

RUSHBY BREWSTER
CONSULTING CIVIL & STRUCTURAL ENGINEERS

DRAINAGE STRATEGY

for

**Proposed Residential Development
at
Holybourne Road
Leigh Park
Havant**

Client:

PMC Construction and Development
Services Ltd
106 Queens Road
Portsmouth
Hampshire
PO2 7NE

Architect:

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Concept House
35 Kingston Crescent
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Portsmouth
PO2 8AA

Issue		A	B
Issued By	Allen Rushby		
Date	March 2016		
Purpose	Planning		
Approved By			

Project No: PMC 239

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1.0 Introduction

It is proposed to re-develop the site at Holybourne Road, Leigh Park to provide new residential accommodation of 5 No houses and 6 No flats with associated entrance road, parking areas and soft landscaping.

This report outlines the proposed foul and surface water drainage strategy for the proposed development.

2.0 The Site

2.1 Site Location and Description

The site is located to the east of Holybourne Road in a predominantly residential area of Havant, neighbouring Trosant Junior School.

The site is irregular in plan and covers an area of approximately 0.29ha. of open flat grassland. The northern boundary of the site is denoted by the fences and hedges of neighbouring residential properties. The eastern edge of the site is defined by the wall to a neighbouring residential property and a line of vegetation. The southern site boundary is marked by a number of tall conifers and fence line. The western site limit meets a pedestrian footpath, fence line to the sports ground of the neighbouring school lying further to the west and a low post and rail fence separating the site from Holybourne Road.

2.2 Existing Site Topography and Drainage

Refer to the Hampshire Land Surveys Ltd drawing in the Appendix.

Site topography is relatively flat with a gradual fall from the north toward the south west at the frontage with Holybourne Road.

There is currently no known foul or surface water drainage on the site. A 225mm diameter public foul sewer is located within Holybourne Road adjacent to No 15 and a 225mm diameter storm water sewer at the end of Holybourne Road adjacent to the site entrance. These are shown on the Southern Water Sewer Plan in the Appendix.

Enquiries with the Environment Agency has confirmed that to the southern boundary of the site there is a 1400mm diameter culvert which is designated by the EA as a 'main river'.

2.3 Ground Conditions

Reference to the British Geological Survey (BGS) Map (Sheet 315, Southampton, Scale 1:50,000) indicates the site to directly overlie superficial geology of River Terrace Deposits (sand, silt and clay) and the London Clay Formation (clay, silt and sand).

A ground investigation report has been prepared by Ridge Property and Construction Consultants together with additional infiltration tests by Soils Ltd. Relevant extracts from these reports are contained within the Appendix for reference.

2.4 Environment Agency Data

The Environment Agency Ground Water Vulnerability map indicates that the site is underlain by superficial Secondary Aquifer.

The site lies within a ground water source protection zone (SPZ), recorded as 1C- Inner Catchment within a confined aquifer.

3.0 Proposed Foul Water Drainage

It is proposed that foul water from the site will be discharged to the existing public sewer in Holybourne Road subject to agreement with Southern Water.

In accordance with 'Sewers For Adoption', the design peak flow rate to the receiving sewer based upon 4000 litres per dwelling per day = 0.51 litres/sec.

4.0 Proposed Surface Water Drainage

4.1 Control of Water Quantity run-off

It is proposed that surface water run-off from roofs of the new development will be discharged directly to soakaways via silt trap inspection chambers to intercept sediments.

All remaining access road and parking bays will be constructed in permeable paving including those within tree root protection zones as shown on the drawings contained within the Appendix.

The ground investigation report carried out in July 2015 by Ridge recorded ground water depths at approximately 3.2m to 3.7m below existing ground levels. The further investigation carried out in January 2016 by Soils Ltd obtained reasonably good infiltration results for one of the three locations tested (ST3).

Test ST2 test depth was too shallow to reach the gravel layer which is at approximately 2m below ground level and recorded inconclusive results. Test ST1 recorded no result due to water entering from the saturated ground at surface level.

It should be noted that the infiltration tests were carried out after two days of exceptional rainfall (26th and 27th January) for which days Southampton Weather Station recorded 13.0mm and 27.6mm of rainfall respectively.

It is proposed therefore that surface water from building roofs will be discharged to soakaways near to location ST3. Design will be for the lowest recorded infiltration rate of 0.00001m/s for the 1 in 100 year + 30% climate change event.

Overflow pipework to discharge into the public sewer in Holybourne Road will be provided in the case of exceedance of this event.

4.2 Water Quality Management

Ciria 753 SuDs Manual – 2015 has specific guidance on water quality management for the protection of surface and ground water and extracts are included in Appendix 4 for reference.

Interception

Wherever possible SuDs should be designed to intercept run-off (and associated pollutants) for most rainfall events up to approximately 5mm in depth.

This requirement will be achieved by discharging rain water from roofs into soakaways and by the use of permeable pavement construction for the access road and parking areas.

Protection of Ground and Surface Water

Table 4.3 refers to the minimum water quality management requirements for discharges to receiving ground water.

For residential roofs the pollution hazard is 'very low' and therefore discharge of rainwater directly to soakaways via silt traps to intercept sediment is acceptable. For the driveway and parking areas, the pollutions hazard is 'low' and the table refers to the 'simple index approach'.

Table 26.1 shows the approach to water quality risk management from which the 'simple index approach' refers to tables 26.2 and 26.4.

Table 26.2 lists the pollution hazard indices for various land use and these indices have to be exceeded by the mitigation indices shown in Table 26.4.

With reference to these tables permeable paving will provide the required mitigation measures and therefore the driveway and parking areas will be constructed with sufficient sub base storage to contain the 1 in 100 year storm + 30% climate change run-off.

5.0 Maintenance of SuDs Components

The maintenance requirements of the surface water drainage system is outlined on the drainage strategy drawing. This maintenance will be the responsibility of the building management company which will be put in place upon commission of the building.



Allen Rushby IEng, AMIStructE
For and on behalf of Rushby Brewster

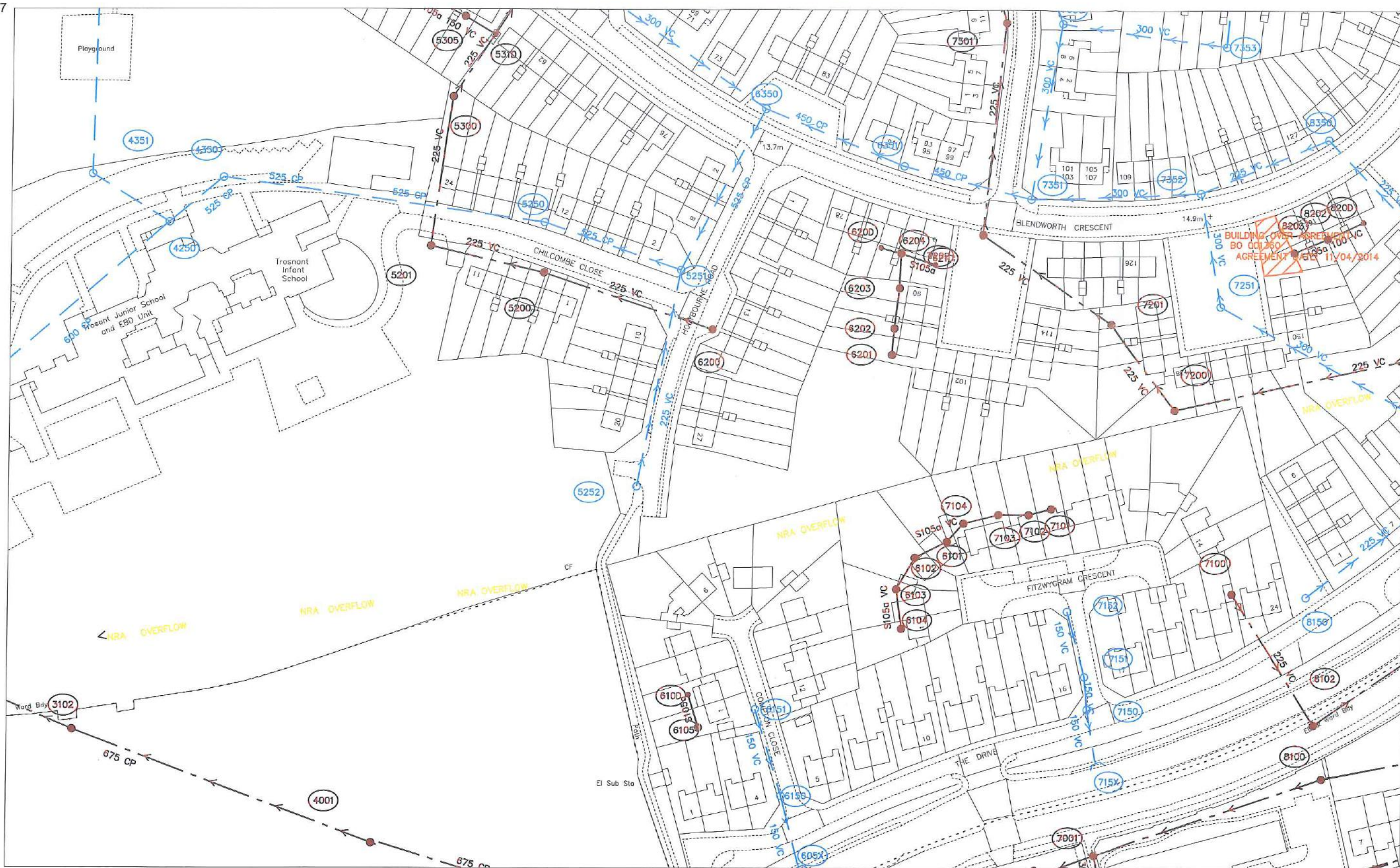
APPENDICES

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APPENDIX 1

Southern Water Sewer Plan

107367



107079

471374

O.S. REF.
SU7107SE

Title: 192756_Land adjacent Holybourn

Drawn by: mondalb

Scale: 1:1250

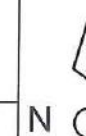
Date: 07/04/2015

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy.

The actual positions should be determined on site.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement
WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement

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Southern
Water

471845

SEWER RECORDS PAGE 2 OF 2

Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape
3102X	12.68	6.96	675	CP	CIRC																		
4001X	13.44	7.19	675	CP	CIRC																		
4250X	12.16		600	CP	CIRC																		
4350X	12.22		525	CP	CIRC																		
4351X	11.02		525	CP	CIRC																		
5200X	13.33	12.23	225	VC	CIRC																		
5201X	13.09		225	VC	CIRC																		
5250X	13.25		525	CP	CIRC																		
5251X	13.94	11.74	525	CP	CIRC																		
5252X	14.34	12.1	225	VC	CIRC																		
5300X	12.74	11.47	225	VC	CIRC																		
5305X			150	VC	CIRC																		
5310X			225	VC	CIRC																		
6101X			UNK	VC	CIRC																		
6102X			UNK	VC	CIRC																		
6103X			UNK	VC	CIRC																		
6104X			UNK	VC	CIRC																		
6150X	13.47	12.7	150	VC	CIRC																		
6151X	13.81	13.02	150	VC	CIRC																		
6200X	14.14	12.69	225	VC	CIRC																		
6201X			UNK	UNK	CIRC																		
6202X			UNK	UNK	CIRC																		
6203X			UNK	UNK	CIRC																		
6204X			UNK	UNK	CIRC																		
6205X			UNK	UNK	CIRC																		
6350X	13.73	10.28	525	CP	CIRC																		
6351X	14.39	11.2	450	CP	CIRC																		
6352X	12.82	8.52	675	CP	CIRC																		
6353X	13.59	11.56	225	VC	CIRC																		
7101X			UNK	VC	CIRC																		
7102X			UNK	VC	CIRC																		
7103X			UNK	VC	CIRC																		
7104X			UNK	VC	CIRC																		
7150X	13.66	12.71	150	VC	CIRC																		
7151X	13.87	12.92	150	VC	CIRC																		
7152X	14.14	13.38	150	VC	CIRC																		
7200X	14.98	12.98	225	VC	CIRC																		
7201X	14.7	12.6	225	VC	CIRC																		
7202X	14.41	12.17	225	VC	CIRC																		
7251X	14.88	11.43	300	VC	CIRC																		
7301X	14.52	11.64	225	VC	CIRC																		
7302X	14.56	11.72	300	VC	CIRC																		
7303X	14.53	10.83	450	CP	CIRC																		
7352X	14.92	11.34	300	VC	CIRC																		
7353X	14.75	12	300	VC	CIRC																		
8100X	12.29		UNK	UNK	CIRC																		
8102X	13.77	12.52	225	VC	CIRC																		
8150X	13.77	12.44	225	VC	CIRC																		
8202X			100	VC	CIRC																		
8203X			100	VC	CIRC																		
8350X	15.22	12.04	225	VC	CIRC																		

LINE STYLES / COLOURS	MATERIALS	LEGEND - SEWERS	SHAPES (S)
Brown — Fault — Fault Syphon Sewer — Fault Ventilation Main — Fault Rising Main — Combined — Combined Syphon Sewer — Combined Rising Main — Lateral Disch — Building Over Agreement Area Dark Blue — Treated Effluent Purple — Storage — Sewer Catchment — Section 104 Area Light Blue — Surface Water — Surface Water Rising Main Yellow — Pile Green — Access Shaft — Decommissioned	AK Asphalt BAG Bundled Asbestos Cement BRC Brick (Common) BRE Brick (Engineering) CC Concrete Box Culvert CI Cast Iron CO Concrete (in-situ) CP Concrete (Pre-Cast) CSB Concrete Segments (bolted) CSU Concrete Segments (unbolted) DI Ductile Iron GRP Glass Reinforced Plastic GRP Glass Reinforced Plastic MAC Masonry in regular courses MAH Masonry in random courses PE Polyethylene PF Pitch Fibre PP Polypropylene PVC Polyvinyl Chloride RPM Reinforced Plastic Main SI Span Iron ST Steel VC Vitreous Clay XXX Other ZZZ Unknown	Manhole (SW) Manhole (F&C) Lamp hole (SW) Lamp hole (F&C) Pumping Station (SW) Pumping Station (F&C) Side entry manhole (SW) Side entry manhole (F&C) Blind shaft (SW) Blind shaft (F&C) Ejector station (SW) Ejector station (F&C) Waterlight door (SW) Waterlight door (F&C) Flushing ch. Min (SW) Flushing ch. Min (F&C) Flushing ch. Max (SW) Flushing ch. Max (F&C) Storm Overflow Back-dip manhole Washout (SW) Washout (F&C) Rising Eye (SW) Rising Eye (F&C) Gauging point (SW) Gauging point (F&C) Intercept chamber (SW) Intercept chamber (F&C) Storm Tank (SW) Storm Tank (F&C) Vortex chamber (SW) Vortex chamber (F&C) Label ellipse Ductile iron manhole Culvert Pneumatic chamber Dampers Storm Overflow Back-dip manhole Door (S) Other Change in sewer (S) Relief valve Flap valve Culvert Ansoie Valve Closed Valve Air Valve Hatch box (SW) Hatch box (F&C) Direction arrow Emptying valve Catchpit Sewerway Inlet Relieving Pond	Wastewater Treatment works Main treatment works Outfall headworks Vent Vent column Tidal storage tank Blank end Head of Public Sewer Micro Pumping Station A Arched B Barrel C Circular E Egg H Horseshoe X Other R Rectangular S Square T Trapezoidal U U-Shaped Other

Drawn by: mondalb

Title: 192756_Land adjacent Holybourn

Date: 07/04/2015

Southern Water

APPENDIX 2

Drainage Calculations



CALCULATIONS

RUSHBY BREWSTER
CONSULTING CIVIL AND STRUCTURAL ENGINEERS

The Town House
St George's Square
Bishops Waltham
Southampton SO32 1AF
T: 01489 890004
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Job Title HOLMBURY ROAD. HANALY.	Job No. PME 239	Sht. No. D1	
Element SOAKAWAY DESIGN.	Prepared P.N.	Date 03/16	Checked Date

FROM GROUND INVESTIGATION REPORT

INFILTRATION RATE 1.0×10^{-5} m/s.

PLOTS 7-9. ROOF AREA = 160 m^2

PLOTS 10-11 ROOF AREA = 110 m^2

TOTAL AREA = 270 m^2 .

SEE 'TEDDS' DESIGN OUTPUT (OVER) FOR CALCULATIONS

USE $2.0 \times 2.0 \times 1.2 \text{ m}$ DEEP CHATE SOAKAWAY.

PLOTS 1-6. ROOF AREA = 230 m^2

USE $2.0 \times 7.5 \times 1.2 \text{ m}$ DEEP CHATE SOAKAWAY.

 RUSHBY BREWSTER CONSULTING CIVIL AND STRUCTURAL ENGINEERS Rushby Brewster	Project Holybourne Road Havant				Job no. PMC239	
	Calcs for Soakaway Plots 1-6				Start page no./Revision D2	
	Calcs by AWR	Calcs date 11/03/2016	Checked by	Checked date	Approved by	Approved date

SOAKAWAY DESIGN

In accordance with BRE Digest 365 - Soakaway design

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area	Other
Impermeable area drained to the system	A = 230.0 m ²
Return period	Period = 100 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.350
5-year return period rainfall of 60 minutes duration	M5_60min = 20.0 mm
Increase of rainfall intensity due to global warming	p _{climate} = 30 %

Soakaway / infiltration trench details

Soakaway type	Rectangular
Minimum depth of pit (below incoming invert)	d = 1200 mm
Width of pit	w = 2000 mm
Length of pit	l = 7433 mm
Percentage free volume	V _{free} = 95 %
Soil infiltration rate	f = 10.0 × 10 ⁻⁶ m/s
Wetted area of pit 50% full	a _{s50} = l × d + w × d = 11319372 mm ²

Table equations

Inflow	I = M100 × A
Outflow	O = a _{s50} × f × D
Storage	S = I - O

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	100 year rainfall, M100 (mm)	Inflow (m ³)	Outflow (m ³)	Storage required (m ³)
5	0.36	9.3	1.89	17.6	4.04	0.03	4.00
10	0.51	13.2	1.96	25.8	5.94	0.07	5.87
15	0.62	16.0	2.00	32.0	7.37	0.10	7.27
30	0.79	20.5	2.03	41.5	9.54	0.20	9.34
60	1.00	26.0	2.00	52.1	11.97	0.41	11.56
120	1.22	31.8	1.96	62.2	14.31	0.81	13.49
240	1.50	38.9	1.90	73.9	16.99	1.63	15.36
360	1.69	43.9	1.86	81.7	18.78	2.44	16.34
600	1.95	50.6	1.81	91.4	21.02	4.07	16.95
1440	2.48	64.5	1.71	110.4	25.38	9.78	15.60

Required storage volume

$$S_{req} = 16.95 \text{ m}^3$$

Soakaway storage volume

$$S_{act} = l \times d \times w \times V_{free} = 16.95 \text{ m}^3$$

FAIL - Soakaway storage volume inadequate

Time for emptying soakaway to half volume

$$t_{s50} = S_{req} \times 0.5 / (a_{s50} \times f) = 20\text{hr } 47\text{min } 38\text{s}$$

PASS - Soakaway discharge time less than or equal to 24 hours

 RUSHBY BREWSTER CONSULTING CIVIL AND STRUCTURAL ENGINEERS Rushby Brewster	Project Holybourne Road Havant				Job no. PMC239	
	Calcs for Soakaway Plots 7-11				Start page no./Revision 13	
	Calcs by AWR	Calcs date 23/03/2016	Checked by	Checked date	Approved by	Approved date

SOAKAWAY DESIGN

In accordance with BRE Digest 365 - Soakaway design

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area	Other
Impermeable area drained to the system	$A = 270.0 \text{ m}^2$
Return period	Period = 100 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	$r = 0.350$
5-year return period rainfall of 60 minutes duration	$M5_{60\text{min}} = 20.0 \text{ mm}$
Increase of rainfall intensity due to global warming	$p_{climate} = 30 \%$

Soakaway / infiltration trench details

Soakaway type	Rectangular
Minimum depth of pit (below incoming invert)	$d = 1200 \text{ mm}$
Width of pit	$w = 2000 \text{ mm}$
Length of pit	$l = 8781 \text{ mm}$
Percentage free volume	$V_{free} = 95 \%$
Soil infiltration rate	$f = 10.0 \times 10^{-6} \text{ m/s}$
Wetted area of pit 50% full	$a_{s50} = l \times d + w \times d = 12937054 \text{ mm}^2$

Table equations

Inflow	$I = M100 \times A$
Outflow	$O = a_{s50} \times f \times D$
Storage	$S = I - O$

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	100 year rainfall, M100 (mm)	Inflow (m³)	Outflow (m³)	Storage required (m³)
5	0.36	9.3	1.89	17.6	4.74	0.04	4.70
10	0.51	13.2	1.96	25.8	6.97	0.08	6.90
15	0.62	16.0	2.00	32.0	8.65	0.12	8.53
30	0.79	20.5	2.03	41.5	11.20	0.23	10.97
60	1.00	26.0	2.00	52.1	14.05	0.47	13.59
120	1.22	31.8	1.96	62.2	16.79	0.93	15.86
240	1.50	38.9	1.90	73.9	19.95	1.86	18.09
360	1.69	43.9	1.86	81.7	22.05	2.79	19.25
600	1.95	50.6	1.81	91.4	24.68	4.66	20.02
1440	2.48	64.5	1.71	110.4	29.80	11.18	18.62

Required storage volume $S_{req} = 20.02 \text{ m}^3$

Soakaway storage volume $S_{act} = l \times d \times w \times V_{free} = 20.02 \text{ m}^3$

PASS - Soakaway storage volume

Time for emptying soakaway to half volume $t_{s50} = S_{req} \times 0.5 / (a_{s50} \times f) = 21\text{hr } 29\text{min } 36\text{s}$

PASS - Soakaway discharge time less than or equal to 24 hours

 RUSHBY BREWSTER CONSULTING CIVIL AND STRUCTURAL ENGINEERS Rushby Brewster	Project Holybourne Road Havant				Job no. PMC239	
	Calcs for Permeable Pavement				Start page no./Revision D4	
	Calcs by AWR	Calcs date 11/03/2016	Checked by	Checked date	Approved by	Approved date

PLANE INFILTRATION SYSTEM DESIGN

In accordance with CIRIA C697 SUDS

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area Other
 Impermeable area drained to the system $A = 100.0 \text{ m}^2$
 Return period Period = 100 yr
 Ratio 60 min to 2 day rainfall of 5 yr return period $r = 0.350$
 5-year return period rainfall of 60 minutes duration $M5_{60\text{min}} = 20.0 \text{ mm}$
 Increase of rainfall intensity due to global warming $p_{\text{climate}} = 30 \%$

Infiltration blanket details

Base area of blanket $A_b = 100.0 \text{ m}^2$
 Porosity $n = 0.4$
 Drainage ratio $R = A / A_b = 1.0$
 Soil infiltration rate $f = 1.00 \times 10^{-6} \text{ m/s}$

Table equations

Rainfall intensity $i = M100 / D$
 Minimum depth required $H = D / n \times (R \times i - f)$

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	100 year rainfall, M100 (mm)	Intensity, i (mm/hr)	Depth (mm)
5	0.36	9.3	1.89	17.6	210.60	43
10	0.51	13.2	1.96	25.8	154.98	63
15	0.62	16.0	2.00	32.0	128.16	78
30	0.79	20.5	2.03	41.5	82.97	99
60	1.00	26.0	2.00	52.1	52.05	121
120	1.22	31.8	1.96	62.2	31.10	137
240	1.50	38.9	1.90	73.9	18.47	149
360	1.69	43.9	1.86	81.7	13.61	150
600	1.95	50.6	1.81	91.4	9.14	138
1440	2.48	64.5	1.71	110.4	4.60	60

Min depth of blanket req'd $H_{\text{max}} = 150 \text{ mm}$

Time for emptying blanket to half volume $t_{50} = n \times H_{\text{max}} / (2 \times f) = 8\text{hr } 20\text{min } 31\text{s}$

PASS - Infiltration system discharge time less than or equal to 24 hours

APPENDIX 3

Extracts from Ground Investigation Report



Thomas Telford House
Sun Valley Business Park
Winnall Close
Winchester SO23 0LB

01962 673 330
soilslimited.co.uk

Ridge and Partners LLP

F.A.O. Antony Platt

By Email only: APlatt@ridge.co.uk

Our Ref: 15409/LR

4th February 2016

Dear Antony

RE: Land to rear of 27 Holybourne Road, Havant, Hampshire PO9 2BN

We are writing in regards to the intrusive investigation undertaken at the above named site.

Brief

The Soils Limited quotation (reference Q17228, dated 15th January 2016) set out the scope of the investigation. The investigation was to comprise machine excavated trial holes and infiltration tests in accordance with the principles of BRE Digest 365 Soakaway design: 1991.

General

The site had an approximate area of 0.24ha and was located between Holybourne Road and Blendworth Avenue, Havant, Hampshire at O.S Land Ranger Grid Reference of SU 710 072.

A site location plan has been included as Figure 1.

Site Works

Site works were undertaken on the 28th January 2016 and comprised three machine excavated trial pits (ST1 – ST3). Following the construction of the trial holes, infiltration tests broadly in accordance with the principles of BRE 365 were carried out. A trial hole location plan is included as Figure 2. Infiltration tests could only be carried out once in each of the trial pits due negligible infiltration rates and saturated ground conditions.

Upon completion all trial holes were backfilled with arisings and mounded over for future settlement.

Ground Conditions

The ground conditions encountered during the site investigation have been summarised below:

Topsoil River Terrace Deposits

Table 1 – Summary of Ground Conditions

Strata	Depth Encountered (m bgl)		Typical Description
	Top	Base	
Topsoil	0.00	0.30 -0.40	Grass over brown slightly gravelly clayey SILT. Gravel was fine to medium sub-angular flint and rare fine brick. Frequent fine roots and rootlets.
River Terrace Deposits	0.30 – 0.40	1.40 ¹ -1.90 ¹	Upper (cohesive): Soft orangey brown mottled grey slightly gravelly silty CLAY. Gravel was fine sub-rounded flint. Occasional fine roots and rootlets. Lower (granular): Brown clayey fine to coarse sub-angular to sub-rounded flint GRAVEL with occasional sub-angular flint cobbles.

Notes: ¹ encountered to base of trial hole

Two machine excavated trial pits were dug for ST2. The first encountered groundwater at 1.65m bgl, this water was pumped out and the pit backfilled with arisings. The second trial pit was excavated close by to a depth of 1.40m bgl in order to avoid groundwater and ensure that accurate infiltration results were obtained.

Infiltration Testing

Infiltration tests were performed in all three of the trial pits during the investigation, in areas selected by Ridge and Partners LLP, in order to provide guidance on the suitability of the ground for the adoption of a surface water drainage system. Each test was undertaken within the River Terrace deposits at depths of 1.90m bgl (ST1), 1.40m bgl (ST2) and 1.90m bgl (ST3). Tests were conducted broadly in accordance with the principles of BRE Digest 365 Soakaway design: 1991.

BRE 365 states that for an accurate infiltration rate to be obtained a soakage pit needs to be filled three times in quick succession. Each test is completed once 75% of the water present has drained away, in order to determine whether or not the underlying ground conditions may be suitable for surface water drainage. Only one test was carried out in trial pit ST1-ST2 and two tests within ST3 due to low infiltration rates observed and the time available during the day of the test (1 day allowed).

The test comprised piping water via a water tanker into the open trial hole, the drop in water level over time was then recorded to give an indication of soakage potential. The test stratum comprised the River Terrace Deposits (RTD).

Table 2 - Infiltration Test Results

Trial Hole (Test No.)	Test Stratum	Test Depth (m bgl)	Infiltration Rate (m/sec)	Notes
ST1	RTD	1.90	N/A	Water levels increasing to ground level over duration of test due to saturated ground at surface – test abandoned after 251 minutes
ST2	RTD	1.40	N/A	Minimal infiltration observed after 200 minutes. Between 200 and 262 minutes: zero infiltration recorded. Test aborted – unable to calculate infiltration rate in accordance with BRE 365.
ST3 - T1	RTD	1.90	1.04×10^{-5}	Test complete after 280 minutes
ST3 - T2	RTD	1.90	1.05×10^{-5}	Extrapolated data used after 120 minutes due to insufficient daylight remaining to continue test within day allowed.

Indicative infiltration rates could not be calculated in ST1 and ST2 due to the negligible infiltration rates and saturated ground conditions.

Full results are included within Appendix A.

Conclusions

Given the observed infiltration over the test period, it is considered unlikely that the whole site would benefit from the adoption of a soakaway system for surface water drainage. The granular soils of the River Terrace Deposits at the location of TP3/ST3 did however show good infiltration over the test period and therefore further investigation of the extent of the granular soils of the River Terrace Deposits may identify other areas across the site where soakaways could be considered. The drainage conditions across the rest of the site are presently unknown as is the depth to groundwater.

It should be noted that the Environment Agency must be consulted on any works which may impact groundwater sources.

The following attachments make up the remainder of this letter report.

Figure 1. Site Location Plan

Figure 2. Trial Hole Location Plan

Appendix A. Field Data

Should you have any further questions please do not hesitate to contact the undersigned.

Yours Sincerely

A handwritten signature in black ink, appearing to read 'J Hills'.

John Hills BSc (Hons)
Graduate Geo-Environmental Engineer
jh@soilslimited.co.uk

**Figure number**

2

Title

Trail hole location plan

Project

Land to rear of 27 Holybourne Road, Havant,
Hampshire PO9 2BN

Date

February 2016

Client

Ridge and Partners LLP

Reference

15409

Southampton Weather

This Stations Daily Rainfall Reports (mm)

Report for the Year 2016

Data last updated: 22/03/16 - 15:40

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	6.2	0.0	6.2	---	---	---	---	---	---	---	---	---
2	10.3	0.0	2.4	---	---	---	---	---	---	---	---	---
3	24.4	0.0	3.8	---	---	---	---	---	---	---	---	---
4	2.6	0.0	1.4	---	---	---	---	---	---	---	---	---
5	1.8	4.4	0.1	---	---	---	---	---	---	---	---	---
6	0.1	8.5	0.0	---	---	---	---	---	---	---	---	---
7	18.5	16.9	0.0	---	---	---	---	---	---	---	---	---
8	8.5	1.3	1.3	---	---	---	---	---	---	---	---	---
9	6.3	1.0	32.6	---	---	---	---	---	---	---	---	---
10	7.7	0.0	0.0	---	---	---	---	---	---	---	---	---
11	19.2	0.0	0.0	---	---	---	---	---	---	---	---	---
12	0.0	3.7	0.0	---	---	---	---	---	---	---	---	---
13	5.9	7.3	0.0	---	---	---	---	---	---	---	---	---
14	0.1	1.6	0.0	---	---	---	---	---	---	---	---	---
15	0.0	0.0	0.0	---	---	---	---	---	---	---	---	---
16	0.1	0.0	0.0	---	---	---	---	---	---	---	---	---
17	2.3	12.1	0.0	---	---	---	---	---	---	---	---	---
18	1.2	0.6	0.0	---	---	---	---	---	---	---	---	---
19	0.0	3.1	0.0	---	---	---	---	---	---	---	---	---
20	0.0	0.8	0.0	---	---	---	---	---	---	---	---	---
21	0.4	0.0	0.0	---	---	---	---	---	---	---	---	---
22	10.2	4.0	0.0	---	---	---	---	---	---	---	---	---
23	3.4	0.1	---	---	---	---	---	---	---	---	---	---
24	1.0	0.0	---	---	---	---	---	---	---	---	---	---
25	0.0	0.0	---	---	---	---	---	---	---	---	---	---
26	13.0	0.0	---	---	---	---	---	---	---	---	---	---
27	27.6	0.0	---	---	---	---	---	---	---	---	---	---
28	0.0	0.0	---	---	---	---	---	---	---	---	---	---
29	5.6	1.3	---	---	---	---	---	---	---	---	---	---
30	6.9		---	---	---	---	---	---	---	---	---	---
31	1.0		---		---		---	---		---		---
Rain Days	25	15	7	0	0	0	0	0	0	0	0	0
Month Total	184.3 mm	66.7 mm	47.8 mm	0.0 mm	0.0 mm	0.0 mm	0.0 mm	0.0 mm	0.0 mm	0.0 mm	0.0 mm	0.0 mm
YTD Total	184.3 mm	251.0 mm	298.8 mm	298.8 mm	298.8 mm	298.8 mm	298.8 mm	298.8 mm	298.8 mm	298.8 mm	298.8 mm	298.8 mm

Colour Key												
< 1.0	1.0 - 2.0	2.0 - 3.0	3.0 - 4.0	4.0 - 5.0	5.0 - 6.0	6.0 - 7.0	7.0 - 8.0	8.0 - 9.0	9.0 - 10.0	10.0 - 11.0	11.0 - 12.0	12.0 >



RIDGE

Property and Construction Consultants

Portsmouth City Council

Ground Condition Assessment
Land at Holybourne Road,
Havant

July 2015

Prepared for:
Portsmouth City Council
Housing Development
Core 1 Floor 1
Civic Offices
Guildhall square
Portsmouth
PO1 2AY

Prepared by:
Partnership House
Moorside Road
Winchester
Hampshire
SO23 7RX

01962 834400
www.ridge.co.uk

Ground Condition Assessment

Section 9 – Conclusions and Recommendations

9.1. Contamination

No significant sources of contamination have been identified in association with the site. No viable pollutant linkages are therefore considered to be present in relation to the proposed residential development at the site.

General Notes

In order to mitigate the generic risks associated with development on potentially contaminated land the following mitigation measures are recommended:

- Preparation of a Discovery Strategy outlining the procedures to be followed in the event that unanticipated contamination is encountered during the development.
- Compliance with relevant Health and Safety procedures during construction works.
- Contractors on site should wear appropriate PPE to mitigate the risks from the chemical and physical impacts to the Made Ground at the site.
- The local authority should be informed if any sources of contamination are identified during the development that have not been assessed in this report. These sources should then be assessed and dealt with appropriately, with the agreement of the local authority.

The conclusions of this assessment are subject to agreement with the regulatory authority, be it the Local Authority for human health related issues or the Environment Agency for environmental issues.

It is recommended that any removal and disposal of sub-soil arisings and/or groundwater from the site should be undertaken in a controlled manner to a licensed facility, with due regard to Duty of Care responsibilities. In addition, an appropriate degree of health and safety provision should be incorporated to protect both the site workers and the general public alike.

During any ground works, it is recommended that skin contact with soils is kept to a minimum in accordance with good working practice / specific control measures and the HSE guidance document 'Protection of Workers and the General Public During the Development of Contaminated Land', 1991.

Ground Condition Assessment

9.2. Geotechnical

The ground investigation revealed the site to be underlain by Topsoil / Made Ground over River Terrace Deposits in turn overlying London Clay Formation to the full depth of the investigation. The River Terrace Deposits comprised an upper layer of fine-grained deposits overlying dense gravels.

Groundwater seepages were not recorded during the ground investigation but subsequent monitoring visits indicated a minimum at rest groundwater level to be 3.24mbgl.

Shallow Foundations

It is recommended that shallow foundations at a minimum depth of 0.90mbgl or below the any Made Ground, should thicker sequences be encountered, are adopted for this site. Foundation excavations should remain stable in the short term; however founding materials should not be left exposed for extended periods of time.

Ultimate bearing resistance calculations have been carried out for foundations constructed in the fine-grained RTD and returned a ULS bearing resistance of 135kN/m².

Serviceability limit state settlement analyses were carried out under a foundation loading of 135kN/m² on a strip foundation constructed within the upper RTD. The results show that, with the foundation loading of 135kN/m², total settlement of less than 25mm should be expected.

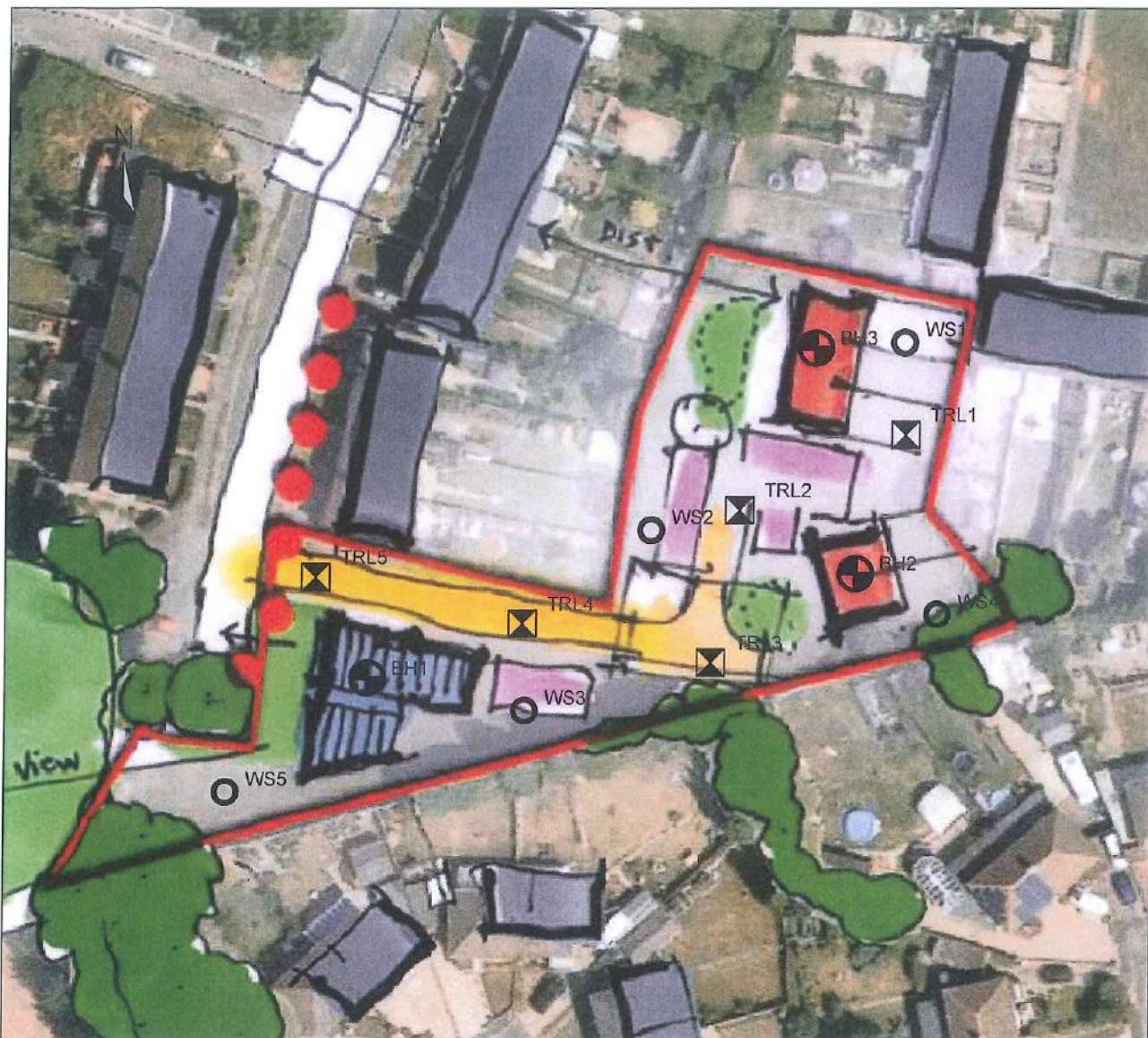
Piled Foundations

It is unclear at the time of reporting whether any multi-storey blocks are to form part of this development. If this is the case it is possible that the calculated bearing resistance may be too restrictive. Therefore, ULS axial pile resistances have been calculated for a range of diameters and lengths of augured pile. However, when sizing piles from these results all applied actions must be factored in accordance with the UK National Annex to Eurocode 7.

It should be noted that the carrying capacity of a pile group is usually less than the sum of the individual piles. Therefore it is recommended that a detailed pile group analysis is carried out when all loads and serviceability limits are known.

Other Geotechnical Considerations

Ground bearing floor slabs are considered appropriate for this site.



KEY:

- BOREHOLE LOCATION
- WINDOW SAMPLE LOCATION
- TRL PROBE LOCATION

10.07	PRELIMINARY	DAP	AP
REF DATE	REVISION	DRAWN	CHECKED

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PROJECT
HOLYBOURNE ROAD
HAVANT

DRAWING
151239 - SITE INVESTIGATION LOCATIONS

RIDGE

CLIENT
PORTSMOUTH CITY COUNCIL

SCALE
NTS @ A4

DATE
10.07.15

DRAWN BY
DAP

CHECKED BY
AP

PARTNERSHIP HOUSE
MOORSIDE ROAD
WINCHESTER
HAMPSHIRE, SO23 7RD
Also at Reading, Bristol, London and Leicester

TEL: 01962 834400
FAX: 01993 815001

www.ridge.co.uk

FIGURE 2

REV

RIDGE

Ridge & Partners LLP
Partnership House
Moorside Road

BOREHOLE LOG

Project Holybourne Rd				BOREHOLE No BH1	
Job No Holybourne Rd	Date 01-06-15 01-06-15	Ground Level (m)	Co-Ordinates ()		
Contractor DJ Drilling				Sheet 1 of 2	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.30 0.30-0.50 0.50-0.70	D1 ESA B2					0.10 (1.80)	Brown silty clayey fine SAND with frequent rootlets Brown silty clayey fine SAND		
1.20-1.55 1.55	U3 D4	30 blows				1.90			
2.00-2.45 2.00	D5	N49				(1.30)	Dense silty clayey fine to coarse angular to sub angular flint GRAVEL		
3.00-3.45 3.00	D6	N8				3.20	Firm brown grey silty CLAY		
4.00-4.45 4.45	U7 D8	35 blows				(1.00) (0.70)	Brown silty clayey fine SAND		
5.00 5.00	D9	N12				4.90	Firm to stiff grey CLAY		
6.00 6.50-7.00 7.00-7.50	D10 B11 B12					(7.10)			
8.00-8.20 8.50 8.50	D13 D14	N19							
9.50	D15								

Report ID: AGS4 UK BH | Project: HOLYBOURNE RD.GP | Library: GINT STD AGS 4 0.GLB | Date: July 21, 2015

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth	From	To	Hours	From	To	
All dimensions in metres Scale 1:62.5			Client PCC			Method/ Plant Used Dando 2000			Logged By DAP		

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Moorside Road

BOREHOLE LOG

Project Holybourne Rd				BOREHOLE No BH1
Job No Holybourne Rd	Date 01-06-15 01-06-15	Ground Level (m)	Co-Ordinates ()	
Contractor DJ Drilling				Sheet 2 of 2

[illegible]

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Depth	Date	Time	Depth	Casing Dia. mm	Water Depth	From	To	Hours	From	To	
All dimensions in metres Scale 1:62.5			Client PCC			Method/ Plant Used Dando 2000					Logged By DAP

Report ID: AGS4 UK BH || Project: HOLYBOURNE RD.GPJ || Library: GINT STD AGS 4.0.GLB || Date: Jun 21, 2015

BOREHOLE LOG

Project Holybourne Rd				BOREHOLE No BH2	
Job No Holybourne Rd	Date 02-06-15 02-06-15	Ground Level (m)	Co-Ordinates ()		
Contractor DJ Drilling				Sheet 1 of 2	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.30	D1	45 blows			0.10	Brown silty clayey fine SAND with frequent rootlets			
0.50-0.70	B2				(1.60)	Brown silty clayey gravelly fine SAND. Gravel is of fine to medium angular flint			
0.50	ESA				1.70				
1.20-1.40	U3	N50/ 225 mm			2.00	Brown silty clayey sandy fine to medium angular flint GRAVEL			
1.40	D4				(1.30)	Dense silty sandy medium to coarse angular to sub angular flint GRAVEL			
2.00-2.50	B5				3.30				
2.00	B6	N14			(1.00)	Firm brown silty CLAY			
3.00-3.50					4.30				
3.00					(0.80)	Brown silty gravelly fine SAND. Gravel is of fine to medium angular flint			
4.00-4.45	U7	N6			5.10	Soft to firm grey silty CLAY			
4.45	D8				(0.90)				
5.00	D9				6.00	Firm to stiff grey CLAY			
5.00	D10	N22			(6.00)				
6.00									
6.50-6.85					U11				
6.85	D12								
7.50	D13								
8.00	D14								
8.00	D15								
9.00									
9.50					B16				

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth	From	To	Hours	From	To	

All dimensions in metres Scale 1:62.5	Client PCC	Method/ Plant Used Dando 2000	Logged By DAP
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RIDGE

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Moorside Road

BOREHOLE LOG

Project Holybourne Rd				BOREHOLE No BH2	
Job No Holybourne Rd	Date 02-06-15 02-06-15	Ground Level (m)	Co-Ordinates ()		
Contractor DJ Drilling				Sheet 2 of 2	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
10.00-10.45	U17	65 blows					Firm to stiff grey CLAY (<i>continued</i>)		
10.45	D18								
11.00	D19								
11.50	D20	N28				12.00			
11.50									

Boring Progress and Water Observations

Chiselling

Water Added

GENERAL REMARKS

Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth	From	To	Hours	From	To	GENERAL REMARKS

All dimensions in metres
Scale 1:62.5

Client PCC

Method/
Plant Used

Dando 2000

Logged By
DAP

Report ID: AGS4 UK BH || Project: HOLYBOURNE RD, GP || Library: QINT STD AGS 4, 0.015 || Date: July 21, 2015

BOREHOLE LOG

Project Holybourne Rd				BOREHOLE No BH3
Job No Holybourne Rd	Date 03-06-15	Ground Level (m)	Co-Ordinates ()	
Contractor DJ Drilling				Sheet 1 of 2

SAMPLES & TESTS			Water	STRATA			Geology	Instrument Backfill	
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)			DESCRIPTION
0.30	D1	N50/ 210 mm			0.10	Brown silty clayey SAND with frequent rootlets			
0.30	ESA						Brown silty clayey fine SAND		
0.50-0.70	B2								
1.20-1.70	B3	N28			(1.70)				
1.80-2.30	B4				1.80				
1.80					2.00	Brown silty clayey gravelly fine SAND. Gravel is of fine to medium angular to sub angular flint			
2.80-3.30	B5	N7			(2.10)	Dense silty slightly sandy clayey fine to coarse angular to sub rounded flint GRAVEL			
2.80									
3.90-4.40	B6				4.10				
3.90		N6			(0.70)	Firm brown CLAY			
5.00-5.45	D7				4.80				
5.00					(0.50)	Brown silty fine SAND			
6.00	D8	N26			5.30	Firm grey silty CLAY			
6.50-7.00	B9				(1.10)				
7.00-7.35	U10				6.40	Firm to stiff grey CLAY			
7.35	D11								
8.00	D12	D14			(5.60)				
8.50-8.95	D13								
8.50									
9.50									

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Depth	Date	Time	Casing Depth	Dia. mm	Water Depth	From	To	Hours	From	To	
All dimensions in metres Scale 1:62.5		Client PCC				Method/ Plant Used Dando 2000			Logged By DAP		

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Moorside Road

BOREHOLE LOG

Project Holybourne Rd				BOREHOLE No BH3
Job No Holybourne Rd	Date 03-06-15 03-06-15	Ground Level (m)	Co-Ordinates ()	
Contractor DJ Drilling				Sheet 2 of 2

SAMPLES & TESTS			Water	STRATA			Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)		
10.00-10.35	U15	N29				12.00	Firm to stiff grey CLAY (continued)	
10.35	D16							
11.00	D17							
11.50	D18							

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth	From	To	Hours	From	To	

All dimensions in metres Scale 1:62.5	Client	PCC	Method/ Plant Used	Dando 2000	Logged By	DAP
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BOREHOLE LOG

Project Holybourne Rd				BOREHOLE No WS1
Job No Holybourne Rd	Date 01-06-15 01-06-15	Ground Level (m)	Co-Ordinates ()	
Contractor DJ Drilling				Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.20	ES1	N7				0.30	Light brown clayey silty fine SAND with occasional rootlets and small brick fragments (TOPSOIL)		
0.45	ES2					0.50	Firm to stiff orange brown slightly sand silty CLAY		
						(1.10)	Stiff orange brown silty clay		
1.00						1.60			
						2.00	Dense coarse angular flint GRAVEL		
2.00		N50/ 70 mm							

[illegible]

BOREHOLE LOG

Project Holybourne Rd				BOREHOLE No WS2	
Job No Holybourne Rd	Date 01-06-15 01-06-15	Ground Level (m)	Co-Ordinates ()		
Contractor DJ Drilling				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.20	ES1	N8				0.40	Brown silty clayey gravelly fine SAND with frequent rootlets and small brick fragments		
0.40	ES2					(1.10)	Firm to stiff orange brown slightly sandy silty CLAY		
0.50-1.00	U3					1.50			
1.00	ES4	N8				1.80	Dense silty clayey fine to coarse angular flint GRAVEL		
1.30-1.60									
1.80		N50/ 110 mm							

Boring Progress and Water Observations

Chiselling

Water Added

GENERAL REMARKS

Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth	From	To	Hours	From	To	GENERAL REMARKS

All dimensions in metres
Scale 1:62.5

Client PCC

Method/
Plant Used

Terrier

Logged By
DAP

BOREHOLE LOG

Project Holybourne Rd				BOREHOLE No WS3	
Job No Holybourne Rd	Date 01-06-15 01-06-15	Ground Level (m)	Co-Ordinates ()		
Contractor DJ Drilling				Sheet 1 of 1	

SAMPLES & TESTS			Water				STRATA		Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION			
0.10-0.30	ES1	N7				0.35	Light brown silty slightly clayey gravelly fine SAND. Gravel is of fine to medium angular flint			
0.50-0.60	ES2					(1.15)	Firm to stiff orange brown slightly sandy silty CLAY			
1.00						1.50				
						1.90	Dense slightly clayey fine to coarse angular flint GRAVEL			
1.90		N50/ 170 mm								

Boring Progress and Water Observations

Chiselling

Water Added

GENERAL REMARKS

Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth	From	To	Hours	From	To	GENERAL REMARKS

All dimensions in metres Scale 1:62.5	Client PCC	Method/ Plant Used Terrier	Logged By DAP
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BOREHOLE LOG

Project Holybourne Rd				BOREHOLE No WS4
Job No Holybourne Rd	Date 01-06-15 02-06-15	Ground Level (m)	Co-Ordinates ()	
Contractor DJ Drilling				Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA			Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick- ness)		
0.15-0.25	ES1	N24			0.25	Dark brown clayey sandy SILT with occasional rootlets		
0.50-0.60	ES2			(1.30)	Firm to stiff orange brown silty slightly sandy CLAY			
1.00								
1.60-1.80	ES3							
2.00		N50/ 135 mm			1.80	Dense angular flint GRAVEL with pockets of stiff orange brown silty clay		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth	From	To	Hours	From	To	
All dimensions in metres Scale 1:62.5			Client PCC			Method/ Plant Used Terrier					Logged By DAP

Ridge & Partners LLP
Partnership House
Moorside Road

BOREHOLE LOG

Project Holybourne Rd				BOREHOLE No WS5
Job No Holybourne Rd	Date 01-06-15 02-06-15	Ground Level (m)	Co-Ordinates ()	
Contractor DJ Drilling				Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA			Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)		
0.10-0.40	ES1	N9			(0.60) 0.60	Light brown silty gravelly fine SAND. Gravel is of medium to coarse angular to sub angular flint		
0.60-0.80	ES2				(1.00) 1.60	Firm to stiff orange brown silty slightly sandy CLAY		
1.00					1.80	Dense clayey fine to coarse angular flint GRAVEL		
1.80		N50/ 165 mm						

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Depth	Date	Time	Depth	Casing Dia. mm	Water Depth	From	To	HOURS	From	To	
All dimensions in metres Scale 1:62.5			Client PCC			Method/ Plant Used Terrier					Logged By DAP

Report ID: AGS4 UK BH | Project: HOLYOUBOURNE RO.GP | Library: GINT STD AGS 4 0.GLB | Date: July 21, 2015

APPENDIX 4

Extracts from SuDs Manual re Water Quality Managment

TABLE 4.3 Minimum water quality management requirements for discharges to receiving surface waters and groundwater

Land use	Pollution hazard level	Requirements for discharge to surface waters, including coasts and estuaries ²	Requirements for discharge to groundwater
Residential roofs	Very low	Removal of gross solids and sediments only	
Individual property driveways, roofs (excluding residential), residential car parks, low traffic roads (eg cul de sacs, home zones, general access roads), non-residential car parking with infrequent change (eg schools, offices)	Low	Simple index approach ³ <i>Note: extra measures may be required for discharges to protected resources¹</i>	
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways	Medium	Simple index approach ³ <i>Note: extra measures may be required for discharges to protected resources¹</i>	Simple index approach ³ <i>Note: extra measures may be required for discharges to protected resources¹</i> In England and Wales, Risk Screening ⁴ must be undertaken first to determine whether consultation with the environmental regulator is required. In Northern Ireland, the need for risk screening should be agreed with the environmental regulator.
Trunk roads and motorways	High	Follow the guidance and risk assessment process set out in HA (2009)	
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured, industrial sites	High	Discharges may require an environmental licence or permit ⁵ . Obtain pre-permitting advice from the environmental regulator. Risk assessment is likely to be required ⁵ .	

Notes

The minimum water quality management requirements for discharges to receiving surface waters and groundwater are presented here. (For Northern Ireland, this guidance should be considered as interim until such time as Northern Ireland publishes its own legislation/policy/guidance.)

- 1 These are not required in Scotland and Northern Ireland. For England and Wales, see Step 3 of the simple index approach (Section 26.7.1).

Protected surface water resources will include those designated for drinking water abstraction or for other environmental protection reasons. Protected groundwater resources are represented by SPZ1s in England and Wales.

- 2 In Scotland, the Water Environment (Controlled Activities) (Scotland) Regulations (CAR) 2011 General Binding Rules, Rule 10 (d) (iv) effectively provides an exemption from requiring SuDS for coastal discharges. However, control of any contaminants likely to be present in surface water runoff is still required, but can be delivered using alternative methods such as proprietary treatment products. As the term 'SuDS' in this manual includes proprietary treatment products, this exemption is not valid in this context.
- 3 The application of the simple index approach should follow the approach outlined in Section 26.7.1 (or equivalent approved).
- 4 Risk screening is an assessment to identify high risk scenarios where the Environment Agency or Natural Resources Wales (NRW) would wish to be consulted regarding infiltration of water from surface runoff in order to agree the proposed design approach. The risk screening method is provided in Section 26.7.2.
- 5 The risk assessment should determine the appropriate design approach to mitigate risk to acceptable levels following the guidance outlined in Section 26.7.3. This assessment should be approved by the environmental regulator.

- detailed risk assessment methods
- process-based treatment modelling methods (which, where used, are likely to form part of a detailed risk assessment).

Each of these methods is summarised in **Table 26.1** and described in more detail in the subsequent sections.

TABLE 26.1 Approaches to water quality risk management

Design method	Hazard characterisation	Risk reduction	
		For surface water	For groundwater
Simple index approach	Simple pollution hazard indices based on land use (eg Table 26.2 or equivalent)	Simple SuDS hazard mitigation indices (eg Table 26.3 or equivalent)	Simple SuDS hazard mitigation indices (eg Table 26.4 or equivalent)
Risk screening ¹	Factors characterising traffic density and extent of infiltration likely to occur (eg Table 26.5 or equivalent)	N/A	Factors characterising unsaturated soil depth and type, and predominant flow type through the soils (eg Table 26.5 or equivalent)
Detailed risk assessment	Site specific information used to define likely pollutants and their significance	More detailed, component specific performance information used to demonstrate that the proposed SuDS components reduce the hazard to acceptable levels	
Process-based treatment modelling	Time series rainfall used with generic pollution characteristics to determine statistical distributions of likely concentrations and loadings in the runoff	Models that represent the treatment processes in the proposed SuDS components give estimates of reductions in event mean discharge concentrations and total annual load reductions delivered by the system	

Note

¹ Risk assessment may be required as a result of the risk screening process.

Table 4.3 (Chapter 4) sets out which of these methods is required – for different generic land use types and receiving waters. Process-based modelling is not currently readily available for SuDS design in the UK, and is not therefore specified as a requirement. However, where robust models can be developed by designers, this approach should not be discounted as a future option for SuDS design.

It is important to ensure that risks to both surface and groundwater are managed effectively, and the approach taken should be agreed with the drainage approving body and/or environmental regulator in advance of the design, as local differences in requirements may exist.

Approaches that consider a number of key pollutant types are recommended because:

- receiving water quality standards tend to be specified in terms of individual pollutant thresholds (**Section 26.4**)
- different components tend to have different capacities to remove different types of pollutants (**Section 26.6**)
- any component (proprietary product or otherwise) will need to demonstrate performance across a range of pollutants, or where this is not possible, different types of component will be needed to remove different pollutants. A series of sediment removal components, such as gulley pots, would be unlikely to meet the performance requirements for the full suite of pollutants.

26.7.1 Simple index approach

The simple method described in this section, and summarised in **Box 26.2**, has been developed from that set out in Ellis *et al* (2012), a summary of which is presented in **Annex 5**.

TABLE 26.2 Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways ¹	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways ¹	High	0.8 ²	0.8 ²	0.9 ²

Notes

- 1 Motorways and trunk roads should follow the guidance and risk assessment process set out in Highways Agency (2009).
- 2 These should only be used if considered appropriate as part of a detailed risk assessment – required for all these land use types (Table 4.3). When dealing with high hazard sites, the environmental regulator should first be consulted for pre-permitting advice. This will help determine the most appropriate approach to the development of a design solution.

Where a site land use falls outside the defined categories, the Indices should be adapted (and agreed with the drainage approving body) or else the more detailed risk assessment method should be adopted.

Where nutrient or bacteria and pathogen removal is important for a particular receiving water, equivalent indices should be developed for these pollutants (if acceptable to the drainage approving body) or the risk assessment method adopted.

Where the mitigation index of an individual component is insufficient, two components (or more) in series will be required, where:

$$\text{Total SuDS mitigation index} = \text{mitigation index}_1 + 0.5 (\text{mitigation index}_2)$$

Where:

$$\text{mitigation Index}_n = \text{mitigation index for component } n$$

A factor of 0.5 is used to account for the reduced performance of secondary or tertiary components associated with already reduced inflow concentrations.

TABLE 26.4 Indicative SuDS mitigation indices for discharges to groundwater

Characteristics of the material overlying the proposed infiltration surface, through which the runoff percolates ¹	TSS	Metals	Hydrocarbons
A layer of dense vegetation underlain by a soil with good contaminant attenuation potential ² of at least 300 mm in depth ³	0.6 ⁴	0.5	0.6
A soil with good contaminant attenuation potential ² of at least 300 mm in depth ³	0.4 ⁴	0.3	0.3
Infiltration trench (where a suitable depth of filtration material is included that provides treatment, ie graded gravel with sufficient smaller particles but not single size coarse aggregate such as 20 mm gravel) underlain by a soil with good contaminant attenuation potential ² of at least 300 mm in depth ³	0.4 ⁴	0.4	0.4
Constructed permeable pavement (where a suitable filtration layer is included that provides treatment, and including a geotextile at the base separating the foundation from the subgrade) underlain by a soil with good contaminant attenuation potential ² of at least 300 mm in depth ³	0.7	0.6	0.7
Bioretention underlain by a soil with good contaminant attenuation potential ² of at least 300 mm in depth ³	0.8 ⁴	0.8	0.8
Proprietary treatment systems ^{5, 6}	These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area.		

Notes

- 1 All designs must include a minimum of 1 m unsaturated depth of aquifer material between the infiltration surface and the maximum likely groundwater level (as required in infiltration design – [Chapter 25](#)).
- 2 For example as recommended in Sniffer (2008a and 2008b), Scott Wilson (2010) or other appropriate guidance.
- 3 Alternative depths may be considered where it can be demonstrated that the combination of the proposed depth and soil characteristics will provide equivalent protection to the underlying groundwater – see note 1.
- 4 If significant volumes of sediment are allowed to enter an infiltration system, there will be a high risk of rapid clogging and subsequent system failure.
- 5 See [Chapter 14](#) for approaches to demonstrate product performance. Note: a British Water/Environment Agency assessment code of practice is currently under development that will allow manufacturers to complete an agreed test protocol for systems intended to treat contaminated surface water runoff. Full details can be found at: www.britishtwater.co.uk/Publications/codes-of-practise.aspx
- 6 SEPA only considers proprietary treatment systems as appropriate in exceptional circumstances where other types of SuDS component are not practicable. Proprietary treatment systems may also be considered appropriate for existing sites that are causing pollution, where there is a requirement to retrofit treatment. WAT-RM-08 (SEPA, 2014) also provides a flowchart with a summary of checks on suitability of a proprietary system.

The following should be noted:

- Where the indices are not considered representative by the designer, a risk assessment can be undertaken ([Section 26.7.3](#)).
- Components should always be designed for treatment, as described in the design guidance set out in the individual component chapters. If they are undersized, incorrectly designed or constructed or inadequately maintained, their treatment performance could be significantly affected. Component checklists ([Appendix B](#)) can be used to confirm design and construction adequacy and set appropriate maintenance regimes.
- Where the infiltration component itself does not provide sufficient pollution mitigation, the design should include upstream SuDS components that are lined to prevent infiltration from occurring. The mitigation indices set out in [Table 26.3](#) (for discharges to surface water) should be used for any upstream treatment.

APPENDIX 5

Drawings :

- a) **Architect's Site Plan**

- b) **PMC 239 – 500- Drainage Strategy**
PMC 239 – 551- Drainage Strategy Details (sheet 1)
PMC 239 – 552- Drainage Strategy Details (sheet 2)

- c) **Topographical Survey**



Site Plan 1:200



- GENERAL NOTES:
1. This drawing is to be read in conjunction with all relevant architects, structural engineers, mechanical & electrical engineers and specialists drawings / specifications.
 2. Any discrepancies in dimensions or details between the various drawings should be reported immediately.
 3. All dimensions are in millimetres and all levels are in metres.
 4. Do not scale from this drawing, if in doubt ASK.

Rev.	Description	Date	Drn	Ch'd
A	Parking amended.	06.16	RL	DT

SCHEDULE OF ACCOMMODATION

5	no. 38/5P Houses @ 108m ²
2	no. 28/4P Flats @ 71.8m ²
4	no. 18/2P Flats @ 52.5-57.8m ²
11	no. Units Total
PARKING	
10	no. Allocated parking spaces
12	no. Unallocated parking spaces
22	no. Total spaces



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SITE LOCATION PLAN SCALE 1:1250



pmc
Construction & Development Services Ltd



kenn scaddan
associates
architects

CONCEPT HOUSE, 35 KINGSTON CRESCENT, NORTH END, PORTSMOUTH, HAMPSHIRE, PO2 8AA
T: 023 9267 3618 F: 023 9267 9819 www.kscald.co.uk info@kscald.co.uk

PROJECT
HOLYBOURNE ROAD

DRAWING TITLE
SITE PLAN

Date	Drawn by	Scale	AI	Drawing No.	Rev.
JAN. 15	PJ/RL	1:200	AI	1103-PD101	A

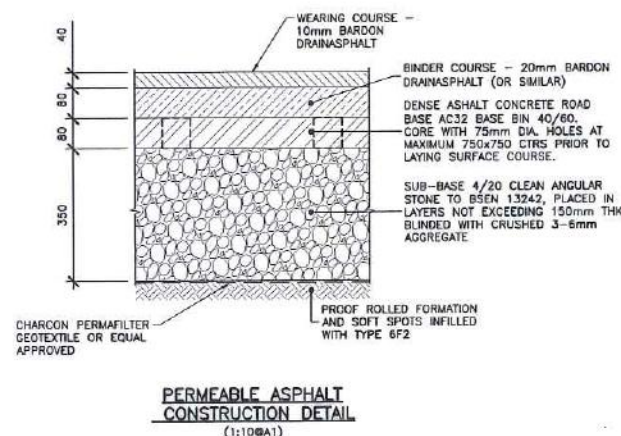
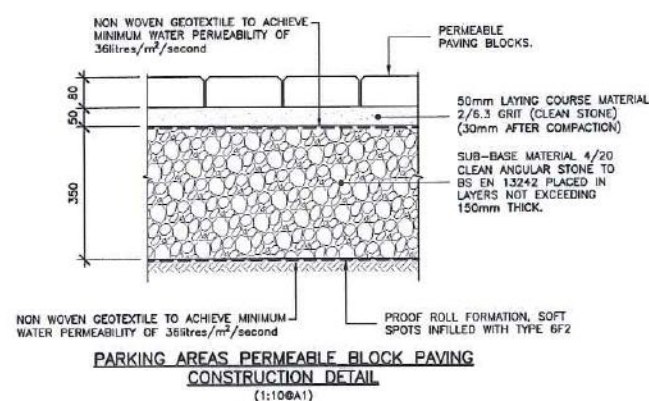
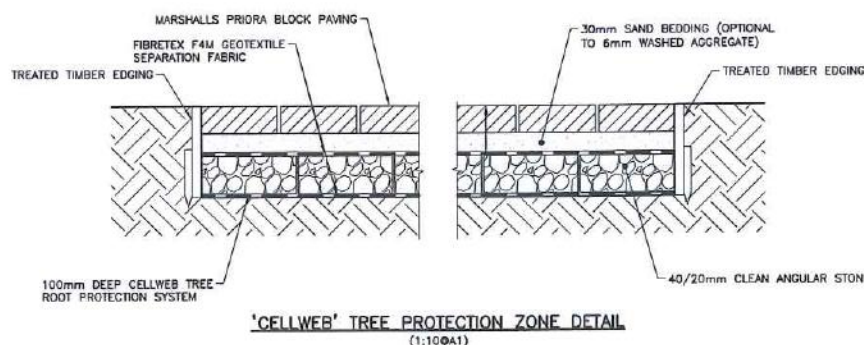
architecture planning design project management

FOUL MANHOLE SCHEDULE							
REF	COVER LEVEL	INVERT LEVEL	DEPTH TO INVERT	SIZE	TYPE	COVER	COMMENTS
F1	TBC	12.840		1200# PCC	TYPE 2	D400 675x675	TO BE ADOPTED
F2	13.850	13.090	0.760	1200# PCC	TYPE 2	D400 675x675	TO BE ADOPTED
F3	14.300	13.130	1.170	500#	TYPE 3	B125 450x450	
F4	14.320	13.240	1.080	500#	TYPE 3	B125 450x450	
F5	14.400	13.380	1.020	500#	TYPE 3	B125 450x450	
F6	14.450	13.540	0.910	500#	TYPE 3	B125 450x450	
F7	14.450	13.640	0.810	500#	TYPE 3	B125 450x450	
F8	14.530	13.750	0.780	500#	TYPE 3	C250 450x450	
F9	14.530	13.780	0.750	500#	TYPE 3	C250 450x450	
F10	14.530	13.840	0.690	500#	TYPE 3	C250 450x450	
F11	14.530	13.950	0.580	500#	TYPE 3	C250 450x450	
F12	14.530	14.000	0.530	500#	TYPE 3	C250 450x450	
F13	14.400	13.600	0.800	500#	TYPE 3	B125 450x450	
F14	14.500	13.800	0.700	500#	TYPE 3	B125 450x450	

SURFACE WATER MANHOLE SCHEDULE							
REF	COVER LEVEL	INVERT LEVEL	DEPTH TO INVERT	SIZE	TYPE	COVER	COMMENTS
S1	14.400	13.450	0.950	500#	TYPE 3	B125 450x450	SILT TRAP 300 DEEP SUMP
S2	14.400	13.600	0.800	500#	TYPE 3	B125 450x450	
S3	14.400	13.800	0.600	500#	TYPE 3	B125 450x450	
S4	14.400	13.600	0.800	500#	TYPE 3	B125 450x450	
S5	14.450	13.400	1.050	500#	TYPE 3	B125 450x450	SILT TRAP 300 DEEP SUMP
S6	14.650	13.600	1.050	500#	TYPE 3	B125 450x450	NOT USED
S7	14.550	13.450	1.100	500#	TYPE 3	B125 450x450	
S8	14.550	13.580	0.970	500#	TYPE 3	B125 450x450	
S9	14.500	13.750	0.750	500#	TYPE 3	B125 450x450	
S10	14.550	13.850	0.700	500#	TYPE 3	B125 450x450	
S11	14.470	12.700	1.770	500#	TYPE 3	B125 450x450	RESTRICTED ACCESS
S12	14.230	12.800	1.430	500#	TYPE 3	C250 450x450	RESTRICTED ACCESS
S13	14.380	13.050	1.330	500#	TYPE 3	C250 450x450	RESTRICTED ACCESS
S14	14.500	13.200	1.300	500#	TYPE 3	B125 450x450	RESTRICTED ACCESS
S15	14.350	13.350	1.000	500#	TYPE 3	B125 450x450	

OPERATION AND MAINTENANCE REQUIREMENTS FOR PERMEABLE PAVING		
MAINTENANCE SCHEDULE	REQUIRED ACTION	TYPICAL FREQUENCY
REGULAR MAINTENANCE	BRUSHING AND VACUUMING (STANDARD COSMETIC SWEEP OVER WHOLE SURFACE)	ONCE A YEAR, AFTER AUTUMN LEAF FALL, OR REDUCED FREQUENCY AS REQUIRED, BASED ON SITE-SPECIFIC OBSERVATIONS OF CLOSING OR MANUFACTURER'S RECOMMENDATIONS - PAY PARTICULAR ATTENTION TO AREAS WHERE WATER RUNS ONTO PERVIOUS SURFACE FROM ADJACENT IMPERMEABLE AREAS AS THIS AREA IS MOST LIKELY TO COLLECT THE MOST SEDIMENT
OCCASIONAL MAINTENANCE	STABILISE AND MOW CONTRIBUTING AND ADJACENT AREAS	AS REQUIRED
	REMOVAL OF WEEDS OR MANAGEMENT USING GLYPHOSATE APPLIED DIRECTLY INTO THE WEEDS BY AN APPLICATION RATHER THAN SPRAYING	AS REQUIRED - ONCE PER YEAR OR LESS FREQUENTLY USED PAVEMENTS
REMEDIAL ACTIONS	REMEDIAL WORK TO ANY DEPRESSIONS, RUTTING AND CRACKED OR BROKEN BLOCKS CONSIDERED DETRIMENTAL TO THE STRUCTURAL PERFORMANCE OR A HAZARD TO USERS, AND REPLACE LOST JOINTING MATERIAL	AS REQUIRED
	REHABILITATION OF SURFACE AND UPPER SUB-STRUCTURES BY REMEDIAL SWEEPING	EVERY 10 TO 15 YEARS OR AS REQUIRED (IF INFILTRATION PERFORMANCE IS REDUCED DUE TO SIGNIFICANT CLOSING)
MONITORING	INITIAL INSPECTION	MONTHLY FOR THREE MONTHS AFTER INSTALLATION
	INSPECT FOR EVIDENCE OF POOR OPERATION AND/OR WEED GROWTH - IF REQUIRED, TAKE REMEDIAL ACTION	THREE-MONTHLY, 48 HOURS AFTER LARGE STORMS IN FIRST SIX MONTHS
	INSPECT SILT ACCUMULATION RATES AND ESTABLISH APPROPRIATE BRUSHING FREQUENCIES	ANNUALLY
	MONITOR INSPECTION CHAMBERS	ANNUALLY

SOAKAWAYS OPERATION AND MAINTENANCE REQUIREMENTS		
MAINTENANCE SCHEDULE	REQUIRED ACTION	TYPICAL FREQUENCY
REGULAR MAINTENANCE	INSPECT FOR SEDIMENT AND DEBRIS IN PRE-TREATMENT COMPONENTS AND FLOOR OF INSPECTION TUBE OR CHAMBER AND INSIDE OF CONCRETE MANHOLE RINGS	ANNUALLY
	CLEANING OF GUTTERS AND ANY FILTERS ON DOWNPIPES	ANNUALLY (OR AS REQUIRED BASED ON INSPECTIONS)
	TRIMMING ANY ROOTS THAT MAY BE CAUSING BLOCKAGES	ANNUALLY (OR AS REQUIRED)
OCCASIONAL MAINTENANCE	REMOVE SEDIMENT AND DEBRIS FROM PRE-TREATMENT COMPONENTS AND FLOOR OF INSPECTION TUBE OR CHAMBER AND INSIDE OF CONCRETE MANHOLE RINGS	AS REQUIRED, BASED ON INSPECTION
REMEDIAL ACTIONS	RECONSTRUCT SOAKAWAY AND/OR REPLACE OR CLEAN VOID FILL, IF PERFORMANCE DETERIORATES OR FAILURE OCCURS	AS REQUIRED
	REPLACEMENT OF CLOGGED GEOTEXTILE (WILL REQUIRE RECONSTRUCTION OF SOAKAWAY)	AS REQUIRED
MONITORING	INSPECT SILT TRAPS AND NOTE RATE OF SEDIMENT ACCUMULATION	MONTHLY IN THE FIRST YEAR AND THEN ANNUALLY
	CHECK SOAKAWAY TO ENSURE EMPTYING IS OCCURRING	ANNUALLY



NOTES

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GENERAL NOTES

- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS AND SPECIALISTS DRAWINGS AND DETAILS.
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- ANY DISCREPANCIES BETWEEN THIS DRAWING AND OTHER INFORMATION IS TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO THE COMMENCEMENT OF THE WORKS ON SITE.
- THE MAIN CONTRACTOR SHALL BE RESPONSIBLE FOR THE SETTING OUT AND ACCURACY OF ALL DIMENSIONS. THE CONTRACTOR IS TO ENSURE THE STABILITY AND STRUCTURAL INTEGRITY OF THE EXISTING PROPERTY AT ALL TIMES DURING WORKS AND IS TO BE RESPONSIBLE FOR ALL PROPPING AND SHORING AS REQUIRED.
- MAIN CONTRACTOR TO PROVIDE AND FIX SUITABLE BRACING AND PROPPING FOR ALL ELEMENTS IN THE TEMPORARY CONDITION DURING CONSTRUCTION STAGE, SUCH AS TO ENSURE STRUCTURE STABILITY AT ALL TIMES.
- IT IS THE CONTRACTORS SOLE RESPONSIBILITY FOR ASCERTAINING SAFE DISPOSAL OF ANY OFF-SITE EXCAVATED SPILL. NO CLAIM RESULTING FROM ABNORMAL TIP REQUIREMENTS WILL BE ENTERTAINED.

DRAINAGE

- ALL MATERIALS AND WORKMANSHIP TO 'SEWERS FOR ADOPTION, 7th EDITION'.
- ALL MATERIALS AND WORKMANSHIP TO COMPLY WITH BS EN 752-1:1996
- WHEN USING VITRIFIED CLAY PIPEWORK WITH FLEXIBLE JOINTS, SUPERSTRENGTH SHALL BE USED. ALL ADAPTABLE WORKS SHALL USE V.C PIPEWORK. FOR NON-ADOPTED SYSTEM PVCU-SM4 CLASS PIPEWORK AND FITTINGS MAY BE SUBSTITUTED.
- CONCRETE ENCASEMENT, MINIMUM 150 BED AND HAUNCH, TO BE USED ON PIPEWORK UNDER ROADS WITH LESS THAN 1200 COVER TO CROWN.
- UNLESS OTHERWISE STATED, ALL PIPEWORK TO BE BEDDED AND SURROUNDED IN 10mm SINGLE SIZE AGGREGATE UP TO 450mm DIAMETER. FOR LARGER PIPEWORK, 20mm SHALL BE USED.
- REFER TO MANHOLE SCHEDULE FOR SIZES, COVERS ETC.
- ALL MATERIALS TO COMPLY WITH THE RELEVANT BS-EN, LATEST EDITION, FOR PIPEWORK AND FITTINGS.
- UPON COMPLETION, ALL WORKS TO BE THOROUGHLY CLEANED BY FLUSHING.

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ACTIVITY	HAZARD	CONTROL

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P2	23.03.16	SW SCHEDULE AMENDED.	PJM
P1	18.03.16	PRELIMINARY ISSUE FOR COMMENT	PJM
15.	Date	Revised	RJ

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ace
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Client: **PMC CONSTRUCTION**
Approved: **KENN SCADDAN ASSOCIATES**

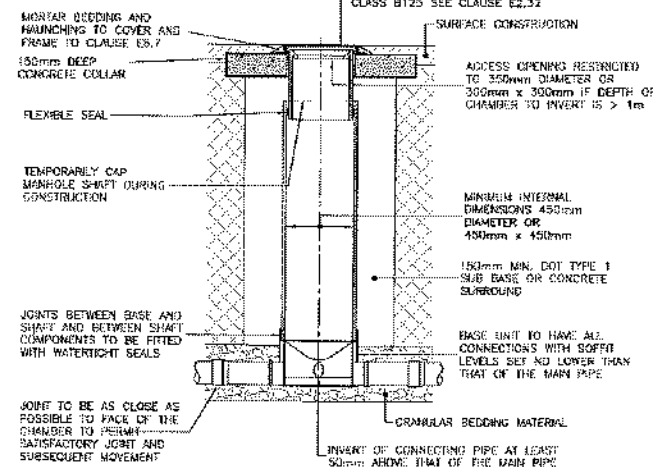
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Drawing Title: **DRAINAGE STRATEGY DETAILS SHEET 1**

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Project No.	Drawing No.	Rev.		
PMC239	551			

PLASTIC CHAMBERS AND RINGS SHALL COMPLY WITH BS EN 13598-1 AND BS EN 13598-2 OR HAVE EQUIVALENT INDEPENDENT APPROVAL

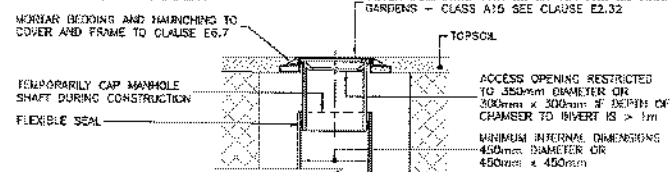
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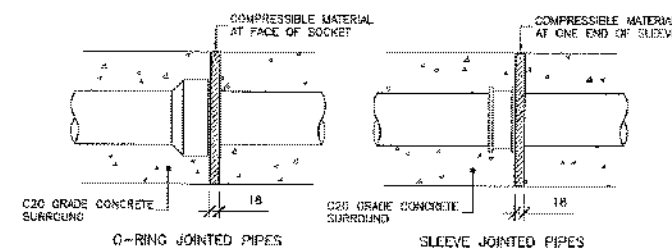
TYPICAL ACCESS CHAMBER DETAIL - TYPE 3
(FLEXIBLE MATERIAL DETAIL)

MAXIMUM DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE IN AREAS SUBJECT TO VEHICLE LOADING 5m, NON-ENTRY (1:250A1)

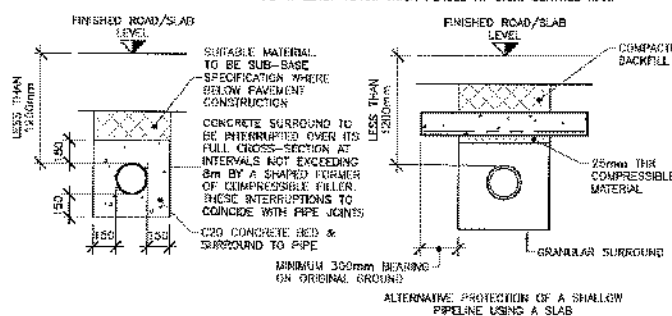
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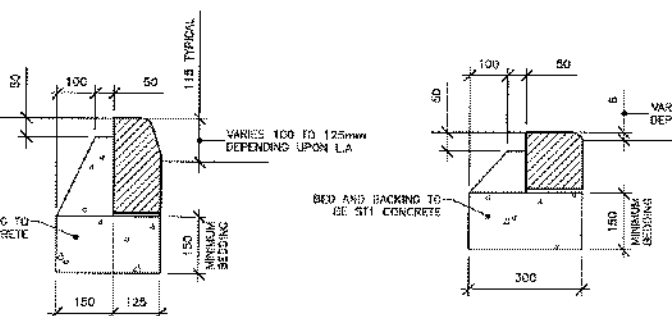
ALTERNATIVE COVER DETAIL FOR LANDSCAPED AREAS - TYPE 3
(1:250A1)



THE FLEXIBILITY OF A PIPELINE BEDDED ON, OR SURROUNDED WITH, CONCRETE SHOULD NORMALLY BE MAINTAINED BY THE PROVISION OF FLEXIBLE CONSTRUCTION JOINTS THROUGH THE CONCRETE AT PIPE JOINTS. THESE SHOULD BE MADE FROM BUTYLEN IMPREGNATED INSULATING BOARD COMPLYING WITH B.S. 1142 PART 3, OR OTHER EQUALLY COMPRESSIBLE FILLER MATERIAL SUCH AS EXPANDED POLYSTYRENE. THE BOARD SHOULD BE CUT TO FIT THE PIPES & PLACED AT THE FACE OF THE PIPE SOCKETS OR AT ONE END OF SLEEVE JOINTS. THE JOINT MATERIAL SHOULD BE AT LEAST 15mm THICK PLACED AT 50mm CENTRES MAX.



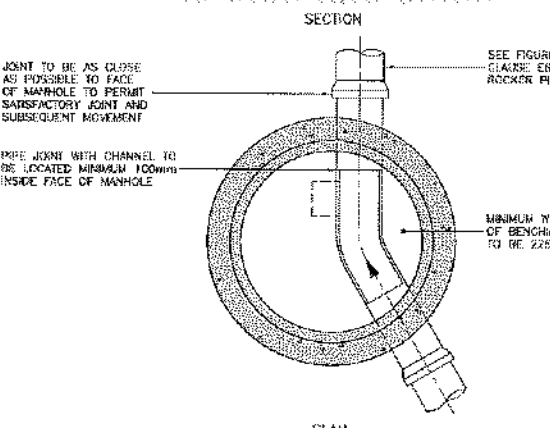
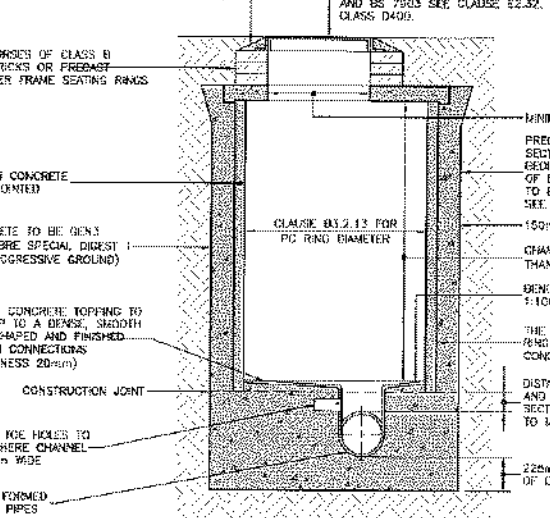
PROTECTION TO PIPELINES WITH LESS THAN 1200mm COVER
(1:250A1)



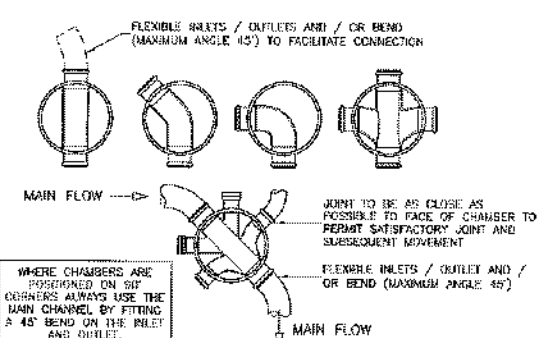
KERB TYPE HB 2 DETAIL
(1:100A1)

KERB TYPE BN DETAIL (DROPPED KERB)
(1:100A1)

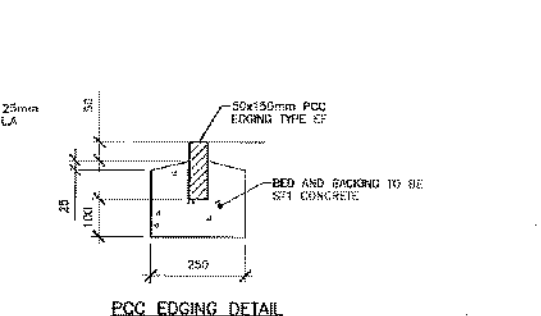
MORTAR BEDDING AND HAUNCHING TO COVER AND FRAME TO CLAUSE E6.7



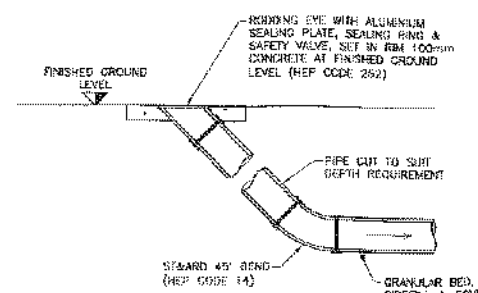
TYPICAL MANHOLE DETAIL - TYPE 2
(1:250A1)



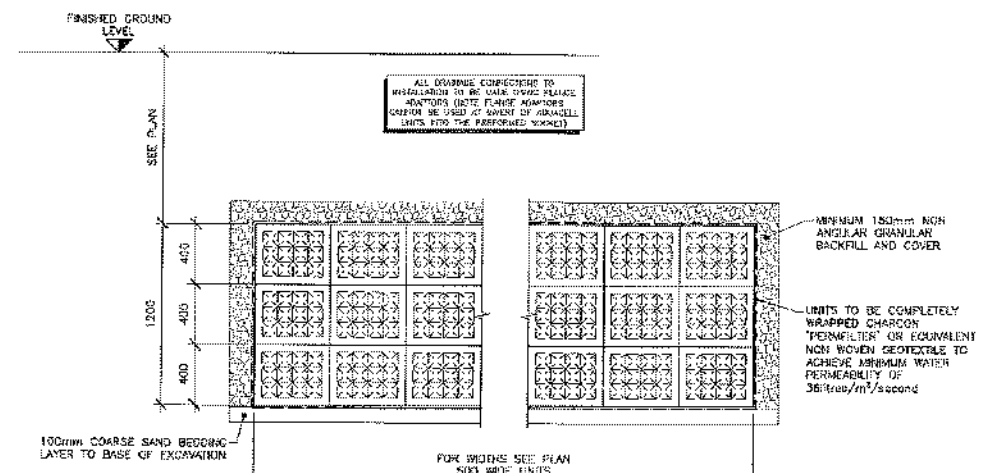
ALTERNATIVE BASE LAYOUTS FOR TYPE 3 CHAMBERS
(1:250A1)



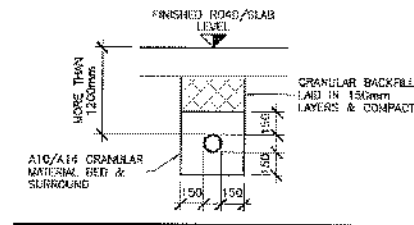
PCC EDGING DETAIL
(1:100A1)



RODDING EYE DETAIL
(VC SHOWN - PVCU ALTERNATIVE TO SUIT)
(1:250A1)



BOX SOAKAWAY
WAVIN/OSMA 'AQUACELL' SOAKAWAY INSTALLATION
(1:250A1)



NOMINAL BORE OF PIPE (mm)	SIZE (mm)	
	SINGLE-SIZED	GRADED
100 & 150	10	-
225 & 300	10 OR 20	20 TO 5
375 - 500	20	20 TO 5

PIPE BED & SURROUND DETAIL
(CLASS S)
(1:250A1)

NOTES

1. This drawing is the copyright of RUSHBY BREWSTER LIMITED. It is to be used only for the project for which it was prepared. It is not to be used for any other project without the written consent of RUSHBY BREWSTER LIMITED.

GENERAL NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS AND SPECIALISTS DRAWINGS AND DETAILS.
2. ALL FIGURED DIMENSIONS TO BE TAKEN IN PREFERENCE TO SCALED DIMENSIONS.
3. ANY DISCREPANCIES BETWEEN THIS DRAWING AND OTHER INFORMATION IS TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO THE COMMENCEMENT OF THE WORKS ON SITE.
4. THE MAIN CONTRACTOR SHALL BE RESPONSIBLE FOR THE SETTING OUT AND ACCURACY OF ALL DIMENSIONS.
5. THE CONTRACTOR IS TO ENSURE THE STABILITY AND STRUCTURAL INTEGRITY OF THE EXISTING PROPERTY AT ALL TIMES DURING WORKS AND IS TO BE RESPONSIBLE FOR ALL PROPPING AND SHORING AS REQUIRED.
6. MAIN CONTRACTOR TO PROVIDE AND FIX SUITABLE BRACING AND PROPPING FOR ALL ELEMENTS IN THE TEMPORARY CONDITION DURING CONSTRUCTION STAGE, SUCH AS TO ENSURE STRUCTURE STABILITY AT ALL TIMES.
7. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY FOR MAINTAINING SAFE DISPOSAL OF ANY OFF-SITE EXCAVATED SPOIL. NO CLAIM RESULTING FROM ABNORMAL TIP REQUIREMENTS WILL BE ENTERAINED.

DRAINAGE

1. ALL MATERIALS AND WORKMANSHIP TO 'SEWERS FOR ADOPTION' 7th EDITION.
2. ALL MATERIALS AND WORKMANSHIP TO COMPLY WITH BS EN 752-1: 1995.
3. WHEN USING WITHEFIED CLAY PIPEWORK WITH FLEXIBLE JOINTS, SUPERSTRENGTH SHALL BE USED. ALL ADAPTABLE JOINTS SHALL USE VJO PIPEWORK. FOR NON-ADOPTED SYSTEM PVCU-SH4 CLASS PIPEWORK AND FITTINGS MAY BE SUBSTITUTED.
4. CONCRETE CONDUIT MINIMUM 150mm BED AND HAUNCH, TO BE USED ON PIPEWORK UNDER ROADS WITH LESS THAN 1200mm COVER TO DROWN.
5. UNLESS OTHERWISE STATED, ALL PIPEWORK TO BE BEDDED AND SURROUNDED IN 150mm SINGLE SIZE AGGREGATE UP TO 450mm DIAMETER. FOR LARGER PIPEWORK, 20mm SHALL BE USED.
6. REFER TO MANHOLE SCHEDULE FOR SIZES, COVERS ETC.
7. ALL MATERIALS TO COMPLY WITH THE RELEVANT BS-EN, LATEST EDITION, FOR PIPEWORK AND FITTINGS.
8. UPON COMPLETION, ALL WORKS TO BE THOROUGHLY CLEANED BY FLOUSING.

ACTIVITY	MAINT	CONTROL

NOTE: THE ABOVE REQUIREMENTS APPLY TO THE DESIGN AND CONSTRUCTION OF THE WORKS. THE MAIN CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE OF THE WORKS.

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH DRAWING No. PMC239-500

COLOURED DRAWING
REQUEST A COLOURED COPY IF THIS STAMP IS NOT RED

PI	16.03.16	PRELIMINARY ISSUE FOR COMMENT	PJM
ES	04/16	Revised	05/16

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Project Title
HOLYBOURNE ROAD LEIGH PARK

Drawing Title
DRAINAGE STRATEGY DETAILS SHEET 2

As Shown	Project No.	Date	Drawn by	Checked by
AI	16.03.16	JAN. 2016	PJM	ASW

Project No.	Drawing No.	Rev
PMC239	552	

