PROPOSED RESIDENTIAL DEVELOPMENT
BRYANSTON ROAD, SOUTHAMPTON

FLOOD RISK STATEMENT
DRAINAGE STRATEGY
& SUDS STATEMENT-

JULY 2023

Document Control Sheet

Project name: Bryanston Road, Southampton

Project ref: DOS/E5077

Report Title Drainage Strategy & SuDS Statement

Doc. ref: TRS/DOS/E5077/18199

Date: 13th June 2023

	Name	Position	Signature	Date
Prepared by:	Terry Seymour	Director		June 2023
Reviewed by:	Terry Seymour	Director		June 2023
Approved by:	Terry Seymour	Director		June 2023

Revision	Date	Description	Prepared	Approved
1	20.06.2023	Updated Draft Report	TRS	TRS
2	28.07.2023	Updated layout	TRS	TRS

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1.0 Introduction

Rogers Cory Partnership Limited have been instructed on behalf of Doswell Proejcts to prepare a Flood Risk Statement with associated Drainage Strategy to support the full planning application associated with the redevelopment of the site referred to as Bryanston Road, for 8 residential dwellings with associated access road and landscaping.

The study will also examine the effects of the development on adjacent parcels of land.

A surface water drainage strategy has been developed and hydraulically modelled incorporating sustainable urban drainage systems (SuDS) in line with the NPPF and EA standing advice. The strategy is based on a reduction in the surface water run-off rates thus ensuring that the development does not increase the risk of flooding from the site during peak storm events.

The report also aims to assess potential flood risk sources to and from the site and detail the drainage strategy for implementation on the scheme.

The National Planning Policy Framework (NPPF) was published in July 2018 and revised in February 2019 by the Department of Housing, Communities and Local Government and replaced all planning policy statements including Planning Policy Statement 25 (PPS 25): Development and Flood Risk. The NPPF set out the Government's planning policy for England and how these are expected to be applied. The Planning Practice Guidance (PPG), published in March 2014, provides additional guidance and retains key elements of the now superseded PPS 25.

Initial searches into the Environment Agency's (EA) website has identified the development site to lie mainly within flood zone 1, considered to be at low risk of flooding from rivers or sea. In this respect requirements in the NPPF (foot note 20) states the following:

'"site-specific flood risk assessment is required for proposals of 1 hectare or greater in Flood Zone 1; all proposals for new development (including minor development and change of use) in Flood Zones 2 and 3, or in an area within Flood Zone 1 which has critical drainage problems (as notified to the local planning authority by the Environment Agency); and where proposed development or a change of use to a more vulnerable class may be subject to other sources of flooding."

Whilst the development site is less than 1 hectare and thus does not require a site specific flood risk assessment in accordance with the NPPF, a flood risk statement with supporting surface water drainage strategy has still been prepared to support the application.

The PPG sets out the objectives of a site-specific FRA as to establish the following:

- *"Whether the proposed development is likely to be affected by current or future flooding from any source;*

- *Whether it will increase flood risk elsewhere;*

- *Whether the measures proposed to deal with these effects and risks are appropriate;*

- *The evidence for the local planning authority to apply (if necessary) the Sequential Test, and;*

- *Whether the development will be safe and pass the Exception Test, if applicable."*

Whilst the area of the re-development area falls just under the 1hectare criteria a site-specific flood risk assessment has still been produced to support this application along with a drainage strategy to meet the requirements of the Lead Local Flood Authority (LLFA).

2.0 Existing Site

The site is located in the eastern part of Southampton City approximately 130m east of the River Itchen. The site is bounded south, east and north by existing residential properties and a railway to the west (Refer to **Figure 1** below).

Figure 1: Site Location

The existing site proposed for development covers approximately 0.38 hectares acres of irregularly shaped areas of rough grass and trees that slopes downwards to the north westwards at a steep gradient. The approximate centre of the site is at Ordnance Survey (OS) Grid Reference 443903; 112120.

The application site generally falls in a northerly westerly direction. A copy of the topographical survey can be found in **Appendix A**.

Geotechnical

The current review of the geotechnical aspects of the site are based on the following documents:

- Soil Limited – Intrusive Investigations Letter dated May 2017

Ground Conditions

BGS geological maps indicate that the site is underlain by the Wittering Formation with no superficial deposits overlying.

Intrusive investigations carried out by Soils Limited indicate that the site consists of MADE GROUND/Topsoil up to 0.9mbgl and 0.15mgl respectively which lies over the Wittering Formation (sandy, silty, CLAY) which was proven to depths of 2.75mbgl.

Infiltration testing was inconclusive due to the slow soakage and deemed that infiltration drainage techniques were not suitable for this site.

Groundwater seepage was encountered at 2.75mblg at the time of testing.

A copy of the extracts from the Soils Limited letter is contained in **Appendix B**.

Hydrology

There are no existing ditches or watercourses located along the boundaries of the site.

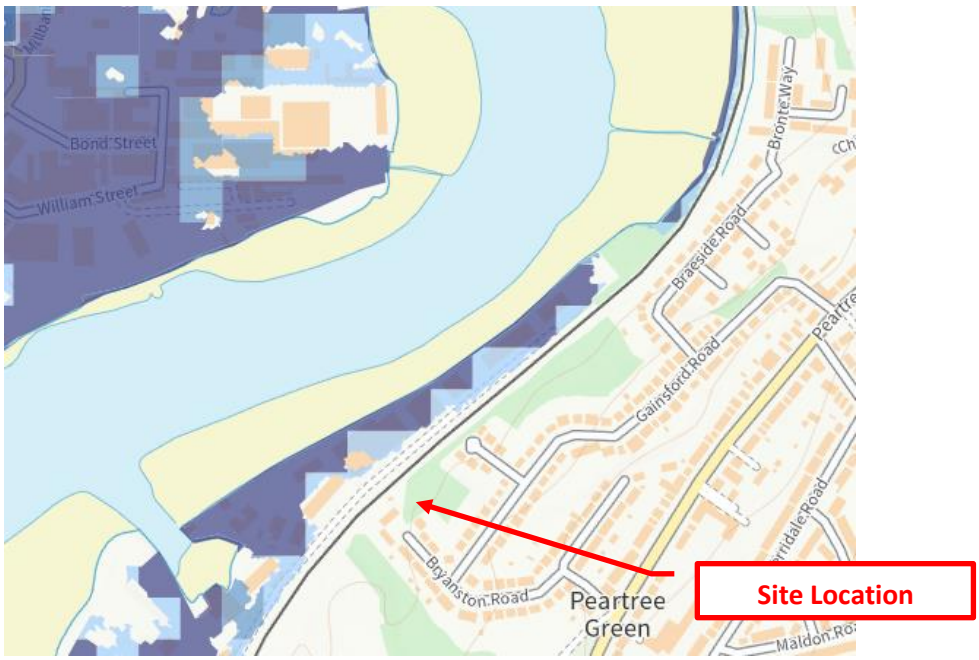


Figure 2: Extract of Flood Map from the EA's website

3.0 Flood Risk and Existing Surface Water Drainage

This report reviews the existing risk of flooding to the site and requirements for a compliant drainage strategy by interrogating the following information:

- Available topographic survey information;

- Available mapping from the Environment Agency's website;
- Soil Limited – Intrusive Investigations Letter dated May 2017

Based on a review of the EA's Flood Zone maps (see **Figure 2**), the development site appears to lie wholly within Flood Zone 1, considered to be at low risk from tidal flooding.

The risk of flooding from pluvial sources has been assessed and based on the mapping information provided by the EA is deemed low across the entrance of the site. However, any localised risk to the future development could be mitigated through consideration of proposed finished levels in relation to these existing low points on the site to ensure such localised surface water flooding will not pose a risk to buildings or people, nor increase the risk of surface water flooding elsewhere.

It should be noted that as from April 2015, the Lead Local Flood Authority (LLFA) has now become a statutory consultee with respects to surface water drainage and risk of flooding from surface water, groundwater, reservoirs and sewers. As such Southampton City Council (SCC) will become a primary consultee during the planning application submission and discharging planning conditions relating to localised flood risk and the surface water drainage strategy.

Existing Site Drainage

A review of the existing topographic information and sewer records has been carried out to assess the existing surface water drainage regime of the site.

The majority of the surface water from fields within the development site appear to drain overland to the west.

4.0 Surface Water Management

The surface water management section should ensure that there is no adverse impact on flood risk elsewhere as a result of a change in the surface water runoff regime from the re-development.

Design Principles

Key design principles in the following guidance documents steer the approach to managing surface water runoff at sites:

- Building Regulations hierarchy of drainage (H3);
- Interim Code of Practice for SuDS; and
- CIRIA best practice guidance, including the use of the 'SuDS management train'.

Building Regulations hierarchy of drainage outlines the preferred methods for the disposal of surface water with infiltration methods being the preferred option. If this is not possible the next favoured option is to drain to an existing watercourse. If

neither of these options are feasible, the regulations state that rainwater discharge should be directed to a sewer.

The Interim Code of Practice for SuDS provides guidance about the hydraulic design criteria for Sustainable Drainage Systems. This in general refers to both peak rate of runoff and the volume of runoff, post development. Prior to mitigation measures such as the use of SuDS attenuation features, both the volume and peak rate of run-off may increase post development.

The design principles for surface water management extend beyond simple hydraulic criteria. CIRIA guidance promotes the use of the SuDS management train, a concept where SuDS techniques are used to treat, convey and store surface water runoff. This approach is considered as part of the SuDS selection methodology.

Sustainable Drainage Systems

To drain the development in a sustainable manner whilst complying with the requirements of the NPPF, the scheme should seek to adopt an appropriate form(s) of sustainable urban drainage systems (SuDS).

SuDS techniques comprise of implementation of use of tanked permeable paving to provide both treatment and attenuation storage of the surface water run-off.

Surface Water Drainage Strategy

In view of the requirements of the NPPF, PPG and SCC along with the design parameters and constraints associated with redeveloping this site, a surface water drainage strategy design has been devised and hydraulically modelled to demonstrate that the scheme can be suitably implemented without increasing the level of flood risk, when the surface water drainage system experiences a 1:100-year rainfall event (including 45% climate change allowance).

The surface water drainage scheme has been designed to ensure:

- A reduction in the pre development site discharge for peak storm events.
- Sustainable Urban Drainage systems are wholly incorporated within the scheme.
- Consideration is given for the improvement of water quality within the design.
- The designed drainage scheme can satisfactorily retain a critical 1 in 100 Year storm event with climate change.

Run-off from the access roads, roofs and hardstandings, will be conveyed to a permeable paving, at which point the surface water will permeate through the sub-base and be collected by central carrier drains which will convey the flows south west wards towards the existing Southern Water surface water manhole located in Bryanston Road.

Flow Control

The hydraulic models of the proposed surface water network, incorporating the permeable paving can be found in **Appendix E**.

The hydraulic calculations have been simulated under various scenarios up to and including the critical 1 in 100 Year storm event with additional 45% allowance for climate change.

Discharge from the site is proposed to be restricted to the mean annual average greenfield rate (Qbar) of 0.24l/s with approximately 67 cubic metres of storage provided within the permeable subbase of the permeable paving.

The simulations confirm that the storm can be managed and contained within the curtailment of the site, with small volumes of surface flooding, during peak storm events contained at surface in areas of low risk to people or property.

Water Quality

It is important to address issues with regards to quality when considering surface water management. As part of the surface water is proposed to be discharge to the existing downstream watercourses, treatment is proposed as part of a SuDS Management Train in accordance with the recommendations of the SuDS Manual (CIRIA 753) and as required by the LLFA.

This SuDS management train will be achieved through the use permeable paving.

Chapter 26 of the CIRIA SuDS Manual (2015) provides guidance on methods that should be used to design SuDS to meet the water quality design criteria and good practice design standards. Diffuse urban pollution is a significant factor in compromising groundwater and receiving water standards that are required under the EA Water Framework Directive. Chapter 4 of the SuDs Manual summarises factors, which influence pollution levels in urban run-off. This summary is presented in **Table 1 overleaf:**

Factors influencing pollution levels in urban run-off
The amount and type of pollution washed off a surface will depend on many things including: • Planning activities on, above and adjacent to the surface that affect the deposition of pollutants, their retention on the surface and the extent to which they are mixed with runoff (including pollution prevention strategies) • Unplanned activities (accidents and spillages) that can cause temporary unexpected high pollution concentrations • The surface location and type, affecting wash-off rates and contaminant movement mechanisms

- The drainage path
- The length of the dry weather period before the rainfall event
- The intensity and the duration of the rainfall, and the associated flow velocities

Any further pollutant transformations occurring during residence and conveyance within gullies, chambers, pipe or channel networks, gravels, soils and vegetation and quiescent bodies of water.

Table 1: Extract of Box 4.1 of the SuDS Manual (CIRIA 753)

Table 4.3 of the SuDS Manual classifies the pollution hazard level for residential sites, including residential car parks, low traffic roads as being “low” and thus only requiring a “Simple index approach” in terms of the requirements for the discharge to surface waters, including coasts and estuaries.

The SuDS Manual summarises the steps for the simple index approach:

Step 1 – *Allocate suitable pollution hazard indices for the proposed land use*

Step 2 – *Select SuDS with a total pollution mitigation index that equals or exceeds the pollution index*

Step 3 – *Where the discharge to a protected surface waters or groundwater, consider the need for a more precautionary approach*

The SuDS Manual describes “protected surface waters” as protected surface water resources, which include those designated for drinking water abstraction or for other environmental protection reasons

Table 26.2 of the SuDS manual notes the following pollution hazard indices for residential land use development:

Land Use	Pollution Hazard Level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Individual property driveways, residential car parks, low traffic roads (eg. cul-de sacs, home zones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie. Less than 300 vehicle movements/day	Low	0.5	0.4	0.4

Table 2: Extract of Table 26.2 of SuDS Manual (2015)

Table 26.3 of the SuDS Manual provides details of the SuDS pollution mitigation indices for various types of SuDS components

	Mitigation indices		
Type of SuDS component	**TSS**	**Metals**	**Hydrocarbons**
Filter Strip	0.4	0.4	0.5
Filter Drain	0.4	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable Paving	0.7	0.6	0.7
Detention Basin	0.5	0.5	0.6
Pond	0.7	0.7	0.5
Wetland	0.8	0.8	0.8

Table 3: Extract of Table 26.3 of SuDS Manual (2015)

As such the total SuDS mitigation index (figure 5) must be greater than the pollution hazard index (figure 4), furthermore when used in combination of two or more SuDS components, a factor of 0.5 is used to account for the reduced performance of the secondary or tertiary components associated with the already reduced inflow of concentration, therefore:

Total SuDS mitigation index = mitigation index$_1$ + 0.5 (mitigation index$_2$)

The use of permeable paving will provide the minimum required level of SuDS mitigation index to the runoff from the development.

Long Term Maintenance

Consideration will need to be given to the long-term maintenance of the permeable paving and all associated external pipework, chambers and manholes within the demise of each plot ownership boundaries will be the responsibility of the future occupants. Elsewhere, the surface water networks below the access roads and open space will be the responsibility of the Management Company.

Exceedance

Whilst the drainage system has been designed to a very high standard (1 in 100 Year storm event including climate change), it is possible that a more extreme event will occur and that the design standard for the system will be exceeded. It is best practice to design the drainage system to shed water, primarily into landscaped and other areas, therefore reducing the risk of flooding areas of built development during extreme events.

5.0 Foul Drainage

The proposed foul water discharge generated by the site has been calculated at 0.37l/s (based on 8 dwellings at 4000l/dwelling/day or 0.05l/second/dwelling) in accordance with Sewers for Adoption.

The foul drainage is proposed to discharge to the existing Southern Water foul water manhole within Bryanston Road

All domestic foul drainage will be designed in accordance with Part H of the Building Regulations.

6.0 Conclusion

A drainage strategy has been prepared and demonstrates that the development proposal can be successfully implemented and designed to withstand the impact of a 1:100-year rainfall event (including 45% climate change), in accordance with the NPPF, PPG and SCC requirements.

In view of this assessment, the report concludes that:

i. The Development can be drained in a sustainable manner utilizing SuDS techniques;

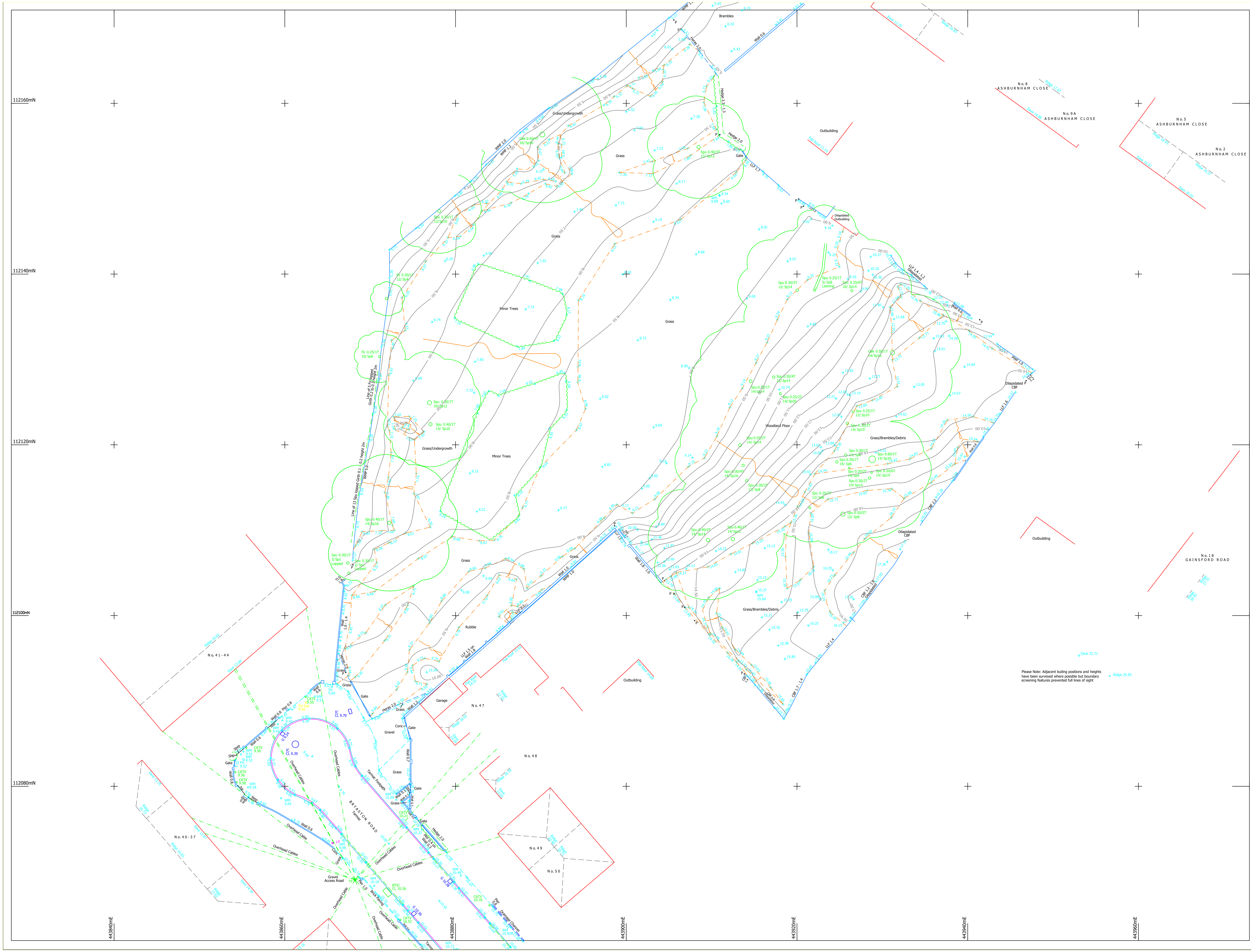
ii. The Development will satisfactorily manage and maintain a 1 in 100 Year storm event with a 45% allowance for climate change;

iii. The detailed drainage strategy generally follows the principles of the approved FRA and Surface Water Drainage Strategy and SuDS Statement;

iv. The findings of this report identify the opportunity to promote the sustainable re-use of existing resources and potential to implement an appropriate SuDS strategy.

Appendix (A)

Topographic Survey



NOTES:

Drainage:
Inspection Covers are lifted where possible and all drainage invert information has been obtained through visual inspection only, with no entry into manholes. Therefore the complete accuracy cannot be guaranteed. Where drainage is of critical importance we suggest the services of a specialist drainage expert be used.

Trees:
Every effort has been made to identify and detail all trees on site but where trees are of critical importance we suggest the use of a specialist such as an arborist. Tree spread and heights are indicative.

GPS:
GPS detail is relative to the time and date of survey. GPS levels and grid are obtained using industry standard guidelines and can vary according to the quality of the GPS network at the time of survey. Unless stated otherwise, surveys are Scale factor 1 and Horizontal and Vertical Datums are established from a central site fix and baseline orientation station utilising GNSS correction data.

Survey notes:
Survey specification is linked to the original purpose of the survey commissioned at source and is to be used for this purpose only. Survey is accurate within limitations of site conditions at the time of survey. In areas difficult to survey due to restricted access, lines of sight or dense vegetation, critical dimensions and positions should be verified following suitable clearance.
Survey detail obtained and shown is relative to the plotting scale.

N

LEGEND

TREE SPECIES INFORMATION

ALDER	ALD	LOCUST	LOC
ASH	ASH	LONDON PLANE	LPN
ASPEN	ASP	MAGNOLIA	MAG
BEECH	BCH	MAPLE	MPL
CEDAR	CED	OAK	OAK
CHERRY	CHY	PINE	PNE
CYPRESS	CYP	POPLAR	POP
ELM	ELM	PRUNUS	PNS
FIR	FIR	RHODODENDRONS	RDN
FRUIT	FRT	ROWAN	RWN
HAWTHORN	HAW	SILVER BIRCH	SIB
HAZEL	HAZ	SORBUS	SOR
HOLLY	HLY	SWEET CHESTNUT	SCH
HORSE CHESTNUT	HCH	SYCAMORE	SYC
HORNBEAM	HRM	WALNUT	WNT
LABURNUM	LRM	WILLOW	WLW
LARCH	LAR	YEW	YEW
LIME	LIM	SPECIES UNKNOWN	SPU
		COPPICED	COP

TREE ANNOTATIONS: Tree Species / Tree Boll Size / No of Bolls
Tree Height / Tree Canopy Spread

FENCE INFORMATION

BARBED WIRE FENCE	BWF
CORRUGATED IRON FENCE	CIF
CLOSE BOARD FENCE	CBF
CHAIN LINK FENCE	CLF
CHESTNUT PALING	CPF
CRASH BARRIER	CBR
HANDRAIL	HDL
IRON RAILINGS	IRF
LARCH LAP FENCE	LLF
MISCELLANEOUS FENCE	MSF
PALISADE FENCE	PSF
PICKET FENCE	PKF
POST AND CHAIN FENCE	PCF
POST AND RAIL FENCE	PRF
POST AND WIRE FENCE	PWF
STOCK WIRE FENCE	SWF
TRELLIS FENCING	TLF

LEVEL INFORMATION

BASEMENT LEVEL	BTL
BED LEVEL	BL
COVER LEVEL	CL
DAMP PROOF COURSE	DPC
FLOOR LEVEL	FL
INVERT LEVEL	IL
OUTFALL LEVEL	OL
THRESHOLD LEVEL	THL
FOUL WATER	FW
SURFACE WATER	SW
UNABLE TO LIFT	UTL
WATER LEVEL	WL

SURFACE INFORMATION

CONCRETE	Conc
BRICK PAVERS	BP
FLOWERBED	FB
PAVING SLABS	PS
RETAINING WALL	RWall
TACTILE PAVING	Tac

FEATURE INFORMATION

BOLLARD	BO	NOTICE BOARD	NB
BRITISH TELECOM BOX	BTB	POST	P
BRITISH TELECOM IC	BTIC	RAIN WATER PIPE	RWP
BUS STOP	BS	RAISED FLOWERBED	RFB
CABLE TELEVISION BOX	CATB	ROAD SIGN	RS
CABLE TELEVISION IC	CATV	RODDING EYE	RE
EARTHING ROD	ER	SERVICE MARKER POST	SMP
ELECTRICITY CABLE PIT	ELCP	SOIL VENT PIPE	SVP
ELECTRICITY CONTROL BOX	ECB	STOP COCK	SC
ELECTRICITY POLE	EP	STOP VALVE	SV
FIRE HYDRANT	FH	TELEGRAPH POLE	TP
INSPECTION COVER	IC	TELEPHONE CALL BOX	TCB
LAMP POST	LP	TRAFFIC SIGNAL	TS
LETTER BOX	LB	TRAFFIC SIGNALS IC	TSIC
LITTER BIN	BIN	WATER METER	WM
KERB OUTLET	KO	WATER TAP	Tap
NAME PLATE	NP		

Level Datum:
Levels are related to OSGB15 derived from the GPS network

Grid:
Grid is related to OSGB15 derived from the GPS network

Northpoint:

ENCOMPASS SURVEYS

Encompass Surveys Ltd
Unit 2
Talisman Business Centre
Duncan Road
Park Gate, Southampton
Hampshire SO31 7GA

Tel: 023 80692002 Email: info@encompass-surveys.co.uk
Fax: 023 80697125 Website: encompass-surveys.co.uk

Client:	Doswell Projects		
Survey Location:	Bryanston Road Bitterne Southampton		
Survey type:	Topographical	Scale:	1:200@A1
Drawing ref:	ENC/020323/2676/S1	Date:	March 2023
Drawn/QA:	M.D/C.H	Revision:	

Appendix (B)

Geotechnical Information

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

01962 673 330
soilslimited.co.uk

Radian Group Limited

F.A.O. Alice Hart
By Email only: Alice.Hart@radian.co.uk
Our Ref: 16240/LR
May 2017

Dear Alice,

RE: Bryanston Road, Southampton, SO19 7AP

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

Brief
The Soils Limited quotation (reference Q18632, dated 4th April 2017) set the scope of the investigation. The investigation was to comprise machine excavated trial holes and to conduct infiltration tests in accordance with the principles of BRE Digest DG365 Soakaway design: 2016.

General
The site had an approximate area of 0.50ha and was located at Bryanston Road, Southampton, SO19 7AP at O.S Land Ranger Grid Reference of SU 438 121. The site was located at between 5m and 16m Above Ordnance Datum (AOD) and had a gradient sloping down to the northwest. The site had a coverage of rough grass and shrubs with evidence of a major site clearage having been recently completed. Mature trees lay to the northwest of the site with the railway located beyond.

A site location plan has been included as Figure 1.

Anticipated Geology
The 1:50,000 BGS map showed the site to be situated on the bedrock of the Wittering Formation with no superficial deposits overlying. A precis of the soils likely to be encountered is presented.

Wittering Formation
The Wittering Formation consists of three main lithologies. The first and most wide-spread is clay-dominated; it consists of olive-grey to brownish grey clay with partings, thin beds and lenses of pale grey or greyish green, very fine-grained sand or silt. The second comprises wavy to lenticular-bedded sand interbedded with clay in approximately equal proportion. The third consists of fine to medium grained, sparsely glauconitic sand that weathers yellowish brown, and includes laminae and flasers of grey silty clay and thicker intercalations of laminated clay

Site Works
Site works were undertaken on the 15th May 2017 and comprised a JCB 3CX to excavate three trial pits (TP1 – TP3). The trial hole locations were selected by the client and confirmed with Soils Limited prior to attendance onsite.

Following the construction of the trial holes, one infiltration test broadly in accordance of the principles of BRE 365 was carried out within each of the trial hole. Infiltration testing could only be carried out once within these trial pits due to slow infiltration rates within the clayey Wittering Formation.

A trial hole location plan is included as Figure 2.

Upon completion, the trial hole was backfilled with arisings and mounded over for future settlement.

Groundwater
Groundwater was encountered within two trial holes (TP1 and TP3) and was struck at a depth of 2.70m bgl (TP1) and 2.75m bgl (TP3). Groundwater is anticipated to flow down to the northwest towards the River Itchen. Changes in groundwater level occur for several reasons including seasonal effects and variations in drainage. The investigation was conducted in May (2017) when groundwater levels should be falling from their annual maximum (highest) elevation, which typically occurs around March.

A topographical location plan is included as Figure 3.

Ground Conditions
The ground conditions encountered during the site investigation are indicated below and have been summarised in Table 1.

Made Ground/Topsoil (MG/TS)
Wittering Formations (WTT)

Table 1 – Summary of Ground Conditions

Strata	Epoch	Depth Encountered (m bgl)		Typical Description
		Top	Base	
MG	Recent	0.00	0.90	Leaf litter over dark brown sandy SILT with brick, ash and occasional fine medium flint gravel and fine medium roots.
TS	Recent	0.00	0.10–0.15	Brown sandy SILT with occasional fine medium round sub-round flint gravel and fine medium roots.
WTT	Ypresian	0.10 – 0.90	2.75[1]	Dark brown red slightly sandy silty CLAY. Sand was fine to coarse.

Notes: [1] encountered to base of trial hole

Infiltration Testing

Infiltration testing comprises piping clean 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.

BRE DG365:2016 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.

Testing was performed once in trial pits TP1, TP2 and TP3. The test was undertaken within the Wittering Formation at a depth of between 2.70m bgl (TP1 and TP2) and 2.75m bgl (TP3).

Due to slow soakage rates only one test was conducted within each of the trial holes. As such, the tests were concluded after 180 minutes. Insufficient data was obtained to allow an infiltration rate to be calculated from any of the tests (e.g. In TP3 a fall in water level of 10cm (11% of volume) was recorded over 179 minutes).

Full results are included within Appendix A.

Conclusions

Given the observed infiltration over the test period and the relatively high groundwater table, it is considered that the site would not be suitable for the adoption of a surface water soakaway system and an alternate method of surface water drainage should be utilized.

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

Figure 1. Site Location Plan
Figure 2. Trial Hole Location Plan
Figure3. Topographical drawing

Appendix A. Field Data

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

Yours Sincerely

[redacted]

Figure 1 – Site location Plan

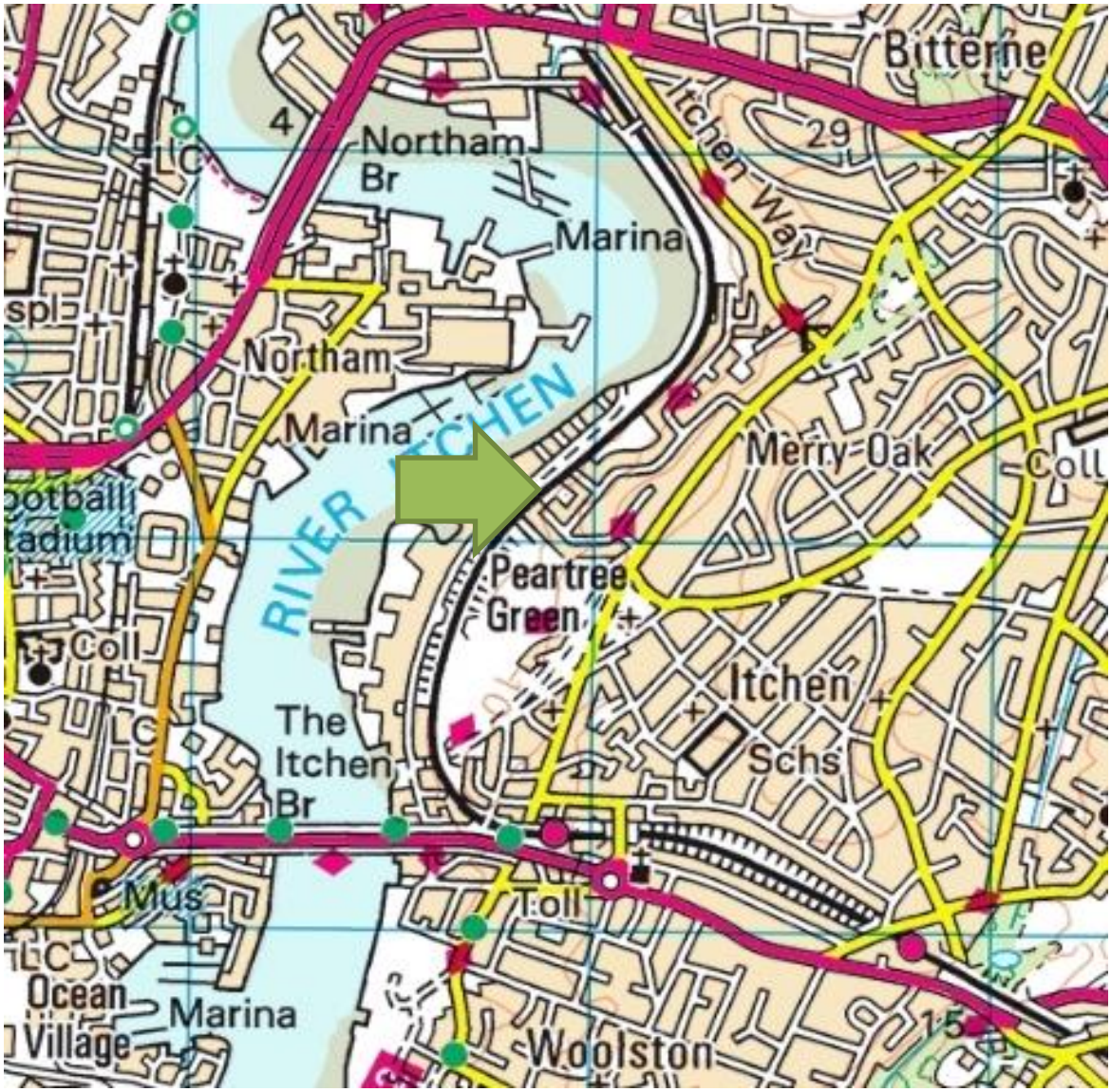


Figure number 1	**Title** Site Location Map
Project Bryanston Road, Southampton, SO19 7AP	**Date** May 2017
Client Radian Group Limited	**Reference** 16240

Figure 2. Trial Hole Location Plan

Figure number 2	**Title** Trail hole location plan
Project Bryanston Road, Southampton, SO19 7AP	**Date** May 2017
Client Radian Group Limited	**Reference** 16240

Figure 3. Topographical Location Plan

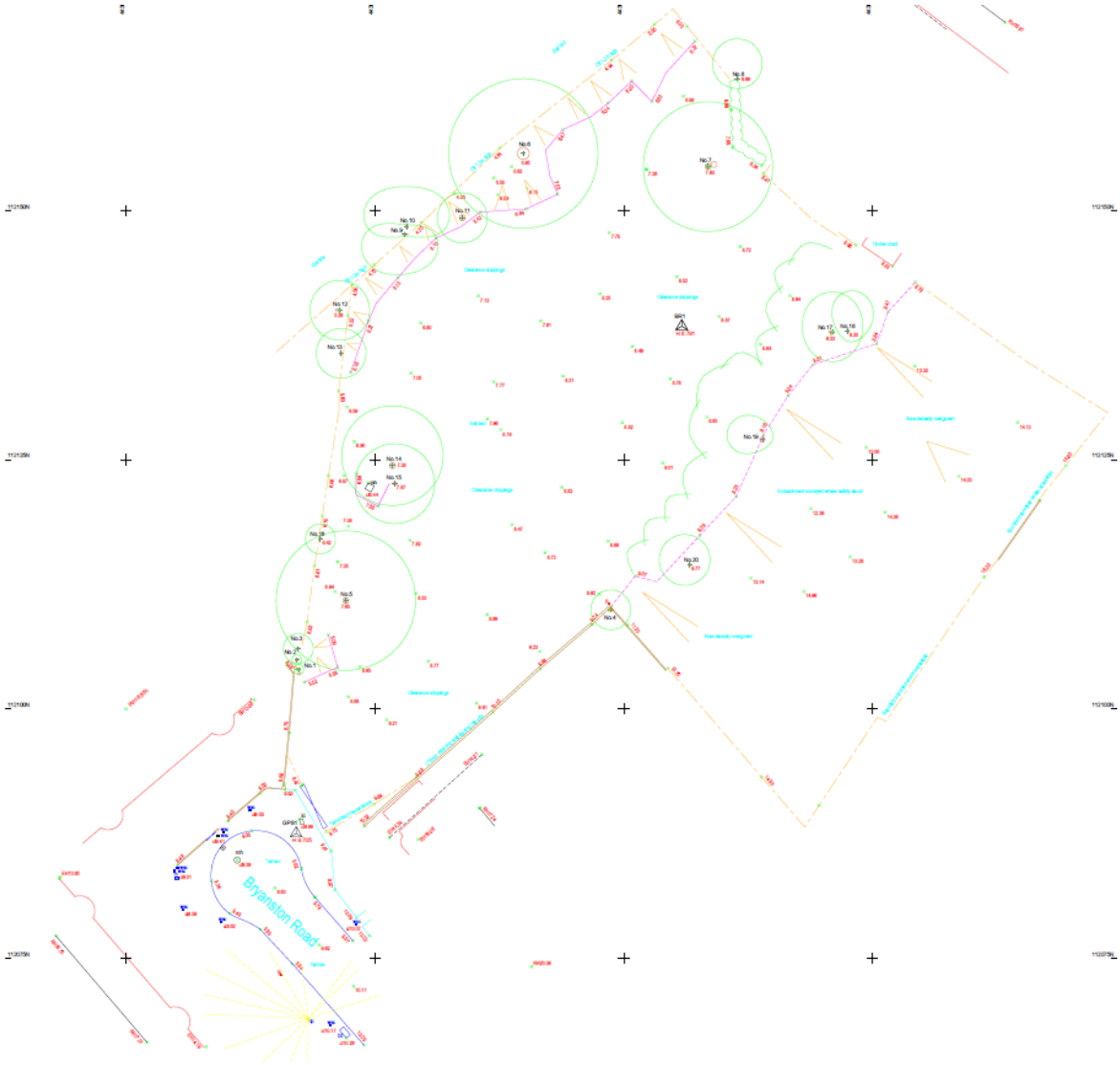


Figure number 3	**Title** Topographical location Plan
Project Bryanston Road, Southampton, SO19 7AP	**Date** May 2017
Client Radian Group Limited	**Reference** 16240

Appendix A. Field Data

Soils Limited
Newton House, Cross Road, Tadworth KT20 5SR
Tel: 01737 814221 Email: admin@soilslimited.co.uk

Trial Pit Log

Trial Pit No. **TP1** Sheet 1 of 1

Project Name: Bryanston Road,	Project No.: 16240	Method: Machine	Hole Type TP
Location: Southampton, SO19 7AP		Plant: JCB 3CX	
		Support: None	Scale 1:25
Client: Radian Group Limited	Trial Pit Length: 2.00m	Trial Pit Width: 0.65m	
Dates: 15-05-2017	Level:	Co-ords:	Logged By SN

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	DJ					Decomposed leaf litter over dark brown sandy SILT with brick ash occasional fine medium flint gravel and fine medium roots. MADE GROUND.
	0.50	BJ					
	0.80	DJ					
	1.00	D		0.90			Firm light brown orange brown Sandy CLAY with occasional fine medium roots. WITTERING FORMATION.
	1.50	D					
	2.00	D		1.60			Brown light grey sandy silty gravelly CLAY with fine medium angular sub angular Flint gravels fine roots. WITTERING FORMATION.
▼	2.50	D		2.70			End of Pit at 2.70m

1 2 3 4 5

General Remarks:
Roots observed to 2.70m bgl.

Groundwater Remarks: Groundwater seepage at 2.70m bgl

Sample Type
D: Disturbed
B: Bulk
J: Jar
W: Water

Soils Limited
Newton House, Cross Road, Tadworth KT20 5SR
Tel: 01737 814221 Email: admin@soilslimited.co.uk

Trial Pit Log

Trial Pit No. **TP2** Sheet 1 of 1

Project Name: Bryanston Road,	Project No.: 16240	Method: Machine	Hole Type TP
Location: Southampton, SO19 7AP		Plant: JCB 3CX	
		Support: None	Scale 1:25
Client: Radian Group Limited	Trial Pit Length: 2.20m	Trial Pit Width: 0.65m	
Dates: 15-05-2017	Level:	Co-ords:	Logged By SN

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	DJ		0.15			Decomposed leaf litter over dark brown sandy SILT occasional fine roots. TOPSOIL.
							Light brown orange brown silty CLAY with fine medium roots. WITTERING FORMATION.
	0.50	BJ		0.40			Firm light brown orange brown fine sandy CLAY with fine medium angular sub angular flint gravel and fine decomposing roots. WITTERING FORMATION.
	0.80	DJ					
	1.00	D					
				1.20			Light brown and light grey slightly silty fine SAND. ferruginous stained from 1.9m. WITTERING FORMATION.
	1.50	D					
	2.00	D					
				2.20			Grey mottled fine sandy SILT. WITTERING FORMATION.
	2.70	D		2.70			End of Pit at 2.70m

General Remarks:
Roots observed to 1.20m bgl.

Groundwater Remarks: No groundwater encountered.

Sample Type
D: Disturbed
B: Bulk
J: Jar
W: Water

Soils Limited
Newton House, Cross Road, Tadworth KT20 5SR
Tel: 01737 814221 Email: admin@soilslimited.co.uk

Trial Pit Log

Trial Pit No. **TP3** Sheet 1 of 1

Project Name: Bryanston Road,	Project No.: 16240	Method: Machine	Hole Type TP
Location: Southampton, SO19 7AP		Plant: JCB 3CX	
		Support: None	Scale 1:25
Client: Radian Group Limited	Trial Pit Length: 1.70m	Trial Pit Width: 0.65m	
Dates: 15-05-2017	Level:	Co-ords:	Logged By SN

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	DJ		0.10			Brown sandy SILT with occasional fine medium round sub round flint gravel and fine medium roots. TOPSOIL.
	0.50	BJ					Light brown sandy CLAY with occasional fine medium flint gravel and fine medium roots. WITTERING FORMATION.
	0.80	DJ		0.60			Light brown light grey orange brown mottled fine sandy CLAY with occasional live and decomposing fine medium roots. WITTERING FORMATION.
	1.00	D					
	1.50	D					
	2.00	D					
▼	2.50	D		2.75			End of Pit at 2.75m

1 2 3 4 5

General Remarks:
Roots observed to 2.75m bgl.

Groundwater Remarks: Groundwater seep at 2.75m bgl.

Sample Type
D: Disturbed
B: Bulk
J: Jar
W: Water

Soakaway Calculations

Soakaway Test No.	TP1 - Test 1
Contract:	Bryanston Road, Southampton, SO19 7AP
Contract No.	16240

Field Test

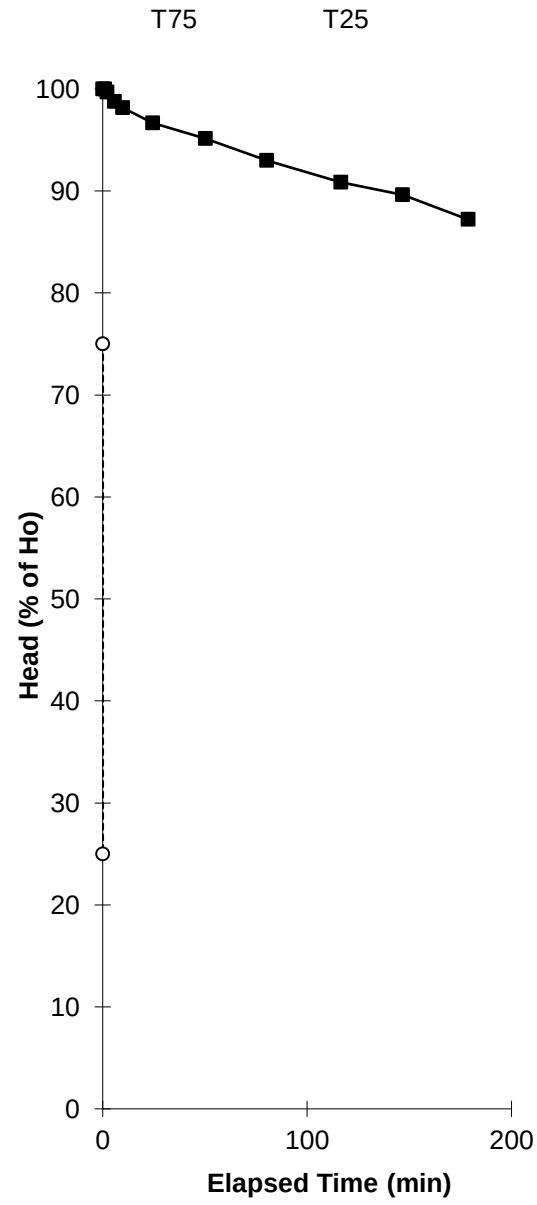
Trial Pit Log (include details of groundwater):
See trial Pit record

Depth of Pit	2.70	m
Width of Pit	0.65	m
Length of Pit	2.00	m
Depth of Pit Soaked	1.64	m
ap50	5.646	m2
Vp75-25	1.066	m3
t75-25	0.0	min
water used	2.1320	m3
f	#DIV/0!	m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
1.06	0	100	1.64
1.06	1.0	100	1.64
1.07	2.2	100	1.64
1.08	5.8	99	1.62
1.09	9.8	98	1.61
1.12	24.6	97	1.59
1.14	50.3	95	1.56
1.18	80.2	93	1.53
1.21	116.5	91	1.49
1.23	146.8	90	1.47
1.27	178.9	87	1.43

T75	0.000	75
T25	0.000	25
T75-25	0.000	Derived from Best Fit



Comments

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Surrey, KT20 5SR
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Facsimile: 01737 812 557

Soakaway Calculations

Soakaway Test No.	TP2 - Test 1
Contract:	Bryanston Road, Southampton, SO19 7AP
Contract No.	16240

Field Test

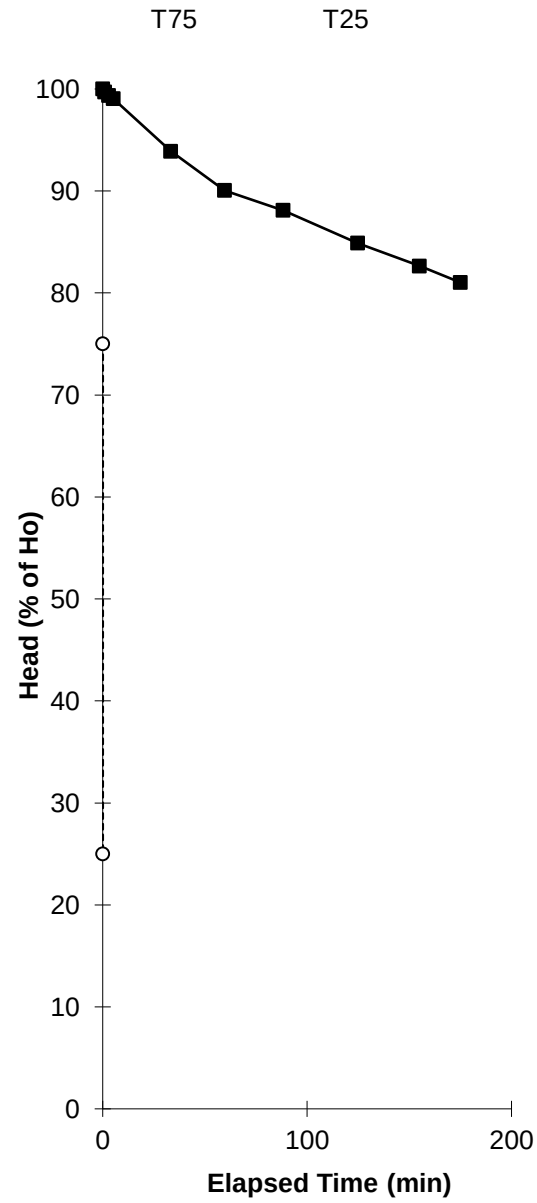
Trial Pit Log (include details of groundwater):
See trial Pit record

Depth of Pit	2.75	m
Width of Pit	0.65	m
Length of Pit	2.20	m
Depth of Pit Soaked	1.56	m
ap50	5.86175	m2
Vp75-25	1.111825	m3
t75-25	0.0	min
water used	2.2237	m3
f	#DIV/0!	m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
1.195	0	100	1.56
1.20	1.0	100	1.55
1.21	3.0	99	1.55
1.21	5.3	99	1.54
1.29	33.4	94	1.46
1.35	59.6	90	1.40
1.38	88.4	88	1.37
1.43	124.8	85	1.32
1.465	155.0	83	1.29
1.49	175.0	81	1.26

T75	0.000	75
T25	0.000	25
T75-25	0.000	Derived from Best Fit



Comments

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Soakaway Calculations

Soakaway Test No.	TP3 - Test 1
Contract:	Bryanston Road, Southampton, SO19 7AP
Contract No.	16240

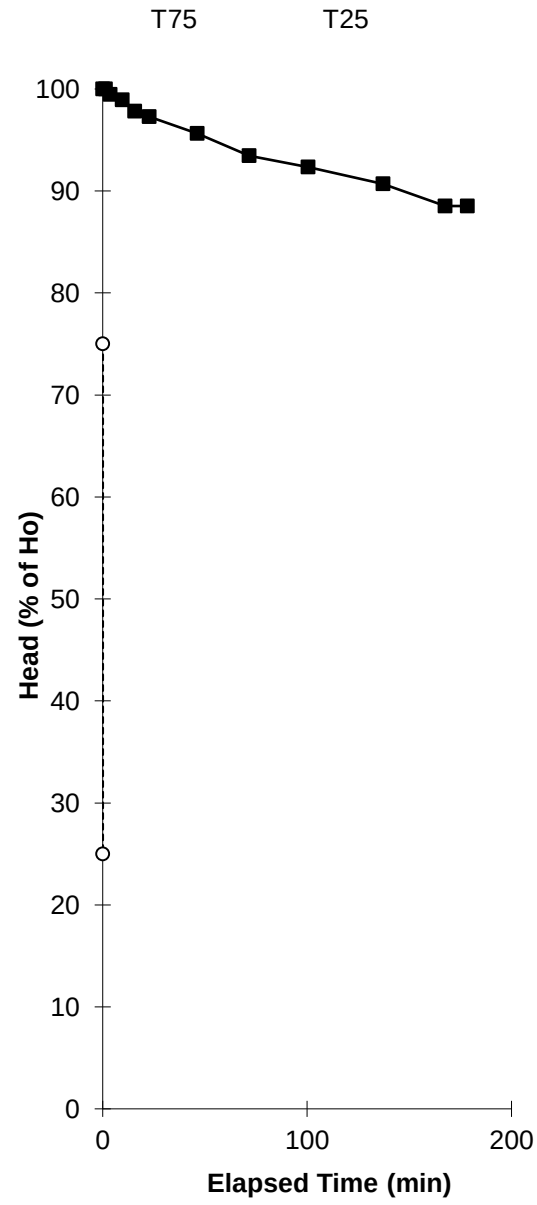
Field Test

Trial Pit Log (include details of groundwater):
See trial Pit record

Depth of Pit	2.75	m
Width of Pit	0.65	m
Length of Pit	1.70	m
Depth of Pit Soaked	0.92	m
ap50	3.25525	m2
Vp75-25	0.5055375	m3
t75-25	0.0	min
water used	1.0111	m3
f	#DIV/0!	m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
1.835	0	100	0.92
1.84	1.3	100	0.92
1.84	3.7	99	0.91
1.85	9.7	99	0.91
1.855	15.8	98	0.90
1.86	22.7	97	0.89
1.875	46.3	96	0.88
1.90	71.7	93	0.86
1.905	100.5	92	0.85
1.92	137.1	91	0.83
1.94	167.5	89	0.81
1.94	178.5	89	0.81



T75	0.000	75
T25	0.000	25
T75-25	0.000	Derived from Best Fit

Comments

SOILS LIMITED
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Appendix (C)

Proposed Site Layout

Site Plan 1:200 @ A1

N

2 0 2 4 6 8 10 12 14 16 18m

1:200

Notes

1. This drawing is the copyright of MH Architects Ltd
2. Do not scale this drawing except for Local Authority planning purposes
3. All dimensions must be checked on site by the contractor prior to commencement of the works.

Client Approval

X	A - Approved
X	B - Approved with comments
X	C - Do not use

Rev.	Revision Note/Purpose of Issue	Drw By	Date	Chk By	Date

SCHEDULE OF ACCOMMODATION

UNIT	TYPE	Internal Area
Unit 1	2b 4p House	79.1 sq. m
Unit 2	3b 5p House	93.4 sq. m
Unit 3	3b 5p House	93.4 sq. m
Unit 4	2b 4p House	79.1 sq. m
Unit 5	2b 4p House	79.1 sq. m
Unit 6	2b 4p House	79.1 sq. m
Unit 7	3b 5p House	93.4 sq. m
Unit 8	3b 5p House	93.4 sq. m

Development Site	0.3819 Ha
Site Density	21 Units/Ha
Car Parking	TOTAL = 20 spaces
	2 spaces per unit and 4 replacement spaces
	Bins and cycles in private gardens

DOSWELL PROJECTS AND ABRI

BRYANSTON ROAD
SOUTHAMPTON

Drawing title

PROPOSED SITE PLAN

Drawn	Date	Checked	Date	Scale at A1
TM	28/04/23			1:200

Job No.	Pro.	Org.	Zone	Level	Type	Role	No.	Rev.
23-018	BRS	MHA	ZZ	ZZ	DR	A	002	P01

Purpose of Issue

PLANNING

Ground Floor | Bicentennial Building
Southern Gate | Chichester
West Sussex | PO19 8EZ

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e. admin@mharchitects.co.uk
www.mharchitects.co.uk

Limited Company
Registered in England No.1994233

ARCHITECTS

Appendix (D)

Proposed Surface Water Strategy

NOTES

1. All dimensions are in metres unless stated otherwise.
2. Do not scale from this drawing. Only written dimensions are to be used.
3. Site layout based on MH Architects Supporting Planning Layout, drawing 23-018-BRS-MHA-ZZ-ZZ-DR-A-002-P01
4. Topographic Survey as per Encompass Topographical Survey, drawing number ENC/020323/2676/S1 dated March 2023.

S4
CL:9.0
IL:8.10

S3
CL:9.0
IL:7.9

S2
CL:9.2
IL:7.7

S1
CL:9.6
IL:7.40

225mm Dia @1:100

225mm Dia @1:100

225mm Dia @1:100

Lined permeable paving with surface water sewer running through a localised deepened trench within the permeable paving

Permeable paving structure to provide a minimum of 67 cubic metres of attenuation storage

Manhole to be fitted with Hydrobrake flow control to restrict the peak discharge to the pre-development greenfield runoff rates

Proposed connection to the existing surface water sewer subject to a S106 Consent with Southern Water

Rev.	Date	Details	By	Chkd	Appd

Client:- DOSWELL PROJECTS

Site:- Bryanston Road Southampton

Drawing Title:- Drainage Strategy Layout

1

Date: June 2023 | Scales: 1:200 at A1

Drawn: TRS | Checked: TRS | Approved: TS

Drawing No. DOS/E5077/001

FOR INFORMATION ONLY

Rogers Cory Partnership
Architectural and Civil Consultants
The Old School Old School Road
Hook Hampshire RG27 9NJ
T: 01256 769269 E: mail@rcpconsultants.co.uk W: rcpconsultants.co.uk

Appendix (E)

Micro Drainage Calculations

Summary of Results for 100 year Return Period (+45%)

Half Drain Time : 6789 minutes.

Outflow is too low. Design is unsatisfactory.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	8.188	0.188	0.0	0.1	0.1	26.1	O K
30 min Summer	8.233	0.233	0.0	0.1	0.1	36.0	O K
60 min Summer	8.282	0.282	0.0	0.1	0.1	46.7	O K
120 min Summer	8.313	0.313	0.0	0.1	0.1	53.5	O K
180 min Summer	8.332	0.332	0.0	0.1	0.1	57.7	O K
240 min Summer	8.346	0.346	0.0	0.1	0.1	60.8	O K
360 min Summer	8.367	0.367	0.0	0.1	0.1	65.4	O K
480 min Summer	8.382	0.382	0.0	0.1	0.1	68.8	O K
600 min Summer	8.394	0.394	0.0	0.1	0.1	71.5	O K
720 min Summer	8.404	0.404	0.0	0.1	0.1	73.7	O K
960 min Summer	8.419	0.419	0.0	0.1	0.1	77.0	O K
1440 min Summer	8.440	0.440	0.0	0.1	0.1	81.6	O K
2160 min Summer	8.458	0.458	0.0	0.1	0.1	85.5	O K
2880 min Summer	8.467	0.467	0.0	0.1	0.1	87.6	O K
4320 min Summer	8.477	0.477	0.0	0.1	0.1	89.7	O K
5760 min Summer	8.485	0.485	0.0	0.1	0.1	91.5	O K
7200 min Summer	8.496	0.496	0.0	0.1	0.1	93.9	O K
8640 min Summer	8.508	0.508	0.0	0.2	0.2	96.5	O K
10080 min Summer	8.521	0.521	0.0	0.2	0.2	99.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	137.460	0.0	8.8	19
30 min Summer	91.640	0.0	9.1	34
60 min Summer	58.435	0.0	19.0	64
120 min Summer	33.358	0.0	19.8	124
180 min Summer	24.016	0.0	20.3	184
240 min Summer	19.034	0.0	20.6	244
360 min Summer	13.751	0.0	21.0	364
480 min Summer	10.937	0.0	21.2	484
600 min Summer	9.167	0.0	21.4	604
720 min Summer	7.941	0.0	21.4	724
960 min Summer	6.338	0.0	21.5	962
1440 min Summer	4.636	0.0	21.2	1442
2160 min Summer	3.404	0.0	43.3	2160
2880 min Summer	2.749	0.0	42.9	2880
4320 min Summer	2.059	0.0	41.5	4104
5760 min Summer	1.698	0.0	84.8	4792
7200 min Summer	1.480	0.0	84.5	5616
8640 min Summer	1.332	0.0	83.6	6400
10080 min Summer	1.227	0.0	81.9	7264

Summary of Results for 100 year Return Period (+45%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Winter	8.205	0.205	0.0	0.1	0.1	29.7	O K
30 min Winter	8.255	0.255	0.0	0.1	0.1	40.8	O K
60 min Winter	8.310	0.310	0.0	0.1	0.1	52.8	O K
120 min Winter	8.344	0.344	0.0	0.1	0.1	60.4	O K
180 min Winter	8.366	0.366	0.0	0.1	0.1	65.2	O K
240 min Winter	8.382	0.382	0.0	0.1	0.1	68.7	O K
360 min Winter	8.405	0.405	0.0	0.1	0.1	74.0	O K
480 min Winter	8.423	0.423	0.0	0.1	0.1	77.9	O K
600 min Winter	8.437	0.437	0.0	0.1	0.1	81.0	O K
720 min Winter	8.449	0.449	0.0	0.1	0.1	83.5	O K
960 min Winter	8.467	0.467	0.0	0.1	0.1	87.5	O K
1440 min Winter	8.492	0.492	0.0	0.1	0.1	93.1	O K
2160 min Winter	8.515	0.515	0.0	0.2	0.2	98.1	O K
2880 min Winter	8.529	0.529	0.0	0.2	0.2	101.2	O K
4320 min Winter	8.546	0.546	0.0	0.2	0.2	105.0	O K
5760 min Winter	8.557	0.557	0.0	0.2	0.2	107.4	O K
7200 min Winter	8.568	0.568	0.0	0.2	0.2	109.8	O K
8640 min Winter	8.582	0.582	0.0	0.2	0.2	113.0	O K
10080 min Winter	8.597	0.597	0.0	0.2	0.2	116.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Winter	137.460	0.0	8.7	19
30 min Winter	91.640	0.0	9.4	34
60 min Winter	58.435	0.0	19.8	64
120 min Winter	33.358	0.0	20.7	124
180 min Winter	24.016	0.0	21.2	182
240 min Winter	19.034	0.0	21.5	242
360 min Winter	13.751	0.0	21.9	360
480 min Winter	10.937	0.0	22.2	478
600 min Winter	9.167	0.0	22.3	596
720 min Winter	7.941	0.0	22.4	714
960 min Winter	6.338	0.0	22.4	952
1440 min Winter	4.636	0.0	22.0	1416
2160 min Winter	3.404	0.0	45.2	2116
2880 min Winter	2.749	0.0	44.8	2796
4320 min Winter	2.059	0.0	43.2	4108
5760 min Winter	1.698	0.0	89.3	5368
7200 min Winter	1.480	0.0	89.0	5904
8640 min Winter	1.332	0.0	88.0	6752
10080 min Winter	1.227	0.0	86.3	7760

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 443920 112121 SU 43920 12121
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.116

Time (mins) From:	To:	Area (ha)
0	4	0.116

Model Details

Storage is Online Cover Level (m) 9.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.5
Membrane Percolation (mm/hr)	1000	Length (m)	70.0
Max Percolation (l/s)	204.2	Slope (1:X)	500.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	8.000	Cap Volume Depth (m)	0.600

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0020-2000-1000-2000
Design Head (m)	1.000
Design Flow (l/s)	0.2
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	20
Invert Level (m)	8.000
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	0.2
Flush-Flo™	0.084	0.1
Kick-Flo®	0.175	0.1
Mean Flow over Head Range	-	0.1

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.1	1.200	0.2	3.000	0.3	7.000	0.5
0.200	0.1	1.400	0.2	3.500	0.3	7.500	0.5
0.300	0.1	1.600	0.2	4.000	0.4	8.000	0.5
0.400	0.1	1.800	0.3	4.500	0.4	8.500	0.5
0.500	0.1	2.000	0.3	5.000	0.4	9.000	0.5
0.600	0.2	2.200	0.3	5.500	0.4	9.500	0.5
0.800	0.2	2.400	0.3	6.000	0.4		
1.000	0.2	2.600	0.3	6.500	0.4		