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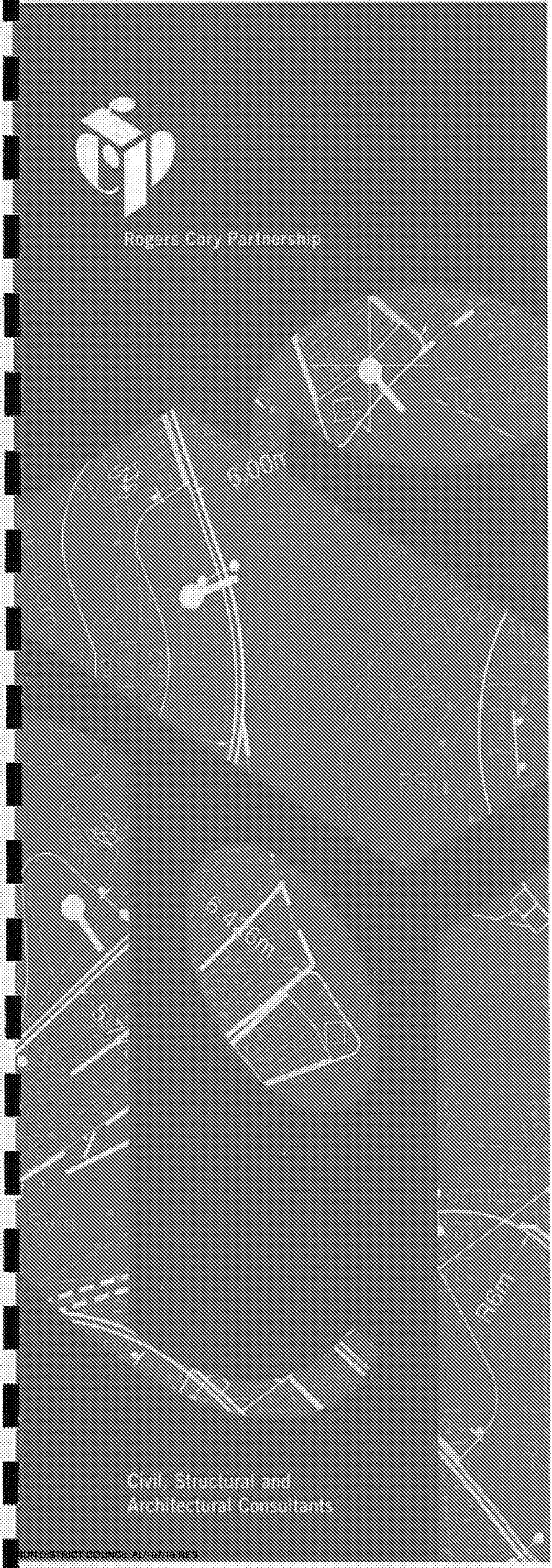

PROPOSED RESIDENTIAL DEVELOPMENT

AT

LAND EAST OF HOOK LANE, WESTERGATE

DRAINAGE STRATEGY AND SUDS STATEMENT

Report Reference	Status	Date of Issue	Author
TS/E4462/16108	DRAFT	May 2016	TRS

Document Control Sheet

Project name: Land off Hook Lane, Westergate

Project ref: BSO/E4462

Report Title Drainage Strategy & SuDS Statement

Doc. ref: TRS/BSO/E4462/16108

Date: 18th May 2016

	Name	Position	Signature	Date
Prepared by:	Terry Seymour	Director		20.05.2016
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Approved by:	Terry Seymour	Director		20.05.2016

Revision	Date	Description	Prepared	Approved
1	22.08.16	Updated issue	TRS	TRS

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1.0 Introduction

Rogers Cory Partnership Limited have been instructed on behalf of Barratt David Wilson Homes to prepare a detailed drainage strategy and SuDS Statement to support the Reserved Matters application for the proposed re-development of the land east of Hook Lane in Westergate, West Sussex.

This report outlines the development of the surface water drainage and SuDS strategy on from the current approved Flood Risk Assessment and Drainage Strategy (FRA) produced by Brookbanks (Report ref:1313/FRA/01, May 2013) which formed part of the outline consent.

As a result of further site and drainage investigations, the surface water drainage and SuDS strategy has been developed further in conjunction with the proposed residential site layout since this original FRA. The purpose of this report is to describe the design development of the detailed drainage and SuDS strategy which still follows the principles of the approved FRA.

The current Appeal Decision notice APP/C3810/A/14/2220943 highlights the following pre-commencement and pre-occupation conditions in relation to drainage and SuDS:

- **Condition 7**: *"Development shall not commence until full details of the proposed surface water drainage scheme have been submitted to, and approved in writing by, the Local Planning Authority. The design shall follow the hierarchy of preference for different types of surface water drainage disposal systems as set out in Approved Document H of the Building Regulations, and the recommendations of the SUDS Manual produced by CIRIA.*

  Winter groundwater monitoring to establish highest annual ground water levels and percolation testing to BRE 365, or similar approved, will be required to support the design of any infiltration drainage.

  No building shall be occupied until the complete surface water drainage system serving that property has been implemented in accordance with the agreed details."

- **Condition 8** *"The development shall not proceed until formal consent has been approved in writing from the local planning authority [acting as agent for the Lead Local Flood Authority (WSCC)] for the discharge of any flows to watercourses, or the culverting, diversion, infilling or obstruction of any watercourse on the site. Any discharge to a watercourse must be at a rate no greater than the predevelopment run off values."*
- **Condition 9** *"Development shall not commence until full details of the maintenance and management of the SUDS system is set out in a site-specific maintenance manual and submitted to, and approved in writing by, the local planning authority. The manual is to include details of financial management and arrangements for the replacement of major components at the end of the manufacturer's recommended design life. Upon completed construction of the SUDS system, the owner or management company shall strictly adhere to and implement the recommendations contained within the manual.*

2.0 Existing Site

The application site is located within Westergate in West Sussex, approximately 500m south west of the centre of Westergate. The site is bounded to the north by a pubic footpath/rights of way, to the east by school playing fields (which form part of Aldingbourne Primary School) and to the west and south by existing residential properties. The existing site comprises of open grass fields with existing redundant buildings in the north west corner of the site. A site location plan is presented as **Appendix A**.

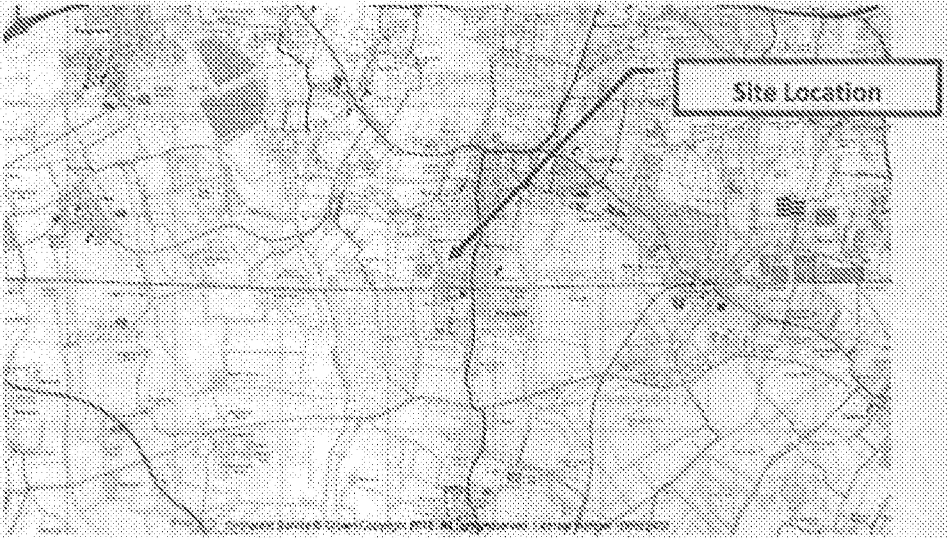


Figure 1: Site location

The existing site covers approximately 3.16ha of Greenfield land comprising of existing open fields and redundant buildings. The approximate centre of the site is at Ordnance Survey (OS) Grid Reference 493557; 104626.

The site generally falls from the north western corner to the south sloping from the north western boundary at 10.56mAOD to 9.55 m AOD at the south eastern corner of the site. An overview of the change in topography is presented as **Figure 2** below.

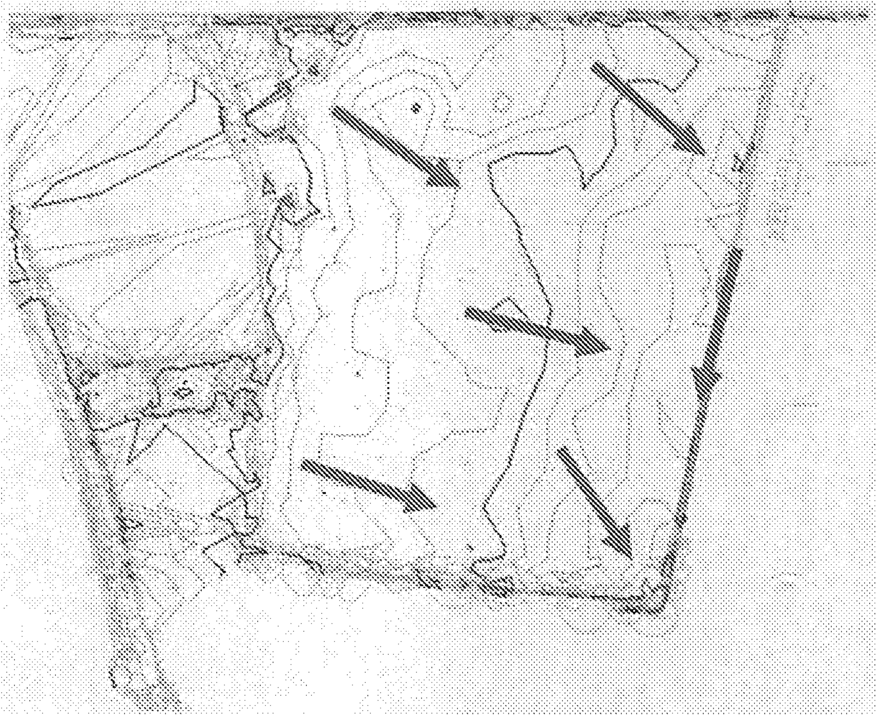


Figure 2: Site Topography

Vehicular access to the site is currently available via the unmade track at the north western corner of the site. The masterplan proposals include for a new access off Hook Lane via the existing property currently occupied by the Oakdenes.

Geotechnical

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

- RSK Geo-Environmental Site Assessment (Report ref: 28391 RO1)
- British Geological Survey (BGS) – Historic Borehole Logs and geology maps;
- Environment Agency (EA) – groundwater vulnerability maps;

Hydrology

The nearest main watercourses is approximately 145m north west of the site which is the Westergate Stream which is tributary of the Aldingbourne Rife. There are existing ordinary watercourses immediately adjacent to the eastern and southern boundary of the site in the forms of ditches. These ditches accommodate run-off from the site and convey this run-off in a southerly direction. The eastern ditch is believed to accommodate flows from rear of properties fronting Lamorna Gardens. These existing ditches will need to be retained as well as regularly maintained to ensure flows are not impeded in the future.

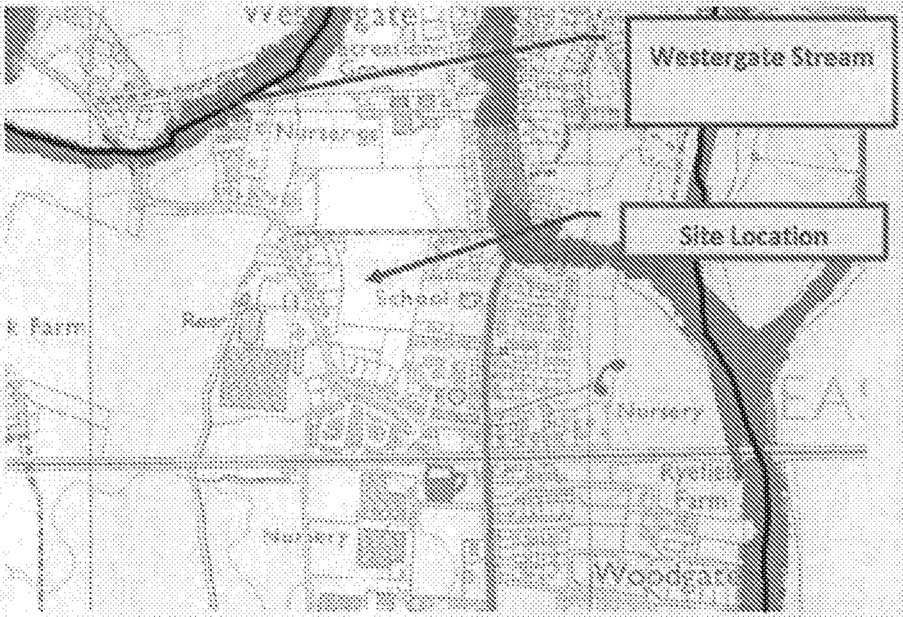


Figure 4- Extract of Flood Map from the EA's website

Hydrogeology

Groundwater mapping published by the EA indicates that the site is located over a Groundwater Vulnerability Zone designated as a Minor Aquifer High. The site is not located over a Groundwater source protection zone but is over a designated Secondary A Superficial Deposit Aquifer.

Ground Conditions

BGS geological maps indicate that the site is underlain by the London Clay Formation with a superficial deposit of River Terrace Deposits. Intrusive investigations carried out by RSK in February 2016 confirmed the presence of Topsoil (0.1m to 0.35m thick) across most of the site over reworked Brickearth (0.15m to 1.75m thick over northern and north western parts of the site) and River Terrace Deposits encountered across the site to depths greater than 2.45mbgl. Made Ground (0.25m to 2m thick) was discovered in the north western (1.2m to 2.6m thick) and south eastern (1.2m thick) parts of the site Shallow groundwater was encountered on site varying in depths from 0.6m to 2.2mbgl. Infiltration tests carried out on site failed during the site investigations as there was no observed infiltration. In addition to this the ground investigation reports noted that the ground conditions did not appear suitable for the use of pit soakaways and that the underlying River Terrace Deposits were considered unsuitable on the basis that it was likely to be saturated.

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 to meet the requirements of the National Planning Policy Framework (NPPF, March 2012) and the Planning Practice Guidance (PPG, March 2014), by interrogating the following information:

- Available topographic survey information;
- Arun District Council Strategic Flood Risk Assessment (SFRA);
- Available mapping from the Environment Agency's website;
- Existing Southern Water sewer service records.

Based on a review of the EA's Flood Zone maps (see **Figure 4**), the site appears to lie wholly within Flood Zone 1, considered to be at low risk from fluvial and tidal flooding.

The remaining risks of flooding from other sources (pluvial, sewer and groundwater) have been assessed and are all deemed low risk for this site.

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 West Sussex County Council will become a primary consultee during the Reserved Matter 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.

Based on the available information and lack of existing surface water infrastructure it has been assumed that the existing surface water run-off from the roofs of the redundant building and fields discharge overland in a westerly and south westerly direction into the existing ditches along the eastern and southern boundaries of the site.

There is an existing Southern Water pumping station located off Hook Lane, north west of the site, as well as a rising main from this pumping station which runs along the public footpath to the north of the site. There is also an existing foul drainage run within Hook Lane running in a northerly direction to the pumping station.

4 Surface Water Management

West Sussex County Council (HCC) are the Lead local flood Authority for Arun District Council and statutory consultee on surface water management on all planning applications within the County.

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 runoff 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 permeable paving, SuDS attenuation basin and below ground cellular storage tanks.

Surface Water Drainage Strategy

In view of the requirements of the NPPF, PPG, WSCC the design parameters and constraints associated with redeveloping this site and the Code for sustainable homes, a surface water drainage strategy design has been devised and hydraulically modeled 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 climate change).

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.

Having taken into consideration the above points, a scheme has been devised and hydraulically modelled based on attenuation techniques with a restricted discharge to the existing watercourses serving the site.

All private hardstanding areas including parking bays and private access drives are proposed to be lined (subject to contamination testing) permeable paving to allow a source control treatment of surface water run-off prior to discharging to the surface water network.

Surface water run-off from the roofs, adoptable roads and footways are to be conveyed via a "traditional" surface water drainage system incorporating gullies and surface water sewers and is proposed to discharge at restricted rates to the respective outfalls located along the northern, eastern and southern boundaries.

The surface water drainage strategy for the site is proposed to restrict the peak flows to the mean annual Greenfield runoff (Qbar) rate for the site of 6.67l/s (as proposed in the approved FRA) and discharge to the existing ditch at the south eastern corner of the site. Due to the limited available fall available on this site and shallow invert level of the ditch, a surface water pumping solution is proposed to discharge flows into the ditch to avoid raising the site wide levels significantly. Attenuation is proposed to be achieved using cellular crate storage tanks as well as an attenuation basin. The overall attenuation should be designed to accommodate all storm events up to and including the 1 in 100 year plus climate change event. Details of the proposed drainage strategy are presented on drawing **BSO/E4462/014 in Appendix E**.

Flow Control

The hydraulic models of the proposed surface water networks, incorporating the SUDs attenuation basins and flow control devices can be found in **Appendix F.**

The hydraulic calculations have been simulated under various scenarios up to and included the critical 1 in 100 Year storm event with additional 30% allowance for climate change. The simulations confirm that the storm can be managed and maintained within the site, with small volumes of surface flooding, during peak storm events contained at surface in areas of low risk to people or property

The hydraulic model of the proposed surface water network, incorporating the SuDS attenuation systems can be found in **Appendix F**.

The hydraulic calculations have been simulated under various scenarios up to and included the critical 1 in 100 Year storm event with additional 30% allowance for climate change. The simulations confirm that the storm can be managed and maintained within the site.

Catchment	Impermeable Development Area (Ha)	Q1 Year (L/sec)	Q30 Year (L/Sec)	Q100 Year Plus Climate (L/Sec)	Discharge Volume (m3) (360min Winter)
1	1.465	6.67	6.67	6.67	283.597

Table 3: Summary of Post Development Runoff with mitigation measures

Water Quality

It is important to address issues with regards to quality when considering surface water management. As the surface water is proposed to be discharge to the existing downstream watercourses, three stages of 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.

Long Term Maintenance

Consideration has been given to the long term maintenance of the proposed drainage structures. SuDS attenuation basins, swales, granular filter drainage and all associated external pipework, chambers and manholes will be the responsibility of a 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.

A strategy for directing overland flows for the site will be confirmed using overland flow modeling as part of the detailed design once key ground levels or development levels across the site have been finalized. Based on the strategic finished floor levels and topographical survey it has however been possible to demonstrate the anticipated exceedance flow routes which can be found in **Appendix G.**

5 Foul Water Drainage Strategy

Southern Water Services Limited are the Local Sewerage provider in this area and as such the development site will seek to connect to the existing public sewer network.

Due to level and tree protection constraints the proposed connection of the site foul water drainage to the existing foul water network should be undertaken via a Section 98 Agreement.

Based on the existing topography of the site it is expected that foul drainage will need to be accommodated via a pumping station and therefore an allowance for a Type 3 adoptable pumping station has been made.

The foul water discharge generated by the proposed residential portion of the development has been approximated at 3.65l/s (based on 79 dwellings at 4000l/dwelling/day) in accordance with Sewers for Adoption.

A Level 2 Capacity study has been produced by Southern Water for this site, Southern Water are currently undertaking further hydraulic modelling to assess the capacity within their system as per of the Section 98 Agreement. A copy of the Level 2 Capacity assessment can be found in Appendix F for information only.

The on-site foul water drainage will need to be designed to meet the relevant requirements of Sewers for Adoption and in consultation with Southern Water.

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

6 Conclusion

A detailed surface water drainage strategy has been prepared and hydraulically modelled which demonstrates that the redevelopment proposals can be successfully implemented and designed to withstand the impact of a 1:100 year rainfall event (including climate change), in accordance with the NPPF, PPG and WSCC requirements

The development's surface water discharge is proposed to be attenuated to less than the pre-development run-off and thus represents a betterment to the site's existing Greenfield run-off rates through the use of SuDS techniques and re-use of existing resources.

In view of this assessment, the report concludes that:

i. That whilst the site is located wholly within Flood Zone 1;

ii. The Development and its occupants are not at an increased risk of flooding;

iii. The Development does not increase the risk of flooding elsewhere;

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

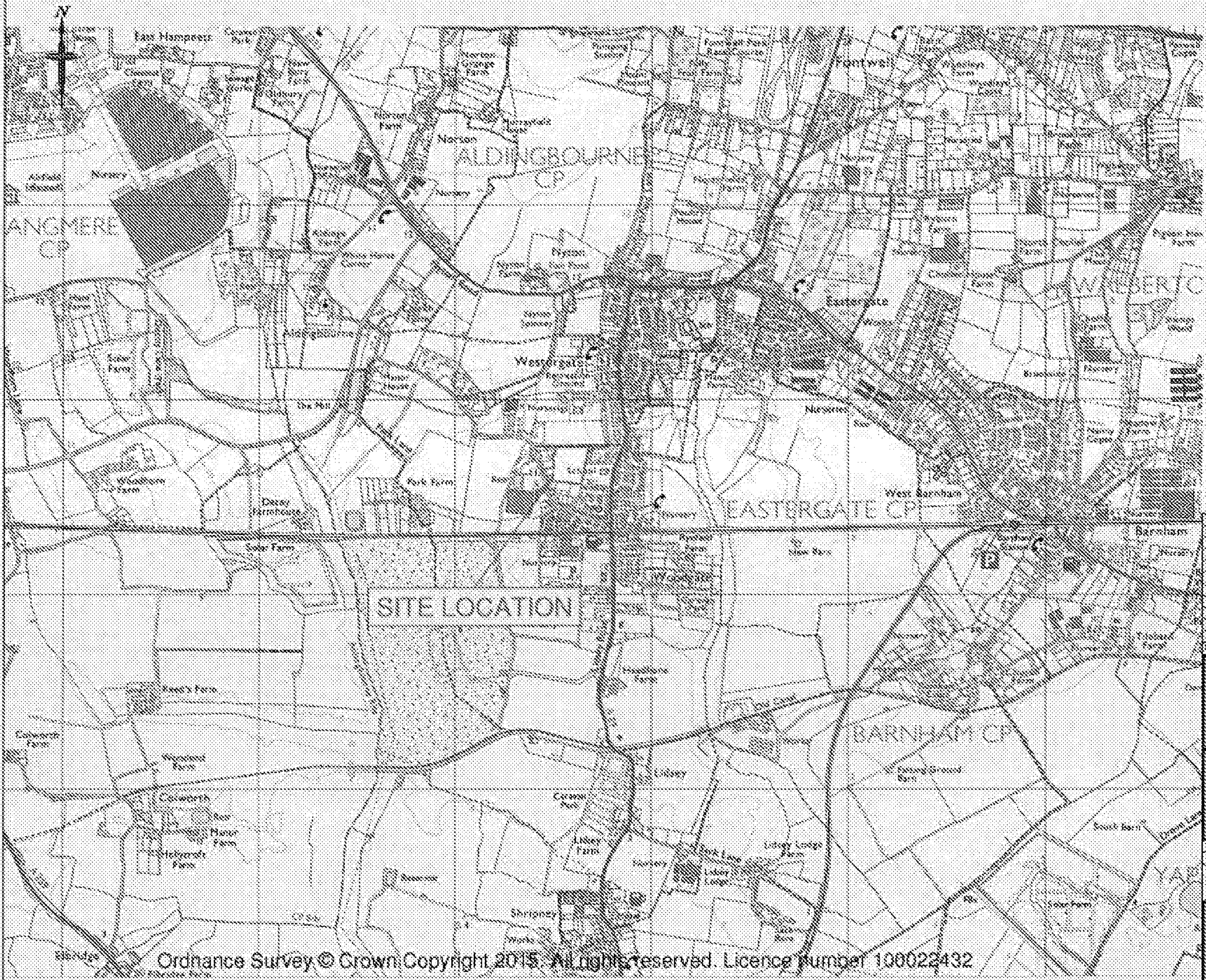
v. The Development will satisfactorily manage and maintain a 1 in 100 Year storm event with allowance for climate change

vi. The detailed drainage strategy follows the principles of the approved FRA.

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)

Site Location Plan



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NOTES

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Rev	Date	Details	By	Chkd	Appd

Client:

DAVID WILSON HOMES

Site:
Land East of Hook
Lane, Westergate
West Sussex

Drawing Title:
LOCATION
PLAN

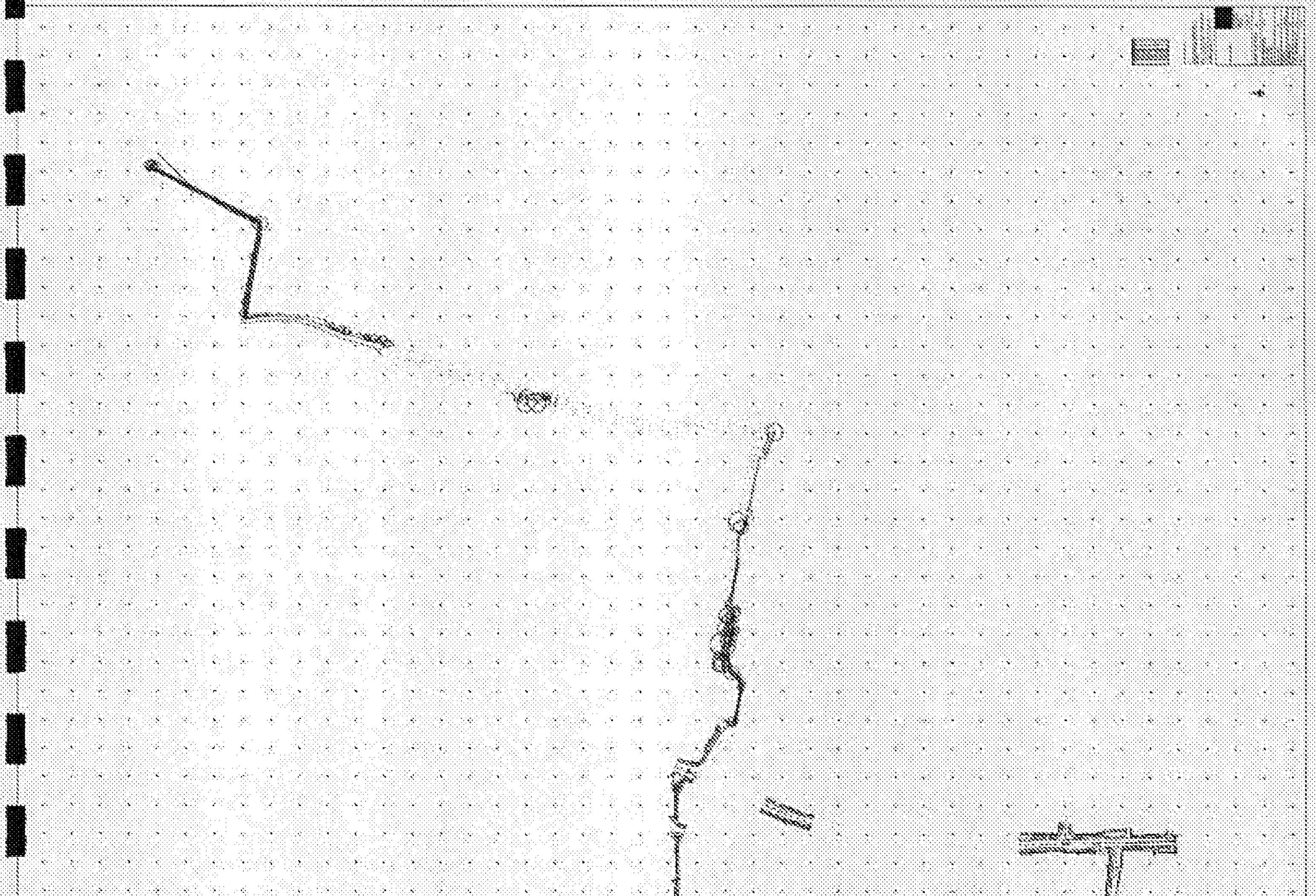
Date: January 2016
Scales: 1:2500 at A3
Drawn: [illegible]
Checked: KJ
Approved: [illegible]

Drawing No: BSO/E4462/018

Rogers Cory Partnership

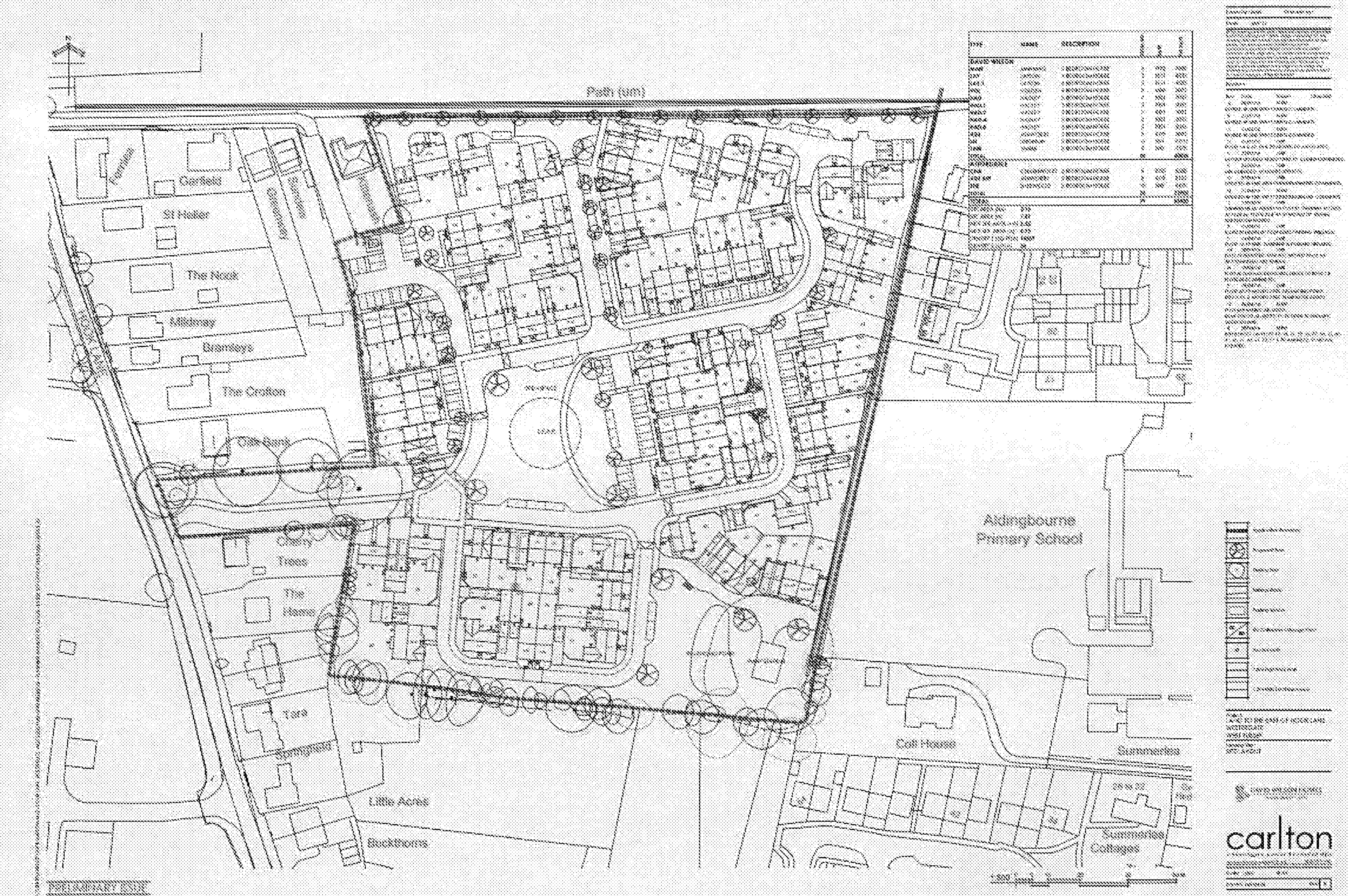
Appendix (B)

Topographical Survey



Appendix (C)

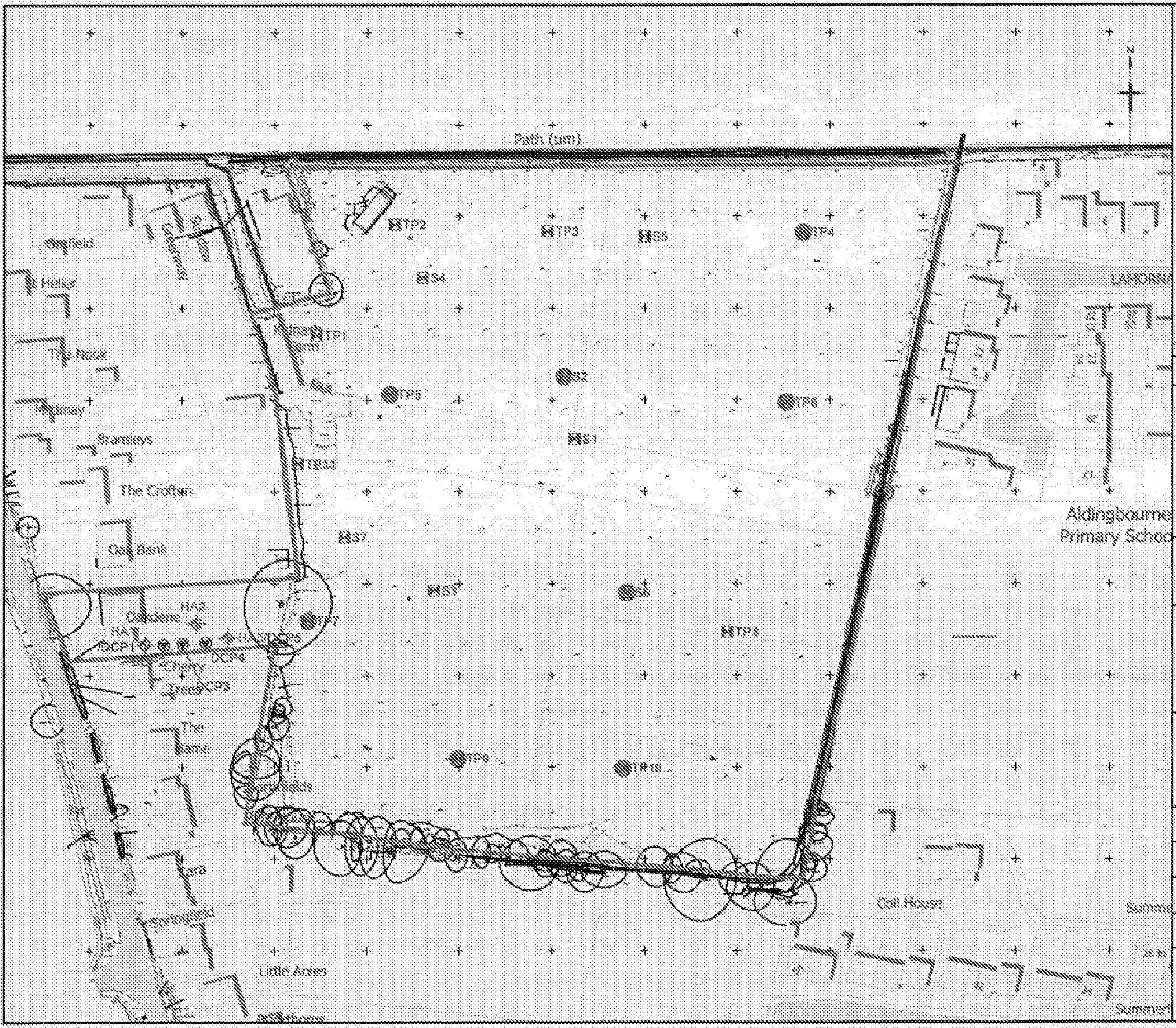
Feasibility Study – Site Layout Plan



ARUN DISTRICT COUNCIL AL/107/16/RES

Appendix (D)

Geotechnical Information



LEGEND

- ▨ Trial Pit Location
- ● DCP Test Location
- ◈ Hand Auger Location
- ● DCP Test Location

Rev	Date	Amendment	Drawn	Chkd	Appd
P1	17.02.16	First issue	ASC	RS	RS

RSK

Client

BDW SOUTHAMPTON

Project Title

HOOK LANE,
WESTERGATE,
WEST SUSSEX

Drawing Title

EXPLORATORY HOLE
LOCATION PLAN

Drawn	Date	Checked	Date	Approved	Date
ASC	17.02.16	RS	17.02.16	RS	17.02.16

Scale 1:1000

Orig Size A3

Dimensions m

Project No. 28391 - R01 (00)

Drawing File 28391 (R01-00).dwg

Drawing No. FIGURE 2

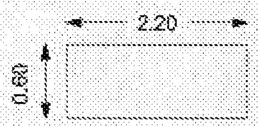
Rev P1

FINAL
TRIAL PIT LOG

Contract: **Hook Lane, West Sussex**		Client: **Barratt Homes Southampton**		Trial Pit: **TPS1**
Contract Ref: **28391**	Start: **10.02.16** End: **10.02.16**	Ground Level: ---	Co-ordinates: ---	Sheet: **1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.10	1	ES				TOPSOIL: Soft dark brown slightly gravelly silty CLAY. Gravel is angular to subangular medium to coarse of flint.	0.15	
0.35		V	c_u=37			Soft brown slightly gravelly silty CLAY. Gravel is angular to subangular medium to coarse of flint. (POSSIBLE MADE GROUND)		
						. . . Becomes mottled orange brown at 0.6m depth.		
0.90	2	ES					(1.45)	
						. . . Becomes gravelly		
1.50	3	D					1.60	
1.70	4	D				Light brown very gravelly slightly sandy CLAY. Gravel is angular to subrounded fine to coarse of flint. Sand is medium to coarse.	1.80	
						Trial pit terminated at 1.8m depth due to partial collapse.		

Plan (Not to Scale)



General Remarks

1. Sides unstable, partial collapse at 1.8m
2. Groundwater at base
3. Backfilled with arisings upon completion

All dimensions in metres | Scale: **1:25**

Method Used: **Machine dug**	Plant Used: **Tracked excavator**	Logged By: **ADavidson**	Checked By:

AGS

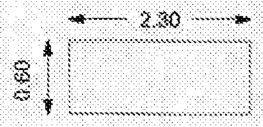
GINT_LIBRARY_V8_06.GLB Libversion: v8_06_006 PrjVersion: v8_06 - Core+Logs - 001 | Log TRIAL PIT LOG - A4P | 28391, HOOK LANE, WEST SUSSEX.GPJ - v8_06. RSK Environment Ltd, 18 Frogmore Road, Hemel Hempstead, Hertfordshire, HP3 9RT. Tel: 01442 437500, Fax: 01442 437550, Web: www.rsk.co.uk. | 17/03/16 - 08:37 | RS2 |

FINAL
TRIAL PIT LOG

Contract: **Hook Lane, West Sussex**		Client: **Barratt Homes Southampton**		Trial Pit: **TPS2**	
Contract Ref: **28391**	Start: **11.02.16** End: **11.02.16**	Ground Level: **---**	Co-ordinates: **---**	Sheet: **1** of **1**	

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20	1	ES				TOSOIL: Soft brown silty CLAY with roots.	(0.30) 0.30	
1.00	2	D				Firm to locally soft mottled orange brown silty slightly gravelly CLAY. Gravel is subangular to subrounded fine of flint.	(1.50) 1.80	
1.90	3	D				Grey white very clayey flint GRAVEL. Gravel is angular to subangular fine to coarse of flint. Trial pit terminated at 1.90m depth.	1.90	

Plan (Not to Scale)



General Remarks

1. Sides unstable, collapse
2. Groundwater at 1.10m
3. Backfilled with arisings upon completion

All dimensions in metres | Scale: **1:25**

Method Used: **Machine dug**	Plant Used: **Tracked excavator**	Logged By: **RSpeight**	Checked By:

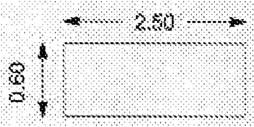
AGS

FINAL
TRIAL PIT LOG

Contract: **Hook Lane, West Sussex**		Client: **Barratt Homes Southampton**		Trial Pit: **TPS3**	
Contract Ref: **28391**	Start: **10.02.16** End: **10.02.16**	Ground Level: ---	Co-ordinates: ---	Sheet: **1** of **1**	

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.10	1	ES				TOPSOIL: Soft dark brown slightly gravelly silty CLAY. Gravel is fine to coarse angular to subrounded of flint.	0.20	
0.30	2	ES				Soft mottled light brown and orange brown slightly gravelly silty CLAY. Gravel is fine to subangular to subrounded of flint.	(1.30) 1.50	
1.00		V	c_u=33					
1.55	3	D				Brown very gravelly silty CLAY. Gravel is fine to coarse angular to subrounded of flint.	1.60	
						Trial pit terminated at 1.6m depth due to partial collapse of sides.		

Plan (Not to Scale)



General Remarks

1. Sides unstable, collapse at 1.6m
2. Pooled water on surface, seepage at 0.2m
3. Backfilled with arisings upon completion

All dimensions in metres

Scale: **1:25**

Method Used: **Machine dug**	Plant Used: **Tracked excavator**	Logged By: **ADavidson**	Checked By:

AGS

GINT_LIBRARY_V8_06.GLB LibVersion: v8_06_008 PrjVersion: v8_06 - Core+Logs - 001 | Log TRIAL PIT LOG - A4P | 28391, HOOK LANE, WEST SUSSEX.GPJ - v8_06.
RSK Environment Ltd, 18 Frogmore Road, Hemel Hempstead, Hertfordshire, HP3 9RT. Tel: 01442 437500, Fax: 01442 437550, Web: www.rsk.co.uk. | 17/03/16 - 08:27 | RS2 |

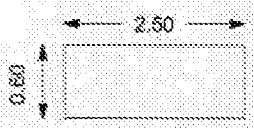
FINAL

TRIAL PIT LOG

Contract: **Hook Lane, West Sussex**	Client: **Barratt Homes Southampton**		Trial Pit: **TPS4**
Contract Ref: **28391**	Start: **10.02.16** End: **10.02.16**	Ground Level: — Co-ordinates: —	Sheet: **1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.10	1	ES				TOPSOIL: Soft dark brown slightly gravelly silty CLAY. Gravel is angular to subangular fine to coarse of flint and occasional chalk.	0.15	
0.30	2	ES				Firm brown silty CLAY. (POSSIBLE MADE GROUND) . . . Becoming slightly chalky and mottled brown orange brown at 0.5m depth. . . . Becoming slightly gravelly at 0.6m depth.	(1.25) 1.40	
0.70	3	ES						
1.45	4	D				Light brown very gravelly silty CLAY. Gravel is anguler to subrounded fine to coarse of flint and some chalk. (Reworked). (POSSIBLE MADE GROUND)	1.50	
1.55	5	D				Brown SAND. Sand is medium to coarse grained.	1.60	
						Trial pit terminated at 1.6m depth.		

Plan (Not to Scale)



General Remarks

1. Sides unstable
2. Groundwater at base, seepage 0.7m
3. Backfilled with arisings upon completion
4. Reworked to 1.50m depth

All dimensions in metres

Scale: **1:25**

Method Used: **Machine dug**	Plant Used: **Tracked excavator**	Logged By: **ADavidson**	Checked By:

AGS

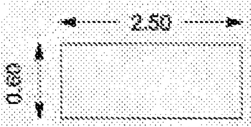
FINAL
TRIAL PIT LOG

Contract: **Hook Lane, West Sussex**		Client: **Barratt Homes Southampton**		Trial Pit: **TPS5**	
Contract Ref: **28391**	Start: **10.02.16** End: **10.02.16**	Ground Level: **---**	Co-ordinates: **---**	Sheet: **1** of **1**	

Samples and In-situ Tests				Water	Backfill
Depth	No	Type	Results		
0.10	1	ES			
0.35	2	ES			
0.70	3	D			
0.80		V	c_u=34		
1.60	4	D			

Description of Strata	Depth (Thickness)	Material Graphic Legend
TOPSOIL: Dark brown soft slightly gravelly silty CLAY. Gravel is angular to subangular fine to coarse of flint.	0.20	
Soft brown slightly gravelly slightly sandy silty CLAY. Gravel is angular to subrounded fine to coarse of flint and some ash. (Reworked). (POSSIBLE MADE GROUND)	(0.30) 0.50	
Soft mottled orange brown slightly gravelly slightly sandy silty CLAY. Gravel is angular to subrounded fine to coarse of flint. . . . Becomes gravelly at 1.5m depth.	(1.20) 1.70	
Trial pit terminated at 1.7m depth.		

Plan (Not to Scale)



General Remarks

1. Sides unstable, partial collapse at 1.7m
2. Groundwater at base, seepage at 0.9m
3. Backfilled with arisings upon completion
4. Reworked to 0.5m depth

All dimensions in metres | Scale: **1:25**

Method Used: **Machine dug**	Plant Used: **Tracked excavator**	Logged By: **ADavidson**	Checked By:

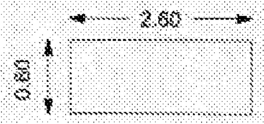
AGS

FINAL
TRIAL PIT LOG

Contract: **Hook Lane, West Sussex**		Client: **Barratt Homes Southampton**		Trial Pit: **TPS6**	
Contract Ref: **28391**	Start: **11.02.16** End: **11.02.16**	Ground Level: **---**	Co-ordinates: **---**	Sheet: **1** of **1**	

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						TOPSOIL: Soft brown silty CLAY with rootlets.	(0.30)	
0.20	1	ES					0.30	
						(Soft) orange brown sandy slightly gravelly CLAY with occasional charcoal. Sand is fine.		
0.70	2	D						
						. . . Becomes slightly sandy at 1.00m	(1.50)	
1.30	3	D						
						. . . Occasional flint gravel at 1.70m, clay becomes silty	1.80	
1.90	4	D				Grey white clayey flint GRAVEL. Gravel is angular to subrounded fine to coarse of flint.	2.00	
						Trial pit terminated at 2.0m depth.		

Plan (Not to Scale)



General Remarks

1. Sides unstable, partial collapse at 1.7m
2. Groundwater seepage at 0.5m
3. Backfilled with arisings upon completion

All dimensions in metres				Scale:	1:25		
Method Used:	**Machine dug**	Plant Used:	**Tracked excavator**	Logged By:	**RSpeight**	Checked By:	

AGS

RSK

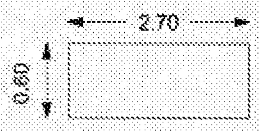
FINAL

TRIAL PIT LOG

Contract: **Hook Lane, West Sussex**		Client: **Barratt Homes Southampton**	Trial Pit: **TPS7**
Contract Ref: **28391**	Start: **11.02.16** End: **11.02.16**	Ground Level: **---**	Co-ordinates: **---**	Sheet: **1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20	1	ES				TOPSOIL: Soft brown silty clay with rare flint gravel and motlets.	(0.30) 0.30	
1.00	2	D				(Firm to soft locally) mottled orange brown silty slightly gravelly CLAY. Gravel is subangular to subrounded fine. . . . Becomes firm below 1.10m depth.	(1.50) 1.80	
1.90	3	D				Grey white very clayey flint GRAVEL. Gravel is angular to subrounded fine to coarse of flint.	(0.30) 2.10	
						Trial pit terminated at 2.10m depth.		

Plan (Not to Scale)



General Remarks

1. Sides unstable
2. No groundwater encountered
3. Backfilled with arisings upon completion

All dimensions in metres

Scale: **1:25**

Method Used: **Machine dug**	Plant Used: **Tracked excavator**	Logged By: **RSpeight**	Checked By:

AGS

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FINAL
TRIAL PIT LOG

Contract: **Hook Lane, West Sussex**		Client: **Barratt Homes Southampton**		Trial Pit: **TP1**	
Contract Ref: **28391**	Start: **09.02.16** End: **09.02.16**	Ground Level: ----	Co-ordinates: ----	Sheet: **1** of **1**	

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.10	1	ES				MADE GROUND: Dark brown gravelly silty sand with rare pockets of clay. Sand is medium to coarse, gravel is angular to subangular fine to coarse of flint, glass, brick, plastic, carpet, tile, tarmac, ash, clinker with some boulders of 0.4m width	0.25	▨
0.35 0.40	 2	V ES	c_u=36			Brown clayey SILT (POSSIBLE MADE GROUND) . . . Becoming more orange and more clayey at 0.4m.	(0.35) 0.60	▨
0.80 0.80	3	D V	 c_u=35			Soft to firm orangish brown mottled brown slightly ashy, slightly sandy CLAY. (POSSIBLE MADE GROUND) . . . Becoming slightly chalky at 0.8m.	(0.60) 1.20	▨
						(Firm) orangish brown mottled brown slightly gravelly slightly sandy CLAY. Gravel is angular to subangular fine to coarse of flint.	(0.75) 1.95	░
2.20	4	D				Light brown silty sandy GRAVEL with pockets of clay. Sand is fine gravel is angular to subrounded fine to coarse of flint . . . Becoming grey at 2.2m	(0.55) 2.50	░
						Trial pit terminated at 2.50m bgl		

General Remarks

1. Sides very unstable, partial collase at 2.5m
2. Water at base and seepage at 1.20m
3. Backfilled with arisings upon completion
4. Reworked to 1.20m

All dimensions in metres Scale: 1:25

Method Used: **Machine dug**	Plant Used: **Tracked excavator**	Logged By: **ADavidson**	Checked By:

AGS

FINAL

TRIAL PIT LOG

Contract: **Hook Lane, West Sussex**		Client: **Barratt Homes Southampton**	Trial Pit: **TP2**
Contract Ref: **28391**	Start: **09.02.16** End: **09.02.16**	Ground Level: ---	Co-ordinates: ---
Sheet: **1** of **1**			

Samples and In-situ Tests				Water	Backfill
Depth	No	Type	Results		
0.05	1	ES			
0.15	2	ES			
0.25		V	c_u=52		
0.45	3	D			
0.90	4	D			
1.30	5	D			
1.40		V	c_u=54		
1.50	6	D			

Description of Strata	Depth (Thickness)	Material Graphic Legend
TOPSOIL: Soft dark brown slightly gravelly clayey SILT with rootlets. Gravel is angular medium of flint.	0.10	
Brown silty slightly gravelly CLAY. Gravel is angular medium of flint with rootlets. (POSSIBLE MADE GROUND)	0.35	
Light brown slightly gravelly clayey SAND and sandy CLAY. Gravel is fine sand is fine to coarse with occasional rootlets. (Reworked). (POSSIBLE MADE GROUND) . . . Chalky layer between 0.7 and 0.95m depth. Chalk is fine gravel to boulder size. Possibly broken up by excavator.	(0.85) 1.20	
Firm orangish brown slightly sandy silty CLAY. Sand is medium. . . . Becomes less silty at 1.5m depth.	(0.60) 1.80	
Greyish brown slightly sandy GRAVEL. Sand is fine, gravel is angular fine to coarse of flint.	(0.40) 2.20	
Trial pit terminated at 2.2m depth.		

General Remarks

1. Sides unstable
2. Water at base and seepage from 0.4m
3. Backfilled with arisings upon completion
4. Reworked to 1.20m

All dimensions in metres Scale: **1:25**

Method Used: **Machine dug**	Plant Used: **Tracked excavator**	Logged By: **ADavidson**	Checked By:

AGS

GINT_LIBRARY_V8_06.GLB LibVersion: v8_06_008 PrjVersion: v8_06 - Core+Logs - 007 | Log TRIAL PIT LOG - NO PLAN - A4P | 28391, HOOK LANE, WEST SUSSEX.GPJ - v8_06
RSK Environment Ltd, 18 Frogmore Road, Hemel Hempstead, Hertfordshire, HP3 9RT, Tel: 01442 437500, Fax: 01442 437550, Web: www.rsk.co.uk | 17/03/16 - 08:34 | RS2 |

RSK

FINAL
TRIAL PIT LOG

Contract: **Hook Lane, West Sussex**		Client: **Barratt Homes Southampton**	Trial Pit: **TP3**
Contract Ref: **28391**	Start: **09.02.16** End: **09.02.16**	Ground Level: **---** Co-ordinates: **---**	Sheet: **1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.15	1	ES				TOPSOIL: Dark brown gravelly very clayey SAND. Sand is fine to coarse with rootlets gravel is angular fine to coarse of flint with some rope.	(0.35) 0.35	
						Soft to firm light brown slightly sandy CLAY. Sand is fine to coarse.		
0.55	2	ES						
0.55		V	c_u=37			. . . Becomes mottled orange at 0.75m depth		
0.85		V	c_u=32				(1.55)	
						. . . Becomes slightly gravelly at 1.20m depth. Gravel is subangular to subrounded fine of flint.		
1.80	3	D				. . . At 1.80m becoming firm.	1.90	
1.80		V	c_u=63			Light brown silty GRAVEL with rare pockets of clay. Gravel is angular to subangular fine to coarse of flint.	(0.30)	
2.10	4	D					2.20	
						Trial pit terminated at 2.2m depth		

General Remarks

1. Unstable sides
2. Groundwater at base and seepage at 0.85m
3. Backfilled with arisings upon completion

		All dimensions in metres	Scale: 1:25
Method Used: **Machine dug**	Plant Used: **Tracked excavator**	Logged By: **ADavidson**	Checked By:

AGS

GINT_LIBRARY_V8_06.GLB Libversion: v8_06_006 PrjVersion: v8_06 - Core+Logs - 161 | Log TRIAL PIT LOG - NO PLAN - A4P | 28391, HOOK LANE, WEST SUSSEX.GPJ - v8_06
RSK Environment Ltd, 18 Frogmore Road, Hemel Hempstead, Hertfordshire, HP3 9RT. Tel: 01442 437500, Fax: 01442 437550, Web: www.rsk.co.uk. | 17/03/16 - 08:35 | AB2 |

RSK

FINAL
TRIAL PIT LOG

Contract: **Hook Lane, West Sussex**		Client: **Barratt Homes Southampton**		Trial Pit: **TP4**
Contract Ref: **28391**	Start: **09.02.16** End: **09.02.16**	Ground Level: ----	Co-ordinates: ----	Sheet: **1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.10	1	ES				TOPSOIL: Soft dark brown slightly gravelly silty clay. Gravel is fine to coarse of flint.	0.25	
0.30		V	c_u=35			Soft to firm light brown silty slightly sandy CLAY. Sand is medium grained.		
0.60	2	ES						
						. . . Becoming mottled orange at 0.7m depth.	(1.05)	
						. . . Becoming sandy at 1.25m depth.	1.30	
						Light brown very gravelly CLAY. Gravel is angular to sub rounded fine to coarse of white flint.	1.60	
1.60	3	D				Light greyish brown sandy GRAVEL. Gravel is angular to subrounded fine to coarse of flint. Sand is medium to coarse with occasional pockets of clay.	(0.40)	
1.80	4	D					1.90	
						Brown slightly silty SAND Sand is medium to coarse grained.	(0.30)	
2.10	5	D					2.20	
						Trial pit terminated at 2.2m depth.		

General Remarks

1. Sides are unstable, partial collapse at 2.2m
2. Groundwater at base
3. Backfilled with arisings upon completion

			All dimensions in metres	Scale:	1:25
Method Used: **Machine dug**	Plant Used: **Tracked excavator**		Logged By: **ADavidson**	Checked By:	AGS

FINAL

TRIAL PIT LOG

Contract: **Hook Lane, West Sussex**		Client: **Barratt Homes Southampton**		Trial Pit: **TP5**	
Contract Ref: **28391**	Start: **09.02.16** End: **09.02.16**	Ground Level: ---	Co-ordinates: ---	Sheet: **1** of **1**	

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.10	1	ES				TOPSOIL: Dark brown slightly gravelly clayey SILT. Gravel is angular to subrounded fine to coarse of flint, brick and clinker.	(0.35) 0.35	
0.55	2	ES				Soft light brown clayey SILT/ silty CLAY.	(0.85) 1.20	
1.00		V	c_u=24					
						(Soft) light brown and grey silty CLAY.	(0.35) 1.55	
						Brown sandy clayey GRAVEL with rare pockets of clay. Sand is coarse. Gravel is fine to coarse of flint and chalk.	(0.55) 2.10	
2.00	3	D						
						Trial pit terminated at 2.10 due to collapse.		

General Remarks

1. Sides are unstable, significant collapse at 2.10m
2. No groundwater
3. Backfilled with arisings upon completion

All dimensions in metres Scale: **1:25**

Method Used: **Machine dug**	Plant Used: **Tracked excavator**	Logged By: **ADavidson**	Checked By:

AGS

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FINAL
TRIAL PIT LOG

Contract: **Hook Lane, West Sussex**	Client: **Barratt Homes Southampton**	Trial Pit: **TP6**

Contract Ref: **28391**	Start: **09.02.16** End: **09.02.16**	Ground Level: **---**	Co-ordinates: **---**	Sheet: **1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.10	1	ES				TOPSOIL: Soft dark brown slightly gravelly silty CLAY. Gravel is subangular to subrounded fine to coarse.	0.25	▨
0.50	2	ES				(Soft to firm) light orangish brown slightly gravelly sandy CLAY. Sand is medium to coarse. Gravel is angular fine to medium. Occasional roots. . . . Becomes mottled orange at 0.5m depth	(0.45) 0.70	▨
0.80	3	D				(Soft) orange brown gravelly sandy CLAY. Gravel is angular to subangular fine to coarse of flint. Sand is fine to medium.	(0.50) 1.20	▨
1.40	4	D				Light brown medium to coarse grained SAND.	(0.40) 1.60	▨
						Trial pit terminated at 1.6m depth due to collapse		

General Remarks

1. Sides very unstable, collapse at 1.6m
2. Groundwater seepage at 0.6m
3. Backfilled with arisings upon completion

All dimensions in metres | Scale: **1:25**

Method Used: **Machine dug**	Plant Used: **Tracked excavator**	Logged By: **ADavidson**	Checked By:

AGS

RSK

FINAL

TRIAL PIT LOG

Contract: **Hook Lane, West Sussex**		Client: **Barratt Homes Southampton**		Trial Pit: **TP7**
Contract Ref: **28391**	Start: **09.02.16** End: **09.02.16**	Ground Level: ---	Co-ordinates: ---	Sheet: **1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.10	1	ES				TOPSOIL: Soft dark brown silty clay with rootlets and tree fragments.	0.15	
0.20	2	D				Dark brown SILT.	0.30	
0.80 0.80	3	ES V	 c_u=37			Soft to firm brown mottled orangish brown silty CLAY.	(1.10) 1.40	
1.50	4	D				Firm brown gravelly CLAY. Gravel is angular fine to medium of flint.	(0.40) 1.80	
1.80 1.90	 5	V D	c_u=45			Brown silty GRAVEL with pockets of clay. Gravel is angular to subangular fine to medium of flint. . . . Becomes slightly grey at 2.0m depth	(0.40) 2.20	
2.20	6	D				Brown fine to medium grained SAND with rare fine angular to subrounded flint.	(0.40) 2.60	
						Trial pit terminated at 2.60m due to collapse.		

General Remarks

1. Sides are very unstable, collapse at 2.2m and 2.6m
2. Groundwater at base
3. Backfilled with arisings upon completion

		All dimensions in metres	Scale: **1:25**
Method Used: **Machine dug**	Plant Used: **Tracked excavator**	Logged By: **ADavidson**	Checked By:

AGS

RSK

FINAL

TRIAL PIT LOG

Contract: **Hook Lane, West Sussex**		Client: **Barratt Homes Southampton**	Trial Pit: **TP8**
Contract Ref: **28391**	Start: **09.02.16** End: **09.02.16**	Ground Level: **---**	Co-ordinates: **---**	Sheet: **1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.10	1	ES				TOPSOIL: Soft dark brown slightly gravelly silty CLAY. Gravel is angular to subangular, fine to coarse with occasional cobbles of flint.	(0.30) 0.30	
0.60	2	ES				(Firm) light brown silty sandy CLAY. Sand is coarse grained.	(0.80) 1.10	
1.20	3	D				(Firm) light brown very gravelly silty CLAY. Gravel is angular to subangular fine to coarse of flint.	(0.30) 1.40	
1.60	4	D				Brownish grey SAND. Sand is medium to coarse.	(0.50) 1.90	
						Trial pit terminated at 1.9m depth due to total collapse of sides.		

General Remarks

1. Sides very unstable. Significant collapse at 1.9m
2. Groundwater at 1.20m
3. Backfilled with arisings upon completion

All dimensions in metres Scale: 1:25

Method Used: **Machine dug**	Plant Used: **Tracked excavator**	Logged By: **ADavidson**	Checked By:

AGS

RSK

FINAL
TRIAL PIT LOG

Contract: **Hook Lane, West Sussex**		Client: **Barratt Homes Southampton**			Trial Pit: **TP9**
Contract Ref: **28391**	Start: **09.02.16** End: **09.02.16**	Ground Level: ----	Co-ordinates: ----		Sheet: **1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.10	1	ES				TOPSOIL: Soft to firm dark brown silty slightly gravelly CLAY. Gravel is subangular fine of flint.	0.20	
0.35 0.40 0.70	2	ES V V	c_u=22 c_u=34			Soft light brown slightly gravelly slightly sandy silty CLAY. Gravel is angular to subrounded fine to coarse of flint sand is coarse. Occasional fine roots. . . . Clay becoming firm at 0.6m depth. . . . Becoming gravelly at 1.0m depth.	(1.40) 1.60	
1.70	3	D				Grey and brown gravelly silty CLAY. Gravel is subangular to subrounded fine to coarse of flint.	(0.50) 2.10	
2.10	4	D				Brown SAND. Sand is fine to coarse.	(0.40) 2.50	
						Trial pit terminated at 2.5m depth due to collapse.		

General Remarks

1. Sides very unstable, collapse at 2.1m and 2.5m
2. No groundwater encountered
3. Backfilled with arisings upon completion

	All dimensions in metres	Scale: **1:25**	
Method Used: **Machine dug**	Plant Used: **Tracked excavator**	Logged By: **ADavidson**	Checked By:

AGS

RSK

FINAL
TRIAL PIT LOG

Contract: **Hook Lane, West Sussex**		Client: **Barratt Homes Southampton**	Trial Pit: **TP10**
Contract Ref: **28391**	Start: **09.02.16** End: **09.02.16**	Ground Level: ---	Co-ordinates: ---	Sheet: **1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.10	1	ES				TOPSOIL: Soft dark brown slightly gravelly silty CLAY. Gravel is subangular to subrounded fine to coarse of flint.	0.15	▨
0.30	2	ES				MADE GROUND: Soft to firm light brown slightly gravelly silty CLAY. Gravel is subangular to subrounded fine to coarse of flint and occasional brick fragments.	(1.05)	▨
0.70		V	c_u=38				1.20	
1.40	3	D				Grayish light brown gravelly SILT and CLAY. Gravel is angular to subangular fine to coarse.	(0.40) 1.60	▨
1.60	4	D				Orangeish brown SAND. Sand is fine to coarse.	(0.70) 2.30	▨
						Trial pit terminated at 2.3m depth.		

General Remarks

1. Sides unstable
2. Groundwater at base
3. Backfilled with arisings upon completion

		All dimensions in metres	Scale: **1:25**
Method Used: **Machine dug**	Plant Used: **Tracked excavator**	Logged By: **ADavidson**	Checked By:

AGS

FINAL
TRIAL PIT LOG

Contract: **Hook Lane, West Sussex**		Client: **Barratt Homes Southampton**		Trial Pit: **TP11**
Contract Ref: **28391**	Start: **11.02.16** End: **11.02.16**	Ground Level: ---	Co-ordinates: ---	Sheet: **1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20	1	ES				TOPSOIL: Dark brown grey slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is angular to subrounded fine to coarse of flint and occasional glass fragment.	(0.30) 0.30	
						MADE GROUND: Mottled orange brown silty slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of flint.		
0.60	2	D						
							(2.30)	
1.50	3	D				. . . Rare fragments of chalk		
						. . . Dark brown organic layers below 2.0m		
2.20	4	D				. . . Glass jar at 2.20m depth	2.60	
						Soft orange brown silty CLAY with occasional flint gravel. Trial pit terminated 2.60m due to collapse.		

General Remarks

1. Sides unstable, collapse at 2.8m
2. Groundwater at 1.75m
3. Backfilled with arisings upon completion
4. Reworked to 2.60m

All dimensions in metres Scale: **1:25**

Method Used: **Machine dug**
Plant Used: **Tracked excavator**
Logged By: **RSpeight**
Checked By:

AGS

DRAFT

HAND AUGER LOG

Contract: **Hook Lane, West Sussex**			Client: **Barratt Homes Southampton**		Position: **HA1**
Contract Ref: **28391**	Date: **29.02.16**	Ground Level: **---**	Co-ordinates: **---**		Sheet: **1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20	1	ES			▨	Firm brown silty slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of chalk, flint and charcoal. (TOPSOIL)	(0.35) 0.35	
0.60	2	ES			▨	Firm orange brown silty CLAY with occasional grey mottling.	(0.95) 1.30	
						Borehole terminated at 1.30m depth.		

General Remarks

1. No groundwater was encountered
2. Borehole backfilled with arisings upon completion

			All dimensions in metres	Scale:	**1:25**	
Method Used: **Hand excavation**	Plant Used: **Hand auger**		Logged By: **RSpeight**	Checked By:		AGS

RSK

DRAFT

HAND AUGER LOG

Contract: **Hook Lane, West Sussex**			Client: **Barratt Homes Southampton**		Position: **HA2**
Contract Ref: **28391**	Date: **29.02.16**	Ground Level: **----**	Co-ordinates: **----**		Sheet: **1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
					▨	Firm brown silty gravelly CLAY. Gravel is subangular to subrounded fine to medium of chalk, flint and charcoal. (TOPSOIL)	(0.35)	▨
0.30	1	ES			▨		0.35	▨
					▨	Soft orange grey brown silty CLAY.		▨
0.50	2	ES			▨			▨
					▨	.... Below 0.70m bgl; Rare flint gravel.	(0.70)	▨
					▨		1.05	▨
						Borehole terminated at 1.05m depth.		

General Remarks

1. No groundwater was encountered
2. Borehole backfilled with arisings upon completion

		All dimensions in metres	Scale: **1:25**
Method Used: **Hand excavation**	Plant Used: **Hand auger**	Logged By: **RSpeight**	Checked By:

AGS

RSK

DRAFT

HAND AUGER LOG

Contract: **Hook Lane, West Sussex**		Client: **Barratt Homes Southampton**		Position: **HA3**
Contract Ref: **28391**	Date: **29.02.16**	Ground Level: **---**	Co-ordinates: **---**	Sheet: **1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20	1	ES			▩	Firm brown silty gravelly CLAY. Gravel is subangular to subrounded fine to medium of chalk, flint and charcoal. (TOPSOIL)	(0.30) 0.30	▒
0.30-0.40	2	ES			▩	Firm orange brown silty slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk, flint and occasional charcoal. (POSSIBLE MADE GROUND)	0.45	☒
					▩	Firm orange grey brown mottled silty CLAY.	(0.55) 1.00	▤
						Borehole terminated at 1.00m depth.		

General Remarks

1. No groundwater was encountered
2. Borehole backfilled with arisings upon completion

	All dimensions in metres	Scale:	1:25
Method Used: **Hand excavation**	Plant Used: **Hand auger+ Dynamic cone penetrometer**	Logged By: **RSpeight**	Checked By:

AGS

FULL SCALE SOAKAWAY TEST

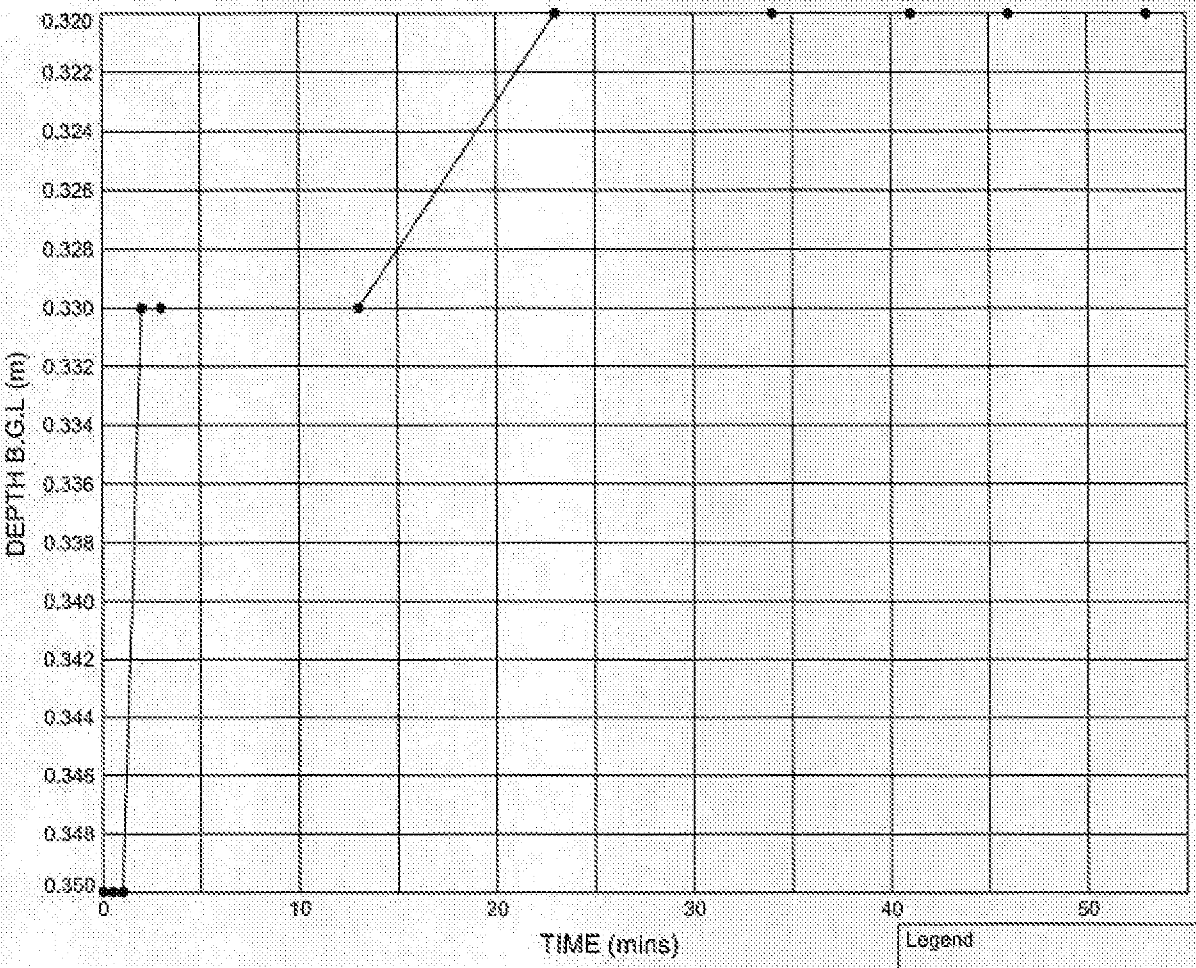
In accordance with BRE Digest 365

Soakaway Test - Position ID : **TPS1**

Ground Level: ---

Co-ordinates: ---

PLOT OF DEPTH OF WATER BELOW GROUND LEVEL AGAINST TIME



Test 1

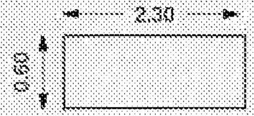
Legend

● Test 1 (10.02.16)

Pit start depth:	=	**1.45**	m
Pit final depth:	=	**1.50**	m
Effective depth, De	=	**1.10**	m
Effective storage volume, V_{p75-25}	=	**0.7590**	m^3
Surface area, a_{p50}	=	**4.5700**	m^2
Time, t_{p75-25}	=	**Not recorded**	secs
Infiltration rate, f	=	**Test fail**	m/s

Notes: Test 1 - Test Fail

Plan (Not to scale)



No Bearing Taken

RSK Environment Ltd 18 Frogmore Road Hemel Hempstead Hertfordshire HP3 9RT	Compiled By	Date	Checked By	Date
	[redacted]	17/02/16		
	Contract: **Hook Lane, West Sussex**		Contract Ref: **28391**	

FULL SCALE SOAKAWAY TEST

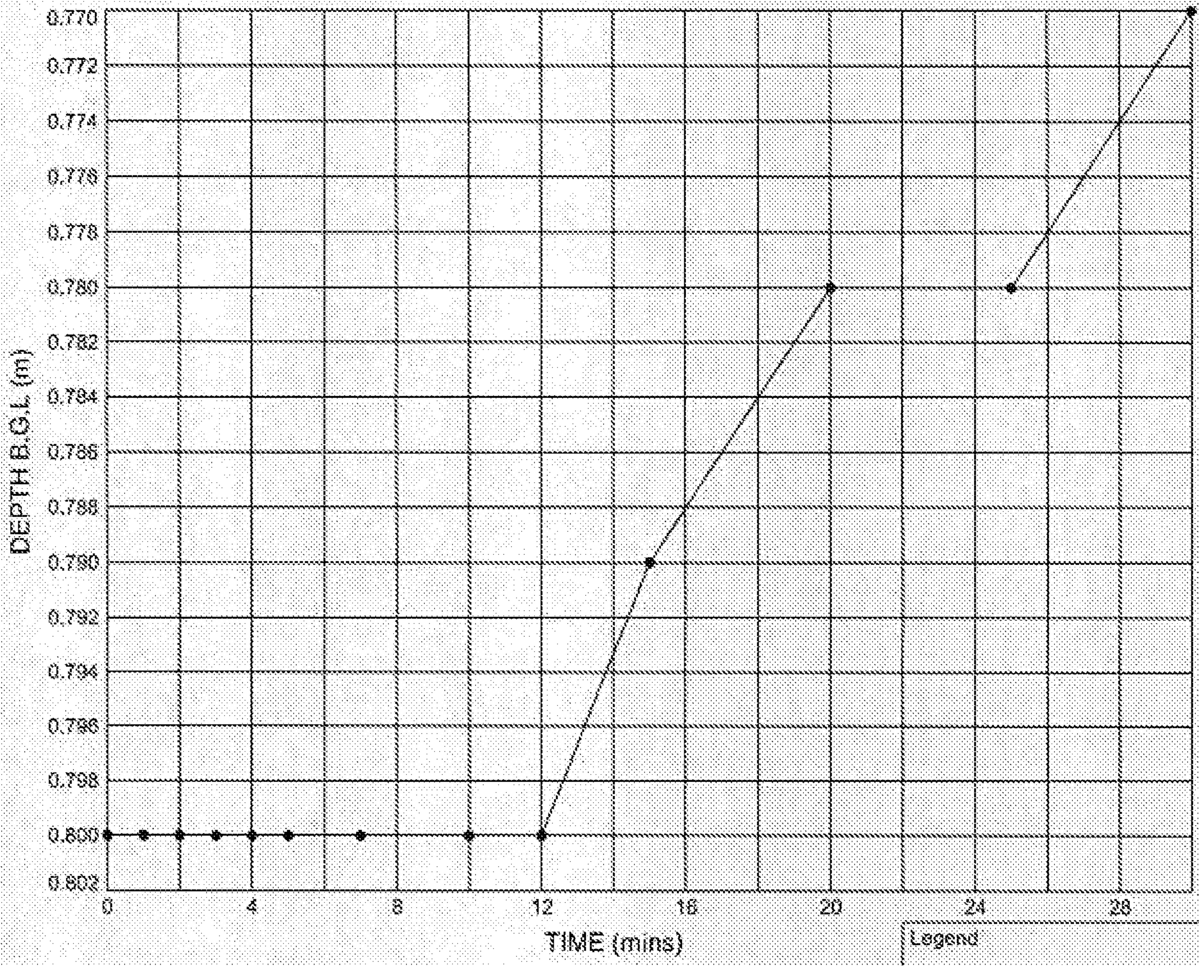
In accordance with BRE Digest 365

Soakaway Test - Position ID : **TPS2**

Ground Level: ---

Co-ordinates: ---

PLOT OF DEPTH OF WATER BELOW GROUND LEVEL AGAINST TIME



Legend

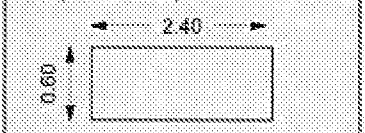
● Test 1 (11.02.16)

Test 1

Pit start depth:	=	**1.90**	m
Pit final depth:	=		m
Effective depth, De	=	**1.20**	m
Effective storage volume, V_{p75-25}	=	**0.9720**	m^3
Surface area, a_{p50}	=	**5.5800**	m^2
Time, t_{p75-25}	=	**Not recorded**	secs
Infiltration rate, f	=	**Test fail**	m/s

Notes: Test 1 - Test fail

Plan (Not to scale)



No Bearing Taken

RSK Environment Ltd
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Compiled By	Date	Checked By	Date
[redacted]	17/02/16		

Contract	Contract Ref:
Hook Lane, West Sussex	**28391**

GINT_LIBRARY_V8_06.GLB Libversion: v8_06_001 PrjVersion: v8_06 - Core+Logs - 001 | Graph L - TP SOAKAWAY - 2 - FINAL REPORT - AAP | 28391, HOOK LANE, WEST SUSSEX.GPJ - v8_06 | 17/02/16 - 11:38 | RS2 |

FULL SCALE SOAKAWAY TEST

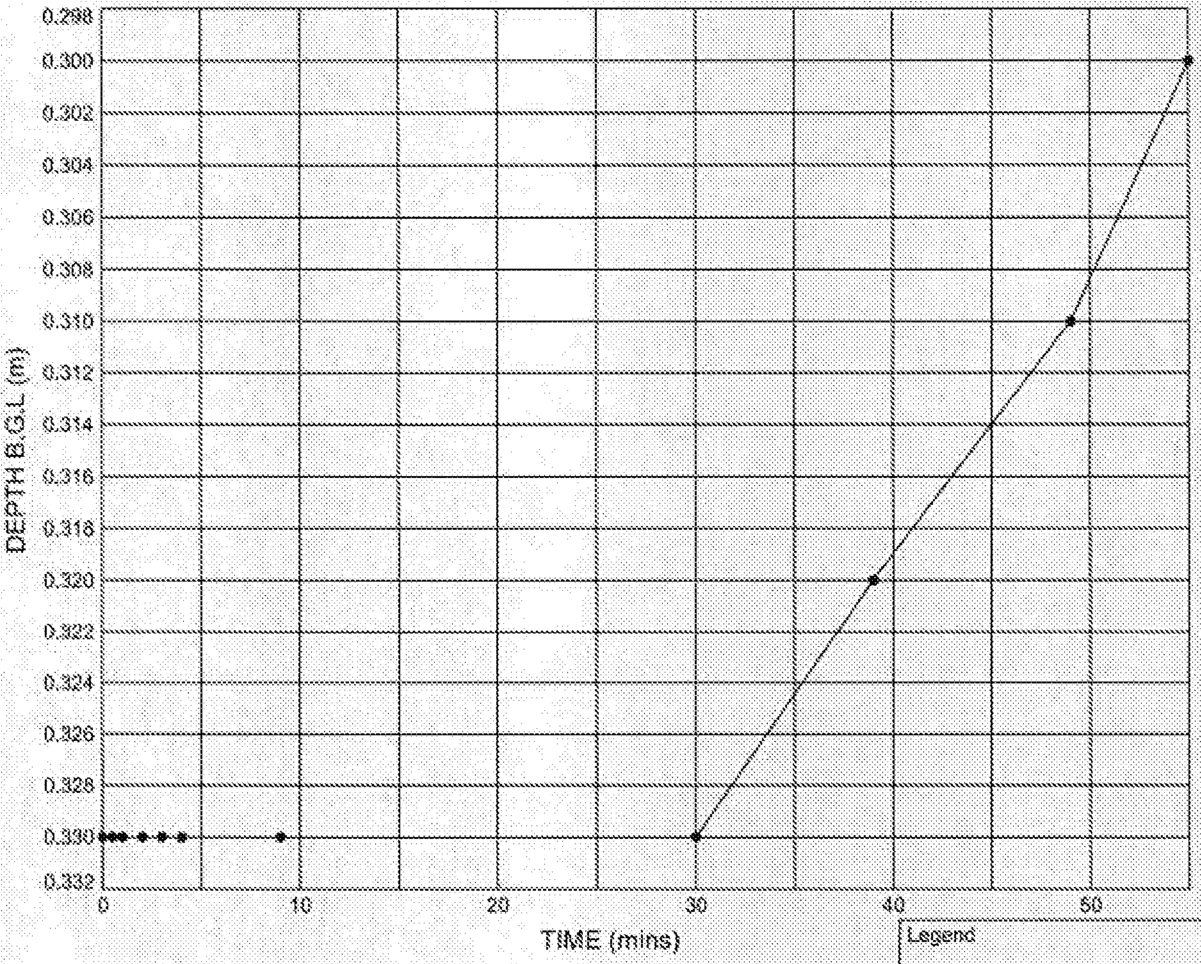
In accordance with BRE Digest 365

Soakaway Test - Position ID : **TPS3**

Ground Level: ---

Co-ordinates: ---

PLOT OF DEPTH OF WATER BELOW GROUND LEVEL AGAINST TIME



Test 1

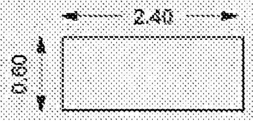
Pit start depth: = **0.98** m
Pit final depth: = **0.95** m
Effective depth, De = **0.65** m
Effective storage volume, V_{p75-25} = **0.4680** m^3
Surface area, a_{p50} = **3.3900** m^2
Time, t_{p75-25} = **Not recorded** secs
Infiltration rate, f = **Test fail** m/s

Notes: Test 1 - Test fail

Legend

● Test 1 (10.02.16)

Plan (Not to scale)



No Bearing Taken

RSK Environment Ltd 18 Frogmore Road Hemel Hempstead Hertfordshire HP3 9RT	Compiled By	Date	Checked By	Date
	[redacted]	17/02/16		
	Contract **Hook Lane, West Sussex**		Contract Ref: **28391**	

GINT_LIBRARY_V8_06.GLB LibVersion: v8_06_003 PrjVersion: v8_06 - Core+Logs - 001 | Graph 1 - TP SOAKAWAY - 2 - FINAL REPORT - A4P | 28391, HOOK LANE, WEST SUSSEX.GPJ - v8_06 | 17/02/16 - 11:08 | RS2 |

FULL SCALE SOAKAWAY TEST

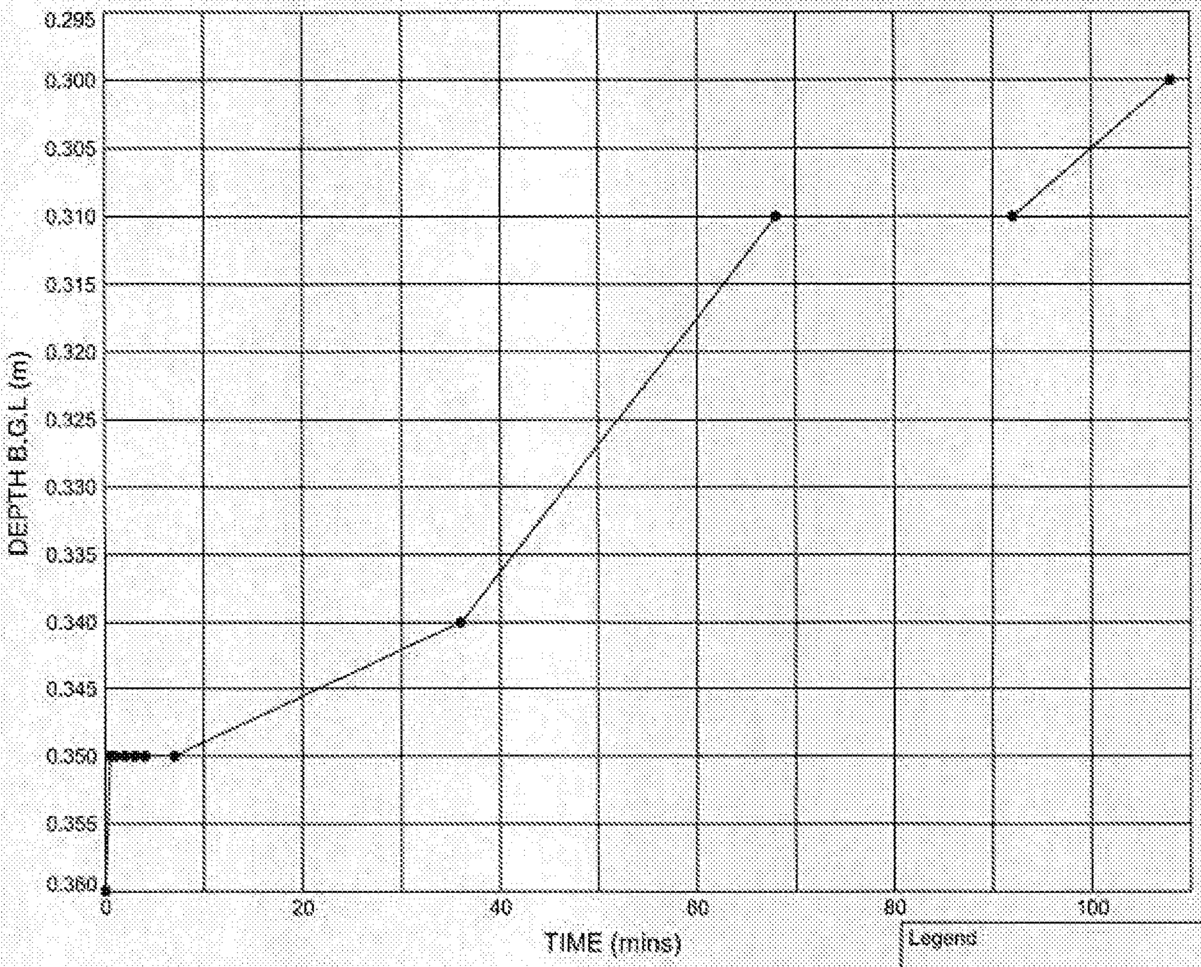
In accordance with BRE Digest 365

Soakaway Test - Position ID : **TPS4**

Ground Level: —

Co-ordinates: —

PLOT OF DEPTH OF WATER BELOW GROUND LEVEL AGAINST TIME



Test 1

Legend

● Test 1 (10.02.16)

Pit start depth: = **1.46** m

Pit final depth: = **1.11** m

Effective depth, De = **1.10** m

Effective storage volume, V_{p75-25} = **0.8250** m^3

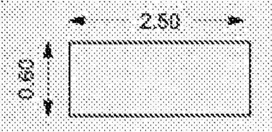
Surface area, a_{p50} = **4.9100** m^2

Time, t_{p75-25} = **Not recorded** secs

Infiltration rate, f = **Test fail** m/s

Notes: Test 1 - Test fail

Plan (Not to scale)



No Bearing Taken

RSK Environment Ltd 18 Frogmore Road Hemel Hempstead Hertfordshire HP3 9RT	Compiled By	Date	Checked By	Date
	[redacted]	17/02/16		
	Contract **Hook Lane, West Sussex**		Contract Ref: **28391**	

GINT_LIBRARY_V8_06.GLB LibVersion: v8_06_001 PrjVersion: v8_06 - Core+Logs - 001 | Graph1 - TP SOAKAWAY - 2 - FINAL REPORT - AAP | 28391, HOOK LANE, WEST SUSSEX.GPJ - v8_06 | 17/02/16 - 11:07 | RS3 |

FULL SCALE SOAKAWAY TEST

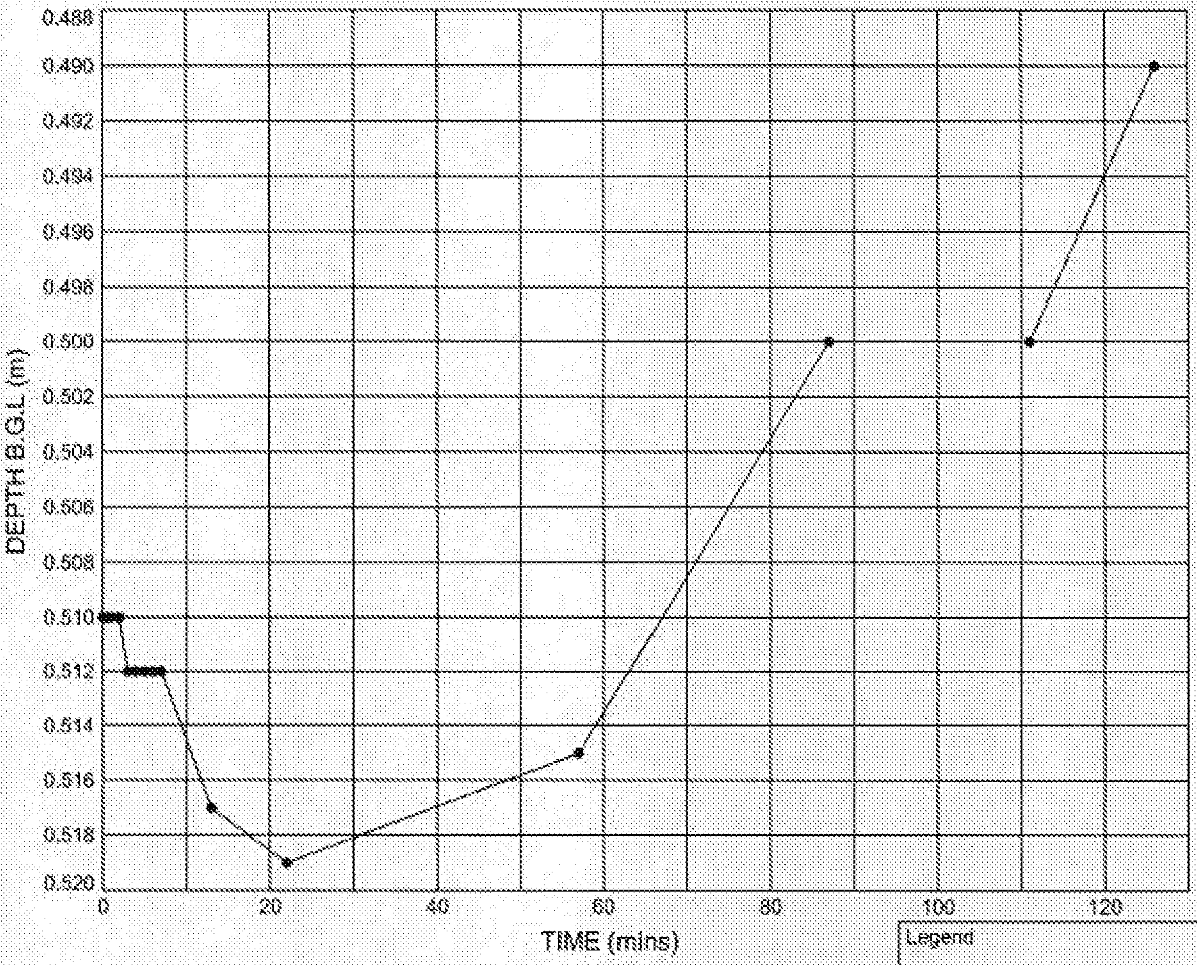
In accordance with BRE Digest 365

Soakaway Test - Position ID : **TPS5**

Ground Level: —

Co-ordinates: —

PLOT OF DEPTH OF WATER BELOW GROUND LEVEL AGAINST TIME



Test 1

Legend		
●	Test 1	(10.02.16)

Pit start depth: = **1.59** m

Pit final depth: = **1.34** m

Effective depth, De = **1.08** m

Effective storage volume, V_{p75-25} = **0.8100** m^3

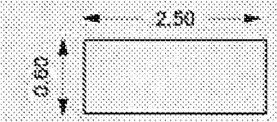
Surface area, a_{p50} = **4.8480** m^2

Time, t_{p75-25} = **Not recorded** secs

Infiltration rate, f = **Test fail** m/s

Notes: Test 1 - Test fail

Plan (Not to scale)



No Bearing Taken

RSK Environment Ltd 18 Frogmore Road Hemel Hempstead Hertfordshire HP3 9RT	Compiled By	Date	Checked By	Date
	[redacted]	17/02/16		
	Contract **Hook Lane, West Sussex**		Contract Ref: **28391**	

FULL SCALE SOAKAWAY TEST

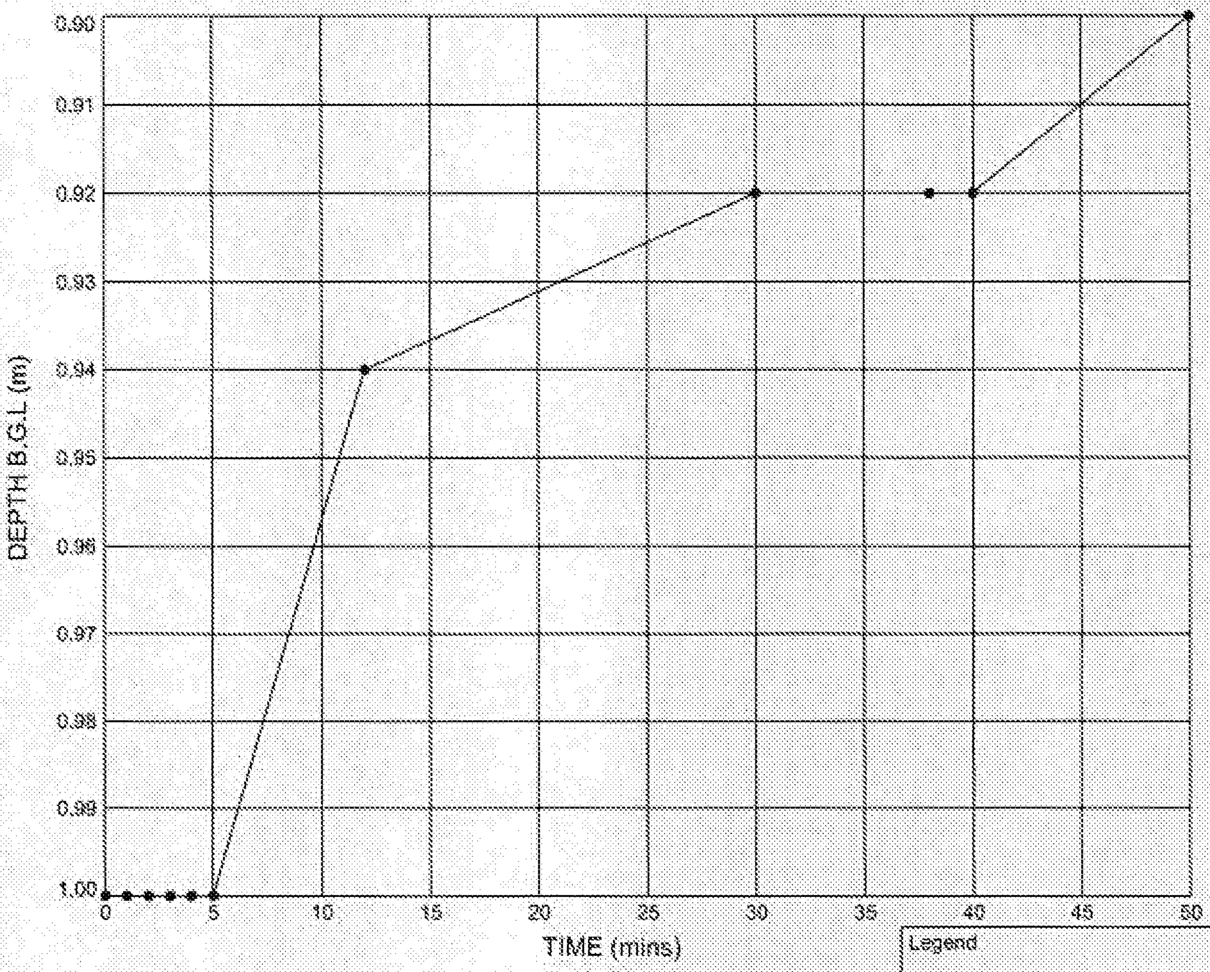
In accordance with BRE Digest 365

Soakaway Test - Position ID : **TPS6**

Ground Level: —

Co-ordinates: —

PLOT OF DEPTH OF WATER BELOW GROUND LEVEL AGAINST TIME



Test 1

Pit start depth: = **2.00** m

Pit final depth: = m

Effective depth, De = **1.00** m

Effective storage volume, V_{p75-25} = **0.7800** m^3

Surface area, a_{p50} = **4.7600** m^2

Time, t_{p75-25} = **Not recorded** secs

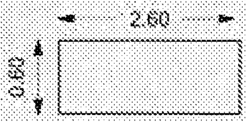
Infiltration rate, f = **Test fail** m/s

Notes: Test 1 - Test fail

Legend

● Test 1 (11.02.16)

Plan (Not to scale)



No Bearing Taken

RSK Environment Ltd
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Compiled By	Date	Checked By	Date
[redacted]	17/02/16		

Contract: **Hook Lane, West Sussex**

Contract Ref: **28391**

FULL SCALE SOAKAWAY TEST

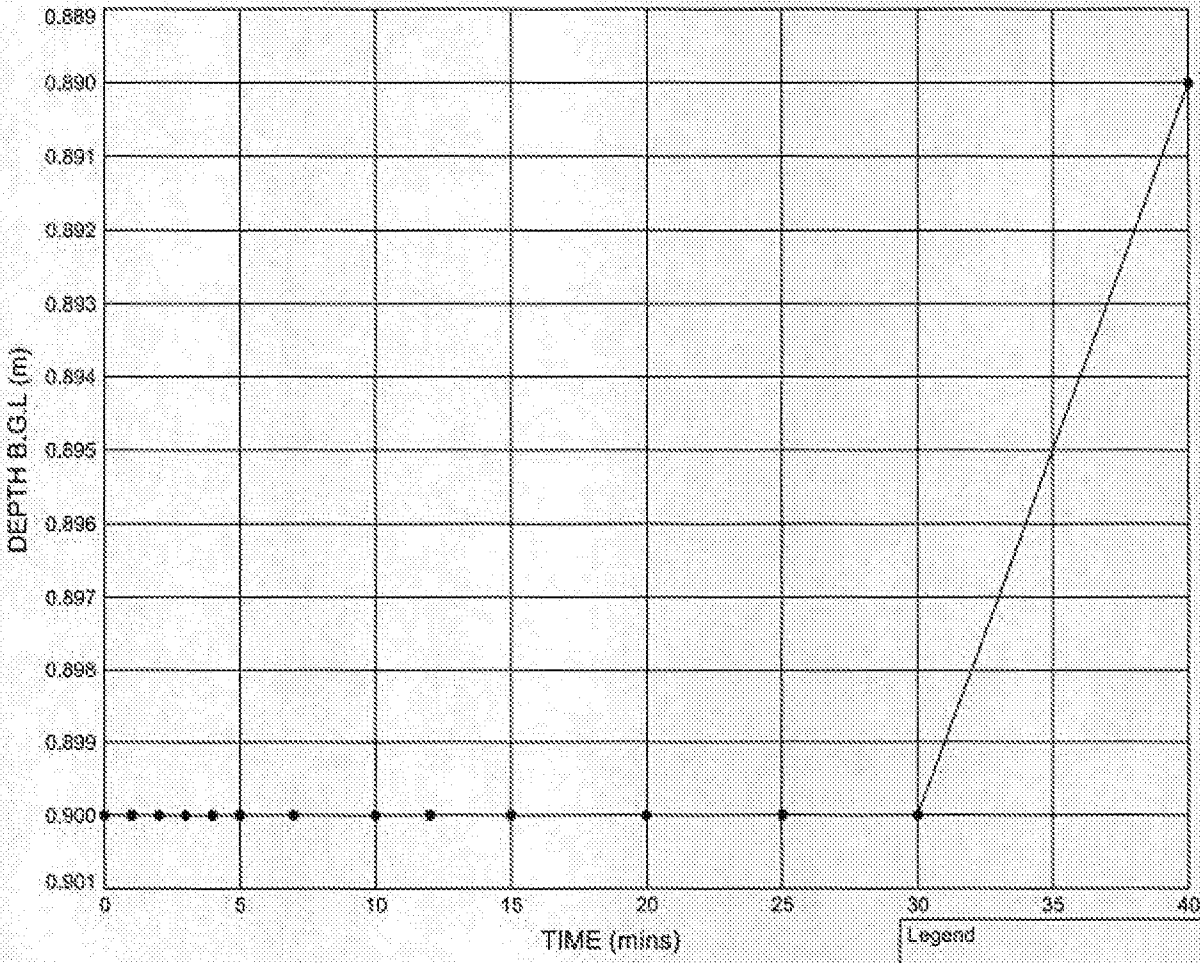
In accordance with BRE Digest 365

Soakaway Test - Position ID : **TPS7**

Ground Level: —

Co-ordinates: —

PLOT OF DEPTH OF WATER BELOW GROUND LEVEL AGAINST TIME



Test 1

Legend

● Test 1 (11.02.16)

Pit start depth: = **2.10** m

Pit final depth: = m

Effective depth, De = **1.20** m

Effective storage volume, V_{p75-25} = **0.9720** m^3

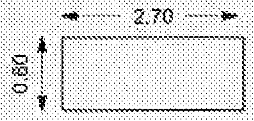
Surface area, a_{p50} = **5.5800** m^2

Time, t_{p75-25} = **Not recorded** secs

Infiltration rate, f = **Test fail** m/s

Notes: Test 1 - Test fail

Plan (Not to scale)

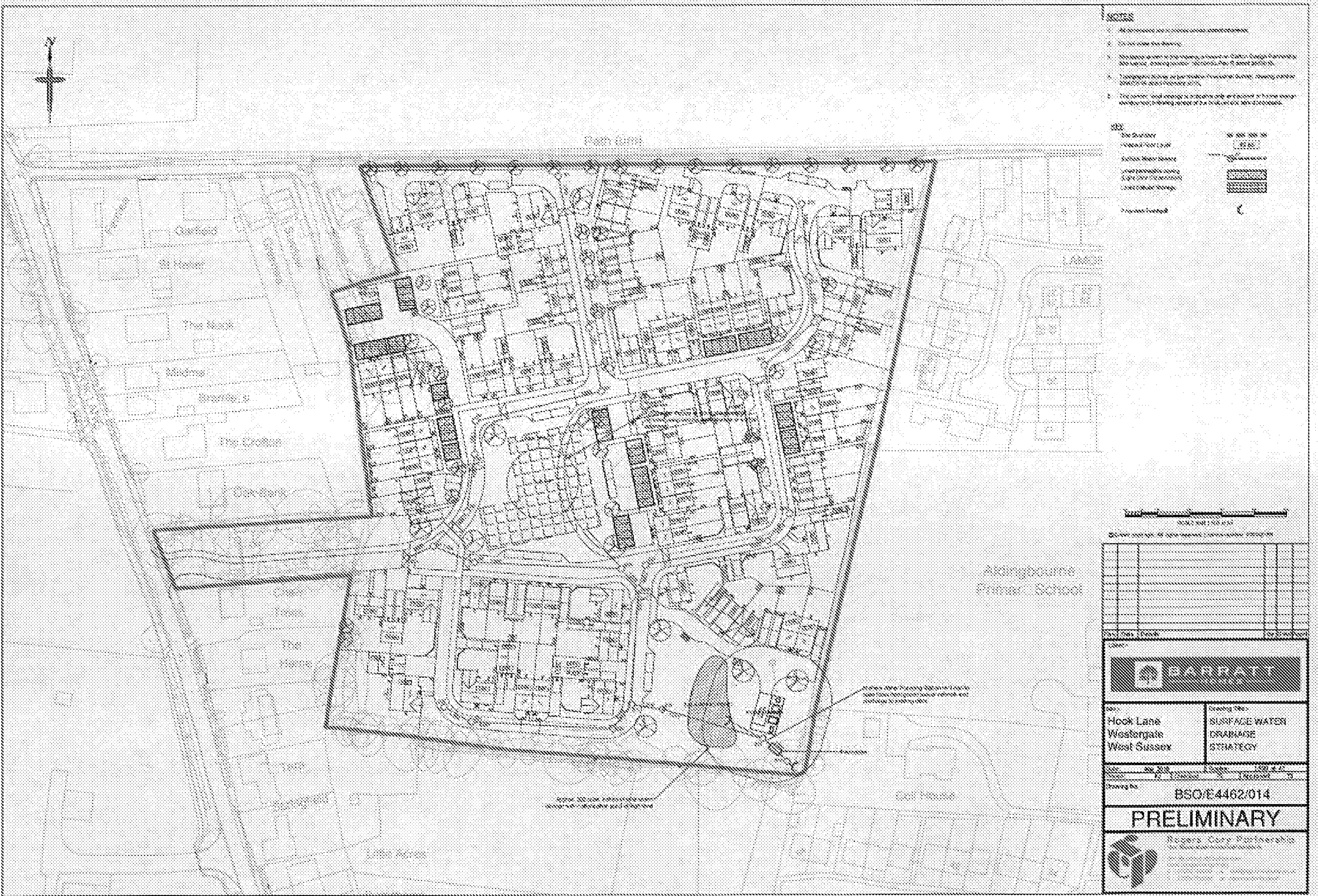


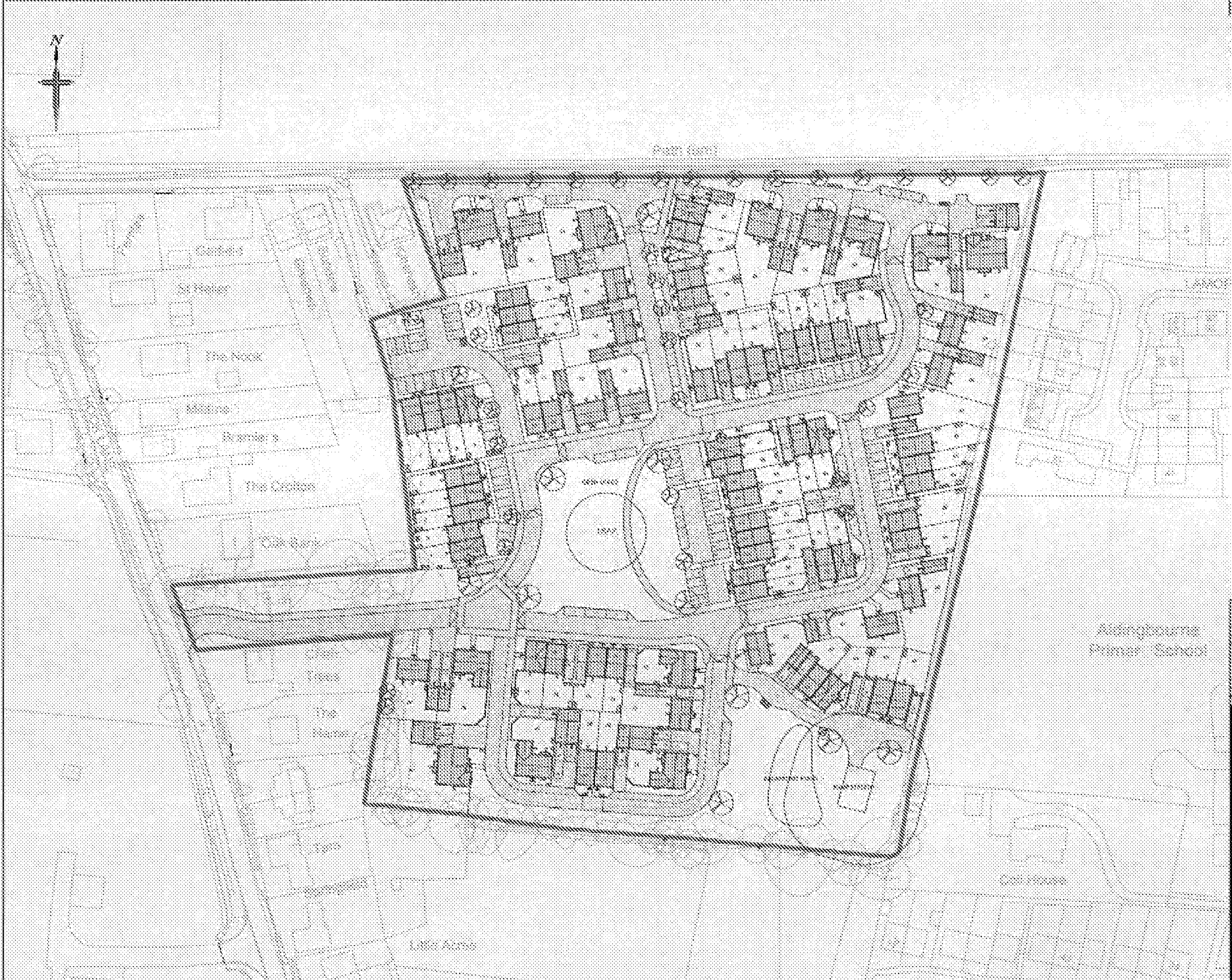
No Bearing Taken

RSK Environment Ltd 18 Frogmore Road Hemel Hempstead Hertfordshire HP3 9RT	Compiled By	Date	Checked By	Date
	[redacted]	17/02/16		
	Contract **Hook Lane, West Sussex**		Contract Ref: **28391**	

Appendix (E)

Proposed Surface Water Strategy


N
Aldingbourne Primary School
Old House
Little Acres
BARRATT
Hook Lane
Westergate
West Sussex
SURFACE WATER
DRAINAGE
STRATEGY
BSO/E4462/014
PRELIMINARY
Rogers Cory Partnership



NOTES

KEY

Barratt

Hook Lane
Westergate
West Sussex

PROPOSED SURFACE
WATER CATCHMENT
LAYOUT

BSO/E4462/015

PRELIMINARY

Rogers Cory Partnership

Appendix (F)

Micro Drainage Hydraulic Model

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	30	Add Flow / Climate Change (%)	0
M5-60 (mm)	19.000	Minimum Backdrop Height (m)	0.200
Ratio R	0.350	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	1.00
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500
Volumetric Runoff Coeff.	0.750		

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.712	4-8	0.730	8-12	0.023

Total Area Contributing (ha) = 1.465

Total Pipe Volume (m³) = 39.137

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
1.000	49.241	0.246	200.0	0.071	5.00	0.0	0.600	o	300	○
1.001	20.643	0.138	149.6	0.040	0.00	0.0	0.600	o	300	●
1.002	40.883	0.273	150.0	0.049	0.00	0.0	0.600	o	300	●
1.003	10.573	0.070	151.0	0.215	0.00	0.0	0.600	o	300	●
1.004	18.500	0.123	150.4	0.000	0.00	0.0	0.600	o	300	●
1.005	15.251	0.302	50.4	0.060	0.00	0.0	0.600	o	300	●

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.74	8.850	0.071	0.0	0.0	0.0	1.11	78.3	9.6
1.001	50.00	6.01	8.604	0.111	0.0	0.0	0.0	1.28	90.7	15.0
1.002	50.00	6.54	8.466	0.160	0.0	0.0	0.0	1.28	90.6	21.7
1.003	50.00	6.68	8.193	0.375	0.0	0.0	0.0	1.28	90.3	50.8
1.004	50.00	6.92	8.123	0.375	0.0	0.0	0.0	1.28	90.5	50.8
1.005	50.00	7.03	8.000	0.435	0.0	0.0	0.0	2.22	156.9	58.9

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
2.000	8.954	1.634	5.5	0.065	5.00	0.0	0.600	○	300	🔒
1.006	14.039	0.094	149.4	0.018	0.00	0.0	0.600	○	300	✓
1.007	46.365	0.309	150.0	0.034	0.00	0.0	0.600	○	300	✓
1.008	8.335	0.138	60.5	0.042	0.00	0.0	0.600	○	300	✓
3.000	23.292	0.155	150.0	0.077	5.00	0.0	0.600	○	150	✓
3.001	17.819	0.119	150.0	0.099	0.00	0.0	0.600	○	225	✓
3.002	20.734	0.138	150.0	0.052	0.00	0.0	0.600	○	225	✓
3.003	48.841	0.326	150.0	0.055	0.00	0.0	0.600	○	225	✓
3.004	14.808	0.099	149.6	0.000	0.00	0.0	0.600	○	225	✓
3.005	40.330	0.269	149.9	0.154	0.00	0.0	0.600	○	300	✓
3.006	7.823	0.237	33.0	0.108	0.00	0.0	0.600	○	300	✓
1.009	36.996	0.247	150.0	0.000	0.00	0.0	0.600	○	375	✓
4.000	14.120	0.094	150.0	0.059	5.00	0.0	0.600	○	150	✓
4.001	44.619	0.297	150.0	0.000	0.00	0.0	0.600	○	150	✓
4.002	9.741	0.065	150.0	0.131	0.00	0.0	0.600	○	225	✓
1.010	9.757	0.065	150.0	0.042	0.00	0.0	0.600	○	450	✓
1.011	34.546	0.230	150.0	0.094	0.00	0.0	0.600	○	450	✓

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
2.000	50.00	5.02	9.400	0.065	0.0	0.0	0.0	6.76	477.8	8.8
1.006	50.00	7.22	7.698	0.518	0.0	0.0	0.0	1.28	90.6	70.1
1.007	50.00	7.82	7.604	0.552	0.0	0.0	0.0	1.28	90.6	74.7
1.008	50.00	7.89	7.295	0.594	0.0	0.0	0.0	2.03	143.2	80.4
3.000	50.00	5.47	8.650	0.077	0.0	0.0	0.0	0.82	14.5	10.4
3.001	50.00	5.75	8.420	0.176	0.0	0.0	0.0	1.07	42.4	23.8
3.002	50.00	6.08	8.301	0.228	0.0	0.0	0.0	1.07	42.4	30.9
3.003	50.00	6.84	8.163	0.283	0.0	0.0	0.0	1.07	42.4	38.3
3.004	50.00	7.07	7.837	0.283	0.0	0.0	0.0	1.07	42.4	38.3
3.005	50.00	7.60	7.663	0.437	0.0	0.0	0.0	1.28	90.6	59.2
3.006	50.00	7.65	7.394	0.545	0.0	0.0	0.0	2.75	194.2	73.8
1.009	50.00	8.31	7.082	1.139	0.0	0.0	0.0	1.48	163.1	154.2
4.000	50.00	5.29	8.550	0.059	0.0	0.0	0.0	0.82	14.5	8.0
4.001	50.00	6.20	8.456	0.059	0.0	0.0	0.0	0.82	14.5	8.0
4.002	50.00	6.35	8.083	0.190	0.0	0.0	0.0	1.07	42.4	25.7
1.010	50.00	8.40	6.760	1.371	0.0	0.0	0.0	1.66	263.6	185.7
1.011	50.00	8.75	6.695	1.465	0.0	0.0	0.0	1.66	263.6	198.4

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
1.012	14.122	0.094	150.0	0.000	0.00	0.0	0.600	o	450	✓

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.012	50.00	8.89	6.465	1.465	0.0	0.0	0.0	1.66	263.6	198.4

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.012		9.550	6.371	9.270	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	30
Ratio R	0.350		

Online Controls for Storm

Pump Manhole: 24, DS/PN: 1.012, Volume (m³): 9.9

Invert Level (m) 6.465

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	6.6700	0.900	6.6700	1.700	6.6700	2.500	6.6700
0.200	6.6700	1.000	6.6700	1.800	6.6700	2.600	6.6700
0.300	6.6700	1.100	6.6700	1.900	6.6700	2.700	6.6700
0.400	6.6700	1.200	6.6700	2.000	6.6700	2.800	6.6700
0.500	6.6700	1.300	6.6700	2.100	6.6700	2.900	6.6700
0.600	6.6700	1.400	6.6700	2.200	6.6700	3.000	6.6700
0.700	6.6700	1.500	6.6700	2.300	6.6700		
0.800	6.6700	1.600	6.6700	2.400	6.6700		

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Storage Structures for Storm

Cellular Storage Manhole: 10, DS/PN: 1.008

Invert Level (m) 7.183 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	1700.0	0.0	0.801	0.0	0.0
0.800	1700.0	0.0			

Tank or Pond Manhole: 23, DS/PN: 1.011

Invert Level (m) 9.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	500.0	0.500	700.0

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 2
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.350
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status ON
DVD Status ON
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 30

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	15 Winter	1	0%	100/15 Summer	100/15 Summer			2
1.001	15 Winter	1	0%	30/15 Summer	100/15 Summer			4
1.002	15 Winter	1	0%	30/15 Summer				
1.003	15 Winter	1	0%	30/15 Summer	100/15 Winter			1
1.004	15 Winter	1	0%	30/15 Summer				
1.005	15 Winter	1	0%	30/15 Summer				
2.000	15 Winter	1	0%					
1.006	15 Winter	1	0%	30/15 Summer				
1.007	15 Winter	1	0%	30/15 Summer				
1.008	10080 Winter	1	0%	100/180 Winter				
3.000	15 Winter	1	0%	30/15 Summer	100/15 Summer			6
3.001	15 Winter	1	0%	30/15 Summer	100/15 Summer			6
3.002	15 Winter	1	0%	30/15 Summer				
3.003	15 Winter	1	0%	30/15 Summer				
3.004	15 Winter	1	0%	30/15 Summer				
3.005	30 Winter	1	0%	30/15 Summer				
3.006	30 Summer	1	0%	1/15 Summer				
1.009	30 Summer	1	0%	1/15 Summer				
4.000	15 Winter	1	0%	30/15 Summer	100/15 Summer			2

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
4.001	15 Winter	1	0%	30/15 Summer				
4.002	15 Winter	1	0%	30/15 Summer				
1.010	30 Summer	1	0%	1/15 Summer				
1.011	30 Summer	1	0%	1/15 Summer				
1.012	30 Summer	1	0%	1/15 Summer				

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	1	8.920	-0.230	0.000	0.12	0.0	8.7	OK
1.001	2	8.684	-0.219	0.000	0.16	0.0	12.9	OK
1.002	3	8.559	-0.206	0.000	0.21	0.0	17.7	OK
1.003	4	8.362	-0.131	0.000	0.60	0.0	39.5	OK
1.004	5	8.275	-0.148	0.000	0.51	0.0	39.6	OK
1.005	6	8.122	-0.178	0.000	0.35	0.0	45.7	OK
2.000	7	9.432	-0.268	0.000	0.03	0.0	6.2	OK
1.006	8	7.890	-0.108	0.000	0.73	0.0	54.7	OK
1.007	9	7.786	-0.117	0.000	0.68	0.0	57.7	OK
1.008	10	7.304	-0.290	0.000	0.01	0.0	0.6	OK
3.000	11	8.744	-0.056	0.000	0.70	0.0	9.8	OK
3.001	12	8.537	-0.108	0.000	0.53	0.0	20.1	OK
3.002	13	8.435	-0.091	0.000	0.65	0.0	25.1	OK
3.003	14	8.311	-0.077	0.000	0.74	0.0	30.1	OK
3.004	15	7.991	-0.071	0.000	0.81	0.0	30.0	OK
3.005	16	7.920	-0.043	0.000	0.47	0.0	39.3	OK
3.006	17	7.838	0.144	0.000	0.40	0.0	49.2	SURCHARGED
1.009	18	7.742	0.285	0.000	0.22	0.0	32.0	SURCHARGED
4.000	19	8.631	-0.069	0.000	0.55	0.0	7.3	OK
4.001	20	8.533	-0.072	0.000	0.50	0.0	7.1	OK
4.002	21	8.208	-0.100	0.000	0.59	0.0	20.7	OK
1.010	22	7.939	0.629	0.000	0.16	0.0	27.7	SURCHARGED
1.011	23	7.850	0.705	0.000	0.11	0.0	24.8	SURCHARGED
1.012	24	7.851	0.936	0.000	0.04	0.0	6.7	SURCHARGED

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

```
           Areal Reduction Factor 1.000   Additional Flow - % of Total Flow 0.000
                 Hot Start (mins)     0       MADD Factor * 10m³/ha Storage 2.000
               Hot Start Level (mm)   0                  Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
   Foul Sewage per hectare (l/s) 0.000

            Number of Input Hydrographs 0 Number of Storage Structures 2
              Number of Online Controls 1 Number of Time/Area Diagrams 0
             Number of Offline Controls 0 Number of Real Time Controls 0
```

Synthetic Rainfall Details

```
              Rainfall Model              FSR     Ratio R 0.350
                     Region England and Wales Cv (Summer) 0.750
                 M5-60 (mm)            19.000 Cv (Winter) 0.840

         Margin for Flood Risk Warning (mm)                     300.0
                        Analysis Timestep 2.5 Second Increment (Extended)
                                 DTS Status                        ON
                                 DVD Status                        ON
                             Inertia Status                       OFF


                   Profile(s)                          Summer and Winter
          Duration(s) (mins)    15, 30, 60, 120, 180, 240, 360, 480, 600,
                                   720, 960, 1440, 2160, 2880, 4320, 5760,
                                                         7200, 8640, 10080
      Return Period(s) (years)                                1, 30, 100
           Climate Change (%)                                   0, 0, 30

                   Return Climate   First X       First Y    First Z  O/F  Lvl
  PN      Storm    Period  Change  Surcharge       Flood     Overflow Act. Exc.

1.000  15 Winter     30      0% 100/15 Summer 100/15 Summer                   2
1.001  15 Winter     30      0%  30/15 Summer 100/15 Summer                   4
1.002  15 Winter     30      0%  30/15 Summer
1.003  15 Winter     30      0%  30/15 Summer 100/15 Winter                   1
1.004  15 Winter     30      0%  30/15 Summer
1.005  15 Winter     30      0%  30/15 Summer
2.000  15 Winter     30      0%
1.006  15 Winter     30      0%  30/15 Summer
1.007  15 Winter     30      0%  30/15 Summer
1.008 480 Winter     30      0% 100/180 Winter
3.000  15 Winter     30      0%  30/15 Summer 100/15 Summer                   6
3.001  15 Winter     30      0%  30/15 Summer 100/15 Summer                   6
3.002  15 Winter     30      0%  30/15 Summer
3.003  15 Winter     30      0%  30/15 Summer
3.004  15 Winter     30      0%  30/15 Summer
3.005  15 Winter     30      0%  30/15 Summer
3.006  15 Winter     30      0%   1/15 Summer
1.009  15 Winter     30      0%   1/15 Summer
4.000  15 Winter     30      0%  30/15 Summer 100/15 Summer                   2
```

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

```
                     Return Climate    First X         First Y     First Z  O/F  Lvl
   PN       Storm    Period Change    Surcharge         Flood      Overflow Act. Exc.

  4.001  15 Winter     30       0%   30/15 Summer
  4.002  15 Summer     30       0%   30/15 Summer
  1.010  15 Summer     30       0%    1/15 Summer
  1.011  15 Summer     30       0%    1/15 Summer
  1.012  15 Summer     30       0%    1/15 Summer

                        Water             Flooded                   Pipe
                 US/MH  Level  Surch'ed   Volume   Flow / O'flow  Flow
           PN    Name    (m)   Depth (m)   (m³)    Cap.    (l/s)  (l/s)     Status

          1.000      1 9.001    -0.149    0.000    0.29     0.0   21.2          OK
          1.001      2 8.977     0.073    0.000    0.46     0.0   36.1 SURCHARGED
          1.002      3 8.937     0.171    0.000    0.56     0.0   47.3 SURCHARGED
          1.003      4 8.886     0.373    0.000    1.30     0.0   86.1 SURCHARGED
          1.004      5 8.769     0.386    0.000    0.99     0.0   77.2 SURCHARGED
          1.005      6 8.652     0.391    0.000    0.70     0.0   92.1 SURCHARGED
          2.000      7 9.449    -0.251    0.000    0.06     0.0   20.1          OK
          1.006      8 8.474     0.476    0.000    1.83     0.0  111.8 SURCHARGED
          1.007      9 8.251     0.348    0.000    1.46     0.0  124.3 SURCHARGED
          1.008     10 7.441    -0.154    0.000    0.12     0.0   11.4          OK
          3.000     11 9.834     1.034    0.000    1.22     0.0   16.7 FLOOD RISK
          3.001     12 9.622     0.977    0.000    0.90     0.0   34.0 SURCHARGED
          3.002     13 9.526     1.000    0.000    1.15     0.0   44.2 SURCHARGED
          3.003     14 9.348     0.900    0.000    1.34     0.0   54.4 SURCHARGED
          3.004     15 8.817     0.755    0.000    1.54     0.0   57.3 SURCHARGED
          3.005     16 8.659     0.896    0.000    1.01     0.0   85.0 SURCHARGED
          3.006     17 8.377     0.683    0.000    0.91     0.0  111.2 SURCHARGED
          1.009     18 8.170     0.713    0.000    0.32     0.0   46.6 SURCHARGED
          4.000     19 8.879     0.179    0.000    1.18     0.0   15.6 SURCHARGED
          4.001     20 8.745     0.140    0.000    1.11     0.0   15.6 SURCHARGED
          4.002     21 8.417     0.109    0.000    1.58     0.0   54.3 SURCHARGED
          1.010     22 8.305     1.094    0.000    0.24     0.0   39.5 SURCHARGED
          1.011     23 8.328     1.183    0.000    0.17     0.0   38.6 SURCHARGED
          1.012     24 8.328     1.413    0.000    0.04     0.0    6.7 SURCHARGED
```

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.350
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 30

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	15 Winter	100	+30%	100/15 Summer	100/15 Summer			2
1.001	15 Winter	100	+30%	30/15 Summer	100/15 Summer			4
1.002	15 Summer	100	+30%	30/15 Summer				
1.003	15 Winter	100	+30%	30/15 Summer	100/15 Winter			1
1.004	15 Winter	100	+30%	30/15 Summer				
1.005	15 Winter	100	+30%	30/15 Summer				
2.000	15 Winter	100	+30%					
1.006	15 Winter	100	+30%	30/15 Summer				
1.007	15 Winter	100	+30%	30/15 Summer				
1.008	720 Winter	100	+30%	100/180 Winter				
3.000	30 Winter	100	+30%	30/15 Summer	100/15 Summer			6
3.001	15 Winter	100	+30%	30/15 Summer	100/15 Summer			6
3.002	15 Summer	100	+30%	30/15 Summer				
3.003	15 Summer	100	+30%	30/15 Summer				
3.004	15 Winter	100	+30%	30/15 Summer				
3.005	15 Winter	100	+30%	30/15 Summer				
3.006	15 Winter	100	+30%	1/15 Summer				
1.009	15 Winter	100	+30%	1/15 Summer				
4.000	15 Winter	100	+30%	30/15 Summer	100/15 Summer			2

```
100 year Return Period Summary of Critical Results by Maximum Level (Rank
                              1) for Storm

                   Return Climate    First X        First Y     First Z  O/F  Lvl
     PN     Storm   Period Change    Surcharge       Flood     Overflow Act. Exc.

   4.001  15 Winter    100    +30%   30/15 Summer
   4.002  15 Winter    100    +30%   30/15 Summer
   1.010  15 Winter    100    +30%    1/15 Summer
   1.011  15 Winter    100    +30%    1/15 Summer
   1.012  15 Winter    100    +30%    1/15 Summer

                        Water               Flooded                Pipe
                 US/MH  Level   Surch'ed    Volume  Flow / O'flow  Flow
            PN    Name    (m)   Depth (m)    (m³)    Cap.   (l/s)  (l/s)    Status

         1.000       1 10.200      1.050    0.070   0.38     0.0   28.3        FLOOD
         1.001       2 10.106      1.202    5.873   0.83     0.0   65.7        FLOOD
         1.002       3 10.130      1.364    0.000   0.72     0.0   60.3   FLOOD RISK
         1.003       4 10.101      1.607    0.731   1.88     0.0  111.6        FLOOD
         1.004       5  9.946      1.523    0.000   1.38     0.0  107.9   SURCHARGED
         1.005       6  9.743      1.443    0.000   0.98     0.0  128.8   SURCHARGED
         2.000       7  9.466     -0.234    0.000   0.11     0.0   33.9           OK
         1.006       8  9.446      1.448    0.000   2.20     0.0  165.8   SURCHARGED
         1.007       9  8.972      1.069    0.000   2.10     0.0  176.4   SURCHARGED
         1.008      10  7.714      0.119    0.000   0.24     0.0   21.9   SURCHARGED
         3.000      11 10.009      1.209    8.509   2.63     0.0   36.0        FLOOD
         3.001      12  9.984      1.320   14.423   1.59     0.0   60.1        FLOOD
         3.002      13 10.070      1.544    0.000   1.55     0.0   59.5   SURCHARGED
         3.003      14 10.073      1.665    0.000   1.53     0.0   61.9   SURCHARGED
         3.004      15  9.849      1.787    0.000   1.72     0.0   83.9   SURCHARGED
         3.005      16  9.736      1.773    0.000   1.33     0.0  111.7   SURCHARGED
         3.006      17  9.241      1.547    0.000   1.33     0.0  162.5   SURCHARGED
         1.009      18  8.809      1.352    0.000   0.32     0.0   47.7   SURCHARGED
         4.000      19  9.901      1.201    0.515   1.68     0.0   21.8        FLOOD
         4.001      20  9.714      1.108    0.000   1.76     0.0   24.7   FLOOD RISK
         4.002      21  9.311      1.002    0.000   2.14     0.0   75.4   SURCHARGED
         1.010      22  8.990      1.780    0.000   0.32     0.0   54.8   SURCHARGED
         1.011      23  9.002      1.857    0.000   0.23     0.0   52.8   SURCHARGED
         1.012      24  9.008      2.093    0.000   0.04     0.0    5.7   SURCHARGED
```

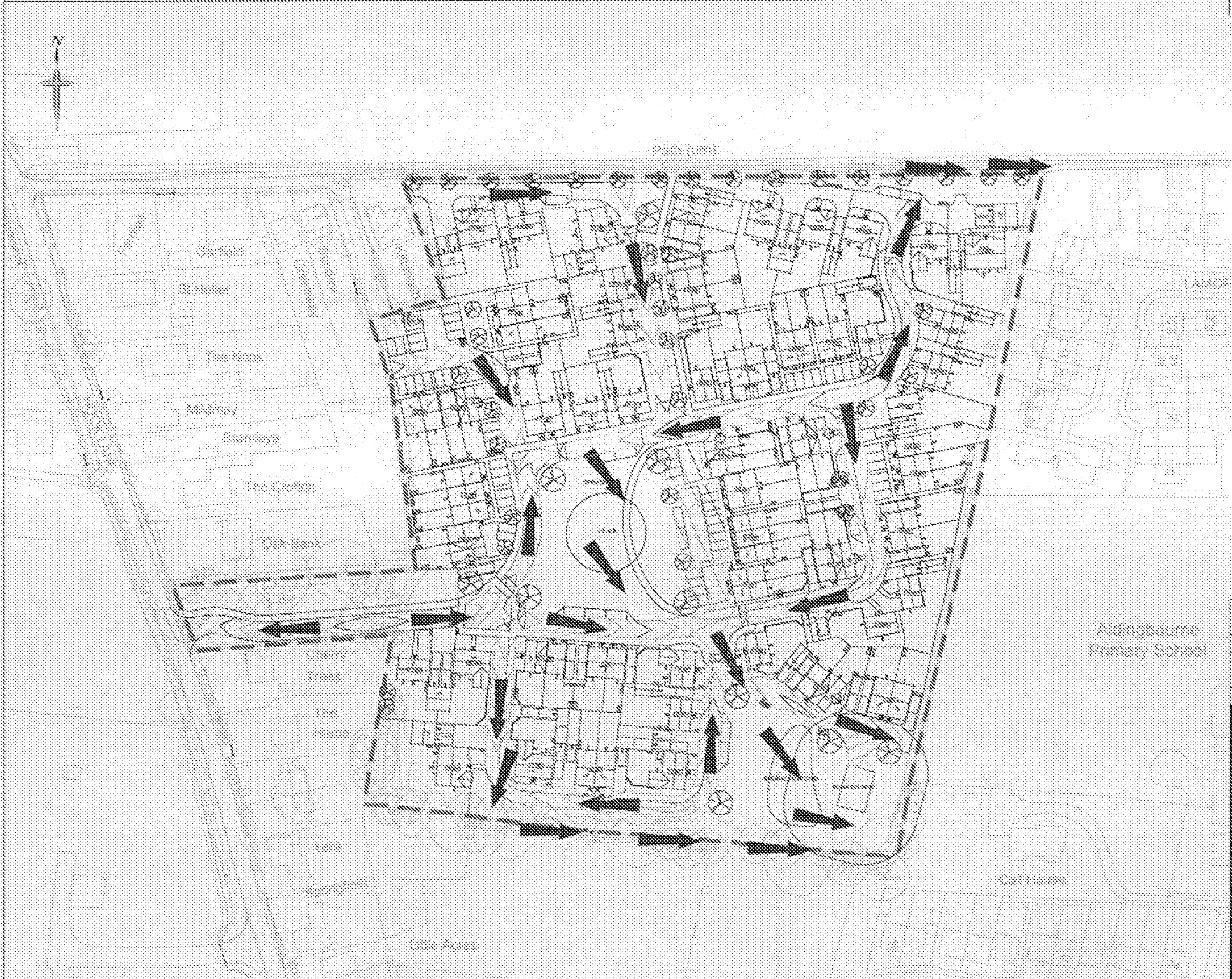
flood voume contained in area of low risk

User Report S:\Clients\BARRATT SOUTHAMPTON\4462 - Hook Lane, Westergate, West Sussex\02 - ENGINEERS\01 - RCP DESIGN\03 - WINDES\sw1.spdx for Storm

PN	Discharge Volume (m³)	PN	Discharge Volume (m³)	PN	Discharge Volume (m³)
1.000	48.868	1.007	379.800	3.006	374.307
1.001	76.406	1.008	-293.171	1.009	74.943
1.002	110.118	3.000	52.996	4.000	40.605
1.003	258.080	3.001	121.143	4.001	40.610
1.004	258.033	3.002	156.912	4.002	130.764
1.005	299.281	3.003	194.760	1.010	229.131
2.000	44.733	3.004	194.808	1.011	290.463
1.006	356.343	3.005	300.773	1.012	293.597

Appendix (G)

Exceedance Flow Paths



NOTES

KEY

Hook Lane
Westergate
West Sussex

EXCEEDANCE FLOW LAYOUT

BSO/E4462/016A

PRELIMINARY

Appendix (H)

Southern Water Capacity Assessment

Southern
Water

INFRASTRUCTURE ASSESSMENT FOR FOUL DRAINAGE AT

HOOK LANE
WESTERGATE
WEST SUSSEX
PO20 3TE

07TH APRIL 2016

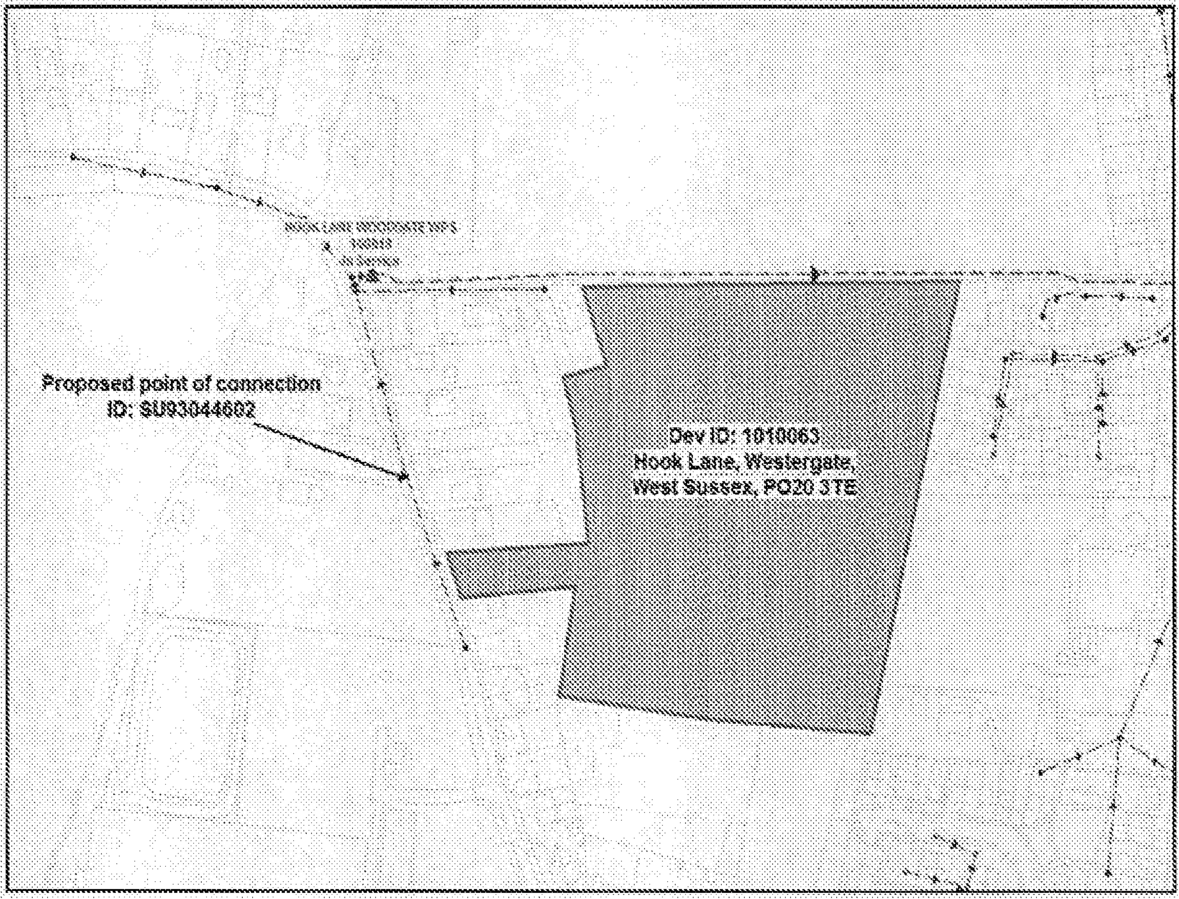
REQUESTED:

ROGERS CORY PARTNERSHIP LIMITED

I. Development Details:

The proposal is to discharge foul flow from the proposed development to the local foul sewerage systems at manhole reference SU93044602 which is located in Hook Lane, 41m west from the development site.

Figure 1 - Proposed Development



II. Results and Conclusions:

Foul Water:

There is currently inadequate capacity within the existing foul sewerage network to accommodate the additional foul flow from the proposed development site. The proposed development would increase flows to the local network and as a result existing properties and land may be subject to a greater risk of flooding. Remedial work will be required to provide sufficient capacity to service the proposed development. Details are shown in Figures 2 and Table 1.

The nearest point where capacity is currently available is at Lidsey Waste Water Treatment Works, located approximately 2.5 km south east of the proposed development site. Section 98 of the Water Industry Act 1991 provides a legal mechanism through which the appropriate infrastructure can be requested (by the developer) and provided to drain a specific location.

Surface Water:

As a surface water capacity check has not been requested it is assumed that Surface Water will be disposed of by alternative means i.e. soakaways or any local drainage watercourses, subject to all interested parties approval.

Figure 2- Proposed Improvements – Foul system

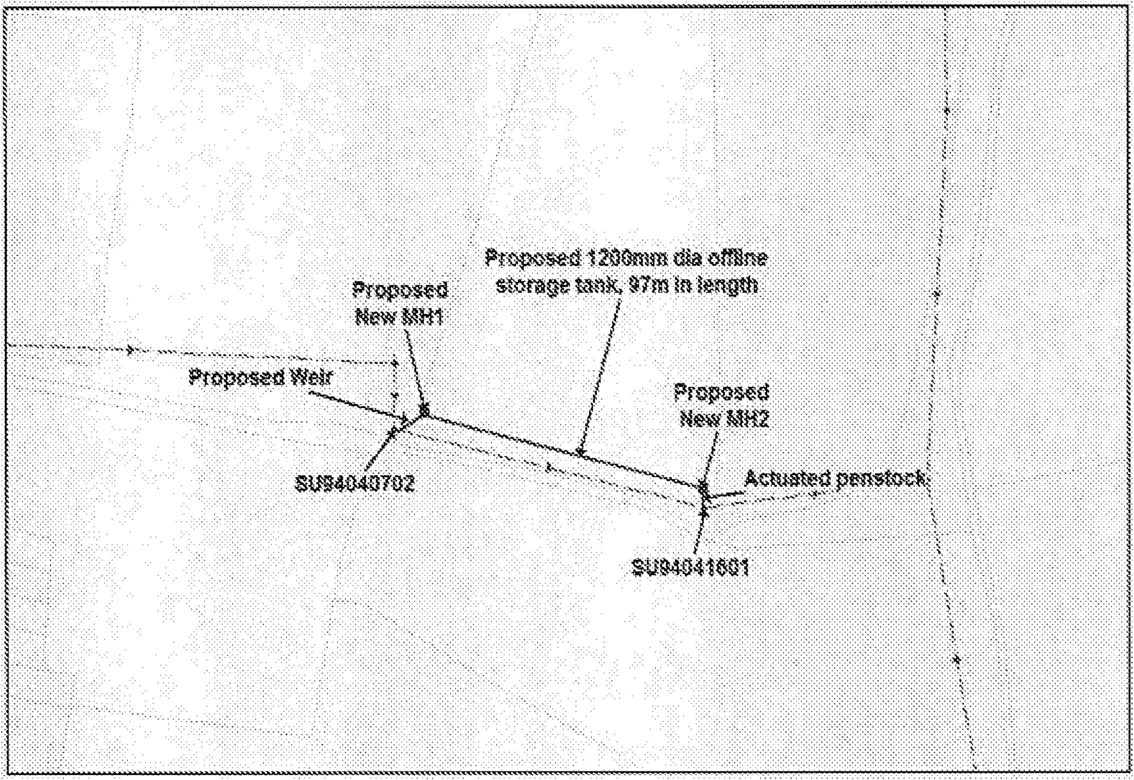


Table 2 - Proposed Improvements Schedule

U/S Manhole	D/S Manhole	Sewer Diameter (mm)		Avg. Depth (m)	Length (m)
		Existing	Proposed		
SU94040702	New MH1		Weir at 2.24m AOD		
New MH1	New MH2		Actuated Penstock		
New MH2	SU94041601		1200 offline storage tank	1.95	97

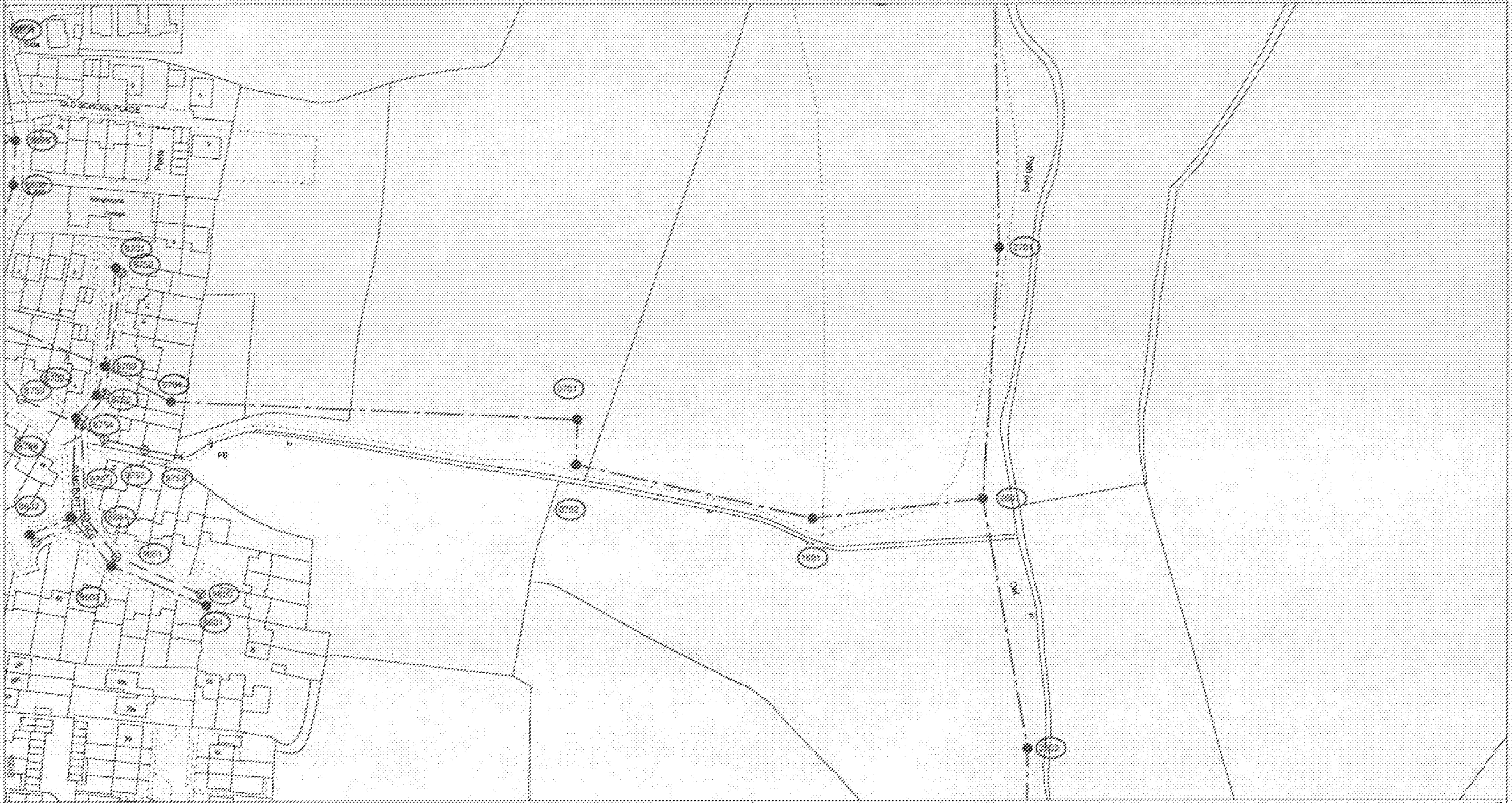
Note: connection from off-line tank to MH SU94041601 via actuated penstock controlled by downstream telemetry

Before any connections are made, an application form needs to be completed and approved by Southern Water Services.

Please note: - The information provided above does not grant approval for any designs /drawings submitted for the capacity analysis. The results are an indicative hydraulic assessment and should not be used as a basis for design. The results quoted above are only valid for 12 months from the date of issue of this letter.

PUBLIC SEWER RECORD

SOUTHERN WATER



[illegible]

[illegible]

O.S. REF: SU9404NW

Scale: 1:1250

Sewer Plot

[illegible]

[illegible]

Southern Water

Printed By: sietrob

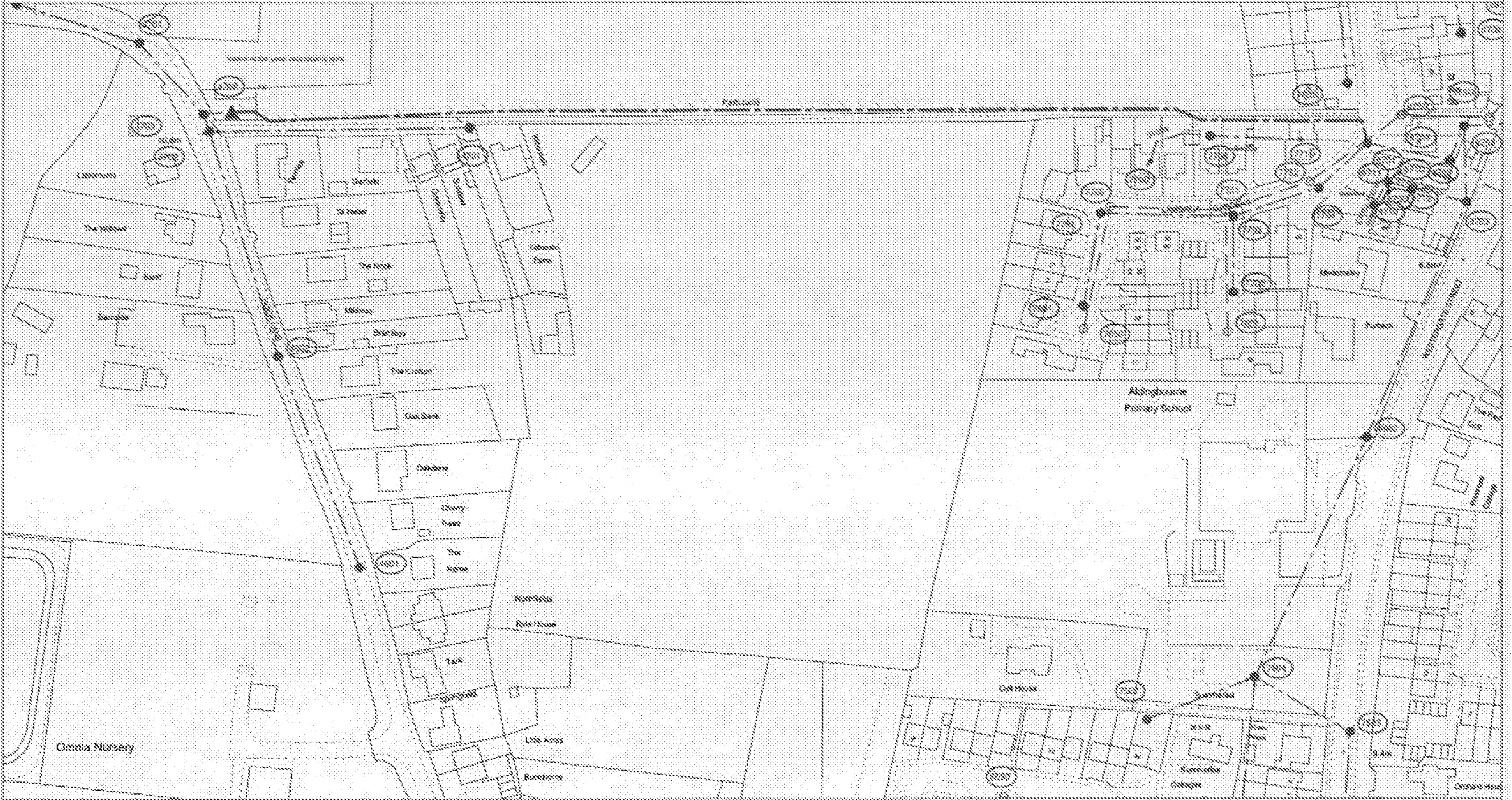
Date: 30-3-2016

Southern Water MapGuide Browser

Requested By:

Sewer Record Extract

SOUTHERN WATER



[illegible]

[illegible]

O.S. REF: SU9304NE

Scale: 1:1250

Sewer Plot

[illegible]

[illegible]

Southern Water

Printed By: sierrob

Date: 30-3-2016

Southern Water MapGuide Browser

Requested By:
Sewer Record Extract

Appendix (I)

Proposed SuDS Maintenance Schedule

Land East of Hook Lane, Westergate

West Sussex

OWNERS MANUAL

Relating to Surface Water Drainage Maintenance

BSO/E4462/16108

The site has been designed in accordance with Sustainable Drainage Systems (SUDS) techniques.

The SUDS Manual (CIRIA C697) states that "Sedimentation is one of the primary removal mechanisms in SUDS. Most pollution in runoff is attached to sediment particles and therefore removal of sediment results in a significant reduction in pollutant loads".

In order to remove sedimentation the surface water drainage design utilises deep seal trapped gullies throughout, catchpit manholes upstream of the surface water storage/infiltration devices and distribution tanks within the permeable paved areas.

Detailed drawings are attached for the permeable paving, cellular infiltration blankets and distribution tanks

CONTENTS

1) Explanation of the Surface Water Drainage System

2) Maintenance Schedule for permeable paving and distribution tanks

3) Maintenance Schedule for cellular infiltration blankets

4) Reasons for Maintenance

1) Explanation of the Surface Water Drainage System

The Principle of SUDs has been adopted for the whole of the site, calculations have been carried out using MicroDrainage with a storm return period of 100 years and an allowance of 30% for climate change.

Generally roof water drains direct to the domestic drainage system within each curtilage and from there will be directed to the below ground surface water network which will eventually discharge to the existing ordinary watercourse via a surface water pumping station.

Hardstanding areas and access roads or drives, drain to trapped gullies. All of these systems outfall to the surface water drainage system within the site.

The parking bays within the site are proposed to be lined permeable paving systems to provide a level of pre-treatment of surface water prior to discharging to the below ground surface water network.

Attenuation of the surface water flows is proposed using below ground cellular storage tanks as well as a SuDS attenuation basin at the south eastern corner of the site.

The final discharge from the site will be passed via a petrol interceptor to provide the required level of treatment in accordance with the SuDS manual Ciria C753.

Maintenance of the surface water pumping system and petrol interceptor will be in accordance with the manufacturers recommendations.

2) Maintenance Schedule for permeable paving

Maintenance Schedule	Required Action	Frequency
Regular maintenance	Brushing & vacuuming	Three times/year at end of winter, mid-summer, after autumn leaf fall, or as required based on site-specific observations of clogging or manufacturers' recommendations.
Occasional maintenance	Stabilise and mow contributing and adjacent areas.	As required.
	Removal of weed.	As required.
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving.	As required.
	Remedial work to any depression's, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users.	As required.
	Rehabilitation of surface and upper sub-structure.	As required (if infiltration performance is reduced as a result of significant clogging).
Monitoring	Initial Inspection	Monthly for 3 months after installation.
	Inspect for evidence of poor operation and/or weed growth. If required take remedial action.	3-monthly, 48h after large storms.
	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually.
	Monitor inspection chambers.	Annually.

3) Maintenance Schedule for catchpits and gullies

Maintenance Schedule	Required Action	Recommended Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly
	Debris removal from catchment surface (where may cause risks to performance)	Monthly
	Remove sediment and oil deposits from all trapped gullies.	Annually, or as required.
	Remove sediment structures upstream of the cellular storage tanks.	Annually, or as required.
Remedial actions	Repair/rehabilitation of inlets, outlets, overflows and vents.	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually and after large storms

4) Cellular storage

Maintenance Schedule	Required Action	Recommended Frequency
Regular	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly.
	Debris removal from catchment surface (where may cause risks to performance)	Monthly

maintenance	Inspect catchpits and clear silt / debris as necessary	Monthly for 3 months, then six monthly.
Remedial actions	Repair/rehabilitation of inlets, outlets, overflows and vents.	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually and after large storms

5) Detention basin operation and maintenance requirements

Maintenance Schedule	Required Action	Recommended Frequency
Regular maintenance	Litter and debris removal.	Monthly
	Grass cutting – for spillways and access routes.	Monthly (during growing season), or as required.
	Grass cutting – meadow grass in and around basin.	Half yearly (spring before nesting season, and autumn).
	Manage other vegetation and remove nuisance plants.	Monthly (at start, then as required).
	Tidy all dead growth before start of growing season.	Annually.
	Remove sediment from inlets, outlet and forebay.	Annually (or as required).
Occasional maintenance	Re-seed areas of poor vegetation growth.	Annually (or as required).
	Prune and trim trees and remove cuttings.	2 years (or as required).

Remedial actions	Repair of erosion or other damage by re-turfing or reseeding.	As required
	Re-level uneven surfaces and reinstate design levels.	As required.
	Repair/rehabilitation of inlets, outlets and overflows.	As required.
Monitoring	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly/ after large storms.
	Inspect banksides, structures, pipework etc. for evidence of physical damage.	Monthly/ after large storms.
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Half yearly.
	Check flow control device and other mechanical devices.	Half yearly.

6) Reasons for Maintenance

Surface water contains variable amounts of sediment which settles out at certain locations and could cause blockages if left.

Road gullies also trap oil and prevent it entering the surface water sewer system.