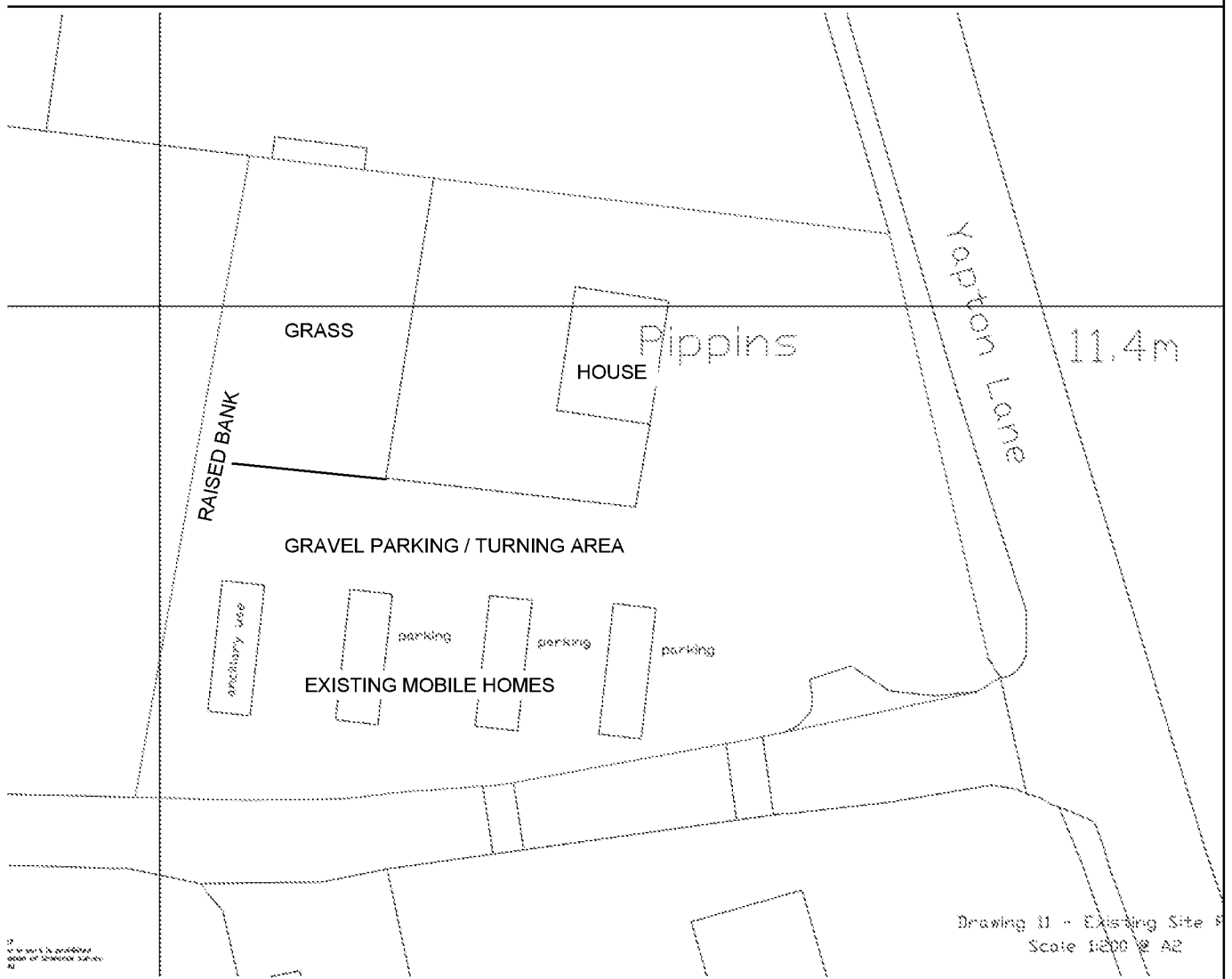
DATE: Mar 2020

North
(Approx)



SCALE:
(Approx)

0 10m



PROJECT: Pippins, Yapton Lane

PREPARED: AJHT

SECTION: Preliminary Ground Investigation

CHECKED: AJHT

TITLE: Proposed Development

DATE: Mar 2020

**3 NEW
RESIDENTIAL
MOBILE HOMES**

parking

parking

parking

section of existing fence line
to be removed
new fence line

Pippin

parking

parking

parking

EXISTING MOBILE HOMES

Ground Management Ltd

Civil and Geotechnical Engineering Services

Robin Hill Farm, Clay Lane, Fishbourne
CHICHESTER, West Sussex PO18 8AB
Phone/Fax: 01243 575073

PROJECT NO: G6406

FIGURE REF: Figure 4

PROJECT: Pippins, Yapton Lane

PREPARED: AJHT

SECTION: Preliminary Ground Investigation

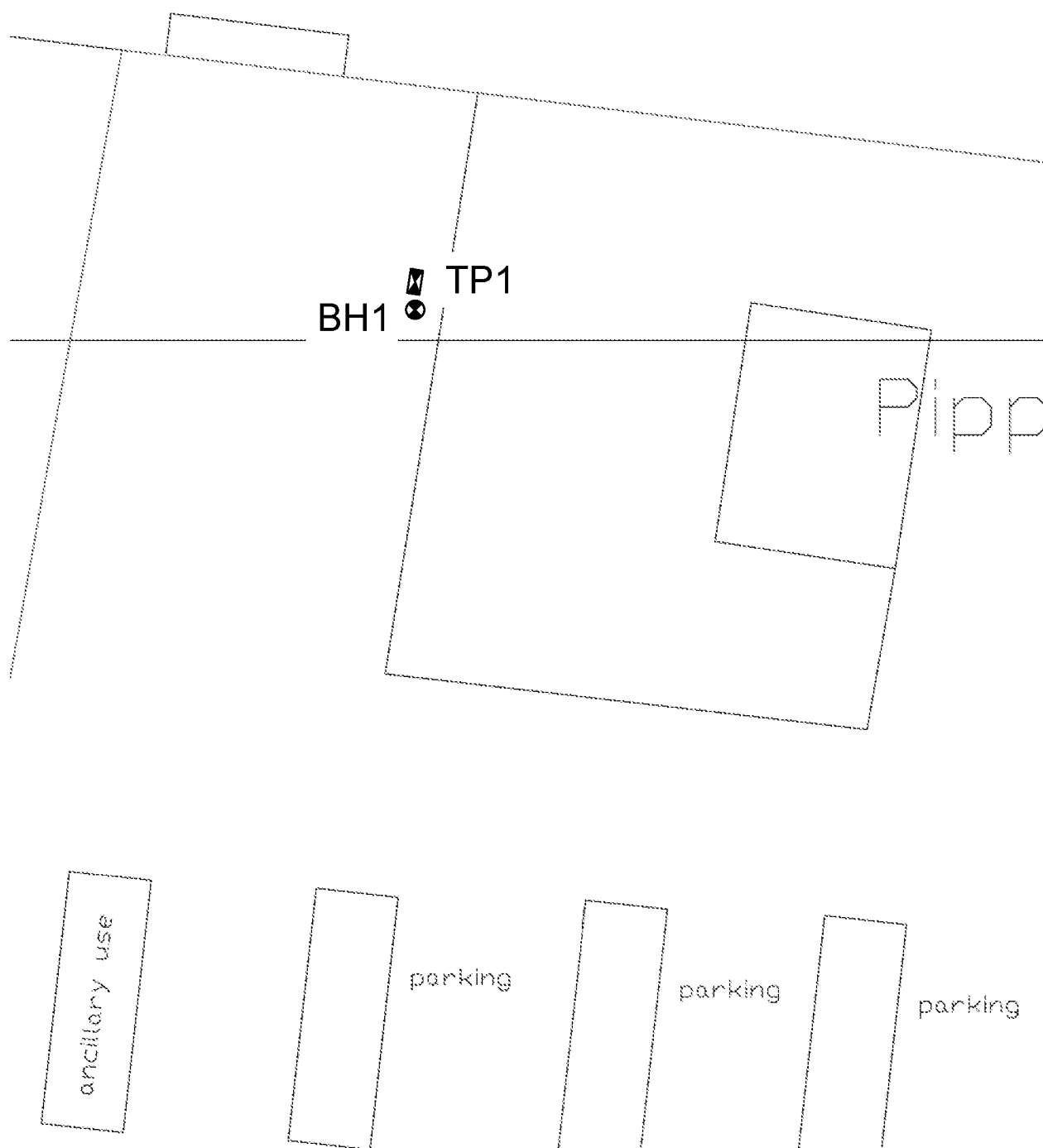
CHECKED: AJHT

TITLE: Exploratory Hole Location Plan

DATE: Mar 2020

(HOLE LOCATIONS ARE INDICATIVE ONLY UNLESS DIMENSIONED)

North
(Approx)



Ground Management Ltd

Civil and Geotechnical Engineering Services

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CHICHESTER West Sussex PO18 8AB
Phone/Fax: 01243 575073

Site

Pippins, Yapton Lane, Walberton

Number
BH1

Excavation Method

Hand held window sampling

Dimensions

80mm to 1.00m
60mm to 2.00m
50mm to 3.00m

Ground Level (mOD)

Client

Mr Len Ayres

Job
Number
G6406

Location

See Location Plan

Dates

20/02/2020

Engineer

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						Grass over soft to firm moist orange brown slightly sandy very silty CLAY with occasional flint gravel		
					(0.90)	... firm below 0.3m bgl		
					0.90	Medium dense wet brown well graded coarse medium and fine angular to subangular flint GRAVEL with a little slightly sandy silty clay.		
					(1.60)			
					2.50	Medium dense yellow brown slightly silty fine to medium SAND		
					(0.50)			
					3.00	Complete at 3.00m		

Remarks

Ground level appears to have been previously reduced by topsoil strip. Ground level along adjacent fence line (1.3m east of borehole) is estimated to be 300mm higher.
Water level rose to approximately 0.4m bgl during excavation
19mm dia. standpipe installed on completion, 2m slotted with geosoc and gravel surround, 1m plain with bentonite pellet seal

Scale
(approx)

1:25

Logged
By

AT

Figure No.

G6406.BH1

Ground Management Ltd

Civil and Geotechnical Engineering Services

Robin Hill Farm Clay Lane Fishbourne
CHICHESTER West Sussex PO18 8AB
Phone/Fax: 01243 575073

Site

Pippins, Yapton Lane, Walberton

**Trial Pit
Number**

TP1

Excavation Method

Hand dug

Dimensions

0.4m x 1.05m

Ground Level (mOD)

Client

Mr Len Ayres

Job Number

G6406

Location

See Location Plan

Dates

26/02/2020

Engineer

Sheet

1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						Soft to firm moist orange brown slightly sandy very silty CLAY with occasional coarse subangular flint gravel.	× × × × × ×	
					(0.45)			
					0.45	Complete at 0.45m		

Plan

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Remarks

Pit sides stable and vertical during excavation
Groundwater was not encountered

Scale (approx)

1:25

Logged By

AT

Figure No.

G6406.TP1

G6406 Pippins Yapton Lane
Soakage Test

TP1 Test 1

Test Start Date: 26-Feb-20

Dimensions (m):

width = 0.40

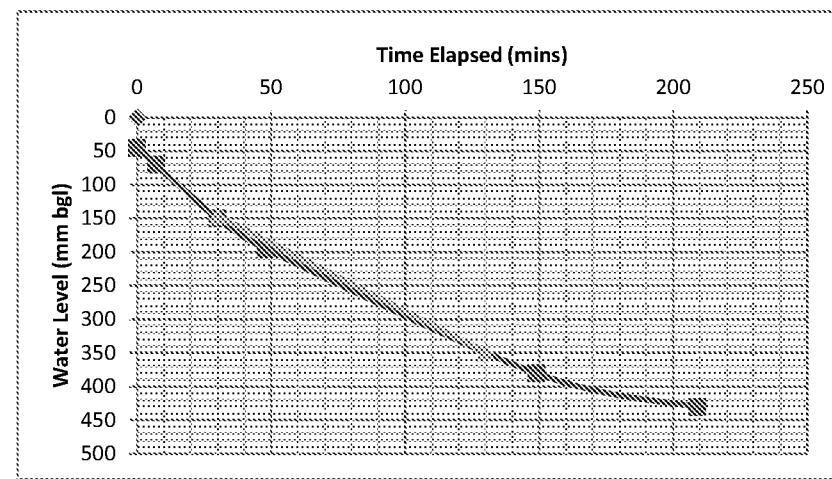
length = 1.05

depth = 0.45

[illegible]

End Fit

0



0

		Time (mins)
t0	45	
t25	146.25	30
t50	247.5	
t75	348.75	130
t100	450	
	fall	0.405
	t25 - t75	0.2025
	Area t50	1.00725

Infiltration Coefficient = 1.41E-05 m/s

G6406 Pippins Yapton Lane
Soakage Test

TP1 Test 2

Test Start Date: 27-Feb-20

Dimensions (m): width = 0.40 length = 1.05 depth = 0.45

Date	Time	Date and time	Elapsed	Dip
27/02/2020	14:30	27/02/2020 14:30	start	320
27/02/2020	14:34	27/02/2020 14:34	0	35
27/02/2020	15:03	27/02/2020 15:03	29	100
27/02/2020	15:35	27/02/2020 15:35	61	160
27/02/2020	16:30	27/02/2020 16:30	116	240
27/02/2020	18:00	27/02/2020 18:00	206	305

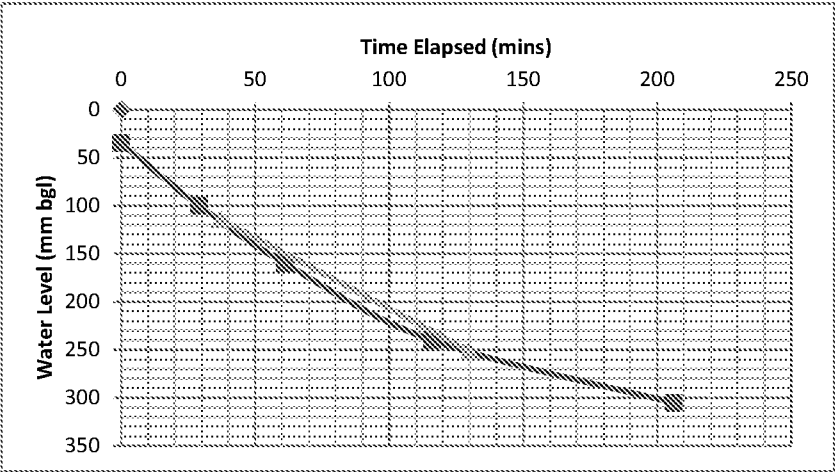
End Fit

as S/Pipe

0

gw at 320
gw drop?

0



Time (mins)		
t0	45	
t25	113.75	37
t50	182.5	
t75	251.25	130
t100	320	
fall		0.275
t25 - t75		0.1375
Area t50		1.22475

Infiltration Coefficient = 8.45E-06 m/s

G6406 Pippins Yapton Lane
Soakage Test

TP1 Test 3

Test Start Date: 02-Mar-20

Dimensions (m):

width = 0.40

length = 1.05

depth = 0.45

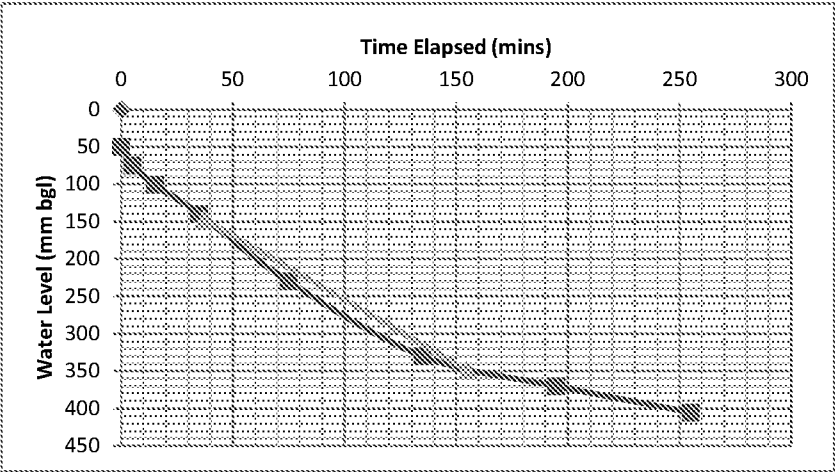
Date	Time	Date and time	Elapsed	Dip
02/03/2020		02/03/2020 00:00	start	405
02/03/2020		02/03/2020 00:00	0	50
02/03/2020		02/03/2020 00:00	5	75
02/03/2020		02/03/2020 00:00	15	100
02/03/2020		02/03/2020 00:00	35	140
02/03/2020		02/03/2020 00:00	75	230
02/03/2020		02/03/2020 00:00	135	330
02/03/2020		02/03/2020 00:00	195	370
02/03/2020		02/03/2020 00:00	255	405

End Fit

as S/Pipe

0

0



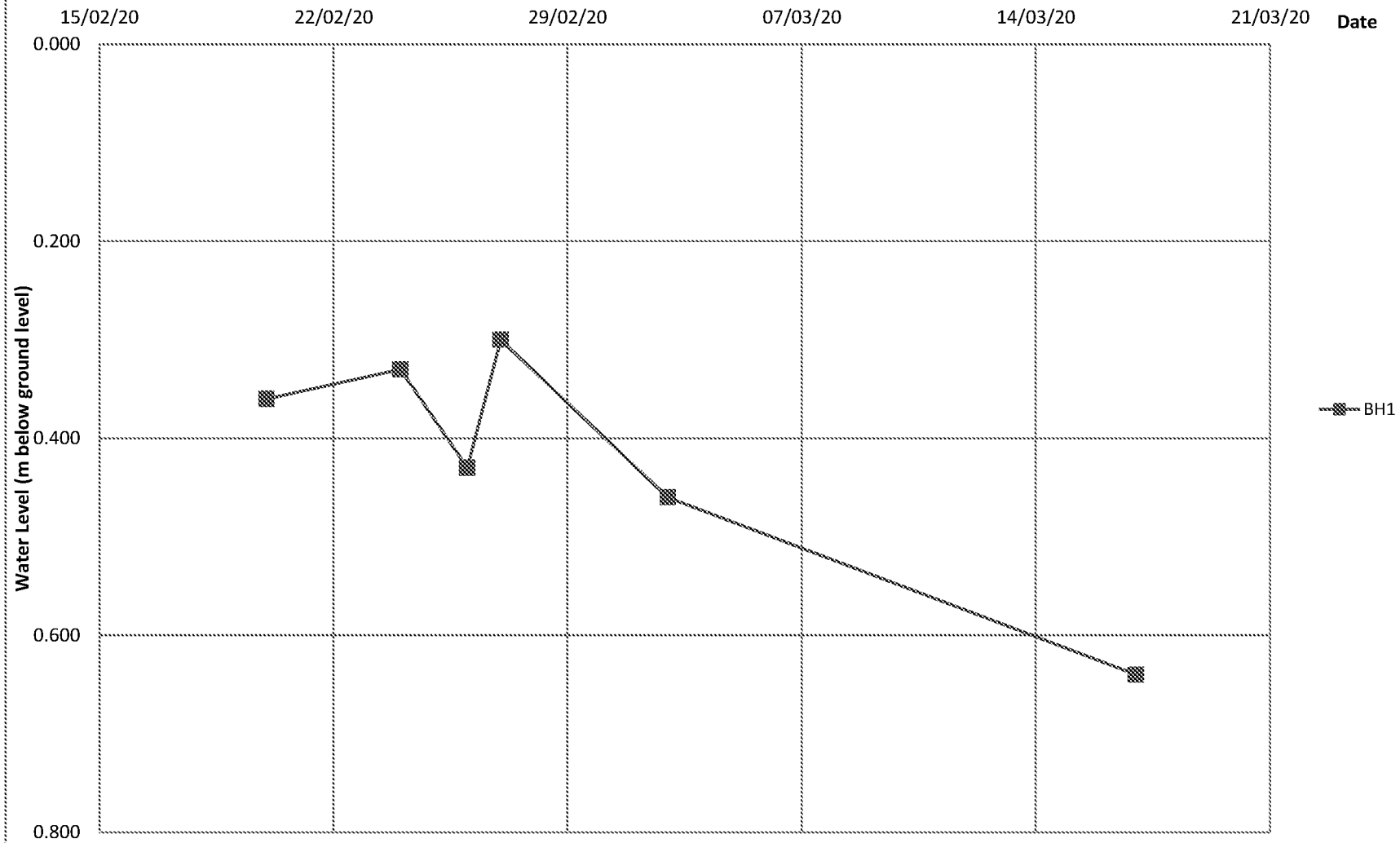
Time (mins)	
t0	45
t25	146.25
t50	247.5
t75	348.75
t100	450
fall	0.405
t25 - t75	0.2025
Area t50	0.99275

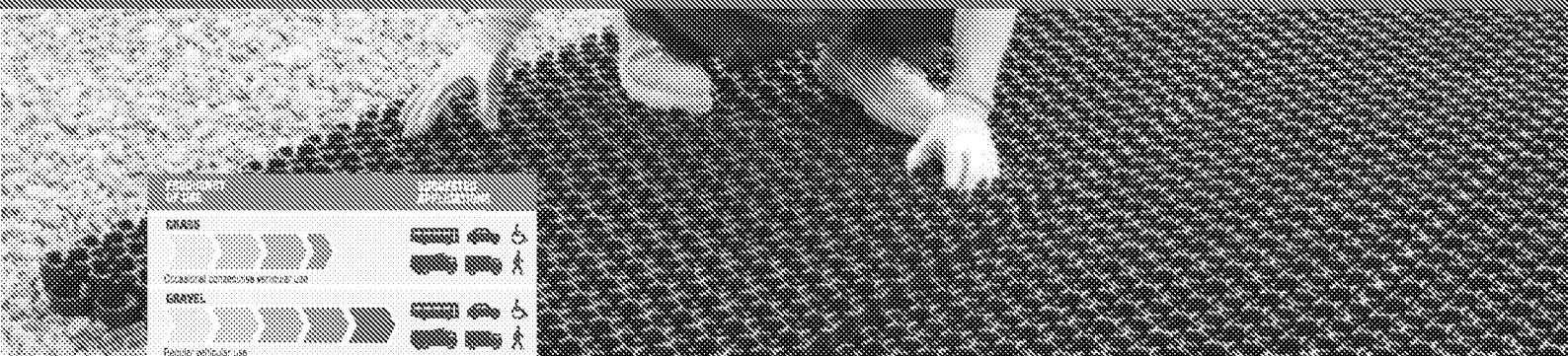
Infiltration Coefficient = 1.21E-05 m/s

mASD: metres Above Site Datum (Estimated by reference to the Topographic Survey)

[illegible]

G6406 Pippins, Yapton Lane Water Level Monitoring

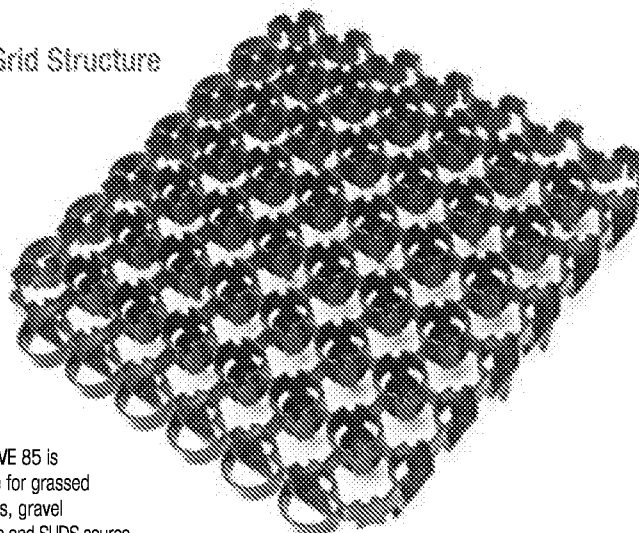




Permanent grassed or gravel car and coach parking bays, fire access routes, helipads, taxiways, cycle paths, driveways, access roads and other trafficked areas where a structurally-sound, well drained base is present or will be installed.

TERRAM BODPAVE 85 is an interlocking cellular porous plastic paving grid system for ground reinforcement which can be installed with either a grass or gravel filled surface. BODPAVE 85 units are manufactured in the UK from UV stabilised 100% recycled waste plastic and are strong, chemically inert & non-toxic. The unique design of the BODPAVE 85 units resist lateral movement, improves traction and allows expansion & contraction whilst promoting optimum grass growth, root protection and surface stabilisation. BODPAVE 85 porous paving provides a durable, safe and environmentally friendly surface for trafficked areas with a very low carbon footprint compared to traditional paving solutions.

Grid Structure



BODPAVE 85 is suitable for grassed surfaces, gravel retention and SUDS source control applications.

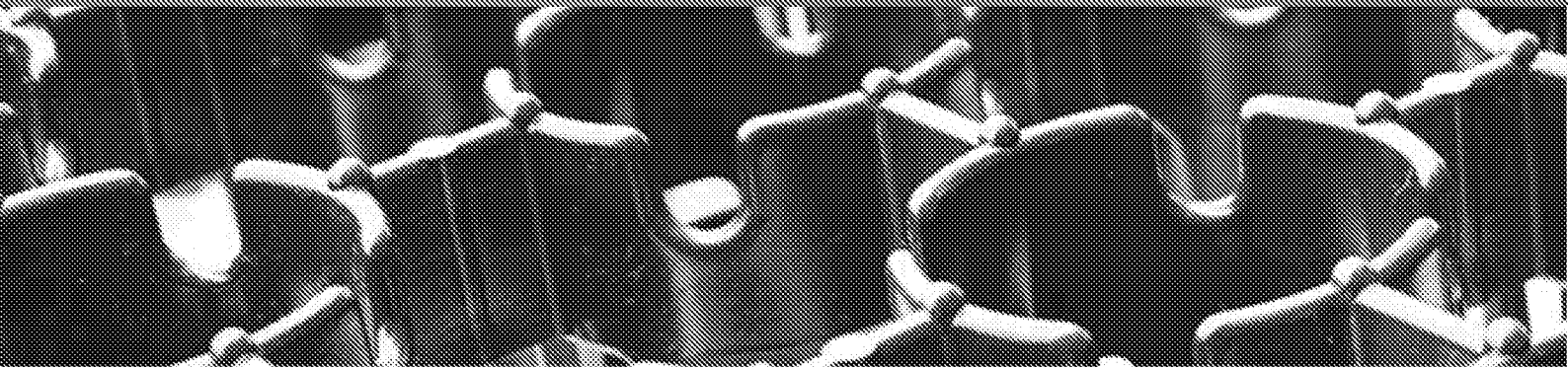
Applications (Grass or Gravel)

- Car Parking / Coach Parking bays
- Overspill / overflow grass car parks
- Emergency Service (Fire access routes)
- Grass aircraft taxiways & helipads
- Walkways and disabled access routes
- Golf buggy paths
- Driveways and residential lawn parking
- SUDS source control



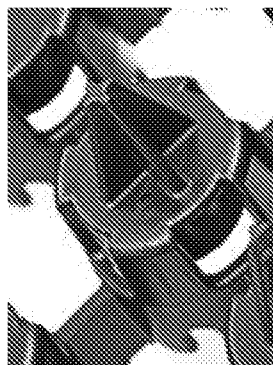
BODPAVE 85 installation for a gravel car park.





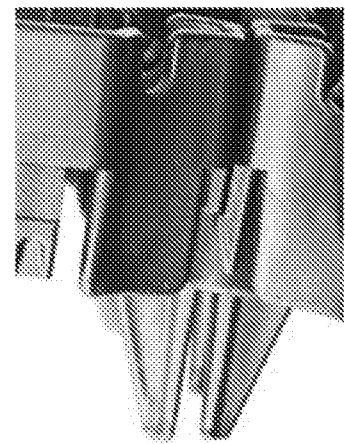
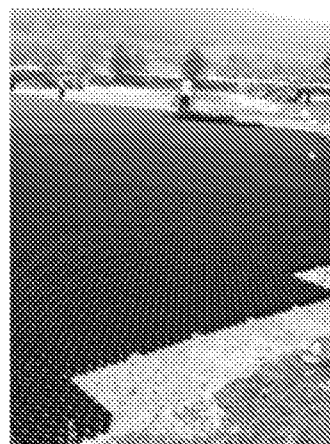
Features and Benefits:

- Load bearing capacity up to 400t/m² - will cope with static axle loads up to 60kN
- Supplied as 4 pre-connected pavers (1m x 1m)
- allows rapid installation
- 24 interlocking connections per paver – excellent lateral transfer of traffic loads
- 18 ground spikes per paver – excellent shear connection with the ground allows slopes up to 1:8 / 12% / 7° and generally no pinning required
- Expansion/contraction tolerant – suitable for hot and cold climates
- Manufactured from 100% recycled and recyclable polymers – highly sustainable, non-toxic and chemically inert to chemicals naturally found in soils
- British manufactured - lower transport carbon footprint for UK deliveries
- 92% open surface structure- SUDS source control compliant
- Grass or gravel finish - free draining and naturally pleasing appearance
- Paving grids can be offset by 1 cell increments – easy to fit around obstacles



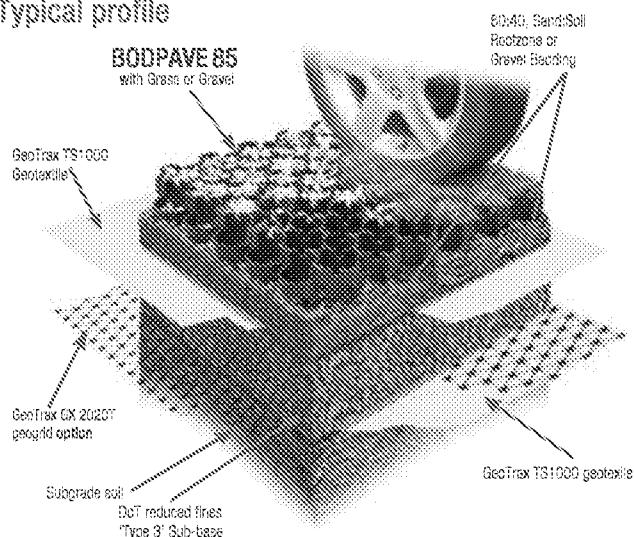
Sustainable Drainage System (SUDS) - Source Control

The open cell structure of TERRAM BODPAVE 85 provides high surface water infiltration and is ideally suited to provide source control within a Sustainable Urban Drainage System (SUDS). BODPAVE 85 permeable paving grids should be installed onto a well prepared, free draining, firm and relatively level existing or newly constructed sub-base. By careful specification of suitable materials the sub-base can be designed to hold rain water (source control SUDS) allowing it to slowly drain away into either the underlying ground or surface water drainage system depending upon site conditions. Construction profiles for each application will be determined by specific site conditions & loading criteria. Detailed specification, design and installation guidance literature and technical information are available to download from www.groundtrax.com/downloads. Please note that for all BODPAVE 85 grass paver/ gravel paver installations, we strongly recommend that all areas should have sufficient drainage prior to the installation. Failure to ensure this may result in the product not performing as intended. Please note that regular tight turning of vehicles and "dry" steering may cause damage to the units and/or displace gravel infill; vehicle manoeuvring should be carefully considered at specification/design stage. Gravel filled units may require some maintenance when subjected to regular channelised and turning traffic loadings. For confirmation of the correct construction profile required and guidance on suitable loadings please contact our office on 03456 800008 to speak with a member of our technical team.





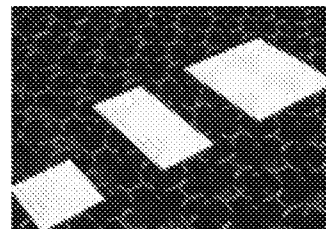
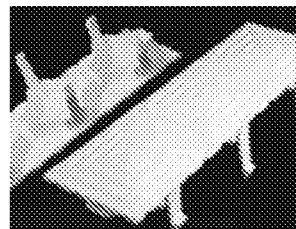
Typical profile



Not all layers will apply to every application and drainage may be required. Please refer to design guidance documents.

Car Park Bay Markers

TERRAM also manufacture car park bay markers that have been designed to snap-fit into the square-shaped cells of the BODPAVE 85 units. Each marker is 215mm x 70mm and can be used to create dashed or solid lines and L or T shapes. They can be fixed permanently in place by using a suitable exterior grade high-strength adhesive.



Line marker details

COLOUR	SIZE	MATERIAL
White	215 x 70	HDPE



PAVER SIZE (mm)	NOMINAL CELL SIZE (mm)	QUANTITY (per m²)	COLOUR	WEIGHT (Nominal)	LOAD BEARING CAPACITY	MATERIAL
500 x 500 x 50	67 Plaque & 46 Round	4 Grids	Black	6.24kg/m²	400 Tonnes/m²	Recycled Polyethylene
500 x 500 x 50	67 Plaque & 46 Round	4 Grids	Green	6.24kg/m²	400 Tonnes/m²	Recycled Polyethylene
Ground Spikes	Each paver includes a 35mm integral ground spike					
Accessories (2 x 2)	1000mm x 1000mm (2 x 2 units)					
Weight	6.24kg per m² / 1.56kg per tile					
Pallet Dimensions	1000mm x 1000mm x 2340mm / Contains 18 units / 45 layers (45m²) / Total pallet weight 300kg					



For more information, contact us today or visit our website:

GROUNDTRAX

Ground Protection and Reinforcement



Type 3 sub-base material