Wormald Burrows Partnership Limited
Civil Engineering Consultants

HAVERHILL NORTH
SUFFOLK

DRAINAGE STRATEGY

JANUARY 2019

E3838-Haverhill-Drainage Strategy-Rev1

12a – 18a Hitchin Street Biggleswade, SG18 8AX
Web: http://www.wormburp.com
Tel: (01767) 317 244 Fax: (01767) 325 434
Email: engineer@wormburp.com

HAVERHILL NORTH
SUFFOLK

DRAINAGE STRATEGY

Client: PERSIMMON HOMES (SUFFOLK) LIMITED

Engineer: Wormald, Burrows Partnership Limited
12a – 18a Hitchin Street
Biggleswade
Bedfordshire SG18 8AX
Tel: (01767) 317 244
Fax (01767) 315 434

Date: January 2019

Original Ref: E3838-Haverhill-Drainage Strategy-Rev0

Written By:	Checked By:	Approved By:
[redacted]	[redacted]	[redacted]
Tom Wilson *Director*	Nick Kohli *Managing Director*	Nick Kohli *Managing Director*

Status: Final

REGISTRATION OF AMENDMENTS

Revision	Date	Amendment Details	Prepared by	Checked by
Rev 1	14/02/21	Layout changes to drawings affecting Appendices B, D & E	Nick Kohli	Tom Wilson
Rev 0	15/01/19	First Issue	Tom Wilson	Nick Kohli

CONTENTS

APPENDICES

1 INTRODUCTION

1.1.1 Wormald Burrows Partnership Limited (WBPL) has been appointed by Persimmon Homes (Suffolk) Limited to prepare and Foul and Surface water Drainage Strategy for a proposed residential development to the north of Haverhill.

1.1.2 The strategy, where possible, follows the details set out in the approved Flood Risk Assessment prepared by MLM, dated September 2010, which formed part of the outline planning application.

1.1.3 The drainage strategy provided in this report sets out how the proposals will not increase off-site flood risk and has been designed in accordance with the Suffolk County Council Surface Water Drainage (SUDS) Guidance Document dated May 2018.

2 SITE DESCRIPTION

2.1 Site Context

2.1.1 The site is located to the north west of Haverhill, approximately 1.2 kilometres north of Haverhill Town Centre and occupies an area of approximately 49.5 Hectares.

2.1.2 This is predominately greenfield and has a number of watercourse running north to south towards Stour Brook, which ultimately discharges into the River Stour to the south east of Haverhill.

2.1.3 The site is bound to the north by the proposed northern relief road (which is currently at the detailed design stage and will be under construction shortly), to the south by the existing residential developments and to the east and west by agricultural land.

2.1.4 Phase 1 of the proposed development is currently under construction, which is located immediately east of the proposed development.

2.1.5 A location plan is provided in **Appendix A**.

2.2 Topography

2.2.1 The topographical survey for the site was undertaken by Survey Solutions in November 2017. This indicates a number of steep valleys within the development, each with watercourses running within them. The site generally falls from North to South with a high point of around 102.9m AOD centrally along the northern boundary to a low point of 82.40m AOD in the south west corner.

2.3 Geology

2.3.1 Inspection of the Site Investigation Report prepared by Geosphere Environmental Limited dated December 2014, confirms that the site is generally underlain by the Lowestoft Formation, which was underlain by the Undifferentiated Lewes nodular and Seaford Chalk formations.

2.3.2 Percolation testing was carried out at various locations across the site, which confirms that infiltration techniques for surface water disposal are not possible.

2.3.3 Extracts from the report are attached in **Appendix F**, these include the executive summary, borehole logs and percolation test results.

2.4 Site Proposals

2.4.1 The proposals consist of up to 850 residential dwellings, with associated highways and drainage infrastructure., a local centre, allotments and a primary school. The main access will be taken from the northern relief road and will also connect up a number of local roads, such as Hales Barn Road, Ann Suckling Road and Howes Road.

2.4.2 As mentioned above, Phase 1 of the proposed development is currently under construction and has its own separate foul and surface water drainage outfalls.

3 SURFACE WATER DRAINAGE STRATEGY

3.1.1 The proposed development will lead to an increase in impermeable area and as such will increase the volume of surface water run-off from the site unless properly managed.

3.1.2 The Sustainable Drainage Systems (SuDS) hierarchy requires that surface water run-off is controlled and preferably re-used wherever possible. Where it is not practicable to reuse, the following methods of disposal shall be considered (in order of preference)

- Via Infiltration
- To a local watercourse
- To existing public sewers

3.1.3 Following a review of the existing geology (See Section 2.3) it is unlikely that any of the site is suitable for infiltration and therefore this option has been discounted. There are however a number of existing watercourses which pass through the site from the north. It is proposed that these are utilised as the main point of discharge.

3.1.4 Review of the site levels and development proposals and phasing has led to the site being split into four separate catchments, all with their own outfalls, flow controls and associated attenuation features.

3.1.5 The SCC SuDS Guidance provides options for the discharge of surface water from the site:

- Option 1 – simple control, use Qbar for discharge of surface water runoff.
- Complex – use greenfield rates and long term storage for the discharge of surface water runoff.

3.1.6 The proposed surface water strategy is based on Option 1, simple control. The greenfield runoff rates have been calculated using the ICP SuDS method within Microdrainage. Details of the Qbar rates are indicated in the table below and supporting calculations and drawings are included in **Appendix B and C**.

Catchment	Catchment Area (Ha)	Qbar (litres/second)
Catchment 1	5.322	15.1
Catchment 2	2.553	7.3
Catchment 3	2.615	7.4
Catchment 4	12.873	36.6

3.1.7 Each of the catchment areas has its own flow control and attenuation facilities, where possible these are above ground dry ponds, with the exception of Catchment 2, which contains the local centre. This catchment has underground geocellular tank.

3.1.8 The Suffolk SuDS Guidance requires the drainage systems should be designed to incorporate a number of surface water treatment stages based on the level of pollution entering the system. The guide states that a minimum of one treatment stage is required for runoff from roofs and two stages for runoff from roads and parking areas.

3.1.9 Deep trapped gullies will provide an initial stage of treatment to highways and large parking areas, especially during the more polluting low intensity storms. All flows will then pass through the balancing ponds prior to discharge into the existing watercourses.

3.1.10 There will also be options to explore additional treatment stages within the parcels such as filter strips, filter trenches and permeable paving.

3.1.11 The surface water drainage strategy, indicating the proposed piped network and attenuation facilities is depicted on drawings E3838/500A–508A in **Appendix D**.

3.1.12 The four drainage networks have been modelled using the Microdrainage Windes software for a 100 year event with a 40% allowance for climate change, results from the simulations area included in **Appendix E**.

3.1.13 It is essential that any SuDS feature is properly maintained to remain effective over the lifespan on the development, a maintenance schedule in included within **Appendix G**, which sets out the type of maintenance require and the frequency.

4 FOUL WATER DRAINAGE STRATEGY

4.1.1 A pre-development report has been obtained from Anglian Water, which provides details on proposed connection points and capacity within the existing public sewer network.

4.1.2 The findings of this report confirm that the Haverhill Water Recycling Centre has sufficient capacity to treat the proposed flows generated from the site, but a direct connection to the existing public sewer network could have a detrimental effect and the need for hydraulic modelling is required.

4.1.3 Results of the hydraulic modelling are awaited.

4.1.4 The onsite foul water network will be directed to a new pumping station located along the southern boundary. The final discharge point is yet to be confirmed.

5 CONCLUSIONS

5.1.1 Surface water will be attenuated onsite and disposed of via proprietary flow control devices to existing watercourses at existing greenfield rates.

5.1.2 Percolation testing has confirmed that the use of infiltration techniques for the disposal of surface water in not feasible.

5.1.3 Discharge rates will be limited to the Qbar values in accordance with SCC guidance.

5.1.4 Due to the undulating nature of the site, careful consideration should be given to the proposed site levels in accordance with normal good practice to ensure that there is no likelihood of flooding caused by overland flow and that any overland flow is directed around buildings in the event of an failure to the piped drainage system.

5.1.5 Further opportunities should be explored to incorporate SuDS into he development parcels where practicable.

APPENDICES

Appendix A

SITE

Rev	Description	Date	Drawn	Checked

Drawing Approval Status:-

N/A Section 104 N/A Section 38 N/A Section 278

FOR COMMENT

Wormald Burrows Partnership Ltd
Civil Engineering Consultants
12a - 18a Hitchin Street, Biggleswade, SG18 8AX
Tel: (01767) 317244 Fax: (01767) 315434
Web: www.wormburn.com
Email: engineer@wormburn.com

Certified by Afnor UK

Scale: 1:2500 @ A1
1:5000 @ A3

Project: Haverhill North

Drawing Description: Location Plan

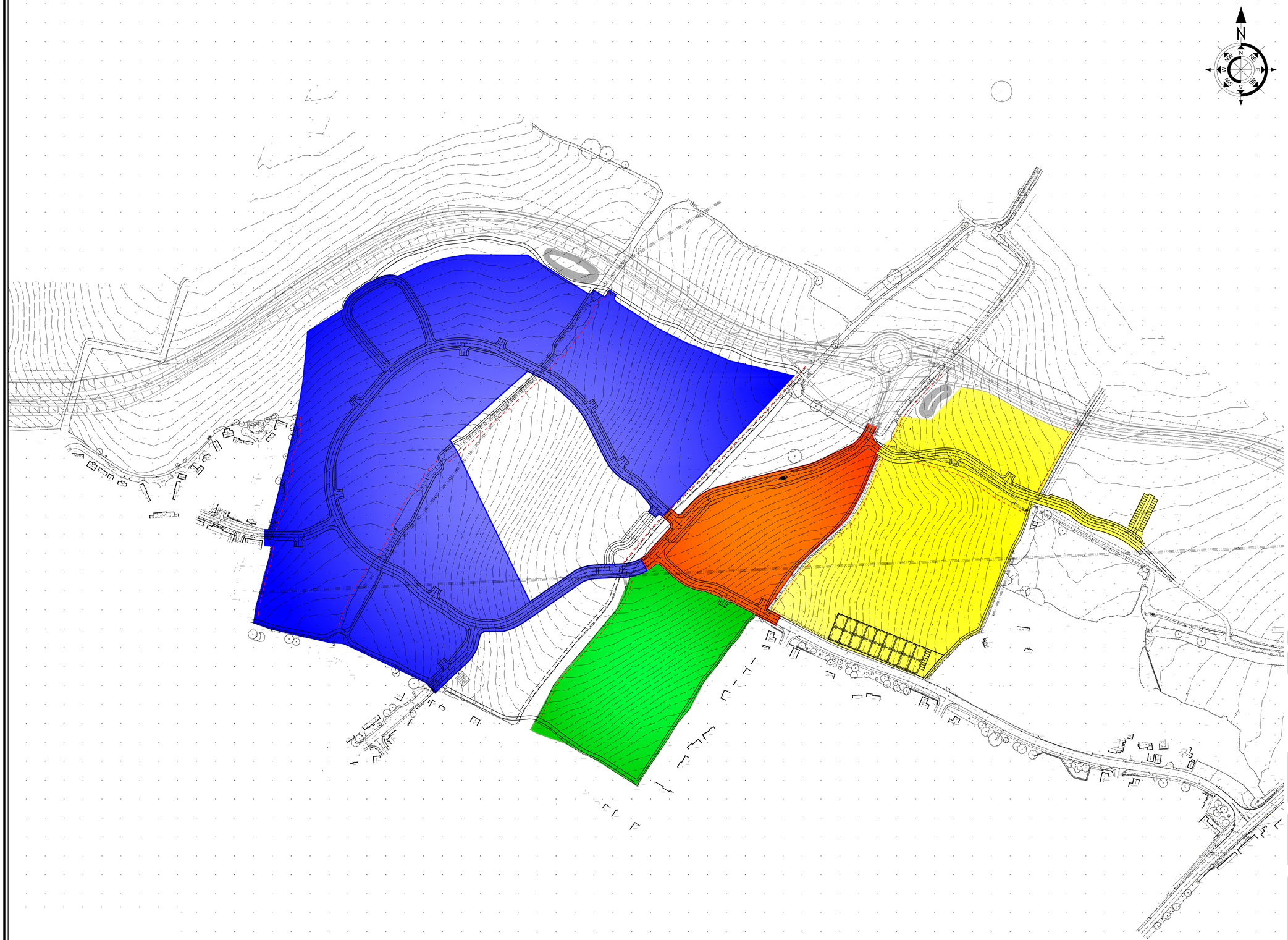
Drawing Number: E3838/100

Client: PERSIMMON

Client Reference:

Designed By:	Drawn By:	Checked By:
Date:	Date:	Date:

Appendix B



LEGEND

- CATCHMENT AREA 1 - 5.322 Ha (Qbar - 15.1 litres/second)
- CATCHMENT AREA 2 - 2.305 Ha (Qbar - 6.5 litres/second)
- CATCHMENT AREA 3 - 2.699 Ha (Qbar - 7.7 litres/second)
- CATCHMENT AREA 4 - 12.929 Ha (Qbar - 36.7 litres/second)

Rev	Description	Date	Drawn	Checked
A	Minor adjustment to catchment areas following layout change	08:01:20	TJW	TJW

Drawing Approval Status:-

N/A Section 104 N/A Section 38 N/A Section 278

FOR INFORMATION

Wormald Burrows Partnership Ltd
Civil Engineering Consultants
12a - 18a Hitchin Street, Biggleswade, SG18 8AX
Tel: (01767) 317244 Fax: (01767) 315434
Web: www.wormburp.com
Email: engineer@wormburp.com

Project:

Haverhill, Boyton Place - Phases 2-6

Drawing Description:

Catchment Areas Plan

Client:

PERSIMMON

Persimmon Homes (Suffolk) Ltd
Orion Court
Orion Court
Great Blakenham
Suffolk IP6 0LW

Drawing Number: E3838/510/A

Client Reference:

Scale: 1:2000 @ A1
NTS @ A3

Designed By: TJW Date: 20.12.18

Drawn By: JMW Date: 03.01.19

Checked By: Date:

0 20m 100m 200m

Scale 1:2000

afaq ISO 9001 Quality — UKAS MANAGEMENT SYSTEMS 022

Certified by Afnor UK

Appendix C

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.400
Area (ha)	12.929	Urban	0.000
SAAR (mm)	600	Region Number	Region 5

Results l/s

QBAR Rural	36.7
QBAR Urban	36.7
Q100 years	130.8
Q1 year	32.0
Q30 years	88.2
Q100 years	130.8

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.400
Area (ha)	2.699	Urban	0.000
SAAR (mm)	600	Region Number	Region 5

Results l/s

QBAR Rural	7.7
QBAR Urban	7.7
Q100 years	27.3
Q1 year	6.7
Q30 years	18.4
Q100 years	27.3

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.400
Area (ha)	2.305	Urban	0.000
SAAR (mm)	600	Region Number	Region 5

Results l/s

QBAR Rural	6.5
QBAR Urban	6.5
Q100 years	23.3
Q1 year	5.7
Q30 years	15.7
Q100 years	23.3

ICP SUDS Mean Annual Flood

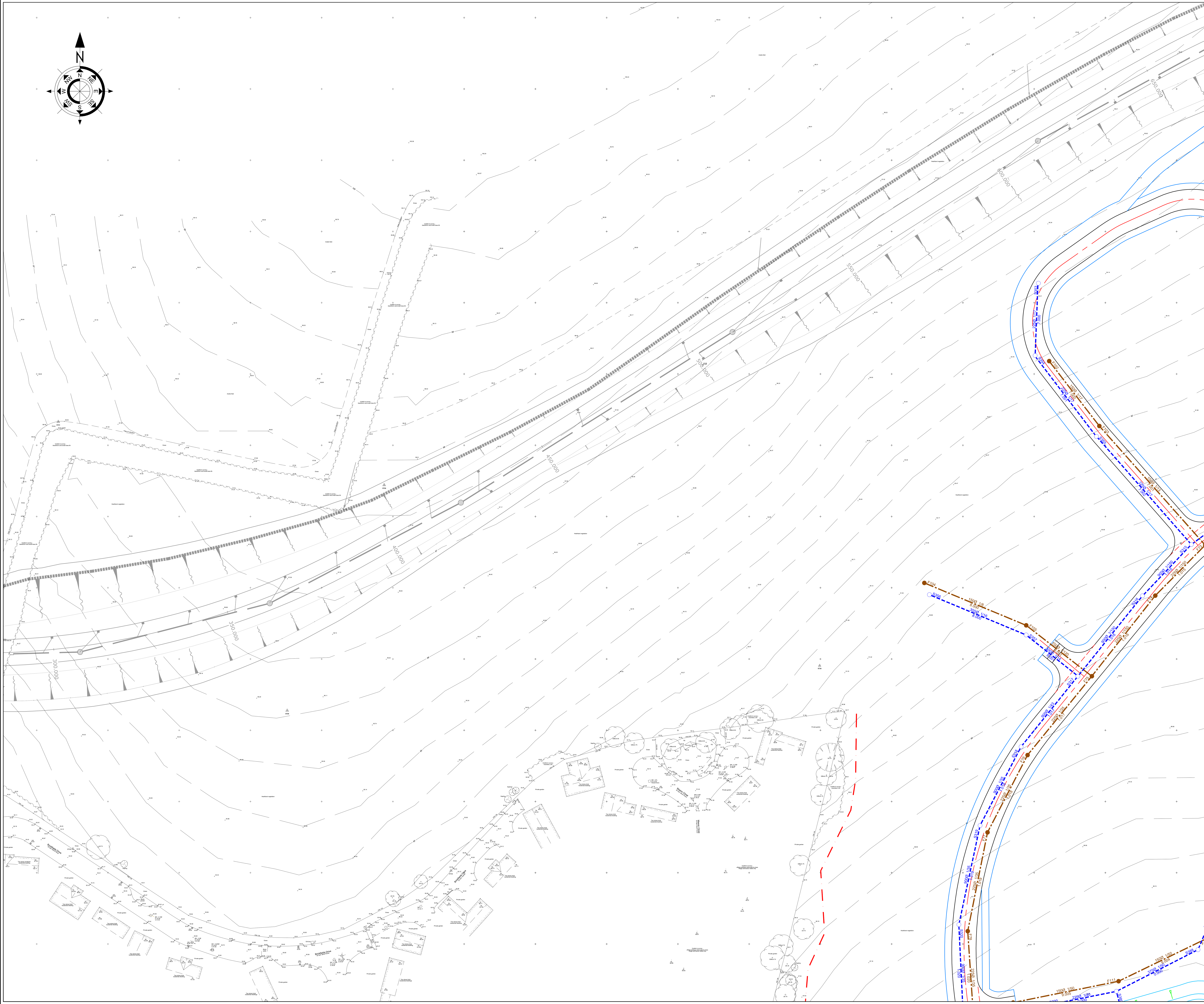
Input

Return Period (years)	100	Soil	0.400
Area (ha)	5.322	Urban	0.000
SAAR (mm)	600	Region Number	Region 5

Results l/s

QBAR Rural	15.1
QBAR Urban	15.1
Q100 years	53.8
Q1 year	13.2
Q30 years	36.3
Q100 years	53.8

Appendix D



Drainage Strategy Legend

- Proposed adoptable Foul Water Sewer
- Proposed adoptable Surface Water Sewer
- Proposed adoptable Highway Drain
- Proposed precast concrete headwall
- Proposed pond

0 5m 10m 20m 30m 40m

Scale 1:500

A	Minor updates to drainage strategy following layout changes	08.01.20	TJW	TJW
Rev	Description	Date	Drawn	Checked

Drawing Approval Status:-

N/A Section 104 N/A Section 38 N/A Section 278

FOR INFORMATION

Wormald Burrows Partnership Ltd
Civil Engineering Consultants
12a - 18a Hitchin Street, Biggleswade, SG18 8AX
Tel: (01767) 317244 Fax: (01767) 315434
Web: www.wormburp.com
Email: engineer@wormburp.com

Project:

Haverhill, Boyton Place - Phases 2-6

Drawing Description:

Drawing Strategy Plan - Sheet 8 of 8

Client:

PERSIMMON

Persimmon Homes (Suffolk) Ltd
Orion Court
Orion Court
Great Blakenham
Suffolk IP6 0LW

Drawing Number: E3838/508/A

Client Reference:

Scale: 1:500 @ A1 1:1000 @ A3

Designed By:	Drawn By:	Checked By:
TJW	JMW	
Date: 20.12.18	Date: 03.01.19	Date:

afaq ISO 9001 Quality

UKAS MANAGEMENT SYSTEMS 022

Certified by Afnor UK

Drainage Strategy Legend

- Proposed adoptable Foul Water Sewer
- Proposed adoptable Surface Water Sewer
- Proposed adoptable Highway Drain
- Proposed precast concrete headwall
- Proposed pond

0 5m 10m 20m 30m 40m

Scale 1:500

Rev	Description	Date	Drawn	Checked

Drawing Approval Status:-

N/A Section 104 N/A Section 38 N/A Section 278

FOR INFORMATION

Wormald Burrows Partnership Ltd
Civil Engineering Consultants
12a - 18a Hitchin Street, Biggleswade, SG18 8AX
Tel: (01767) 317244 Fax: (01767) 315434
Web: www.wormburp.com
Email: engineer@wormburp.com

Project:

Haverhill, Boyton Place - Phases 2-6

Drawing Description:

Drainage Strategy Plan - Sheet 7 of 8

Client:

PERSIMMON

Persimmon Homes (Suffolk) Ltd
Orion Court
Orion Court
Great Blakenham
Suffolk IP6 0LW

Drawing Number: E3838/507

Client Reference:

Scale: 1:500 @ A1
1:1000 @ A3

Designed By:	Drawn By:	Checked By:
TJW	JMW	
Date: 20.12.18	Date: 03.01.19	Date:

afaq ISO 9001 Quality — UKAS MANAGEMENT SYSTEMS 022

Certified by Afnor UK

POND 3 (dry)
Bed Level - 81.800m AOD
Bank Level - 84.200m AOD
Top Water Level - 83.777m AOD
Storage Volume - 3,077m3
Overall Cut - 5,166m3
Overall Fill - 8m3

NO ENTRY

ENTRANCE

Drainage Strategy Legend

- Proposed adoptable Foul Water Sewer
- Proposed adoptable Surface Water Sewer
- Proposed adoptable Highway Drain
- Proposed precast concrete headwall
- Proposed pond

0 5m 10m 20m 30m 40m

Scale 1:500

Rev	Description	Date	Drawn	Checked
A	Minor updates to drainage strategy following layout changes	08:01:20	TJW	TJW

Drawing Approval Status:-

N/A Section 104 N/A Section 38 N/A Section 278

FOR INFORMATION

Wormald Burrows Partnership Ltd
Civil Engineering Consultants
12a - 18a Hitchin Street, Biggleswade, SG18 8AX
Tel: (01767) 317244 Fax: (01767) 315434
Web: www.wormburp.com
Email: engineer@wormburp.com

Project:
Haverhill, Boyton Place - Phases 2-6

Drawing Description:
Drainage Strategy Plan - Sheet 6 of 8

Client:
PERSIMMON
Persimmon Homes (Suffolk) Ltd
Orion Court
Orion Court
Great Blakenham
Suffolk IP6 0LW

Drawing Number:
E3838/506/A

Client Reference:

Scale:
1:500 @ A1
1:1000 @ A3

Designed By:	Drawn By:	Checked By:
TJW	JMW	
Date: 20.12.18	Date: 03.01.19	Date:

afaq ISO 9001 Quality
UKAS MANAGEMENT SYSTEMS 022
Certified by Afnor UK

POND 3 (dry)
Bed Level - 81.800m AOD
Bank Level - 84.200m AOD
Top Water Level - 83.777m AOD
Storage Volume - 3,077m3
Overall Cut - 5,166m3
Overall Fill - 8m3

POND 4 (dry)
Bed Level - 80.900m AOD
Bank Level - 82.400m AOD
Top Water Level - 81.807m AOD
Storage Volume - 2,695m3
Overall Cut - 5,307m3
Overall Fill - 12m3

OUTFALL 4 - Catchment area 4
Maximum outflow rate - 36.7 litres/second
for all storms up to and including 100y +40% CC.

FOUL WATER PUMPING STATION

Drainage Strategy Legend

- Proposed adoptable Foul Water Sewer
- Proposed adoptable Surface Water Sewer
- Proposed adoptable Highway Drain
- Proposed precast concrete headwall
- Proposed pond

0 5m 10m 20m 30m 40m
Scale 1:500

Rev	Description	Date	Drawn	Checked
A	Minor updates to drainage strategy following layout changes	08:01:20	TJW	TJW

Drawing Approval Status:-

N/A Section 104 N/A Section 38 N/A Section 278

FOR INFORMATION

Wormald Burrows Partnership Ltd
Civil Engineering Consultants
12a - 18a Hitchin Street, Biggleswade, SG18 8AX
Tel: (01767) 317244 Fax: (01767) 315434
Web: www.wormburp.com
Email: engineer@wormburp.com

Project:
Haverhill, Boyton Place - Phases 2-6

Drawing Description:
Drainage Strategy Plan - Sheet 5 of 8

Client:
PERSIMMON
Persimmon Homes (Suffolk) Ltd
Orion Court
Orion Court
Great Blakenham
Suffolk IP6 0LW

Drawing Number:
E3838/505/A

Client Reference:

Scale:
1:500 @ A1
1:1000 @ A3

Designed By:	Drawn By:	Checked By:
TJW	JMW	
Date: 20.12.18	Date: 03.01.19	Date:

afaq ISO 9001 Quality — UKAS MANAGEMENT SYSTEMS 022
Certified by Afnor UK

ENTRANCE

TANK 1 (35x30x1.6m)
Invert Level - 88.262m AOD
Soffit Level - 89.862m AOD
Storage Volume - 1,596m3

POND
Bed Level - 8
Bank Level - 9
Top Water Level
Maximum Storage
Overall Cut
Overall Fi

POND 2 (dry)
Bed Level - 83.500m AOD
Bank Level - 85.000m AOD
Top Water Level - 84.494m AOD
MaximumStorage Volume - 946m3
Overall Cut - 1,863m3
Overall Fill - 61m3

OUTFALL 1 - Catchment are
Maximum outflow rate - 15.1 l
for all storms up to and includ

OUTFALL 2 - Catchment area 2
Maximum outflow rate - 6.5 litres/second
for all storms up to and including 100y +40% CC

OUTFALL 3 - Catchment area 3
Maximum outflow rate - 7.7 litres/second
for all storms up to and including 100y +40% CC

Drainage Strategy Legend

- Proposed adoptable Foul Water Sewer
- Proposed adoptable Surface Water Sewer
- Proposed adoptable Highway Drain
- Proposed precast concrete headwall
- Proposed pond

0 5m 10m 20m 30m 40m
Scale 1:500

Rev	Description	Date	Drawn	Checked
A	Minor updates to drainage strategy following layout changes	08:01:20	TJW	TJW

Drawing Approval Status:-

N/A Section 104 N/A Section 38 N/A Section 278

FOR INFORMATION

Wormald Burrows Partnership Ltd
Civil Engineering Consultants
12a - 18a Hitchin Street, Biggleswade, SG18 8AX
Tel: (01767) 317244 Fax: (01767) 315434
Web: www.wormburp.com
Email: engineer@wormburp.com

Project:
Haverhill, Boyton Place - Phases 2-6

Drawing Description:
Drainage Strategy Plan - Sheet 4 of 8

Client:
PERSIMMON
Persimmon Homes (Suffolk) Ltd
Orion Court
Orion Court
Great Blakenham
Suffolk IP6 0LW

Drawing Number:
E3838/504/A

Client Reference:

Scale:
1:500 @ A1
1:1000 @ A3

Designed By:	Drawn By:	Checked By:
TJW	JMW	
Date: 20.12.18	Date: 03.01.19	Date:

afaq ISO 9001 Quality
UKAS MANAGEMENT SYSTEMS 022
Certified by Afnor UK

Drainage Strategy Legend

- Proposed adoptable Foul Water Sewer
- Proposed adoptable Surface Water Sewer
- Proposed adoptable Highway Drain
- Proposed precast concrete headwall
- Proposed pond

0 5m 10m 20m 30m 40m

Scale 1:500

Rev	Description	Date	Drawn	Checked
A	Minor updates to drainage strategy following layout changes	08:01:20	TJW	TJW

Drawing Approval Status:-

N/A Section 104 N/A Section 38 N/A Section 278

FOR INFORMATION

Wormald Burrows Partnership Ltd
Civil Engineering Consultants
12a - 18a Hitchin Street, Biggleswade, SG18 8AX
Tel: (01767) 317244 Fax: (01767) 315434
Web: www.wormburp.com
Email: engineer@wormburp.com

Project:

Haverhill, Boyton Place - Phases 2-6

Drawing Description:

Drainage Strategy Plan - Sheet 3 of 8

Client:

PERSIMMON

Persimmon Homes (Suffolk) Ltd
Orion Court
Orion Court
Great Blakenham
Suffolk IP6 0LW

Drawing Number: E3838/503/A

Client Reference:

Scale: 1:500 @ A1
1:1000 @ A3

Designed By:	Drawn By:	Checked By:
TJW	JMW	
Date: 20.12.18	Date: 03.01.19	Date:

afaq ISO 9001 Quality — UKAS MANAGEMENT SYSTEMS 022

Certified by Afnor UK

TANK 1 (35x30x1.6m)
Invert Level - 88.262m AOD
Soffit Level - 89.862m AOD
Storage Volume - 1,596m3

POND 1 (dry)
Bed Level - 89.200m AOD
Bank Level - 90.700m AOD
Top Water Level - 90.218m AOD
Maximum Storage Volume - 2,004m3
Overall Cut - 7,551m3
Overall Fill - 33m3

OUTFALL 1 - Catchment area 1
Maximum outflow rate - 15.1 litres/second
for all storms up to and including 100y +40% CC

OUTFALL 2 - Catchment area 2
Maximum outflow rate - 6.5 litres/second
for all storms up to and including 100y +40% CC

Drainage Strategy Legend

- Proposed adoptable Foul Water Sewer
- Proposed adoptable Surface Water Sewer
- Proposed adoptable Highway Drain
- Proposed precast concrete headwall
- Proposed pond

0 5m 10m 20m 30m 40m

Scale 1:500

Rev	Description	Date	Drawn	Checked
A	Minor updates to drainage strategy following layout changes	08:01:20	TJW	TJW

Drawing Approval Status:-

N/A Section 104 N/A Section 38 N/A Section 278

FOR INFORMATION

Wormald Burrows Partnership Ltd
Civil Engineering Consultants
12a - 18a Hitchin Street, Biggleswade, SG18 8AX
Tel: (01767) 317244 Fax: (01767) 315434
Web: www.wormburp.com
Email: engineer@wormburp.com

Project:
Haverhill, Boyton Place - Phases 2-6

Drawing Description:
Drainage Strategy Plan - Sheet 2 of 8

Client:
PERSIMMON
Persimmon Homes (Suffolk) Ltd
Orion Court
Orion Court
Great Blakenham
Suffolk IP6 0LW

Drawing Number:
E3838/502/A

Client Reference:

Scale:
1:500 @ A1
1:1000 @ A3

Designed By:	Drawn By:	Checked By:
TJW	JMW	
Date: 20.12.18	Date: 03.01.19	Date:

afaq ISO 9001 Quality
UKAS MANAGEMENT SYSTEMS 022
Certified by Afnor UK

N

Drainage Strategy Legend

- Proposed adoptable Foul Water Sewer
- Proposed adoptable Surface Water Sewer
- Proposed adoptable Highway Drain
- Proposed precast concrete headwall
- Proposed pond

0 5m 10m 20m 30m 40m

Scale 1:500

Rev	Description	Date	Drawn	Checked
A	Minor updates to drainage strategy following layout changes	08:01:20	TJW	TJW

Drawing Approval Status:-

N/A Section 104 N/A Section 38 N/A Section 278

FOR INFORMATION

Wormald Burrows Partnership Ltd
Civil Engineering Consultants
12a - 18a Hitchin Street, Biggleswade, SG18 8AX
Tel: (01767) 317244 Fax: (01767) 315434
Web: www.wormburp.com
Email: engineer@wormburp.com

Project:

Haverhill, Boyton Place - Phases 2-6

Drawing Description:

Drainage Strategy Plan - Sheet 1 of 8

Client:

PERSIMMON

Persimmon Homes (Suffolk) Ltd
Orion Court
Orion Court
Great Blakenham
Suffolk IP6 0LW

Drawing Number: E3838/501/A

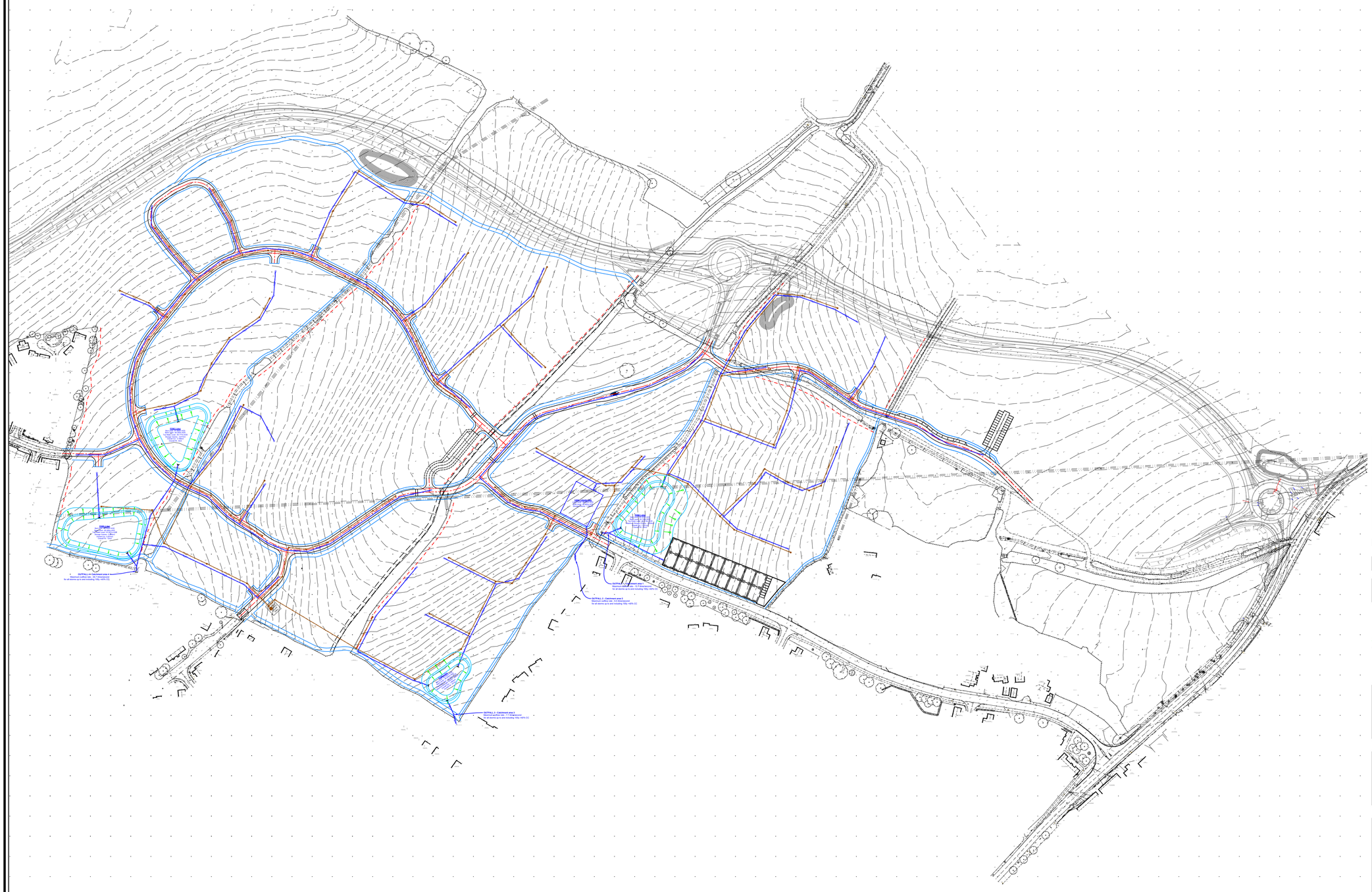
Client Reference:

Scale: 1:500 @ A1
1:1000 @ A3

Designed By:	Drawn By:	Checked By:
TJW	JMW	
Date: 20.12.18	Date: 03.01.19	Date:

afaq ISO 9001 Quality — UKAS MANAGEMENT SYSTEMS 022

Certified by Afnor UK



0 20m 100m 200m

Scale 1:2000

Rev	Description	Date	Drawn	Checked
A	Minor updates to drainage strategy following layout changes	08:01:20	TJW	TJW

Drawing Approval Status:-

N/A Section 104 N/A Section 38 N/A Section 278

FOR INFORMATION

Wormald Burrows Partnership Ltd
Civil Engineering Consultants
12a - 18a Hitchin Street, Biggleswade, SG18 8AX
Tel: (01767) 317244 Fax: (01767) 315434
Web: www.wormburp.com
Email: engineer@wormburp.com

Project:

Haverhill, Boyton Place - Phases 2-6

Drawing Description:

Drainage Strategy Plan (Overall)

Client:

PERSIMMON

Persimmon Homes (Suffolk) Ltd
Orion Court
Orion Court
Great Blakenham
Suffolk IP6 0LW

Drawing Number:
E3838/500/A

Client Reference:

Scale:
1:2000 @ A1
NTS @ A3

Designed By:	Drawn By:	Checked By:
TJW	JMW	
Date: 20.12.18	Date: 03.01.19	Date:

afaq ISO 9001 Quality
UKAS MANAGEMENT SYSTEMS 022
Certified by Afnor UK

Appendix E

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Surface Network 1

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	21.000	Add Flow / Climate Change (%)	0
Ratio R	0.421	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Surface Network 1

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	1.721	4-8	1.017	8-12	0.002

Total Area Contributing (ha) = 2.740

Total Pipe Volume (m^3) = 924.229

Network Design Table for Surface Network 1

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	36.660	0.244	150.2	0.137	5.00	0.0	0.600	o	300	Pipe/Conduit	
1.001	35.020	0.233	150.3	0.051	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	59.857	1.995	30.0	0.067	0.00	0.0	0.600	o	300	Pipe/Conduit	

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	5.48	105.528	0.137	0.0	0.0	0.0	1.28	90.5	18.6
1.001	50.00	5.93	105.283	0.188	0.0	0.0	0.0	1.28	90.5	25.5
1.002	50.00	6.28	105.050	0.255	0.0	0.0	0.0	2.88	203.6	34.5

Network Design Table for Surface Network 1

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.003	13.213	0.529	25.0	0.059	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.000	32.231	1.289	25.0	0.050	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.001	40.498	1.620	25.0	0.091	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.004	47.729	1.909	25.0	0.062	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.005	9.552	0.422	22.6	0.113	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.006	40.873	1.635	25.0	0.069	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.007	40.669	1.365	29.8	0.082	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.008	78.070	3.600	21.7	0.131	0.00	0.0	0.600	o	600	Pipe/Conduit	
3.000	25.482	1.274	20.0	0.060	5.00	0.0	0.600	o	225	Pipe/Conduit	
3.001	31.541	1.577	20.0	0.028	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.002	46.663	2.592	18.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.003	45.266	2.038	22.2	0.124	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.004	23.662	1.155	20.5	0.184	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.005	50.145	2.245	22.3	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.009	62.179	3.315	18.8	0.173	0.00	0.0	0.600	o	600	Pipe/Conduit	

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)
1.003	50.00	6.35	103.045	0.314	0.0	0.0	0.0	3.16	223.3	42.5
2.000	50.00	5.20	105.449	0.050	0.0	0.0	0.0	2.63	104.5	6.8
2.001	50.00	5.39	104.010	0.141	0.0	0.0	0.0	3.64	401.7	19.1
1.004	50.00	6.57	102.366	0.517	0.0	0.0	0.0	3.64	401.6	70.0
1.005	50.00	6.61	100.457	0.630	0.0	0.0	0.0	3.82	422.2	85.3
1.006	50.00	6.78	99.960	0.699	0.0	0.0	0.0	4.08	648.8	94.7
1.007	50.00	6.94	98.250	0.781	0.0	0.0	0.0	4.11	890.7	105.8
1.008	50.00	7.19	96.810	0.912	0.0	0.0	0.0	5.24	1482.9	123.5
3.000	50.00	5.14	104.466	0.060	0.0	0.0	0.0	2.94	116.9	8.1
3.001	50.00	5.32	103.192	0.088	0.0	0.0	0.0	2.94	116.9	11.9
3.002	50.00	5.53	101.540	0.088	0.0	0.0	0.0	3.72	263.2	11.9
3.003	50.00	5.76	98.948	0.212	0.0	0.0	0.0	3.35	236.8	28.7
3.004	50.00	5.87	96.910	0.396	0.0	0.0	0.0	3.49	246.6	53.6
3.005	50.00	6.09	95.680	0.396	0.0	0.0	0.0	3.85	425.0	53.6
1.009	50.00	7.37	93.210	1.481	0.0	0.0	0.0	5.64	1594.7	200.5

Network Design Table for Surface Network 1

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
4.000	62.524	0.782	80.0	0.058	5.00	0.0	0.600	o	225	Pipe/Conduit	
4.001	24.289	1.278	19.0	0.176	0.00	0.0	0.600	o	300	Pipe/Conduit	
4.002	18.329	0.965	19.0	0.096	0.00	0.0	0.600	o	300	Pipe/Conduit	
4.003	22.089	1.163	19.0	0.043	0.00	0.0	0.600	o	300	Pipe/Conduit	
4.004	14.071	0.563	25.0	0.052	0.00	0.0	0.600	o	375	Pipe/Conduit	
4.005	46.649	1.710	27.3	0.076	0.00	0.0	0.600	o	375	Pipe/Conduit	
5.000	55.057	3.671	15.0	0.135	5.00	0.0	0.600	o	225	Pipe/Conduit	
5.001	17.460	1.164	15.0	0.086	0.00	0.0	0.600	o	225	Pipe/Conduit	
4.006	47.668	3.120	15.3	0.100	0.00	0.0	0.600	o	375	Pipe/Conduit	
4.007	24.400	2.635	9.3	0.087	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.010	13.825	0.046	300.5	0.138	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.011	56.767	0.650	87.3	0.000	0.00	0.0	0.600	1.5 _/	500	1:1.5 Ditch	
1.012	14.693	0.250	58.8	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
6.000	60.337	3.017	20.0	0.212	5.00	0.0	0.600	o	300	Pipe/Conduit	
1.013	7.778	0.050	155.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

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)
4.000	50.00	5.71	102.420	0.058	0.0	0.0	0.0	1.46	58.2	7.9
4.001	50.00	5.82	101.564	0.234	0.0	0.0	0.0	3.62	256.1	31.7
4.002	50.00	5.91	100.285	0.330	0.0	0.0	0.0	3.62	256.2	44.7
4.003	50.00	6.01	99.321	0.373	0.0	0.0	0.0	3.62	256.2	50.5
4.004	50.00	6.07	98.083	0.425	0.0	0.0	0.0	3.64	401.7	57.6
4.005	50.00	6.30	97.520	0.501	0.0	0.0	0.0	3.48	384.5	67.8
5.000	50.00	5.27	100.795	0.135	0.0	0.0	0.0	3.40	135.0	18.3
5.001	50.00	5.36	97.124	0.221	0.0	0.0	0.0	3.40	135.0	29.9
4.006	50.00	6.47	95.810	0.822	0.0	0.0	0.0	4.66	514.2	111.3
4.007	50.00	6.54	92.690	0.909	0.0	0.0	0.0	5.98	660.9	123.1
1.010	50.00	7.54	89.896	2.528	0.0	0.0	0.0	1.40	395.7	342.3
1.011	50.00	7.86	89.850	2.528	0.0	0.0	0.0	2.92	832.9	342.3
1.012	50.00	7.94	89.200	2.528	0.0	0.0	0.0	3.18	899.3	342.3
6.000	50.00	5.28	92.267	0.212	0.0	0.0	0.0	3.53	249.6	28.7
1.013	50.00	8.06	88.950	2.740	0.0	0.0	0.0	1.05	41.6«	371.0

Manhole Schedules for Surface Network 1

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S30	106.945	1.417	Open Manhole	1050	1.000	105.528	300				
S31	107.526	2.243	Open Manhole	1050	1.001	105.283	300	1.000	105.284	300	1
S10	107.226	2.176	Open Manhole	1200	1.002	105.050	300	1.001	105.050	300	
S11	104.932	1.887	Open Manhole	1200	1.003	103.045	300	1.002	103.055	300	10
S1	107.034	1.585	Open Manhole	1200	2.000	105.449	225				
S2	105.828	1.818	Open Manhole	1350	2.001	104.010	375	2.000	104.160	225	
S3	104.421	2.055	Open Manhole	1350	1.004	102.366	375	1.003	102.516	300	75
								2.001	102.390	375	24
S4	102.518	2.061	Open Manhole	1350	1.005	100.457	375	1.004	100.457	375	
S5	102.102	2.142	Open Manhole	1350	1.006	99.960	450	1.005	100.035	375	
S6	100.051	1.801	Open Manhole	1240 x 975	1.007	98.250	525	1.006	98.325	450	
S7	99.682	2.872	Open Manhole	1500	1.008	96.810	600	1.007	96.885	525	
S12	106.068	1.602	Open Manhole	1200	3.000	104.466	225				
S13	105.023	1.831	Open Manhole	1200	3.001	103.192	225	3.000	103.192	225	
S14	103.087	1.547	Open Manhole	1200	3.002	101.540	300	3.001	101.615	225	
S15	100.916	1.968	Open Manhole	1200	3.003	98.948	300	3.002	98.948	300	
S16	100.181	3.271	Open Manhole	1200	3.004	96.910	300	3.003	96.910	300	
S17	99.292	3.612	Open Manhole	1350	3.005	95.680	375	3.004	95.755	300	
S8	95.248	2.038	Open Manhole	1240 x 1050	1.009	93.210	600	1.008	93.210	600	
								3.005	93.435	375	
S18	104.140	1.720	Open Manhole	1200	4.000	102.420	225				
S19	103.408	1.844	Open Manhole	1200	4.001	101.564	300	4.000	101.638	225	
S20	102.262	1.977	Open Manhole	1200	4.002	100.285	300	4.001	100.286	300	1
S21	101.147	1.827	Open Manhole	1200	4.003	99.321	300	4.002	99.320	300	
S22	99.837	1.754	Open Manhole	1350	4.004	98.083	375	4.003	98.158	300	
S23	99.450	1.930	Open Manhole	1350	4.005	97.520	375	4.004	97.520	375	
S26	102.624	1.829	Open Manhole	1200	5.000	100.795	225				
S27	99.095	1.971	Open Manhole	1200	5.001	97.124	225	5.000	97.124	225	
S24	97.950	2.140	Open Manhole	1350	4.006	95.810	375	4.005	95.810	375	
								5.001	95.960	225	
S25	94.880	2.190	Open Manhole	1350	4.007	92.690	375	4.006	92.690	375	
S9	92.954	3.059	Open Manhole	1500	1.010	89.896	600	1.009	89.895	600	
								4.007	90.055	375	
HW1	92.741	2.891	Open Manhole	10000	1.011	89.850	500	1.010	89.850	600	

Manhole Schedules for Surface Network 1

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
POND1	90.700	1.500	Open Manhole	10000	1.012	89.200	600	1.011	89.200	500	
S28	94.304	2.037	Open Manhole	1200	6.000	92.267	300				
S29	90.700	1.750	Open Manhole	1500	1.013	88.950	225	1.012	88.950	600	
								6.000	89.250	300	375
HW2	90.700	1.800	Open Manhole	0		OUTFALL		1.013	88.900	225	

PIPELINE SCHEDULES for Surface Network 1

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	300	S30	106.945	105.528	1.117	Open Manhole	1050
1.001	o	300	S31	107.526	105.283	1.943	Open Manhole	1050
1.002	o	300	S10	107.226	105.050	1.876	Open Manhole	1200
1.003	o	300	S11	104.932	103.045	1.587	Open Manhole	1200
2.000	o	225	S1	107.034	105.449	1.360	Open Manhole	1200
2.001	o	375	S2	105.828	104.010	1.443	Open Manhole	1350
1.004	o	375	S3	104.421	102.366	1.680	Open Manhole	1350
1.005	o	375	S4	102.518	100.457	1.686	Open Manhole	1350
1.006	o	450	S5	102.102	99.960	1.692	Open Manhole	1350
1.007	o	525	S6	100.051	98.250	1.276	Open Manhole	1240 x 975
1.008	o	600	S7	99.682	96.810	2.272	Open Manhole	1500
3.000	o	225	S12	106.068	104.466	1.377	Open Manhole	1200
3.001	o	225	S13	105.023	103.192	1.606	Open Manhole	1200
3.002	o	300	S14	103.087	101.540	1.247	Open Manhole	1200
3.003	o	300	S15	100.916	98.948	1.668	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	36.660	150.2	S31	107.526	105.284	1.942	Open Manhole	1050
1.001	35.020	150.3	S10	107.226	105.050	1.876	Open Manhole	1200
1.002	59.857	30.0	S11	104.932	103.055	1.577	Open Manhole	1200
1.003	13.213	25.0	S3	104.421	102.516	1.605	Open Manhole	1350
2.000	32.231	25.0	S2	105.828	104.160	1.443	Open Manhole	1350
2.001	40.498	25.0	S3	104.421	102.390	1.656	Open Manhole	1350
1.004	47.729	25.0	S4	102.518	100.457	1.686	Open Manhole	1350
1.005	9.552	22.6	S5	102.102	100.035	1.692	Open Manhole	1350
1.006	40.873	25.0	S6	100.051	98.325	1.276	Open Manhole	1240 x 975
1.007	40.669	29.8	S7	99.682	96.885	2.272	Open Manhole	1500
1.008	78.070	21.7	S8	95.248	93.210	1.438	Open Manhole	1240 x 1050
3.000	25.482	20.0	S13	105.023	103.192	1.606	Open Manhole	1200
3.001	31.541	20.0	S14	103.087	101.615	1.247	Open Manhole	1200
3.002	46.663	18.0	S15	100.916	98.948	1.668	Open Manhole	1200
3.003	45.266	22.2	S16	100.181	96.910	2.971	Open Manhole	1200

PIPELINE SCHEDULES for Surface Network 1

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
3.004	o	300	S16	100.181	96.910	2.971	Open Manhole	1200
3.005	o	375	S17	99.292	95.680	3.237	Open Manhole	1350
1.009	o	600	S8	95.248	93.210	1.438	Open Manhole	1240 x 1050
4.000	o	225	S18	104.140	102.420	1.495	Open Manhole	1200
4.001	o	300	S19	103.408	101.564	1.544	Open Manhole	1200
4.002	o	300	S20	102.262	100.285	1.677	Open Manhole	1200
4.003	o	300	S21	101.147	99.321	1.526	Open Manhole	1200
4.004	o	375	S22	99.837	98.083	1.379	Open Manhole	1350
4.005	o	375	S23	99.450	97.520	1.555	Open Manhole	1350
5.000	o	225	S26	102.624	100.795	1.604	Open Manhole	1200
5.001	o	225	S27	99.095	97.124	1.746	Open Manhole	1200
4.006	o	375	S24	97.950	95.810	1.765	Open Manhole	1350
4.007	o	375	S25	94.880	92.690	1.815	Open Manhole	1350

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
3.004	23.662	20.5	S17	99.292	95.755	3.237	Open Manhole	1350
3.005	50.145	22.3	S8	95.248	93.435	1.438	Open Manhole	1240 x 1050
1.009	62.179	18.8	S9	92.954	89.895	2.459	Open Manhole	1500
4.000	62.524	80.0	S19	103.408	101.638	1.545	Open Manhole	1200
4.001	24.289	19.0	S20	102.262	100.286	1.676	Open Manhole	1200
4.002	18.329	19.0	S21	101.147	99.320	1.527	Open Manhole	1200
4.003	22.089	19.0	S22	99.837	98.158	1.379	Open Manhole	1350
4.004	14.071	25.0	S23	99.450	97.520	1.555	Open Manhole	1350
4.005	46.649	27.3	S24	97.950	95.810	1.765	Open Manhole	1350
5.000	55.057	15.0	S27	99.095	97.124	1.746	Open Manhole	1200
5.001	17.460	15.0	S24	97.950	95.960	1.765	Open Manhole	1350
4.006	47.668	15.3	S25	94.880	92.690	1.815	Open Manhole	1350
4.007	24.400	9.3	S9	92.954	90.055	2.524	Open Manhole	1500

PIPELINE SCHEDULES for Surface Network 1

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.010	o	600	S9	92.954	89.896	2.458	Open Manhole	1500
1.011	1.5 _/	500	HW1	92.741	89.850	2.591	Open Manhole	10000
1.012	o	600	POND1	90.700	89.200	0.900	Open Manhole	10000
6.000	o	300	S28	94.304	92.267	1.737	Open Manhole	1200
1.013	o	225	S29	90.700	88.950	1.525	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.010	13.825	300.5	HW1	92.741	89.850	2.291	Open Manhole	10000
1.011	56.767	87.3	POND1	90.700	89.200	1.200	Open Manhole	10000
1.012	14.693	58.8	S29	90.700	88.950	1.150	Open Manhole	1500
6.000	60.337	20.0	S29	90.700	89.250	1.150	Open Manhole	1500
1.013	7.778	155.6	HW2	90.700	88.900	1.575	Open Manhole	0

Area Summary for Surface Network 1

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.137	0.137	0.137
1.001	-	-	100	0.051	0.051	0.051
1.002	-	-	100	0.067	0.067	0.067
1.003	-	-	100	0.059	0.059	0.059
2.000	-	-	100	0.050	0.050	0.050
2.001	-	-	100	0.091	0.091	0.091
1.004	-	-	100	0.062	0.062	0.062
1.005	-	-	100	0.113	0.113	0.113
1.006	-	-	100	0.069	0.069	0.069
1.007	-	-	100	0.082	0.082	0.082
1.008	-	-	100	0.131	0.131	0.131
3.000	-	-	100	0.060	0.060	0.060
3.001	-	-	100	0.028	0.028	0.028
3.002	-	-	100	0.000	0.000	0.000
3.003	-	-	100	0.124	0.124	0.124
3.004	-	-	100	0.184	0.184	0.184
3.005	-	-	100	0.000	0.000	0.000
1.009	-	-	100	0.173	0.173	0.173
4.000	-	-	100	0.058	0.058	0.058
4.001	-	-	100	0.176	0.176	0.176
4.002	-	-	100	0.096	0.096	0.096
4.003	-	-	100	0.043	0.043	0.043
4.004	-	-	100	0.052	0.052	0.052
4.005	-	-	100	0.076	0.076	0.076
5.000	-	-	100	0.135	0.135	0.135
5.001	-	-	100	0.086	0.086	0.086
4.006	-	-	100	0.100	0.100	0.100
4.007	-	-	100	0.087	0.087	0.087
1.010	-	-	100	0.138	0.138	0.138
1.011	-	-	100	0.000	0.000	0.000
1.012	-	-	100	0.000	0.000	0.000
6.000	-	-	100	0.212	0.212	0.212
1.013	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				2.740	2.740	2.740

Free Flowing Outfall Details for Surface Network 1

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.013	HW2	90.700	88.900	0.000	0	0

Simulation Criteria for Surface Network 1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	21.000	Storm Duration (mins)	30
Ratio R	0.421		

Online Controls for Surface Network 1

Hydro-Brake® Optimum Manhole: S29, DS/PN: 1.013, Volume (m³): 9.8

Unit Reference	MD-SHE-0168-1510-1500-1510
Design Head (m)	1.500
Design Flow (l/s)	15.1
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	168
Invert Level (m)	88.950
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	15.1	Kick-Flo®	0.956	12.2
Flush-Flo™	0.440	15.1	Mean Flow over Head Range	-	13.1

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	6.0	1.200	13.6	3.000	21.0	7.000	31.5
0.200	13.6	1.400	14.6	3.500	22.6	7.500	32.6
0.300	14.7	1.600	15.6	4.000	24.1	8.000	33.6
0.400	15.1	1.800	16.5	4.500	25.5	8.500	34.6
0.500	15.1	2.000	17.3	5.000	26.8	9.000	35.6
0.600	14.9	2.200	18.1	5.500	28.1	9.500	36.6
0.800	14.0	2.400	18.9	6.000	29.3		
1.000	12.5	2.600	19.6	6.500	30.4		

Storage Structures for Surface Network 1

Tank or Pond Manhole: POND1, DS/PN: 1.012

Invert Level (m) 89.200

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1380.4	0.500	1617.5	1.000	1868.8	1.499	2133.6
0.100	1426.7	0.600	1666.7	1.100	1920.7	1.500	2134.2
0.200	1473.6	0.700	1716.3	1.200	1973.2		
0.300	1521.0	0.800	1766.6	1.300	2026.3		
0.400	1569.0	0.900	1817.4	1.400	2079.9		

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.421
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	21.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	450.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880
Return Period(s) (years)	100
Climate Change (%)	40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S30	15 Winter	100	+40%	100/15 Summer				106.062
1.001	S31	15 Winter	100	+40%	100/15 Summer				105.800
1.002	S10	15 Winter	100	+40%					105.256
1.003	S11	15 Winter	100	+40%	100/15 Winter				103.380
2.000	S1	15 Winter	100	+40%					105.540
2.001	S2	15 Winter	100	+40%					104.142
1.004	S3	15 Winter	100	+40%	100/15 Winter				102.779
1.005	S4	15 Winter	100	+40%	100/15 Summer				101.388
1.006	S5	15 Winter	100	+40%					100.254
1.007	S6	15 Winter	100	+40%					98.555
1.008	S7	15 Winter	100	+40%					97.085
3.000	S12	15 Winter	100	+40%					104.561
3.001	S13	15 Winter	100	+40%					103.311
3.002	S14	15 Winter	100	+40%					101.640

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S30	0.234	0.000	1.03		86.1	SURCHARGED	
1.001	S31	0.217	0.000	1.38		114.7	SURCHARGED	
1.002	S10	-0.094	0.000	0.79		153.2	OK	
1.003	S11	0.035	0.000	1.02		185.5	SURCHARGED	
2.000	S1	-0.134	0.000	0.34		33.4	OK	
2.001	S2	-0.243	0.000	0.27		98.0	OK	
1.004	S3	0.038	0.000	0.85		315.6	SURCHARGED	
1.005	S4	0.556	0.000	1.52		387.5	SURCHARGED	
1.006	S5	-0.156	0.000	0.75		431.1	OK	
1.007	S6	-0.220	0.000	0.62		483.6	OK	
1.008	S7	-0.325	0.000	0.42		567.8	OK	
3.000	S12	-0.130	0.000	0.37		40.0	OK	
3.001	S13	-0.106	0.000	0.54		59.6	OK	
3.002	S14	-0.200	0.000	0.24		59.2	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
3.003	S15	15 Winter	100	+40%					99.129
3.004	S16	15 Winter	100	+40%	100/15 Summer				97.873
3.005	S17	15 Winter	100	+40%					95.911
1.009	S8	15 Winter	100	+40%	100/15 Summer				94.048
4.000	S18	15 Winter	100	+40%					102.559
4.001	S19	15 Winter	100	+40%					101.753
4.002	S20	15 Winter	100	+40%	100/15 Summer				100.872
4.003	S21	15 Winter	100	+40%	100/15 Summer				100.064
4.004	S22	15 Winter	100	+40%	100/15 Summer				98.936
4.005	S23	15 Winter	100	+40%	100/15 Summer				98.543
5.000	S26	15 Winter	100	+40%					100.934
5.001	S27	15 Winter	100	+40%	100/15 Summer				98.742
4.006	S24	15 Winter	100	+40%	100/15 Summer				97.442
4.007	S25	15 Winter	100	+40%	100/15 Summer				94.617
1.010	S9	15 Winter	100	+40%	100/15 Summer				92.653
1.011	HW1	15 Winter	100	+40%					90.271
1.012	POND1	600 Winter	100	+40%	100/30 Winter				90.218
6.000	S28	15 Winter	100	+40%					92.435
1.013	S29	600 Winter	100	+40%	100/15 Summer				90.236

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
3.003	S15	-0.119	0.000	0.66		147.3	OK	
3.004	S16	0.663	0.000	1.23		269.3	SURCHARGED	
3.005	S17	-0.144	0.000	0.69		270.8	OK	
1.009	S8	0.238	0.000	0.64		921.3	SURCHARGED	
4.000	S18	-0.086	0.000	0.67		37.6	OK	
4.001	S19	-0.111	0.000	0.71		161.3	OK	
4.002	S20	0.287	0.000	0.98		217.1	SURCHARGED	
4.003	S21	0.443	0.000	1.06		239.2	SURCHARGED	
4.004	S22	0.478	0.000	0.89		261.5	SURCHARGED	
4.005	S23	0.648	0.000	0.86		302.7	SURCHARGED	
5.000	S26	-0.086	0.000	0.69		89.3	OK	
5.001	S27	1.393	0.000	1.05		126.9	FLOOD RISK	
4.006	S24	1.257	0.000	0.96		454.3	SURCHARGED	
4.007	S25	1.552	0.000	0.92		522.1	FLOOD RISK	
1.010	S9	2.157	0.000	5.45		1487.1	FLOOD RISK	
1.011	HW1	-2.470	0.000	0.03		1487.1	OK	
1.012	POND1	0.418	0.000	0.03		16.4	SURCHARGED	
6.000	S28	-0.132	0.000	0.59		140.3	OK	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.013	S29	1.061	0.000	0.48		15.1	SURCHARGED	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Surface Network 2

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	21.000	Add Flow / Climate Change (%)	0
Ratio R	0.422	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Surface Network 2

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	1.178	4-8	0.692	8-12	0.014

Total Area Contributing (ha) = 1.884

Total Pipe Volume (m^3) = 56.806

Network Design Table for Surface Network 2

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	23.765	1.188	20.0	0.057	5.00	0.0	0.600	o	300	Pipe/Conduit	
1.001	39.360	1.574	25.0	0.049	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	33.144	0.276	120.0	0.039	0.00	0.0	0.600	o	300	Pipe/Conduit	

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	5.11	99.399	0.057	0.0	0.0	0.0	3.53	249.6	7.7
1.001	50.00	5.32	98.211	0.106	0.0	0.0	0.0	3.16	223.2	14.4
1.002	50.00	5.71	96.636	0.145	0.0	0.0	0.0	1.43	101.4	19.6

Network Design Table for Surface Network 2

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.003	25.587	0.213	120.1	0.038	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	41.283	0.344	120.0	0.060	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.005	32.994	0.275	120.0	0.062	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.006	80.189	0.668	120.0	0.163	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.007	31.769	0.265	119.9	0.069	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.008	21.926	0.183	119.8	0.019	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.009	23.806	1.253	19.0	0.025	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.010	29.595	1.558	19.0	0.038	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.011	17.358	0.914	19.0	0.356	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.012	44.041	2.318	19.0	0.069	0.00	0.0	0.600	o	450	Pipe/Conduit	
2.000	38.092	2.539	15.0	0.050	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.001	29.980	2.998	10.0	0.191	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.000	34.836	0.995	35.0	0.223	5.00	0.0	0.600	o	300	Pipe/Conduit	
3.001	24.295	0.694	35.0	0.027	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.002	7.189	0.205	35.1	0.128	0.00	0.0	0.600	o	375	Pipe/Conduit	
2.003	38.522	2.080	18.5	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
2.004	8.349	0.042	198.8	0.193	0.00	0.0	0.600	o	375	Pipe/Conduit	

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)
1.003	50.00	6.00	96.630	0.183	0.0	0.0	0.0	1.43	101.3	24.8
1.004	50.00	6.48	96.147	0.243	0.0	0.0	0.0	1.43	101.4	32.9
1.005	50.00	6.87	95.803	0.305	0.0	0.0	0.0	1.43	101.4	41.3
1.006	50.00	7.67	95.528	0.468	0.0	0.0	0.0	1.65	182.5	63.4
1.007	50.00	7.99	94.860	0.537	0.0	0.0	0.0	1.65	182.7	72.7
1.008	50.00	8.22	94.595	0.556	0.0	0.0	0.0	1.65	182.7	75.3
1.009	50.00	8.31	94.337	0.581	0.0	0.0	0.0	4.17	461.0	78.7
1.010	50.00	8.43	93.084	0.619	0.0	0.0	0.0	4.17	461.0	83.8
1.011	50.00	8.50	91.527	0.975	0.0	0.0	0.0	4.17	461.1	132.0
1.012	50.00	8.65	90.538	1.044	0.0	0.0	0.0	4.68	744.5	141.4
2.000	50.00	5.19	96.328	0.050	0.0	0.0	0.0	3.40	135.0	6.8
2.001	50.00	5.31	93.788	0.241	0.0	0.0	0.0	4.16	165.5	32.6
3.000	50.00	5.22	92.480	0.223	0.0	0.0	0.0	2.67	188.5	30.2
3.001	50.00	5.37	91.485	0.250	0.0	0.0	0.0	2.67	188.5	33.9
2.002	50.00	5.41	90.715	0.619	0.0	0.0	0.0	3.07	338.9	83.8
2.003	50.00	5.56	90.510	0.619	0.0	0.0	0.0	4.23	466.9	83.8
2.004	50.00	5.67	88.262	0.812	0.0	0.0	0.0	1.28	141.5	110.0

Network Design Table for Surface Network 2

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.013	21.856	0.185	118.1	0.028	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.014	5.247	0.035	150.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

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)
1.013	50.00	9.05	88.220	1.884	0.0	0.0	0.0	0.92	16.3«	255.1
1.014	50.00	9.16	88.035	1.884	0.0	0.0	0.0	0.82	14.5«	255.1

Manhole Schedules for Surface Network 2

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S100	101.196	1.797	Open Manhole	1200	1.000	99.399	300				
S101	100.027	1.816	Open Manhole	1200	1.001	98.211	300	1.000	98.211	300	
S102	98.770	2.134	Open Manhole	1200	1.002	96.636	300	1.001	96.637	300	1
S103	99.039	2.679	Open Manhole	1350	1.003	96.630	300	1.002	96.360	300	
S104	99.261	3.114	Open Manhole	1350	1.004	96.147	300	1.003	96.417	300	270
S105	99.515	3.712	Open Manhole	1200	1.005	95.803	300	1.004	95.803	300	
S106	99.159	3.631	Open Manhole	1200	1.006	95.528	375	1.005	95.528	300	
S107	98.161	3.301	Open Manhole	1200	1.007	94.860	375	1.006	94.860	375	
S108	97.244	2.649	Open Manhole	1200	1.008	94.595	375	1.007	94.595	375	
S109	96.479	2.142	Open Manhole	1350	1.009	94.337	375	1.008	94.412	375	75
S110	95.339	2.255	Open Manhole	1350	1.010	93.084	375	1.009	93.084	375	
S111	93.870	2.344	Open Manhole	1350	1.011	91.527	375	1.010	91.526	375	
S112	92.966	2.428	Open Manhole	1350	1.012	90.538	450	1.011	90.613	375	
S115	97.995	1.667	Open Manhole	1200	2.000	96.328	225				
S116	95.625	1.837	Open Manhole	1200	2.001	93.788	225	2.000	93.789	225	1
S118	94.010	1.530	Open Manhole	1200	3.000	92.480	300				
S119	93.134	1.649	Open Manhole	1200	3.001	91.485	300	3.000	91.485	300	
S117	93.750	3.035	Open Manhole	1200	2.002	90.715	375	2.001	90.790	225	
								3.001	90.791	300	1
TANK1	93.034	2.524	Open Manhole	1200	2.003	90.510	375	2.002	90.510	375	
TANK2	91.500	3.238	Open Manhole	1200	2.004	88.262	375	2.003	88.430	375	168
S113	90.760	2.540	Open Manhole	2100	1.013	88.220	150	1.012	88.220	450	
								2.004	88.220	375	
S114	89.493	1.458	Open Manhole	1200	1.014	88.035	150	1.013	88.035	150	
HW100	89.286	1.286	Open Manhole	1200		OUTFALL		1.014	88.000	150	

PIPELINE SCHEDULES for Surface Network 2

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	300	S100	101.196	99.399	1.497	Open Manhole	1200
1.001	o	300	S101	100.027	98.211	1.516	Open Manhole	1200
1.002	o	300	S102	98.770	96.636	1.834	Open Manhole	1200
1.003	o	300	S103	99.039	96.630	2.109	Open Manhole	1350
1.004	o	300	S104	99.261	96.147	2.814	Open Manhole	1350
1.005	o	300	S105	99.515	95.803	3.412	Open Manhole	1200
1.006	o	375	S106	99.159	95.528	3.256	Open Manhole	1200
1.007	o	375	S107	98.161	94.860	2.926	Open Manhole	1200
1.008	o	375	S108	97.244	94.595	2.274	Open Manhole	1200
1.009	o	375	S109	96.479	94.337	1.767	Open Manhole	1350
1.010	o	375	S110	95.339	93.084	1.880	Open Manhole	1350
1.011	o	375	S111	93.870	91.527	1.968	Open Manhole	1350
1.012	o	450	S112	92.966	90.538	1.978	Open Manhole	1350
2.000	o	225	S115	97.995	96.328	1.442	Open Manhole	1200
2.001	o	225	S116	95.625	93.788	1.612	Open Manhole	1200
3.000	o	300	S118	94.010	92.480	1.230	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	23.765	20.0	S101	100.027	98.211	1.516	Open Manhole	1200
1.001	39.360	25.0	S102	98.770	96.637	1.833	Open Manhole	1200
1.002	33.144	120.0	S103	99.039	96.360	2.379	Open Manhole	1350
1.003	25.587	120.1	S104	99.261	96.417	2.544	Open Manhole	1350
1.004	41.283	120.0	S105	99.515	95.803	3.412	Open Manhole	1200
1.005	32.994	120.0	S106	99.159	95.528	3.331	Open Manhole	1200
1.006	80.189	120.0	S107	98.161	94.860	2.926	Open Manhole	1200
1.007	31.769	119.9	S108	97.244	94.595	2.274	Open Manhole	1200
1.008	21.926	119.8	S109	96.479	94.412	1.692	Open Manhole	1350
1.009	23.806	19.0	S110	95.339	93.084	1.880	Open Manhole	1350
1.010	29.595	19.0	S111	93.870	91.526	1.969	Open Manhole	1350
1.011	17.358	19.0	S112	92.966	90.613	1.978	Open Manhole	1350
1.012	44.041	19.0	S113	90.760	88.220	2.090	Open Manhole	2100
2.000	38.092	15.0	S116	95.625	93.789	1.611	Open Manhole	1200
2.001	29.980	10.0	S117	93.750	90.790	2.735	Open Manhole	1200
3.000	34.836	35.0	S119	93.134	91.485	1.349	Open Manhole	1200

PIPELINE SCHEDULES for Surface Network 2

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
3.001	o	300	S119	93.134	91.485	1.349	Open Manhole	1200
2.002	o	375	S117	93.750	90.715	2.660	Open Manhole	1200
2.003	o	375	TANK1	93.034	90.510	2.149	Open Manhole	1200
2.004	o	375	TANK2	91.500	88.262	2.863	Open Manhole	1200
1.013	o	150	S113	90.760	88.220	2.390	Open Manhole	2100
1.014	o	150	S114	89.493	88.035	1.308	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
3.001	24.295	35.0	S117	93.750	90.791	2.659	Open Manhole	1200
2.002	7.189	35.1	TANK1	93.034	90.510	2.149	Open Manhole	1200
2.003	38.522	18.5	TANK2	91.500	88.430	2.695	Open Manhole	1200
2.004	8.349	198.8	S113	90.760	88.220	2.165	Open Manhole	2100
1.013	21.856	118.1	S114	89.493	88.035	1.308	Open Manhole	1200
1.014	5.247	150.0	HW100	89.286	88.000	1.136	Open Manhole	1200

Area Summary for Surface Network 2

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.057	0.057	0.057
1.001	-	-	100	0.049	0.049	0.049
1.002	-	-	100	0.039	0.039	0.039
1.003	-	-	100	0.038	0.038	0.038
1.004	-	-	100	0.060	0.060	0.060
1.005	-	-	100	0.062	0.062	0.062
1.006	-	-	100	0.163	0.163	0.163
1.007	-	-	100	0.069	0.069	0.069
1.008	-	-	100	0.019	0.019	0.019
1.009	-	-	100	0.025	0.025	0.025
1.010	-	-	100	0.038	0.038	0.038
1.011	-	-	100	0.356	0.356	0.356
1.012	-	-	100	0.069	0.069	0.069
2.000	-	-	100	0.050	0.050	0.050
2.001	-	-	100	0.191	0.191	0.191
3.000	-	-	100	0.223	0.223	0.223
3.001	-	-	100	0.027	0.027	0.027
2.002	-	-	100	0.128	0.128	0.128
2.003	-	-	100	0.000	0.000	0.000
2.004	-	-	100	0.193	0.193	0.193
1.013	-	-	100	0.028	0.028	0.028
1.014	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				1.884	1.884	1.884

Free Flowing Outfall Details for Surface Network 2

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.014	HW100	89.286	88.000	0.000	1200	0

Simulation Criteria for Surface Network 2

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

Simulation Criteria for Surface Network 2

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	21.000	Storm Duration (mins)	30
Ratio R	0.422		

Online Controls for Surface Network 2

Hydro-Brake® Optimum Manhole: S113, DS/PN: 1.013, Volume (m³): 16.3

Unit Reference	MD-SHE-0110-7300-2100-7300
Design Head (m)	2.100
Design Flow (l/s)	7.3
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	110
Invert Level (m)	88.220
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.100	7.3	Kick-Flo®	0.985	5.1
Flush-Flo™	0.479	6.5	Mean Flow over Head Range	-	6.0

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.8	1.200	5.6	3.000	8.6	7.000	12.9
0.200	5.7	1.400	6.0	3.500	9.3	7.500	13.3
0.300	6.2	1.600	6.4	4.000	9.9	8.000	13.8
0.400	6.4	1.800	6.8	4.500	10.5	8.500	14.2
0.500	6.5	2.000	7.1	5.000	11.0	9.000	14.6
0.600	6.4	2.200	7.5	5.500	11.5	9.500	14.9
0.800	6.0	2.400	7.8	6.000	12.0		
1.000	5.2	2.600	8.1	6.500	12.5		

Storage Structures for Surface Network 2

Cellular Storage Manhole: TANK2, DS/PN: 2.004

Invert Level (m) 88.262 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	1050.0	1050.0	1.601	0.0	1258.0
1.600	1050.0	1258.0			

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 2

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.421
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	21.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	450.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880
Return Period(s) (years)	100
Climate Change (%)	40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S100	15 Winter	100	+40%					99.483
1.001	S101	15 Winter	100	+40%	100/15 Winter				98.566
1.002	S102	15 Winter	100	+40%	100/15 Summer				98.423
1.003	S103	15 Winter	100	+40%	100/15 Summer				98.292
1.004	S104	15 Winter	100	+40%	100/15 Summer				98.106
1.005	S105	15 Winter	100	+40%	100/15 Summer				97.615
1.006	S106	15 Winter	100	+40%	100/15 Summer				96.997
1.007	S107	15 Winter	100	+40%	100/15 Summer				95.906
1.008	S108	15 Winter	100	+40%	100/15 Summer				95.280
1.009	S109	15 Winter	100	+40%					94.565
1.010	S110	15 Winter	100	+40%					93.428
1.011	S111	15 Winter	100	+40%	100/15 Summer				92.776
1.012	S112	15 Winter	100	+40%	100/15 Summer				91.435
2.000	S115	15 Winter	100	+40%					96.406

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 2

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S100	-0.216	0.000	0.17		38.1	OK	
1.001	S101	0.055	0.000	0.35		72.6	SURCHARGED	
1.002	S102	1.487	0.000	0.82		75.7	FLOOD RISK	
1.003	S103	1.362	0.000	0.99		89.9	SURCHARGED	
1.004	S104	1.659	0.000	1.24		117.2	SURCHARGED	
1.005	S105	1.512	0.000	1.54		142.5	SURCHARGED	
1.006	S106	1.094	0.000	1.27		220.8	SURCHARGED	
1.007	S107	0.671	0.000	1.52		246.6	SURCHARGED	
1.008	S108	0.310	0.000	1.64		254.3	SURCHARGED	
1.009	S109	-0.147	0.000	0.67		264.5	OK	
1.010	S110	-0.031	0.000	0.70		284.7	OK	
1.011	S111	0.874	0.000	1.20		449.1	SURCHARGED	
1.012	S112	0.447	0.000	0.72		484.1	SURCHARGED	
2.000	S115	-0.147	0.000	0.26		33.4	OK	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 2

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
2.001	S116	15 Winter	100	+40%	100/15 Summer				94.700
3.000	S118	15 Winter	100	+40%	100/15 Summer				93.062
3.001	S119	15 Winter	100	+40%	100/15 Summer				92.412
2.002	S117	15 Winter	100	+40%	100/15 Summer				91.834
2.003	TANK1	15 Winter	100	+40%					90.788
2.004	TANK2	960 Winter	100	+40%	100/15 Summer				89.644
1.013	S113	15 Winter	100	+40%	100/15 Summer				90.192
1.014	S114	15 Winter	100	+40%					88.119

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
2.001	S116	0.687	0.000	0.98		150.9	SURCHARGED	
3.000	S118	0.282	0.000	0.80		138.1	SURCHARGED	
3.001	S119	0.627	0.000	0.94		157.3	SURCHARGED	
2.002	S117	0.744	0.000	2.15		380.7	SURCHARGED	
2.003	TANK1	-0.097	0.000	0.90		380.5	OK	
2.004	TANK2	1.007	0.000	0.07		6.5	SURCHARGED	
1.013	S113	1.822	0.000	0.46		7.1	SURCHARGED	
1.014	S114	-0.066	0.000	0.60		7.1	OK	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Surface Network 4

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	21.000	Add Flow / Climate Change (%)	0
Ratio R	0.421	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Surface Network 4

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	2.299	4-8	3.855	8-12	0.231

Total Area Contributing (ha) = 6.384

Total Pipe Volume (m^3) = 442.356

Network Design Table for Surface Network 4

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	29.925	0.665	45.0	0.167	5.00	0.0	0.600	o	300	Pipe/Conduit	
1.001	42.062	0.935	45.0	0.222	0.00	0.0	0.600	o	300	Pipe/Conduit	

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	5.21	98.478	0.167	0.0	0.0	0.0	2.35	166.1	22.6
1.001	50.00	5.51	97.738	0.389	0.0	0.0	0.0	2.35	166.1	52.7

Network Design Table for Surface Network 4

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
2.000	29.339	0.838	35.0	0.110	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.001	29.914	0.997	30.0	0.084	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	82.735	2.068	40.0	0.150	0.00	0.0	0.600	o	450	Pipe/Conduit	
3.000	21.524	1.196	18.0	0.133	5.00	0.0	0.600	o	300	Pipe/Conduit	
3.001	20.835	1.158	18.0	0.058	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	16.218	0.901	18.0	0.051	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.004	30.911	1.717	18.0	0.120	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.005	22.293	1.239	18.0	0.032	0.00	0.0	0.600	o	450	Pipe/Conduit	
4.000	62.711	1.792	35.0	0.132	5.00	0.0	0.600	o	300	Pipe/Conduit	
4.001	29.190	0.834	35.0	0.120	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.006	27.376	1.521	18.0	0.084	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.007	21.853	1.214	18.0	0.060	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.008	21.454	0.215	99.8	0.174	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.009	41.755	0.278	150.2	0.037	0.00	0.0	0.600	o	900	Pipe/Conduit	

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	5.22	98.713	0.110	0.0	0.0	0.0	2.22	88.2	14.9
2.001	50.00	5.39	97.800	0.194	0.0	0.0	0.0	2.88	203.6	26.3
1.002	50.00	5.94	96.340	0.733	0.0	0.0	0.0	3.22	512.4	99.3
3.000	50.00	5.10	97.149	0.133	0.0	0.0	0.0	3.72	263.2	18.0
3.001	50.00	5.19	95.954	0.191	0.0	0.0	0.0	3.72	263.2	25.9
1.003	50.00	5.99	94.721	0.975	0.0	0.0	0.0	4.81	765.0	132.0
1.004	50.00	6.10	93.820	1.095	0.0	0.0	0.0	4.81	764.9	148.3
1.005	50.00	6.18	92.103	1.127	0.0	0.0	0.0	4.81	765.1	152.6
4.000	50.00	5.39	93.565	0.132	0.0	0.0	0.0	2.67	188.5	17.9
4.001	50.00	5.57	91.773	0.252	0.0	0.0	0.0	2.67	188.5	34.1
1.006	50.00	6.27	90.789	1.463	0.0	0.0	0.0	4.81	765.0	198.1
1.007	50.00	6.34	89.268	1.523	0.0	0.0	0.0	5.30	1146.7	206.2
1.008	50.00	6.49	88.054	1.697	0.0	0.0	0.0	2.44	689.3	229.8
1.009	50.00	6.76	87.540	1.734	0.0	0.0	0.0	2.55	1625.1	234.8

Network Design Table for Surface Network 4

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
5.000	37.352	1.494	25.0	0.089	5.00	0.0	0.600	o	225	Pipe/Conduit	
5.001	20.574	0.137	150.2	0.072	0.00	0.0	0.600	o	225	Pipe/Conduit	
5.002	57.443	0.383	150.0	0.095	0.00	0.0	0.600	o	300	Pipe/Conduit	
5.003	46.284	0.309	149.8	0.157	0.00	0.0	0.600	o	375	Pipe/Conduit	
5.004	48.918	1.761	27.8	0.215	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.010	15.786	0.105	150.3	0.112	0.00	0.0	0.600	o	900	Pipe/Conduit	
1.011	29.479	0.197	149.6	0.056	0.00	0.0	0.600	o	900	Pipe/Conduit	
1.012	27.097	0.181	149.7	0.111	0.00	0.0	0.600	o	900	Pipe/Conduit	
6.000	39.196	2.270	17.3	0.181	5.00	0.0	0.600	o	225	Pipe/Conduit	
6.001	32.104	2.242	14.3	0.175	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.013	20.014	0.133	150.5	0.061	0.00	0.0	0.600	o	900	Pipe/Conduit	
1.014	31.289	0.209	149.7	0.051	0.00	0.0	0.600	o	900	Pipe/Conduit	
7.000	20.300	1.194	17.0	0.037	5.00	0.0	0.600	o	225	Pipe/Conduit	
7.001	28.518	1.677	17.0	0.116	0.00	0.0	0.600	o	225	Pipe/Conduit	
7.002	40.355	2.374	17.0	0.109	0.00	0.0	0.600	o	225	Pipe/Conduit	

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)
5.000	50.00	5.24	92.068	0.089	0.0	0.0	0.0	2.63	104.5	12.1
5.001	50.00	5.56	90.574	0.161	0.0	0.0	0.0	1.06	42.3	21.8
5.002	50.00	6.31	90.362	0.256	0.0	0.0	0.0	1.28	90.6	34.7
5.003	50.00	6.83	89.979	0.413	0.0	0.0	0.0	1.48	163.3	55.9
5.004	50.00	7.06	89.670	0.628	0.0	0.0	0.0	3.45	381.0	85.0
1.010	50.00	7.17	87.261	2.474	0.0	0.0	0.0	2.55	1624.3	335.0
1.011	50.00	7.36	87.156	2.530	0.0	0.0	0.0	2.56	1628.2	342.6
1.012	50.00	7.54	86.960	2.641	0.0	0.0	0.0	2.56	1627.8	357.6
6.000	50.00	5.21	92.305	0.181	0.0	0.0	0.0	3.16	125.8	24.5
6.001	50.00	5.36	90.035	0.356	0.0	0.0	0.0	3.48	138.2	48.2
1.013	50.00	7.67	86.779	3.058	0.0	0.0	0.0	2.55	1623.6	414.1
1.014	50.00	7.87	86.645	3.109	0.0	0.0	0.0	2.56	1627.8	421.0
7.000	50.00	5.11	92.897	0.037	0.0	0.0	0.0	3.19	126.8	5.0
7.001	50.00	5.26	91.703	0.153	0.0	0.0	0.0	3.19	126.8	20.7
7.002	50.00	5.47	90.025	0.262	0.0	0.0	0.0	3.19	126.8	35.5

Network Design Table for Surface Network 4

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.015	19.911	0.133	149.7	0.078	0.00	0.0	0.600	o	900	Pipe/Conduit	
1.016	28.937	0.193	149.9	0.080	0.00	0.0	0.600	o	900	Pipe/Conduit	
8.000	29.433	1.840	16.0	0.142	5.00	0.0	0.600	o	300	Pipe/Conduit	
8.001	18.558	1.160	16.0	0.064	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.017	25.423	0.591	43.0	0.042	0.00	0.0	0.600	o	900	Pipe/Conduit	
1.018	24.922	0.712	35.0	0.040	0.00	0.0	0.600	o	900	Pipe/Conduit	
1.019	28.450	0.813	35.0	0.102	0.00	0.0	0.600	o	900	Pipe/Conduit	
1.020	27.305	0.780	35.0	0.084	0.00	0.0	0.600	o	900	Pipe/Conduit	
1.021	25.942	0.741	35.0	0.116	0.00	0.0	0.600	o	900	Pipe/Conduit	
9.000	28.860	0.825	35.0	0.078	5.00	0.0	0.600	o	300	Pipe/Conduit	
9.001	37.075	1.059	35.0	0.096	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.022	25.208	0.720	35.0	0.017	0.00	0.0	0.600	o	900	Pipe/Conduit	
1.023	28.801	0.192	150.0	0.065	0.00	0.0	0.600	o	900	Pipe/Conduit	
10.000	26.118	1.306	20.0	0.055	5.00	0.0	0.600	o	225	Pipe/Conduit	
10.001	31.219	1.561	20.0	0.052	0.00	0.0	0.600	o	225	Pipe/Conduit	

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)
1.015	50.00	8.00	86.437	3.449	0.0	0.0	0.0	2.56	1627.8	467.0
1.016	50.00	8.19	86.304	3.529	0.0	0.0	0.0	2.56	1626.6	477.9
8.000	50.00	5.12	89.699	0.142	0.0	0.0	0.0	3.95	279.2	19.2
8.001	50.00	5.20	87.860	0.206	0.0	0.0	0.0	3.95	279.2	27.9
1.017	50.00	8.28	86.111	3.777	0.0	0.0	0.0	4.78	3043.8	511.5
1.018	50.00	8.36	85.523	3.817	0.0	0.0	0.0	5.31	3375.3	516.9
1.019	50.00	8.44	84.811	3.919	0.0	0.0	0.0	5.31	3375.7	530.7
1.020	50.00	8.53	83.998	4.003	0.0	0.0	0.0	5.31	3375.1	542.1
1.021	50.00	8.61	83.218	4.119	0.0	0.0	0.0	5.31	3374.9	557.8
9.000	50.00	5.18	84.811	0.078	0.0	0.0	0.0	2.67	188.5	10.6
9.001	50.00	5.41	83.986	0.174	0.0	0.0	0.0	2.67	188.5	23.6
1.022	50.00	8.69	82.477	4.310	0.0	0.0	0.0	5.30	3374.9	583.6
1.023	50.00	8.88	81.607	4.375	0.0	0.0	0.0	2.56	1626.2	592.4
10.000	50.00	5.15	96.182	0.055	0.0	0.0	0.0	2.94	116.9	7.4
10.001	50.00	5.33	94.876	0.107	0.0	0.0	0.0	2.94	116.9	14.5

Network Design Table for Surface Network 4

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
10.002	57.244	2.862	20.0	0.075	0.00	0.0	0.600	o	300	Pipe/Conduit	
10.003	23.788	1.189	20.0	0.086	0.00	0.0	0.600	o	300	Pipe/Conduit	
10.004	22.404	1.120	20.0	0.031	0.00	0.0	0.600	o	300	Pipe/Conduit	
10.005	17.890	0.894	20.0	0.079	0.00	0.0	0.600	o	375	Pipe/Conduit	
10.006	34.164	1.708	20.0	0.064	0.00	0.0	0.600	o	375	Pipe/Conduit	
11.000	47.473	1.187	40.0	0.199	5.00	0.0	0.600	o	300	Pipe/Conduit	
10.007	14.567	0.728	20.0	0.095	0.00	0.0	0.600	o	375	Pipe/Conduit	
10.008	26.549	1.328	20.0	0.049	0.00	0.0	0.600	o	450	Pipe/Conduit	
10.009	22.661	0.780	29.1	0.115	0.00	0.0	0.600	o	450	Pipe/Conduit	
12.000	27.737	0.925	30.0	0.136	5.00	0.0	0.600	o	225	Pipe/Conduit	
12.001	22.598	0.753	30.0	0.106	0.00	0.0	0.600	o	225	Pipe/Conduit	
12.002	49.036	0.981	50.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
12.003	48.146	0.963	50.0	0.062	0.00	0.0	0.600	o	375	Pipe/Conduit	
10.010	14.833	0.615	24.1	0.100	0.00	0.0	0.600	o	750	Pipe/Conduit	
13.000	15.970	0.735	21.7	0.000	5.00	0.0	0.600	o	900	Pipe/Conduit	

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)
10.002	50.00	5.60	93.240	0.182	0.0	0.0	0.0	3.53	249.6	24.6
10.003	50.00	5.71	90.378	0.268	0.0	0.0	0.0	3.53	249.6	36.3
10.004	50.00	5.81	89.189	0.299	0.0	0.0	0.0	3.53	249.6	40.5
10.005	50.00	5.89	87.994	0.378	0.0	0.0	0.0	4.07	449.1	51.2
10.006	50.00	6.03	87.099	0.442	0.0	0.0	0.0	4.07	449.2	59.9
11.000	50.00	5.32	86.657	0.199	0.0	0.0	0.0	2.49	176.3	26.9
10.007	50.00	6.09	85.391	0.736	0.0	0.0	0.0	4.07	449.1	99.7
10.008	50.00	6.18	84.588	0.785	0.0	0.0	0.0	4.56	725.7	106.3
10.009	50.00	6.28	83.260	0.900	0.0	0.0	0.0	3.78	601.7	121.9
12.000	50.00	5.19	86.327	0.136	0.0	0.0	0.0	2.40	95.4	18.4
12.001	50.00	5.35	85.402	0.242	0.0	0.0	0.0	2.40	95.3	32.8
12.002	50.00	5.67	84.499	0.242	0.0	0.0	0.0	2.57	283.6	32.8
12.003	50.00	5.98	83.518	0.304	0.0	0.0	0.0	2.57	283.6	41.2
10.010	50.00	6.33	82.480	1.304	0.0	0.0	0.0	5.71	2523.6	176.6
13.000	50.00	5.04	81.800	0.000	0.0	0.0	0.0	6.74	4286.3	0.0

Network Design Table for Surface Network 4

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.024	41.941	0.232	181.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.025	29.514	0.268	110.1	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
14.000	29.480	1.474	20.0	0.077	5.00	0.0	0.600	o	225	Pipe/Conduit	
14.001	18.222	0.911	20.0	0.058	0.00	0.0	0.600	o	225	Pipe/Conduit	
14.002	44.216	2.211	20.0	0.095	0.00	0.0	0.600	o	300	Pipe/Conduit	
14.003	43.031	0.430	100.1	0.141	0.00	0.0	0.600	o	375	Pipe/Conduit	
14.004	22.463	0.225	99.8	0.113	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.026	22.182	0.087	255.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
15.000	35.922	1.437	25.0	0.104	5.00	0.0	0.600	o	225	Pipe/Conduit	
15.001	13.046	0.518	25.2	0.117	0.00	0.0	0.600	o	225	Pipe/Conduit	
15.002	44.513	0.800	55.6	0.000	0.00	0.0	0.600	o	500	Pipe/Conduit	
15.003	12.211	0.072	169.6	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.027	4.188	0.028	149.6	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

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)
1.024	50.00	9.34	81.415	5.679	0.0	0.0	0.0	1.51	239.8«	769.0
1.025	50.00	9.60	81.183	5.679	0.0	0.0	0.0	1.94	308.0«	769.0
14.000	50.00	5.17	86.391	0.077	0.0	0.0	0.0	2.94	116.9	10.4
14.001	50.00	5.27	84.917	0.135	0.0	0.0	0.0	2.94	116.9	18.3
14.002	50.00	5.48	83.931	0.230	0.0	0.0	0.0	3.53	249.6	31.1
14.003	50.00	5.88	81.720	0.371	0.0	0.0	0.0	1.81	200.0	50.2
14.004	50.00	6.08	81.290	0.484	0.0	0.0	0.0	1.81	200.3	65.5
1.026	50.00	9.89	80.915	6.163	0.0	0.0	0.0	1.27	201.8«	834.5
15.000	50.00	5.23	83.655	0.104	0.0	0.0	0.0	2.63	104.5	14.1
15.001	50.00	5.31	82.218	0.221	0.0	0.0	0.0	2.62	104.1	29.9
15.002	50.00	5.57	81.700	0.221	0.0	0.0	0.0	2.92	572.7	29.9
15.003	50.00	5.67	80.900	0.221	0.0	0.0	0.0	1.87	527.9	29.9
1.027	50.00	9.94	80.828	6.384	0.0	0.0	0.0	1.28	90.7«	864.5

Manhole Schedules for Surface Network 4

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S300	99.999	1.521	Open Manhole	1200	1.000	98.478	300				
S301	99.800	2.062	Open Manhole	1200	1.001	97.738	300	1.000	97.813	300	75
S328	100.218	1.505	Open Manhole	1200	2.000	98.713	225				
S329	99.806	2.006	Open Manhole	1200	2.001	97.800	300	2.000	97.875	225	
S302	98.942	2.602	Open Manhole	1200	1.002	96.340	450	1.001	96.803	300	313
								2.001	96.803	300	313
S340	98.905	1.756	Open Manhole	1200	3.000	97.149	300				
S341	98.163	2.210	Open Manhole	1200	3.001	95.954	300	3.000	95.953	300	
S303	96.902	2.630	Open Manhole	1350	1.003	94.721	450	1.002	94.272	450	
								3.001	94.796	300	
S304	95.954	2.134	Open Manhole	1350	1.004	93.820	450	1.003	93.820	450	
S305	94.142	2.039	Open Manhole	1350	1.005	92.103	450	1.004	92.103	450	
S342	95.036	1.471	Open Manhole	1200	4.000	93.565	300				
S343	93.470	1.697	Open Manhole	900 x 750	4.001	91.773	300	4.000	91.773	300	
S306	92.812	2.023	Open Manhole	1350	1.006	90.789	450	1.005	90.864	450	75
								4.001	90.939	300	
S307	91.199	1.931	Open Manhole	1240 x 900	1.007	89.268	525	1.006	89.268	450	
S308	90.538	2.484	Open Manhole	1350	1.008	88.054	600	1.007	88.054	525	
S309	89.896	2.356	Open Manhole	1240 x 1050	1.009	87.540	900	1.008	87.839	600	
S344	93.976	1.908	Open Manhole	1200	5.000	92.068	225				
S345	92.360	1.786	Open Manhole	1200	5.001	90.574	225	5.000	90.574	225	
S348	92.113	1.751	Open Manhole	1200	5.002	90.362	300	5.001	90.437	225	
S349	93.747	3.768	Open Manhole	1200	5.003	89.979	375	5.002	89.979	300	
S350	92.045	2.375	Open Manhole	1200	5.004	89.670	375	5.003	89.670	375	
S310	89.797	2.536	Open Manhole	1500	1.010	87.261	900	1.009	87.262	900	1
								5.004	87.909	375	123
S311	89.899	2.743	Open Manhole	1500	1.011	87.156	900	1.010	87.156	900	
S312	90.108	3.149	Open Manhole	1500	1.012	86.960	900	1.011	86.959	900	
S351	93.860	1.555	Open Manhole	1200	6.000	92.305	225				
S352	91.809	1.774	Open Manhole	1200	6.001	90.035	225	6.000	90.035	225	
S313	90.309	3.530	Open Manhole	1500	1.013	86.779	900	1.012	86.779	900	
								6.001	87.793	225	339
S314	90.438	3.793	Open Manhole	1500	1.014	86.645	900	1.013	86.646	900	1
S353	94.321	1.424	Open Manhole	1200	7.000	92.897	225				

Manhole Schedules for Surface Network 4

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S354	93.556	1.853	Open Manhole	1200	7.001	91.703	225	7.000	91.703	225	
S355	92.010	1.985	Open Manhole	1200	7.002	90.025	225	7.001	90.026	225	1
S315	90.495	4.059	Open Manhole	1500	1.015	86.437	900	1.014	86.436	900	
								7.002	87.651	225	539
S316	90.090	3.786	Open Manhole	1800	1.016	86.304	900	1.015	86.304	900	
S356	91.487	1.788	Open Manhole	1200	8.000	89.699	300				
S357	90.015	2.156	Open Manhole	1200	8.001	87.860	300	8.000	87.859	300	
S317	89.222	3.111	Open Manhole	1800	1.017	86.111	900	1.016	86.111	900	
								8.001	86.700	300	
S318	88.451	2.931	Open Manhole	1800	1.018	85.523	900	1.017	85.520	900	
S319	87.703	2.892	Open Manhole	1800	1.019	84.811	900	1.018	84.811	900	
S320	86.852	2.854	Open Manhole	2100	1.020	83.998	900	1.019	83.998	900	
S321	86.029	2.811	Open Manhole	2100	1.021	83.218	900	1.020	83.218	900	
S358	86.781	1.970	Open Manhole	1200	9.000	84.811	300				
S359	85.689	1.703	Open Manhole	1200	9.001	83.986	300	9.000	83.986	300	
S322	85.266	2.789	Open Manhole	2100	1.022	82.477	900	1.021	82.477	900	
								9.001	82.927	300	
S323	84.520	2.913	Open Manhole	2400	1.023	81.607	900	1.022	81.757	900	150
S360	97.803	1.621	Open Manhole	1200	10.000	96.182	225				
S361	97.055	2.179	Open Manhole	1200	10.001	94.876	225	10.000	94.876	225	
S362	95.482	2.242	Open Manhole	1200	10.002	93.240	300	10.001	93.315	225	
S363	92.475	2.097	Open Manhole	1200	10.003	90.378	300	10.002	90.378	300	
S364	91.247	2.058	Open Manhole	1200	10.004	89.189	300	10.003	89.189	300	
S365	90.102	2.108	Open Manhole	1350	10.005	87.994	375	10.004	88.069	300	
S366	89.187	2.088	Open Manhole	1350	10.006	87.099	375	10.005	87.100	375	1
S371	88.271	1.614	Open Manhole	1200	11.000	86.657	300				
S367	87.395	2.004	Open Manhole	1350	10.007	85.391	375	10.006	85.391	375	
								11.000	85.470	300	4
S368	86.629	2.041	Open Manhole	1350	10.008	84.588	450	10.007	84.663	375	
S369	85.264	2.004	Open Manhole	1350	10.009	83.260	450	10.008	83.260	450	
S372	87.953	1.626	Open Manhole	1200	12.000	86.327	225				
S373	87.041	1.639	Open Manhole	1200	12.001	85.402	225	12.000	85.402	225	
S374	86.268	1.769	Open Manhole	1350	12.002	84.499	375	12.001	84.649	225	
S375	85.292	1.774	Open Manhole	1350	12.003	83.518	375	12.002	83.518	375	

Manhole Schedules for Surface Network 4

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S370	84.456	1.976	Open Manhole	1350	10.010	82.480	750	10.009	82.480	450	
								12.003	82.555	375	
HW302	84.200	2.400	Open Manhole	1800	13.000	81.800	900				
S324	84.240	3.175	Open Manhole	3000	1.024	81.415	450	1.023	81.415	900	
								10.010	81.865	750	750
								13.000	81.065	900	
S325	83.123	1.940	Open Manhole	1240 x 900	1.025	81.183	450	1.024	81.183	450	
S376	88.831	2.440	Open Manhole	1200	14.000	86.391	225				
S377	87.332	2.415	Open Manhole	1200	14.001	84.917	225	14.000	84.917	225	
S378	86.267	2.336	Open Manhole	1350	14.002	83.931	300	14.001	84.006	225	
S379	83.888	2.168	Open Manhole	1350	14.003	81.720	375	14.002	81.720	300	
S380	83.022	1.732	Open Manhole	900 x 750	14.004	81.290	375	14.003	81.290	375	
S326	82.494	1.579	Open Manhole	1240 x 900	1.026	80.915	450	1.025	80.915	450	
								14.004	81.065	375	75
S381	85.197	1.542	Open Manhole	1200	15.000	83.655	225				
S382	83.963	1.745	Open Manhole	1200	15.001	82.218	225	15.000	82.218	225	
HW303	83.295	1.595	Open Manhole	1500	15.002	81.700	500	15.001	81.700	225	
HW304	82.143	1.243	Open Manhole	1500	15.003	80.900	600	15.002	80.900	500	
S327	82.091	1.263	Open Manhole	900 x 1050	1.027	80.828	300	1.026	80.828	450	
								15.003	80.828	600	
HW300	82.100	1.300	Open Manhole	0		OUTFALL		1.027	80.800	300	

PIPELINE SCHEDULES for Surface Network 4

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	300	S300	99.999	98.478	1.221	Open Manhole	1200
1.001	o	300	S301	99.800	97.738	1.762	Open Manhole	1200
2.000	o	225	S328	100.218	98.713	1.280	Open Manhole	1200
2.001	o	300	S329	99.806	97.800	1.706	Open Manhole	1200
1.002	o	450	S302	98.942	96.340	2.152	Open Manhole	1200
3.000	o	300	S340	98.905	97.149	1.456	Open Manhole	1200
3.001	o	300	S341	98.163	95.954	1.909	Open Manhole	1200
1.003	o	450	S303	96.902	94.721	1.731	Open Manhole	1350
1.004	o	450	S304	95.954	93.820	1.684	Open Manhole	1350
1.005	o	450	S305	94.142	92.103	1.589	Open Manhole	1350
4.000	o	300	S342	95.036	93.565	1.171	Open Manhole	1200
4.001	o	300	S343	93.470	91.773	1.397	Open Manhole	900 x 750

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	29.925	45.0	S301	99.800	97.813	1.687	Open Manhole	1200
1.001	42.062	45.0	S302	98.942	96.803	1.839	Open Manhole	1200
2.000	29.339	35.0	S329	99.806	97.875	1.706	Open Manhole	1200
2.001	29.914	30.0	S302	98.942	96.803	1.839	Open Manhole	1200
1.002	82.735	40.0	S303	96.902	94.272	2.180	Open Manhole	1350
3.000	21.524	18.0	S341	98.163	95.953	1.910	Open Manhole	1200
3.001	20.835	18.0	S303	96.902	94.796	1.806	Open Manhole	1350
1.003	16.218	18.0	S304	95.954	93.820	1.684	Open Manhole	1350
1.004	30.911	18.0	S305	94.142	92.103	1.589	Open Manhole	1350
1.005	22.293	18.0	S306	92.812	90.864	1.498	Open Manhole	1350
4.000	62.711	35.0	S343	93.470	91.773	1.397	Open Manhole	900 x 750
4.001	29.190	35.0	S306	92.812	90.939	1.573	Open Manhole	1350

PIPELINE SCHEDULES for Surface Network 4

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.006	o	450	S306	92.812	90.789	1.573	Open Manhole	1350
1.007	o	525	S307	91.199	89.268	1.406	Open Manhole	1240 x 900
1.008	o	600	S308	90.538	88.054	1.884	Open Manhole	1350
1.009	o	900	S309	89.896	87.540	1.456	Open Manhole	1240 x 1050
5.000	o	225	S344	93.976	92.068	1.683	Open Manhole	1200
5.001	o	225	S345	92.360	90.574	1.561	Open Manhole	1200
5.002	o	300	S348	92.113	90.362	1.451	Open Manhole	1200
5.003	o	375	S349	93.747	89.979	3.393	Open Manhole	1200
5.004	o	375	S350	92.045	89.670	2.000	Open Manhole	1200
1.010	o	900	S310	89.797	87.261	1.636	Open Manhole	1500
1.011	o	900	S311	89.899	87.156	1.843	Open Manhole	1500
1.012	o	900	S312	90.108	86.960	2.248	Open Manhole	1500
6.000	o	225	S351	93.860	92.305	1.330	Open Manhole	1200
6.001	o	225	S352	91.809	90.035	1.549	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.006	27.376	18.0	S307	91.199	89.268	1.481	Open Manhole	1240 x 900
1.007	21.853	18.0	S308	90.538	88.054	1.959	Open Manhole	1350
1.008	21.454	99.8	S309	89.896	87.839	1.457	Open Manhole	1240 x 1050
1.009	41.755	150.2	S310	89.797	87.262	1.635	Open Manhole	1500
5.000	37.352	25.0	S345	92.360	90.574	1.561	Open Manhole	1200
5.001	20.574	150.2	S348	92.113	90.437	1.451	Open Manhole	1200
5.002	57.443	150.0	S349	93.747	89.979	3.468	Open Manhole	1200
5.003	46.284	149.8	S350	92.045	89.670	2.000	Open Manhole	1200
5.004	48.918	27.8	S310	89.797	87.909	1.513	Open Manhole	1500
1.010	15.786	150.3	S311	89.899	87.156	1.843	Open Manhole	1500
1.011	29.479	149.6	S312	90.108	86.959	2.249	Open Manhole	1500
1.012	27.097	149.7	S313	90.309	86.779	2.630	Open Manhole	1500
6.000	39.196	17.3	S352	91.809	90.035	1.549	Open Manhole	1200
6.001	32.104	14.3	S313	90.309	87.793	2.291	Open Manhole	1500

PIPELINE SCHEDULES for Surface Network 4

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.013	o	900	S313	90.309	86.779	2.630	Open Manhole	1500
1.014	o	900	S314	90.438	86.645	2.893	Open Manhole	1500
7.000	o	225	S353	94.321	92.897	1.199	Open Manhole	1200
7.001	o	225	S354	93.556	91.703	1.628	Open Manhole	1200
7.002	o	225	S355	92.010	90.025	1.760	Open Manhole	1200
1.015	o	900	S315	90.495	86.437	3.158	Open Manhole	1500
1.016	o	900	S316	90.090	86.304	2.886	Open Manhole	1800
8.000	o	300	S356	91.487	89.699	1.488	Open Manhole	1200
8.001	o	300	S357	90.015	87.860	1.855	Open Manhole	1200
1.017	o	900	S317	89.222	86.111	2.211	Open Manhole	1800
1.018	o	900	S318	88.451	85.523	2.028	Open Manhole	1800
1.019	o	900	S319	87.703	84.811	1.992	Open Manhole	1800
1.020	o	900	S320	86.852	83.998	1.954	Open Manhole	2100
1.021	o	900	S321	86.029	83.218	1.911	Open Manhole	2100

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.013	20.014	150.5	S314	90.438	86.646	2.892	Open Manhole	1500
1.014	31.289	149.7	S315	90.495	86.436	3.159	Open Manhole	1500
7.000	20.300	17.0	S354	93.556	91.703	1.628	Open Manhole	1200
7.001	28.518	17.0	S355	92.010	90.026	1.759	Open Manhole	1200
7.002	40.355	17.0	S315	90.495	87.651	2.619	Open Manhole	1500
1.015	19.911	149.7	S316	90.090	86.304	2.886	Open Manhole	1800
1.016	28.937	149.9	S317	89.222	86.111	2.211	Open Manhole	1800
8.000	29.433	16.0	S357	90.015	87.859	1.856	Open Manhole	1200
8.001	18.558	16.0	S317	89.222	86.700	2.222	Open Manhole	1800
1.017	25.423	43.0	S318	88.451	85.520	2.031	Open Manhole	1800
1.018	24.922	35.0	S319	87.703	84.811	1.992	Open Manhole	1800
1.019	28.450	35.0	S320	86.852	83.998	1.954	Open Manhole	2100
1.020	27.305	35.0	S321	86.029	83.218	1.911	Open Manhole	2100
1.021	25.942	35.0	S322	85.266	82.477	1.889	Open Manhole	2100

PIPELINE SCHEDULES for Surface Network 4

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
9.000	o	300	S358	86.781	84.811	1.670	Open Manhole	1200
9.001	o	300	S359	85.689	83.986	1.403	Open Manhole	1200
1.022	o	900	S322	85.266	82.477	1.889	Open Manhole	2100
1.023	o	900	S323	84.520	81.607	2.013	Open Manhole	2400
10.000	o	225	S360	97.803	96.182	1.396	Open Manhole	1200
10.001	o	225	S361	97.055	94.876	1.954	Open Manhole	1200
10.002	o	300	S362	95.482	93.240	1.942	Open Manhole	1200
10.003	o	300	S363	92.475	90.378	1.797	Open Manhole	1200
10.004	o	300	S364	91.247	89.189	1.758	Open Manhole	1200
10.005	o	375	S365	90.102	87.994	1.733	Open Manhole	1350
10.006	o	375	S366	89.187	87.099	1.713	Open Manhole	1350
11.000	o	300	S371	88.271	86.657	1.314	Open Manhole	1200
10.007	o	375	S367	87.395	85.391	1.629	Open Manhole	1350

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
9.000	28.860	35.0	S359	85.689	83.986	1.403	Open Manhole	1200
9.001	37.075	35.0	S322	85.266	82.927	2.039	Open Manhole	2100
1.022	25.208	35.0	S323	84.520	81.757	1.863	Open Manhole	2400
1.023	28.801	150.0	S324	84.240	81.415	1.925	Open Manhole	3000
10.000	26.118	20.0	S361	97.055	94.876	1.954	Open Manhole	1200
10.001	31.219	20.0	S362	95.482	93.315	1.942	Open Manhole	1200
10.002	57.244	20.0	S363	92.475	90.378	1.797	Open Manhole	1200
10.003	23.788	20.0	S364	91.247	89.189	1.758	Open Manhole	1200
10.004	22.404	20.0	S365	90.102	88.069	1.733	Open Manhole	1350
10.005	17.890	20.0	S366	89.187	87.100	1.712	Open Manhole	1350
10.006	34.164	20.0	S367	87.395	85.391	1.629	Open Manhole	1350
11.000	47.473	40.0	S367	87.395	85.470	1.625	Open Manhole	1350
10.007	14.567	20.0	S368	86.629	84.663	1.591	Open Manhole	1350

PIPELINE SCHEDULES for Surface Network 4

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
10.008	o	450	S368	86.629	84.588	1.591	Open Manhole	1350
10.009	o	450	S369	85.264	83.260	1.554	Open Manhole	1350
12.000	o	225	S372	87.953	86.327	1.401	Open Manhole	1200
12.001	o	225	S373	87.041	85.402	1.414	Open Manhole	1200
12.002	o	375	S374	86.268	84.499	1.394	Open Manhole	1350
12.003	o	375	S375	85.292	83.518	1.399	Open Manhole	1350
10.010	o	750	S370	84.456	82.480	1.226	Open Manhole	1350
13.000	o	900	HW302	84.200	81.800	1.500	Open Manhole	1800
1.024	o	450	S324	84.240	81.415	2.375	Open Manhole	3000
1.025	o	450	S325	83.123	81.183	1.490	Open Manhole	1240 x 900
14.000	o	225	S376	88.831	86.391	2.215	Open Manhole	1200
14.001	o	225	S377	87.332	84.917	2.190	Open Manhole	1200
14.002	o	300	S378	86.267	83.931	2.036	Open Manhole	1350

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
10.008	26.549	20.0	S369	85.264	83.260	1.554	Open Manhole	1350
10.009	22.661	29.1	S370	84.456	82.480	1.526	Open Manhole	1350
12.000	27.737	30.0	S373	87.041	85.402	1.414	Open Manhole	1200
12.001	22.598	30.0	S374	86.268	84.649	1.394	Open Manhole	1350
12.002	49.036	50.0	S375	85.292	83.518	1.399	Open Manhole	1350
12.003	48.146	50.0	S370	84.456	82.555	1.526	Open Manhole	1350
10.010	14.833	24.1	S324	84.240	81.865	1.625	Open Manhole	3000
13.000	15.970	21.7	S324	84.240	81.065	2.275	Open Manhole	3000
1.024	41.941	181.0	S325	83.123	81.183	1.490	Open Manhole	1240 x 900
1.025	29.514	110.1	S326	82.494	80.915	1.129	Open Manhole	1240 x 900
14.000	29.480	20.0	S377	87.332	84.917	2.190	Open Manhole	1200
14.001	18.222	20.0	S378	86.267	84.006	2.036	Open Manhole	1350
14.002	44.216	20.0	S379	83.888	81.720	1.868	Open Manhole	1350

PIPELINE SCHEDULES for Surface Network 4

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
14.003	o	375	S379	83.888	81.720	1.793	Open Manhole	1350
14.004	o	375	S380	83.022	81.290	1.357	Open Manhole	900 x 750
1.026	o	450	S326	82.494	80.915	1.129	Open Manhole	1240 x 900
15.000	o	225	S381	85.197	83.655	1.317	Open Manhole	1200
15.001	o	225	S382	83.963	82.218	1.520	Open Manhole	1200
15.002	o	500	HW303	83.295	81.700	1.095	Open Manhole	1500
15.003	o	600	HW304	82.143	80.900	0.643	Open Manhole	1500
1.027	o	300	S327	82.091	80.828	0.963	Open Manhole	900 x 1050

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
14.003	43.031	100.1	S380	83.022	81.290	1.357	Open Manhole	900 x 750
14.004	22.463	99.8	S326	82.494	81.065	1.054	Open Manhole	1240 x 900
1.026	22.182	255.0	S327	82.091	80.828	0.813	Open Manhole	900 x 1050
15.000	35.922	25.0	S382	83.963	82.218	1.520	Open Manhole	1200
15.001	13.046	25.2	HW303	83.295	81.700	1.370	Open Manhole	1500
15.002	44.513	55.6	HW304	82.143	80.900	0.743	Open Manhole	1500
15.003	12.211	169.6	S327	82.091	80.828	0.663	Open Manhole	900 x 1050
1.027	4.188	149.6	HW300	82.100	80.800	1.000	Open Manhole	0

Area Summary for Surface Network 4

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.167	0.167	0.167
1.001	-	-	100	0.222	0.222	0.222
2.000	-	-	100	0.110	0.110	0.110
2.001	-	-	100	0.084	0.084	0.084
1.002	-	-	100	0.150	0.150	0.150
3.000	-	-	100	0.133	0.133	0.133
3.001	-	-	100	0.058	0.058	0.058
1.003	-	-	100	0.051	0.051	0.051
1.004	-	-	100	0.120	0.120	0.120
1.005	-	-	100	0.032	0.032	0.032
4.000	-	-	100	0.132	0.132	0.132
4.001	-	-	100	0.120	0.120	0.120
1.006	-	-	100	0.084	0.084	0.084
1.007	-	-	100	0.060	0.060	0.060
1.008	-	-	100	0.174	0.174	0.174
1.009	-	-	100	0.037	0.037	0.037
5.000	-	-	100	0.089	0.089	0.089
5.001	-	-	100	0.072	0.072	0.072
5.002	-	-	100	0.095	0.095	0.095
5.003	-	-	100	0.157	0.157	0.157
5.004	-	-	100	0.215	0.215	0.215
1.010	-	-	100	0.112	0.112	0.112
1.011	-	-	100	0.056	0.056	0.056
1.012	-	-	100	0.111	0.111	0.111
6.000	-	-	100	0.181	0.181	0.181
6.001	-	-	100	0.175	0.175	0.175
1.013	-	-	100	0.061	0.061	0.061
1.014	-	-	100	0.051	0.051	0.051
7.000	-	-	100	0.037	0.037	0.037
7.001	-	-	100	0.116	0.116	0.116
7.002	-	-	100	0.109	0.109	0.109
1.015	-	-	100	0.078	0.078	0.078
1.016	-	-	100	0.080	0.080	0.080
8.000	-	-	100	0.142	0.142	0.142
8.001	-	-	100	0.064	0.064	0.064
1.017	-	-	100	0.042	0.042	0.042
1.018	-	-	100	0.040	0.040	0.040
1.019	-	-	100	0.102	0.102	0.102
1.020	-	-	100	0.084	0.084	0.084
1.021	-	-	100	0.116	0.116	0.116
9.000	-	-	100	0.078	0.078	0.078
9.001	-	-	100	0.096	0.096	0.096
1.022	-	-	100	0.017	0.017	0.017
1.023	-	-	100	0.065	0.065	0.065
10.000	-	-	100	0.055	0.055	0.055
10.001	-	-	100	0.052	0.052	0.052

Area Summary for Surface Network 4

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
10.002	-	-	100	0.075	0.075	0.075
10.003	-	-	100	0.086	0.086	0.086
10.004	-	-	100	0.031	0.031	0.031
10.005	-	-	100	0.079	0.079	0.079
10.006	-	-	100	0.064	0.064	0.064
11.000	-	-	100	0.199	0.199	0.199
10.007	-	-	100	0.095	0.095	0.095
10.008	-	-	100	0.049	0.049	0.049
10.009	-	-	100	0.115	0.115	0.115
12.000	-	-	100	0.136	0.136	0.136
12.001	-	-	100	0.106	0.106	0.106
12.002	-	-	100	0.000	0.000	0.000
12.003	-	-	100	0.062	0.062	0.062
10.010	-	-	100	0.100	0.100	0.100
13.000	-	-	100	0.000	0.000	0.000
1.024	-	-	100	0.000	0.000	0.000
1.025	-	-	100	0.000	0.000	0.000
14.000	-	-	100	0.077	0.077	0.077
14.001	-	-	100	0.058	0.058	0.058
14.002	-	-	100	0.095	0.095	0.095
14.003	-	-	100	0.141	0.141	0.141
14.004	-	-	100	0.113	0.113	0.113
1.026	-	-	100	0.000	0.000	0.000
15.000	-	-	100	0.104	0.104	0.104
15.001	-	-	100	0.117	0.117	0.117
15.002	-	-	100	0.000	0.000	0.000
15.003	-	-	100	0.000	0.000	0.000
1.027	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				6.384	6.384	6.384

Free Flowing Outfall Details for Surface Network 4

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.027	HW300	82.100	80.800	0.000	0	0

Simulation Criteria for Surface Network 4

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.500
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 Offline Controls 0	Number of Time/Area Diagrams 0
Number of Online Controls 2	Number of Storage Structures 2	Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	21.000	Storm Duration (mins)	30
Ratio R	0.421		

Online Controls for Surface Network 4

Hydro-Brake® Optimum Manhole: S324, DS/PN: 1.024, Volume (m³): 50.8

Unit Reference	MD-SHE-0281-5000-2000-5000
Design Head (m)	2.000
Design Flow (l/s)	50.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	281
Invert Level (m)	81.415
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	2100

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.000	49.9	Kick-Flo®	1.330	41.0
Flush-Flo™	0.612	49.8	Mean Flow over Head Range	-	42.9

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	8.8	1.200	45.0	3.000	60.7	7.000	91.5
0.200	29.0	1.400	42.0	3.500	65.4	7.500	94.7
0.300	45.9	1.600	44.8	4.000	69.7	8.000	97.7
0.400	48.3	1.800	47.4	4.500	73.8	8.500	100.6
0.500	49.5	2.000	49.9	5.000	77.7	9.000	103.5
0.600	49.8	2.200	52.2	5.500	81.4	9.500	106.2
0.800	49.3	2.400	54.5	6.000	84.9		
1.000	47.9	2.600	56.6	6.500	88.3		

Hydro-Brake® Optimum Manhole: S327, DS/PN: 1.027, Volume (m³): 7.7

Unit Reference	MD-SHE-0252-3660-1500-3660
Design Head (m)	1.500
Design Flow (l/s)	36.6
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	252
Invert Level (m)	80.828
Minimum Outlet Pipe Diameter (mm)	300

Hydro-Brake® Optimum Manhole: S327, DS/PN: 1.027, Volume (m³): 7.7

Suggested Manhole Diameter (mm) 1800

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	36.6	Kick-Flo®	1.037	30.7
Flush-Flo™	0.476	36.6	Mean Flow over Head Range	-	31.2

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	8.2	1.200	32.9	3.000	51.1	7.000	77.1
0.200	25.8	1.400	35.4	3.500	55.1	7.500	79.7
0.300	35.3	1.600	37.7	4.000	58.7	8.000	82.2
0.400	36.4	1.800	39.9	4.500	62.2	8.500	84.7
0.500	36.6	2.000	42.0	5.000	65.4	9.000	87.1
0.600	36.3	2.200	44.0	5.500	68.5	9.500	89.4
0.800	35.1	2.400	45.9	6.000	71.5		
1.000	31.9	2.600	47.7	6.500	74.3		

Storage Structures for Surface Network 4

Tank or Pond Manhole: HW302, DS/PN: 13.000

Invert Level (m) 81.800

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1129.7	0.700	1441.0	1.400	1780.0	2.100	2146.7
0.100	1172.5	0.800	1487.7	1.500	1830.7	2.199	2200.8
0.200	1215.9	0.900	1535.0	1.600	1881.9	2.200	2201.3
0.300	1259.8	1.000	1582.9	1.700	1933.7	2.400	2300.0
0.400	1304.2	1.100	1631.3	1.800	1986.1		
0.500	1349.3	1.200	1680.3	1.900	2039.1		
0.600	1394.9	1.300	1729.9	2.000	2092.6		

Tank or Pond Manhole: HW304, DS/PN: 15.003

Invert Level (m) 80.900

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1893.8	0.500	2174.1	1.000	2468.6	1.499	2776.5
0.100	1948.7	0.600	2231.9	1.100	2529.1	1.500	2777.1
0.200	2004.2	0.700	2290.2	1.200	2590.3		
0.300	2060.3	0.800	2349.1	1.300	2652.0		
0.400	2116.9	0.900	2408.5	1.400	2714.3		

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 4

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.500
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.421
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	21.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	450.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880
Return Period(s) (years)	100
Climate Change (%)	40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S300	15 Winter	100	+40%	100/15 Summer				99.512
1.001	S301	15 Winter	100	+40%	100/15 Summer				99.238
2.000	S328	15 Winter	100	+40%					98.880
2.001	S329	15 Winter	100	+40%					97.990
1.002	S302	15 Winter	100	+40%	100/15 Summer				97.324
3.000	S340	15 Winter	100	+40%					97.278
3.001	S341	15 Winter	100	+40%					96.160
1.003	S303	15 Winter	100	+40%	100/15 Summer				95.966
1.004	S304	15 Winter	100	+40%	100/15 Summer				95.148
1.005	S305	15 Winter	100	+40%	100/15 Summer				93.873
4.000	S342	15 Winter	100	+40%					93.714
4.001	S343	15 Winter	100	+40%	100/15 Summer				93.312
1.006	S306	15 Winter	100	+40%	100/15 Summer	100/15 Winter			92.817
1.007	S307	15 Winter	100	+40%	100/15 Summer				91.174

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 4

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S300	0.734	0.000	0.67		101.0	SURCHARGED	
1.001	S301	1.200	0.000	1.44		223.7	SURCHARGED	
2.000	S328	-0.058	0.000	0.89		73.2	OK	
2.001	S329	-0.110	0.000	0.72		132.4	OK	
1.002	S302	0.534	0.000	0.87		420.9	SURCHARGED	
3.000	S340	-0.171	0.000	0.38		88.8	OK	
3.001	S341	-0.094	0.000	0.56		129.2	OK	
1.003	S303	0.795	0.000	0.99		530.8	SURCHARGED	
1.004	S304	0.878	0.000	0.88		580.8	SURCHARGED	
1.005	S305	1.320	0.000	0.92		575.1	FLOOD RISK	
4.000	S342	-0.151	0.000	0.48		86.4	OK	
4.001	S343	1.239	0.000	0.78		133.3	FLOOD RISK	
1.006	S306	1.578	5.380	1.10		715.4	FLOOD	1
1.007	S307	1.381	0.000	0.86		726.8	FLOOD RISK	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 4

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.008	S308	15 Winter	100	+40%	100/15 Summer				90.298
1.009	S309	15 Winter	100	+40%	100/15 Summer				89.657
5.000	S344	15 Winter	100	+40%	100/15 Summer				92.840
5.001	S345	15 Winter	100	+40%	100/15 Summer	100/15 Summer			92.362
5.002	S348	15 Winter	100	+40%	100/15 Summer				91.988
5.003	S349	15 Winter	100	+40%	100/15 Summer				91.370
5.004	S350	15 Winter	100	+40%	100/15 Summer				90.841
1.010	S310	15 Winter	100	+40%	100/15 Summer				89.549
1.011	S311	15 Winter	100	+40%	100/15 Summer				89.291
1.012	S312	15 Winter	100	+40%	100/15 Summer				89.050
6.000	S351	15 Winter	100	+40%	100/15 Summer				93.498
6.001	S352	15 Winter	100	+40%	100/15 Summer	100/15 Summer			91.816
1.013	S313	15 Winter	100	+40%	100/15 Summer				88.793
1.014	S314	15 Winter	100	+40%	100/15 Summer				88.453
7.000	S353	15 Winter	100	+40%					92.968
7.001	S354	15 Winter	100	+40%	100/15 Summer				92.578
7.002	S355	15 Winter	100	+40%	100/15 Summer				91.622
1.015	S315	15 Winter	100	+40%	100/15 Summer				88.095
1.016	S316	15 Winter	100	+40%	100/15 Summer				87.651
8.000	S356	15 Winter	100	+40%					89.827
8.001	S357	15 Winter	100	+40%					88.025
1.017	S317	15 Winter	100	+40%	100/15 Winter				87.225
1.018	S318	15 Winter	100	+40%	100/15 Winter				86.753
1.019	S319	15 Winter	100	+40%	100/15 Summer				86.269
1.020	S320	15 Winter	100	+40%	100/15 Summer				85.764
1.021	S321	15 Winter	100	+40%	100/15 Summer				85.239
9.000	S358	15 Winter	100	+40%					84.925
9.001	S359	15 Winter	100	+40%	100/15 Summer				84.794
1.022	S322	15 Winter	100	+40%	100/15 Summer				84.701
1.023	S323	15 Winter	100	+40%	100/15 Summer				84.146
10.000	S360	15 Winter	100	+40%					96.273
10.001	S361	15 Winter	100	+40%					95.012
10.002	S362	15 Winter	100	+40%					93.397
10.003	S363	15 Winter	100	+40%					90.592
10.004	S364	15 Winter	100	+40%					89.422
10.005	S365	15 Winter	100	+40%					88.231
10.006	S366	15 Winter	100	+40%	100/15 Summer				87.536
11.000	S371	15 Winter	100	+40%	100/15 Summer				87.319
10.007	S367	15 Winter	100	+40%	100/15 Summer				86.733
10.008	S368	15 Winter	100	+40%	100/15 Summer				85.428
10.009	S369	15 Winter	100	+40%	100/15 Summer				84.653
12.000	S372	15 Winter	100	+40%	100/15 Summer				87.497
12.001	S373	15 Winter	100	+40%	100/15 Summer				86.754

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 4

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.008	S308	1.644	0.000	1.71		794.5	FLOOD RISK	
1.009	S309	1.217	0.000	0.68		807.9	FLOOD RISK	
5.000	S344	0.547	0.000	0.53		52.7	SURCHARGED	
5.001	S345	1.563	2.212	2.39		91.8	FLOOD	2
5.002	S348	1.326	0.000	1.49		128.3	FLOOD RISK	
5.003	S349	1.016	0.000	1.42		213.4	SURCHARGED	
5.004	S350	0.796	0.000	0.89		314.0	SURCHARGED	
1.010	S310	1.388	0.000	1.20		1146.6	FLOOD RISK	
1.011	S311	1.235	0.000	1.16		1157.2	SURCHARGED	
1.012	S312	1.190	0.000	1.25		1200.5	SURCHARGED	
6.000	S351	0.968	0.000	0.85		101.5	FLOOD RISK	
6.001	S352	1.556	6.980	1.28		165.9	FLOOD	3
1.013	S313	1.114	0.000	1.44		1373.6	SURCHARGED	
1.014	S314	0.908	0.000	1.35		1390.5	SURCHARGED	
7.000	S353	-0.154	0.000	0.21		24.7	OK	
7.001	S354	0.650	0.000	0.77		90.7	SURCHARGED	
7.002	S355	1.372	0.000	1.24		149.8	FLOOD RISK	
1.015	S315	0.758	0.000	1.63		1554.8	SURCHARGED	
1.016	S316	0.447	0.000	1.59		1577.8	SURCHARGED	
8.000	S356	-0.172	0.000	0.37		94.8	OK	
8.001	S357	-0.135	0.000	0.58		139.5	OK	
1.017	S317	0.214	0.000	0.96		1667.8	SURCHARGED	
1.018	S318	0.330	0.000	0.84		1606.1	SURCHARGED	
1.019	S319	0.558	0.000	0.79		1606.9	SURCHARGED	
1.020	S320	0.866	0.000	0.82		1627.8	SURCHARGED	
1.021	S321	1.121	0.000	0.85		1651.0	SURCHARGED	
9.000	S358	-0.186	0.000	0.31		52.1	OK	
9.001	S359	0.508	0.000	0.65		112.5	SURCHARGED	
1.022	S322	1.324	0.000	0.89		1700.7	SURCHARGED	
1.023	S323	1.639	0.000	1.74		1721.0	FLOOD RISK	
10.000	S360	-0.134	0.000	0.34		36.7	OK	
10.001	S361	-0.089	0.000	0.67		73.4	OK	
10.002	S362	-0.143	0.000	0.53		126.6	OK	
10.003	S363	-0.086	0.000	0.85		187.6	OK	
10.004	S364	-0.067	0.000	0.95		209.2	OK	
10.005	S365	-0.138	0.000	0.72		264.6	OK	
10.006	S366	0.062	0.000	0.74		298.4	SURCHARGED	
11.000	S371	0.362	0.000	0.70		116.3	SURCHARGED	
10.007	S367	0.967	0.000	1.34		448.7	SURCHARGED	
10.008	S368	0.390	0.000	0.77		470.2	SURCHARGED	
10.009	S369	0.943	0.000	1.06		525.9	SURCHARGED	
12.000	S372	0.945	0.000	0.90		79.9	SURCHARGED	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 4

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
12.001	S373	1.127	0.000	1.56		135.9	FLOOD RISK	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 4

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
12.002	S374	15 Winter	100	+40%					84.692
12.003	S375	15 Winter	100	+40%	100/15 Summer				84.180
10.010	S370	360 Winter	100	+40%	100/15 Summer				83.890
13.000	HW302	360 Winter	100	+40%	100/15 Summer				83.770
1.024	S324	360 Winter	100	+40%	100/15 Summer				83.898
1.025	S325	15 Winter	100	+40%	100/15 Summer				82.322
14.000	S376	15 Winter	100	+40%					86.500
14.001	S377	15 Winter	100	+40%					85.082
14.002	S378	15 Winter	100	+40%	100/15 Winter				84.265
14.003	S379	15 Winter	100	+40%	100/15 Summer				83.401
14.004	S380	15 Winter	100	+40%	100/15 Summer				82.724
1.026	S326	15 Winter	100	+40%	100/15 Summer				82.174
15.000	S381	15 Winter	100	+40%					83.873
15.001	S382	15 Winter	100	+40%	100/15 Summer				83.252
15.002	HW303	15 Winter	100	+40%					81.880
15.003	HW304	2160 Winter	100	+40%	100/600 Summer				81.807
1.027	S327	2880 Winter	100	+40%	100/15 Summer				81.909

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
12.002	S374	-0.182	0.000	0.52		136.4	OK	
12.003	S375	0.287	0.000	0.59		155.0	SURCHARGED	
10.010	S370	0.660	0.000	0.09		110.7	SURCHARGED	
13.000	HW302	1.070	0.000	0.03		62.5	FLOOD RISK	
1.024	S324	2.033	0.000	0.25		53.1	FLOOD RISK	
1.025	S325	0.689	0.000	0.30		79.4	SURCHARGED	
14.000	S376	-0.116	0.000	0.47		51.4	OK	
14.001	S377	-0.060	0.000	0.88		92.2	OK	
14.002	S378	0.034	0.000	0.66		153.1	SURCHARGED	
14.003	S379	1.306	0.000	1.27		232.6	SURCHARGED	
14.004	S380	1.059	0.000	1.77		301.6	FLOOD RISK	
1.026	S326	0.809	0.000	2.06		341.4	FLOOD RISK	
15.000	S381	-0.007	0.000	0.67		66.2	OK	
15.001	S382	0.809	0.000	1.59		142.7	SURCHARGED	
15.002	HW303	-0.320	0.000	0.28		142.8	OK	
15.003	HW304	0.307	0.000	0.15		50.4	FLOOD RISK	
1.027	S327	0.781	0.000	0.64		36.5	FLOOD RISK	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Surface Network 3

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	20.400	Add Flow / Climate Change (%)	0
Ratio R	0.438	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Surface Network 3

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.918	4-8	0.286

Total Area Contributing (ha) = 1.204

Total Pipe Volume (m^3) = 361.089

Network Design Table for Surface Network 3

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	31.321	0.895	35.0	0.036	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	31.408	0.897	35.0	0.076	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	40.195	1.148	35.0	0.064	0.00	0.0	0.600	o	300	Pipe/Conduit	

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	5.24	92.845	0.036	0.0	0.0	0.0	2.22	88.2	4.9
1.001	50.00	5.47	91.950	0.112	0.0	0.0	0.0	2.22	88.2	15.2
1.002	50.00	5.72	90.978	0.176	0.0	0.0	0.0	2.67	188.4	23.8

Network Design Table for Surface Network 3

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.003	61.544	4.103	15.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	16.097	1.073	15.0	0.166	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.005	22.835	1.153	19.8	0.000	0.00	0.0	0.600	1.5 _/	500	1:1.5 Ditch	
2.000	49.785	1.659	30.0	0.085	5.00	0.0	0.600	o	300	Pipe/Conduit	
2.001	22.934	0.295	77.7	0.047	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.000	57.899	4.495	12.9	0.183	5.00	0.0	0.600	o	300	Pipe/Conduit	
2.002	58.260	2.535	23.0	0.065	0.00	0.0	0.600	o	375	Pipe/Conduit	
4.000	49.674	4.140	12.0	0.182	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.003	31.745	1.556	20.4	0.209	0.00	0.0	0.600	o	450	Pipe/Conduit	
2.004	34.343	0.384	89.4	0.091	0.00	0.0	0.600	1.5 _/	500	1:1.5 Ditch	
1.006	16.593	1.350	12.3	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.007	8.947	0.150	59.6	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

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)
1.003	50.00	5.97	89.829	0.176	0.0	0.0	0.0	4.08	288.4	23.8
1.004	50.00	6.04	85.726	0.342	0.0	0.0	0.0	4.08	288.4	46.3
1.005	50.00	6.10	84.653	0.342	0.0	0.0	0.0	6.15	1753.2	46.3
2.000	50.00	5.29	90.080	0.085	0.0	0.0	0.0	2.88	203.6	11.5
2.001	50.00	5.50	88.420	0.132	0.0	0.0	0.0	1.78	126.2	17.9
3.000	50.00	5.22	92.620	0.183	0.0	0.0	0.0	4.40	311.3	24.8
2.002	50.00	5.76	88.050	0.380	0.0	0.0	0.0	3.79	419.0	51.5
4.000	50.00	5.22	89.805	0.182	0.0	0.0	0.0	3.80	151.0	24.6
2.003	50.00	5.88	85.440	0.771	0.0	0.0	0.0	4.52	718.4	104.4
2.004	50.00	6.07	83.884	0.862	0.0	0.0	0.0	2.89	823.0	116.7
1.006	50.00	6.14	83.500	1.204	0.0	0.0	0.0	6.97	1970.9	163.0
1.007	50.00	6.26	82.150	1.204	0.0	0.0	0.0	1.30	23.1«	163.0

Manhole Schedules for Surface Network 3

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S206	94.572	1.727	Open Manhole	1200	1.000	92.845	225				
S207	93.679	1.729	Open Manhole	1200	1.001	91.950	225	1.000	91.950	225	
S208	92.786	1.808	Open Manhole	1200	1.002	90.978	300	1.001	91.053	225	
S209	91.625	1.796	Open Manhole	1200	1.003	89.829	300	1.002	89.830	300	1
S210	87.144	1.418	Open Manhole	1200	1.004	85.726	300	1.003	85.726	300	
HW203	86.003	1.350	Open Manhole	10000	1.005	84.653	500	1.004	84.653	300	
S203	92.056	1.976	Open Manhole	1200	2.000	90.080	300				
S204	90.044	1.624	Open Manhole	1200	2.001	88.420	300	2.000	88.421	300	1
S200	94.433	1.813	Open Manhole	1200	3.000	92.620	300				
S201	90.747	2.697	Open Manhole	1350	2.002	88.050	375	2.001	88.125	300	
								3.000	88.125	300	
S205	91.392	1.587	Open Manhole	1200	4.000	89.805	225				
S202	87.768	2.328	Open Manhole	1350	2.003	85.440	450	2.002	85.515	375	
								4.000	85.665	225	
HW201	85.904	2.020	Open Manhole	10000	2.004	83.884	500	2.003	83.884	450	
HW202	85.000	1.500	Open Manhole	900 x 1050	1.006	83.500	600	1.005	83.500	500	
								2.004	83.500	500	
S211	85.000	2.850	Open Manhole	1500	1.007	82.150	150	1.006	82.150	600	
HW200	83.618	1.618	Open Manhole	0		OUTFALL		1.007	82.000	150	

PIPELINE SCHEDULES for Surface Network 3

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	225	S206	94.572	92.845	1.502	Open Manhole	1200
1.001	o	225	S207	93.679	91.950	1.504	Open Manhole	1200
1.002	o	300	S208	92.786	90.978	1.508	Open Manhole	1200
1.003	o	300	S209	91.625	89.829	1.496	Open Manhole	1200
1.004	o	300	S210	87.144	85.726	1.118	Open Manhole	1200
1.005	1.5 _/	500	HW203	86.003	84.653	1.050	Open Manhole	10000
2.000	o	300	S203	92.056	90.080	1.676	Open Manhole	1200
2.001	o	300	S204	90.044	88.420	1.324	Open Manhole	1200
3.000	o	300	S200	94.433	92.620	1.513	Open Manhole	1200
2.002	o	375	S201	90.747	88.050	2.322	Open Manhole	1350
4.000	o	225	S205	91.392	89.805	1.362	Open Manhole	1200
2.003	o	450	S202	87.768	85.440	1.878	Open Manhole	1350
2.004	1.5 _/	500	HW201	85.904	83.884	1.720	Open Manhole	10000

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	31.321	35.0	S207	93.679	91.950	1.504	Open Manhole	1200
1.001	31.408	35.0	S208	92.786	91.053	1.508	Open Manhole	1200
1.002	40.195	35.0	S209	91.625	89.830	1.495	Open Manhole	1200
1.003	61.544	15.0	S210	87.144	85.726	1.118	Open Manhole	1200
1.004	16.097	15.0	HW203	86.003	84.653	1.050	Open Manhole	10000
1.005	22.835	19.8	HW202	85.000	83.500	1.200	Open Manhole	900 x 1050
2.000	49.785	30.0	S204	90.044	88.421	1.323	Open Manhole	1200
2.001	22.934	77.7	S201	90.747	88.125	2.322	Open Manhole	1350
3.000	57.899	12.9	S201	90.747	88.125	2.322	Open Manhole	1350
2.002	58.260	23.0	S202	87.768	85.515	1.878	Open Manhole	1350
4.000	49.674	12.0	S202	87.768	85.665	1.878	Open Manhole	1350
2.003	31.745	20.4	HW201	85.904	83.884	1.570	Open Manhole	10000
2.004	34.343	89.4	HW202	85.000	83.500	1.200	Open Manhole	900 x 1050

PIPELINE SCHEDULES for Surface Network 3

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.006	o	600	HW202	85.000	83.500	0.900	Open Manhole	900 x 1050
1.007	o	150	S211	85.000	82.150	2.700	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.006	16.593	12.3	S211	85.000	82.150	2.250	Open Manhole	1500
1.007	8.947	59.6	HW200	83.618	82.000	1.468	Open Manhole	0

Area Summary for Surface Network 3

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.036	0.036	0.036
1.001	-	-	100	0.076	0.076	0.076
1.002	-	-	100	0.064	0.064	0.064
1.003	-	-	100	0.000	0.000	0.000
1.004	-	-	100	0.166	0.166	0.166
1.005	-	-	100	0.000	0.000	0.000
2.000	-	-	100	0.085	0.085	0.085
2.001	-	-	100	0.047	0.047	0.047
3.000	-	-	100	0.183	0.183	0.183
2.002	-	-	100	0.065	0.065	0.065
4.000	-	-	100	0.182	0.182	0.182
2.003	-	-	100	0.209	0.209	0.209
2.004	-	-	100	0.091	0.091	0.091
1.006	-	-	100	0.000	0.000	0.000
1.007	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				1.204	1.204	1.204

Free Flowing Outfall Details for Surface Network 3

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.007	HW200	83.618	82.000	0.000	0	0

Simulation Criteria for Surface Network 3

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.438
Return Period (years)	100	Profile Type	Summer
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.400	Cv (Winter)	0.840

Synthetic Rainfall Details

Storm Duration (mins) 30

Online Controls for Surface Network 3

Hydro-Brake® Optimum Manhole: S211, DS/PN: 1.007, Volume (m³): 9.4

Unit Reference	MD-SHE-0107-7400-2400-7400
Design Head (m)	2.400
Design Flow (l/s)	7.4
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	107
Invert Level (m)	82.150
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.400	7.4	Kick-Flo®	0.956	4.8
Flush-Flo™	0.468	6.0	Mean Flow over Head Range	-	5.8

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.7	1.200	5.3	3.000	8.2	7.000	12.3
0.200	5.4	1.400	5.7	3.500	8.8	7.500	12.7
0.300	5.8	1.600	6.1	4.000	9.4	8.000	13.1
0.400	6.0	1.800	6.5	4.500	9.9	8.500	13.5
0.500	6.0	2.000	6.8	5.000	10.5	9.000	13.8
0.600	6.0	2.200	7.1	5.500	10.9	9.500	14.2
0.800	5.6	2.400	7.4	6.000	11.4		
1.000	4.9	2.600	7.7	6.500	11.8		

Storage Structures for Surface Network 3

Tank or Pond Manhole: HW202, DS/PN: 1.006

Invert Level (m) 83.500

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	521.6	0.500	670.3	1.000	833.0	1.499	1009.5
0.100	550.2	0.600	701.7	1.100	867.3	1.500	1009.9
0.200	579.4	0.700	733.7	1.200	902.1		
0.300	609.1	0.800	766.2	1.300	937.5		
0.400	639.4	0.900	799.3	1.400	973.4		

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.422
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	21.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	450.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880
Return Period(s) (years)	100
Climate Change (%)	40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S206	15 Winter	100	+40%					92.928
1.001	S207	15 Winter	100	+40%					92.124
1.002	S208	15 Winter	100	+40%					91.165
1.003	S209	15 Winter	100	+40%					89.970
1.004	S210	15 Winter	100	+40%					85.965
1.005	HW203	15 Winter	100	+40%					84.763
2.000	S203	15 Winter	100	+40%					90.192
2.001	S204	15 Winter	100	+40%					88.627
3.000	S200	15 Winter	100	+40%					92.755
2.002	S201	15 Winter	100	+40%					88.274
4.000	S205	15 Winter	100	+40%					89.965
2.003	S202	15 Winter	100	+40%					85.761
2.004	HW201	480 Winter	100	+40%					84.494
1.006	HW202	480 Winter	100	+40%	100/30 Summer				84.494

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S206	-0.142	0.000	0.29		24.0	OK	
1.001	S207	-0.051	0.000	0.94		78.0	OK	
1.002	S208	-0.113	0.000	0.70		123.2	OK	
1.003	S209	-0.159	0.000	0.45		122.7	OK	
1.004	S210	-0.061	0.000	0.98		240.3	OK	
1.005	HW203	-1.240	0.000	0.02		236.0	OK	
2.000	S203	-0.188	0.000	0.29		56.3	OK	
2.001	S204	-0.093	0.000	0.80		89.1	OK	
3.000	S200	-0.165	0.000	0.41		122.3	OK	
2.002	S201	-0.151	0.000	0.65		253.8	OK	
4.000	S205	-0.065	0.000	0.84		121.4	OK	
2.003	S202	-0.129	0.000	0.84		520.6	OK	
2.004	HW201	-1.410	0.000	0.00		52.7	OK	
1.006	HW202	0.394	0.000	0.01		11.5	SURCHARGED	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.007	S211	180 Winter	100	+40%	100/15 Summer				84.543

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.007	S211	2.243	0.000	0.36		7.2	SURCHARGED	

Appendix F

APPENDIX 6 – EXPLORATORY HOLE LOGS

Borehole Logs

(BH1 to BH8)

Windowless Sample Hole Logs

(WS1 to WS19 and WSA to WSI)

Trial Pit Logs

(TP1 to TP*)

CLIENT: c/o Savills	PROJECT: Land to the North West of Haverhill	GROUND LEVEL	HOLE No. BH1
LOGGED BY: AC FIELDWORK BY: AGB TEMPLATE REF: GEL AGS BH BETA CHECKED BY: DATE:	EXCAVATION METHOD: Cable Percussion (shell and auger) 1.50mm cased from 0.0 to 10.0m	COORDINATES E N DATES 20/10/2014 - 20/10/2014	SHEET 1 OF 1 PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata Leg	Strata Reduced Level	Strata Depth	Graphical Representation SPT 'N' Value 0 10 20 30 40	Sampling/In-Situ Testing Depths	Type	No.	Blows	SPT N	Laboratory Testing <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
20/10 09:00	0.00	Dry		TOPSOIL (Dark brown clay with rootlets).			0.00													Hand pit from GL to 1.2m
				Firm to stiff orange brown grey mottled slightly gravelly CLAY. Gravel of rounded fine to coarse chalk. (LOWESTOFT FORMATION)			0.30		0.40-0.80	B	1									
				1.50 Becoming pale in colour with depth					1.20	D S	1	1 2 3 4 4 4	15	78	20	18	37			Moisture content, Atterberg Limit
									2.00	D S	2	1 2 3 3 4 4	14							
									3.00-3.45	U	U	(45)								
									3.45	D	3			89	21	17	35			Moisture content, Atterberg Limit
20/10	1.00	4.00							4.00	D S	4	1 2 3 5 5 6	19							Seepage inflow of water at 4m
				Stiff grey gravelly CLAY. Gravel of rounded fine to coarse chalk. (LOWESTOFT FORMATION)			4.80		5.00	D S	5	2 4 6 7 8 10	31							
									6.00	D	6									
									6.50	D S	7	2 4 6 6 6 7	25							pH and Sulphate
									7.50	D	8									
									8.00-8.45	U	2	(70)		90	18	17	33	2.14	272.4	Moisture content, Atterberg Limit, Triaxial test
									8.45	D	9									
									9.00	D	10									
									9.50	D S	11	3 5 7 8 9 9	33							
20/10 16:30 20/10 16:45	1.50 0.00	Damp					10.00													Borehole completed at 10.0m

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal, Response zone, Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. BH1 | SHEET 1 OF 1 | PROJECT No. 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF,SG,GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills	PROJECT: Land to the North West of Haverhill	GROUND LEVEL	HOLE No. BH2
LOGGED BY: AC FIELDWORK BY: AGB TEMPLATE REF: GEL AGS BH BETA CHECKED BY: DATE:	EXCAVATION METHOD: Cable Percussion (shell and auger) 4.50mm cased from 0.0 to 10.0m	COORDINATES E N DATES 21/10/2014 - 21/10/2014	SHEET 1 OF 1 PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
21/10 08:30	0.00	Dry		TOPSOIL			0.00													Hand pit from GL to 1.2m
				Firm to stiff brown slightly sandy CLAY. (HEAD DEPOSITS)			0.30		0.40-0.80	B	1									
									1.20	D S	1	1 1 2 2 2 3	9							
				Firm brown slightly gravelly CLAY. Gravel of rounded fine to coarse chalk. (LOWESTOFT FORMATION)			1.80		2.00-2.45	U	1	(45)								
									2.45	D	2			91	19	16	30			Moisture content, Atterberg Limit, pH and sulphate
									3.00	D S	3	2 2 3 3 3 3	12							
21/10 + 15 mins	1.50	4.00 1.60							4.00	D S	4	1 1 1 2 2 3	8							Inflow of water at 4m Water sealed out at 4.5m.
				Firm to stiff grey gravelly CLAY. Gravel of rounded fine to coarse rounded chalk. (LOWESTOFT FORMATION)			4.40		5.00-5.45	U	2	(35)			20			2.07	80.5	pH and sulphate, Triaxial test
									5.45	D	5									
									6.00	D	6									
									6.50	D S	7	1 2 3 4 5 8	20							
									7.50	D	8									
									8.00	D S	9	2 3 6 6 7 7	26							
									9.00	D	10									pH and sulphate
									9.50	D S	11	3 4 6 6 8 9	29							
21/10 13:00 21/10 13:15	4.50 0.00	Dry					10.00													Borehole completed at 10.0m

*WATER ▼ Standing water level ▽ Water strikes PIEZOMETER Upper seal Response zone Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. BH2 . | SHEET 1 OF 1 | PROJECT No. 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF.SG.GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills

PROJECT: Land to the North West of Haverhill

GROUND LEVEL

HOLE No. BH3

LOGGED BY: AC
FIELDWORK BY: AGB
TEMPLATE REF: GEL AGS BH BETA

CHECKED BY:
DATE:

EXCAVATION METHOD: Cable Percussion (shell and auger)
1.50mm cased from 0.0 to 10.0m

COORDINATES E N

DATES 21/10/2014 - 21/10/2014

SHEET 1 OF 1

PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
21/10 14:00	0.00	Dry		TOPSOIL			0.00		0											Hand pit from GL to 1.2m
				Stiff dark brown slightly silty gravelly CLAY. Gravel of rounded fine to coarse chalk (LOWESTOFT FORMATION)			0.30		0.40-0.80	B	1									
									1.20	D S	1	2 2 4 4 4 6	18							
									2.00	D S	2	1 2 3 4 4 4	15							
									3.00	D S	3	1 2 3 3 5 5	16							
				Stiff to very stiff dark grey gravelly CLAY. Gravel of rounded fine to coarse chalk. (LOWESTOFT FORMATION)			3.70		4.00-4.45	U	1	(60)		90	18	19	48			Moisture content, Atterberg Limit
									4.45	D	4									
									5.00	D S	5	3 5 7 9 10 10	36							
									6.00	D	6									
									6.50-6.95	U	2	(80)								
									6.95	D	7									
									7.00	D	8									
									8.00	D S	9	5 7 8 8 9 10	35							pH and sulphate
									9.00	D	10									
									9.50	D S	11	4 8 9 10 12 13	44							
21/10 17:00	1.50	Dry																		
21/10 17:15	0.00						10.00		10											Borehole completed at 10.0m

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal, Response zone, Lower seal

SAMPLE AND TEST KEY

D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample

S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. BH3 | SHEET 1 OF 1 | PROJECT No. 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF,SG,GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills	PROJECT: Land to the North West of Haverhill	GROUND LEVEL	HOLE No. BH4
LOGGED BY: AC FIELDWORK BY: AGB TEMPLATE REF: GEL AGS BH BETA CHECKED BY: DATE:	EXCAVATION METHOD: Cable Percussion (shell and auger) 1.50mm cased from 0.0 to 10.0m	COORDINATES E N DATES 23/10/2014 - 23/10/2014	SHEET 1 OF 1 PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata Leg	Strata Reduced Level	Strata Depth	Graphical Representation SPT 'N' Value 0 10 20 30 40	Sampling/In-Situ Testing Depths	Type	No.	Blows	SPT N	Laboratory Testing <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
23/10 08:30	0.00	Dry		TOPSOIL			0.00													
				Stiff orange brown grey mottled gravelly CLAY. Gravel of rounded fine to coarse chalk. (LOWESTOFT FORMATION)			0.20		0.40-0.80	B	1									
									1.20	D S	1	6 10 10 12 8 8	38							
									2.00	D S	2	3 5 6 7 7 7	27							
									3.00-3.45	U	1	(80)			18			2.10	211.4	Triaxial test
				Very stiff to hard dark grey slightly gravelly CLAY. Gravel of rounded fine to coarse chalk. (LOWESTOFT FORMATION)			3.30		3.45	D	3									
									4.00	D S	4	5 7 10 10 12 15	47							
									5.00	D S	D5	3 6 8 10 11 11	40							
									6.00	D	6									
									6.50	D S	7	5 5 8 10 12 12	42							
									7.50	D	8									
									8.00	D S	9	3 7 11 14 15 10	60*							
									9.00	D	10									
									9.50-9.95	U	2	(90)			16			2.14	349.4	pH and sulphate, Triaxial test
23/10 13:00	1.50	Dry																		
23/10 13:15	0.00						10.00		9.95	D	11									

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal, Response zone, Lower seal

SAMPLE AND TEST KEY

D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. BH4 | SHEET 1 OF 1 | PROJECT No. 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF,SG,GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills	PROJECT: Land to the North West of Haverhill	GROUND LEVEL	HOLE No. BH5
LOGGED BY: AC FIELDWORK BY: AGB TEMPLATE REF: GEL AGS BH BETA CHECKED BY: DATE:	EXCAVATION METHOD: Cable Percussion (shell and auger) 1.50mm cased from 0.0 to 10.0m	COORDINATES E N DATES 22/10/2014 - 22/10/2014	SHEET 1 OF 1 PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata Leg	Strata Reduced Level	Strata Depth	Graphical Representation SPT 'N' Value 0 10 20 30 40	Sampling/In-Situ Testing Depths	Type	No.	Blows	SPT N	Laboratory Testing <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
22/10 09:00	0.00	Dry		TOPSOIL			0.00													Hand pit from GL to 1.2m
				Stiff orange brown grey mottled slightly gravelly CLAY. Gravel of rounded fine to medium chalk. (LOWESTOFT FORMATION)			0.10		0.40-0.80	B	1									
									1.20-1.65	U	1	(55)			18			2.11	148.3	Triaxial test
									2.20	S D	2	2 2 4 5 5 6	20							
									3.00	D S	3	2 4 5 8 11 8	32							
									4.00	D S	4	3 5 6 8 9 12	35							
				Stiff to very stiff dark grey slightly gravelly CLAY. Gravel of rounded fine to medium chalk. (LOWESTOFT FORMATION)			4.80		5.00	D S	5	3 5 6 8 8 9	31							
									6.00	D	6									
									6.50-6.95	U	2	(80)		93	17	17	42	2.15	312.5	Moisture content, Atterberg Limit, Triaxial test
									6.95	D	7									
									7.50	D	8									
									8.00	D S	9	2 4 7 8 10 10	35							
									9.00	D	10									
									9.50	D S	11	5 19 38 12	74*							
22/10 16:00	1.50	Dry																		
22/10 16:15	0.00						10.00													Borehole completed at 10.0m

*WATER ▼ Standing water level ▽ Water strikes PIEZOMETER Upper seal Response zone Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. BH5 . | SHEET 1 OF 1 | PROJECT No. 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF,SG.GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills	PROJECT: Land to the North West of Haverhill	GROUND LEVEL	HOLE No. BH6
LOGGED BY: AC FIELDWORK BY: AGB TEMPLATE REF: GEL AGS BH BETA CHECKED BY: DATE:	EXCAVATION METHOD: Cable Percussion (shell and auger) 1.50mm cased from 0.0 to 8.3m	COORDINATES E N DATES 24/10/2014 - 24/10/2014	SHEET 1 OF 1 PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
24/10 08:30	0.00	Dry		TOPSOIL			0.00													Hand pit from GL to 1.2m
				Firm to stiff orange brown grey mottled gravelly CLAY. Gravel of rounded fine to medium chalk. (LOWESTOFT FORMATION)			0.20		0.40-0.80	B	1									
									1.20	D S	1	5 5 6 7 8 8	29							
									2.00-2.45	U	1	(50)		94	18	19	48	2.09	174.1	Moisture content, Atterberg Limit, Triaxial test
									2.45	D	2									
									3.00	D S	3	2 4 5 5 6 8	24							
				Very stiff to hard dark grey slightly gravelly CLAY. Gravel of rounded fine to medium chalk. (LOWESTOFT FORMATION)			4.00		4.00	D S	4	2 3 5 5 6 7	23							
									5.00-5.45	U	2	(70)								
									5.45	D	5									
									6.00	D	6									
									6.50	D S	7	2 4 5 6 8 10	29							
									7.50	D	8									
24/10 13:00	1.50	Dry							8.00	D S	9	17								
24/10 13:15	0.00						8.30													Borehole completed at 8.3m

*WATER ▼ Standing water level ▽ Water strikes PIEZOMETER Upper seal Response zone Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. BH6 | SHEET 1 OF 1 | PROJECT No. 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF,SG,GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills	PROJECT: Land to the North West of Haverhill	GROUND LEVEL	HOLE No. BH7
LOGGED BY: AC FIELDWORK BY: AGB TEMPLATE REF: GEL AGS BH BETA CHECKED BY: DATE:	EXCAVATION METHOD: Cable Percussion (shell and auger) 1.50mm cased from 0.0 to 8.2m	COORDINATES E N DATES 24/10/2014 - 24/10/2014	SHEET 1 OF 1 PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
24/10 14:00	0.00	Dry		TOPSOIL			0.00													Hand pit from GL to 1.2m
				Firm to stiff orange brown grey mottled slightly gravelly CLAY. Gravel of rounded fine to medium chalk. (LOWESTOFT FORMATION)			0.40		0.40-0.80	B	1									
									1.20-1.65	U	1	(40)								
									1.65	D	1									
									2.00	D S	2	1 2 3 4 4 6	17							
									3.00	D S	3	1 3 3 5 5 6	19							
				Very stiff dark grey gravelly CLAY. Gravel of rounded fine to coarse chalk. (LOWESTOFT FORMATION)			3.30													
									4.00-4.45	U	2	(55)		92	20	19	42	2.12	205.6	Moisture content, Atterberg Limit, pH and sulphate, Triaxial test
									4.45	D	4									
									5.00	D S	5	2 4 6 6 7 8	27							
									6.00	D	6									
									6.50	D S	7	2 4 5 6 8 9	28							
									7.50	D	8									pH and sulphate
24/10 17:00	1.50	Dry																		
24/10 17:15	0.00						8.20			C		25								Borehole completed at 8.20m

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal, Response zone, Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. BH7 . | SHEET 1 OF 1 | PROJECT No. 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF.SG.GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills

PROJECT: Land to the North West of Haverhill

GROUND LEVEL

HOLE No. BH8

LOGGED BY: AC
FIELDWORK BY: AGB
TEMPLATE REF: GEL AGS BH BETA

CHECKED BY:
DATE:

EXCAVATION METHOD: Cable Percussion (shell and auger)
6.00mm cased from 0.0 to 10.0m

COORDINATES E N

DATES 23/10/2014 - 23/10/2014

SHEET 1 OF 1

PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
23/10 14:00	0.00	Dry		TOPSOIL			0.00													Hand pit from GL to 1.2m
				Firm brown slightly silty CLAY (HEAD DEPOSITS)			0.40		0.40-0.80	B	1									
									1.20	D S	1	1 2 2 3 4 5	14	100	24	20	51			Moisture content, Atterberg Limit
23/10		2.00		Soft brown very sandy CLAY. (HEAD DEPOSITS)			1.80		1.80	D	2									
				Soft to firm brown slightly gravelly sandy CLAY. Gravel of rounded fine to coarse chalk. (HEAD DEPOSITS)			2.20		2.00	D S	3	1 1 1 2 2 3	8							Seepage inflow of water at 2m
									3.00	D S	4	1 2 2 2 2 3	9							
23/10		4.50							4.00	D S	5	1 2 2 3 3 3	11							Seepage inflow of water at 4.5m
				Stiff grey gravelly CLAY. Gravel of rounded fine to coarse chalk. (LOWESTOFT FORMATION)			5.20		5.00	D S	6	1 2 1 2 3 4	10							
									6.00	D	7									Water sealed out at 6.0m.
									6.50	D S	8	1 3 4 5 5 5	19							
				7.50 Becoming very stiff with depth.					7.50	D	9									
									8.00-8.45	U	1	(45)			18			2.16	217.2	Triaxial test
									8.45	D	10									
									9.00	D	11									
23/10 17:00	6.00	Dry							9.50	D S	12	2 3 4 5 6 8	23							
23/10 17:15	0.00						10.00													Borehole completed at 10.0m

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal, Response zone, Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. BH8 | SHEET 1 OF 1 | PROJECT No. 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF,SG,GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills	PROJECT: Land to the North West of Haverhill	GROUND LEVEL	HOLE No. WS1
LOGGED BY: LF FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: DATE:	EXCAVATION METHOD: Windowless sampler Uncased to 4.0 m	COORDINATES E N DATES 28/10/2014 - 28/10/2014	SHEET 1 OF 1 PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				TOPSOIL (Dark brown slightly sandy slightly gravelly clay with rootlets. Gravel of angular to subrounded fine to medium flint and infrequent brick fragments)			0.00		0												Groundwater not encountered during drilling
									0.20	J	1									Metals, PAH, TPH, Moisture content, pH and Sulphate
									0.35	J	2									
				Firm becoming stiff brown slightly sandy gravelly CLAY. Gravel of subrounded to rounded chalk and angular to subrounded fine to coarse flint. (LOWESTOFT FORMATION)			0.45													
									0.70	J	3									Metals, PAH, TPH, Moisture content, pH and Sulphate
									0.80	D	1									Shear vane test = 48kN/m²
									1.00	D C	2	1 1 2 2 3 4	11							Shear vane test = 50kN/m²
				1.20 Becomes brown grey mottled with depth																
									2.00	D C	3	11 5 5 5 5 7	22							Shear vane test = 87kN/m²
									3.00	D C	4	4 4 4 6 7 9	26							Collapse of sidewalls at 3.0m depth Shear vane test = 112kN/m²
							4.00		4.00	D C	5	5 7 8 10 12 14	44							50mm diameter monitoring well installed to 4.0m Windowless sample hole completed at 4.0m depth

*WATER ▼ Standing water level ▽ Water strikes PIEZOMETER Upper seal Response zone Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road,
Bightwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. WS1. | SHEET 1 OF 1 | PROJECT No. 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF.SG.GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills	PROJECT: Land to the North West of Haverhill	GROUND LEVEL	HOLE No. WS2
LOGGED BY: LF FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: DATE:	EXCAVATION METHOD: Windowless sampler Uncased to 4.0 m	COORDINATES E N DATES 28/10/2014 - 28/10/2014	SHEET 1 OF 1 PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				TOPSOIL (Dark brown slightly sandy slightly gravelly clay with rootlets. Gravel of angular to subrounded fine to coarse flint and infrequent fine to medium brick and charcoal fragments)			0.00		0												Groundwater not encountered during drilling
									0.10	J	1									No collapse of sidewalls during drilling
									0.30	J	2									
				Firm becoming stiff brown slightly sandy gravelly CLAY. Gravel of subrounded to rounded chalk and angular to subrounded fine to coarse flint. (LOWESTOFT FORMATION)			0.47													
				0.80 Becomes brown grey mottled with depth					0.70	J	3									
									0.80	D	1									Shear vane test = 70kN/m²
									1.00	D	2									Shear vane test = 76kN/m²
									2.00	D	3									Shear vane test = 82kN/m²
									3.00	D	4									Shear vane test = 91kN/m²
							4.00		4.00	D	5									50mm diameter monitoring well installed to 4.0m Shear vane test = 96kN/m² Windowless sample hole completed at 4.0m depth

*WATER: Standing water level; Water strikes

PIEZOMETER: Upper seal; Response zone; Lower seal

SAMPLE AND TEST KEY

D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows: SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N: N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425: Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road,
Bightwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. WS2. | SHEET 1 OF 1 | PROJECT No. 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF,SG.GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills	PROJECT: Land to the North West of Haverhill	GROUND LEVEL	HOLE No. WS3
LOGGED BY: LF FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: DATE:	EXCAVATION METHOD: Windowless sampler Uncased to 1.8 m	COORDINATES E N DATES 29/10/2014 - 29/10/2014	SHEET 1 OF 1 PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				TOPSOIL (Dark brown sandy clay with rootlets)			0.00		0											
				TOPSOIL (Brown slightly sandy slightly gravelly clay. Gravel of angular to subrounded fine to medium flint and rare fine brick and charcoal fragments)			0.05		0.10	J	1									Groundwater not encountered during drilling
									0.20	J	2									No collapse of sidewalls during drilling
				Firm becoming stiff brown slightly sandy gravelly CLAY. Gravel of subrounded to rounded chalk and angular to subrounded fine to coarse flint. (LOWESTOFT FORMATION)			0.30													
									0.60	J	3									
									0.80	D	1									Shear vane test = 74kN/m²
									1.00	D	2									Shear vane test = 84kN/m²
							1.80		1.80	D	3									Infiltration test undertaken at 1.48m depth Shear vane test = 96kN/m²
																				Windowless sample hole completed at 1.8m depth

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal, Response zone, Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road,
Bightwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. WS3. | SHEET 1 OF 1 | PROJECT No. 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF.SG.GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills

PROJECT: Land to the North West of Haverhill

GROUND LEVEL

HOLE No. WS4

LOGGED BY: LF
FIELDWORK BY: GEL
TEMPLATE REF: GEL AGS BH BETA

CHECKED BY:
DATE:

EXCAVATION METHOD: Windowless sampler
Uncased to 2.0 m

COORDINATES E N

DATES 29/10/2014 - 29/10/2014

SHEET 1 OF 1

PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				TOPSOIL (Dark brown slightly gravelly sandy clay with rootlets. Gravel of angular to subrounded fine to medium flint)			0.00		0											Groundwater not encountered during drilling
				TOPSOIL (Dark brown slightly sandy slightly gravelly clay. Gravel of angular to subrounded fine to medium flint and rare fine brick and charcoal fragments)			0.05		0.10	J	1									
				Stiff becoming very stiff pale brown grey mottled slightly sandy gravelly CLAY. Gravel of subrounded to rounded fine to coarse chalk and angular to subrounded fine to coarse flint. (LOWESTOFT FORMATION)			0.25		0.50	J	2									No collapse of sidewalls during drilling
									0.80	D	1									Shear vane test = 68kN/m²
									1.00	D	2									Shear vane test = 82kN/m²
							2.00		2.00	D	3									Shear vane test = 87kN/m² Windowless sample hole completed at 2.0m depth

*WATER: Standing water level; Water strikes
PIEZOMETER: Upper seal; Response zone; Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road,
Bightwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. WS4. | SHEET 1 OF 1 | PROJECT No. 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF.SG.GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills	PROJECT: Land to the North West of Haverhill	GROUND LEVEL	HOLE No. WS5
LOGGED BY: LF FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: DATE:	EXCAVATION METHOD: Windowless sampler Uncased to 4.0 m	COORDINATES E N DATES 29/10/2014 - 29/10/2014	SHEET 1 OF 1 PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				TOPSOIL (Dark brown slightly gravelly sandy clay with rootlets. Gravel of angular to subrounded fine to medium flint)			0.00		0											Groundwater not encountered during drilling
				TOPSOIL (Dark brown slightly sandy slightly gravelly clay. Gravel of angular to subrounded fine to medium flint and rare fine brick and charcoal fragments)			0.05		0.10	J	1									Metals, PAH, TPH, Moisture content, pH and Sulphate
				Firm becoming stiff pale brown grey mottled slightly sandy gravelly CLAY. Gravel of subrounded to rounded fine to coarse chalk and angular to subrounded fine to coarse flint. (LOWESTOFT FORMATION)			0.40		0.70	D	1									No collapse of sidewalls during drilling
				1.00 Becoming dark yellow brown grey mottled with depth					1	C		2 3 3 4 5 5	17							
				2.00 Becoming dark brown grey mottled with depth					1.60	D	2									
									2	C		3 3 4 4 5 6	19							
									2.60	D	3									
									3	C		4 4 5 5 7 6	23							
				3.50 Occasional iron oxide staining below 3.5m depth					3.60	D	4									
							4.00		4	C		5 5 5 7 7 9	28							Windowless sample hole completed at 4.0m depth

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal / Response zone / Lower seal

SAMPLE AND TEST KEY

D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road,
Bightwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. WS5. | SHEET 1 OF 1 | PROJECT No 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF.SG.GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills	PROJECT: Land to the North West of Haverhill	GROUND LEVEL	HOLE No. WS6
LOGGED BY: LF FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: DATE:	EXCAVATION METHOD: Windowless sampler Uncased to 1.9 m	COORDINATES E N DATES 29/10/2014 - 29/10/2014	SHEET 1 OF 1 PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				TOPSOIL (Dark brown slightly gravelly sandy clay with rootlets. Gravel of angular to subrounded fine to medium flint)			0.00		0											Groundwater not encountered during drilling
				TOPSOIL (Dark brown slightly sandy slightly gravelly clay. Gravel of angular to subrounded fine to medium flint and rare fine brick and charcoal fragments)			0.05		0.10	J	1									
				Stiff becoming very stiff pale brown grey mottled slightly sandy gravelly CLAY. Gravel of subrounded to rounded fine to coarse chalk and angular to subrounded fine to coarse flint. (LOWESTOFT FORMATION)			0.25		0.60	J	2									No collapse of sidewalls during drilling
									0.80	D	1									
				1.00 Becoming yellow brown grey mottled with depth below 1.0m					1											
																				Infiltration test undertaken at 1.41m depth
									1.80	D	2									
							1.89		2											Windowless sample hole completed at 1.89m depth
									3											
									4											

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal, Response zone, Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road,
Bightwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. WS6. | SHEET 1 OF 1 | PROJECT No. 995,SI

CLIENT: c/o Savills	PROJECT: Land to the North West of Haverhill	GROUND LEVEL	HOLE No. WS7
LOGGED BY: LF FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: DATE:	EXCAVATION METHOD: Windowless sampler Uncased to 4.0 m	COORDINATES E N DATES 29/10/2014 - 29/10/2014	SHEET 1 OF 1 PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				TOPSOIL (Dark brown slightly gravelly clay. Gravel of angular to subrounded fine to medium flint, rare brick and charcoal fragments)			0.00		0												Groundwater not encountered during drilling
									0.10	J	1									Metals, PAH, TPH, Moisture content, pH and Sulphate
				Firm becoming stiff brown grey mottled slightly sandy gravelly CLAY. Gravel of subrounded to rounded fine to coarse chalk and angular to subrounded fine to coarse flint. (LOWESTOFT FORMATION)			0.30													No collapse of sidewalls during drilling
									0.40	J	2									Metals, PAH, TPH, Moisture content, pH and Sulphate
									0.80	D	1									
				1.00 Occasional iron oxide staining below 1.0m depth					1											Shear vane test = 56kN/m²
									1.80	D	2									
				2.00 Becoming dark yellow brown grey mottled with depth					2											Shear vane test = 82kN/m²
									2.60	D	3									
									3											Shear vane test = 94kN/m²
				3.50 Becoming dark grey with brown mottling with depth					3.60	D	4									
							4.00		4											Shear vane test = 88kN/m²
																				Windowless sample hole completed at 4.0m depth
																				50mm diameter monitoring well installed to 4.0m

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal, Response zone, Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road,
Bightwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. WS7 | SHEET 1 OF 1 | PROJECT No. 995,SI

CLIENT: c/o Savills	PROJECT: Land to the North West of Haverhill	GROUND LEVEL	HOLE No. WS8
LOGGED BY: LF FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: DATE:	EXCAVATION METHOD: Windowless sampler Uncased to 2.0 m	COORDINATES E N DATES 29/10/2014 - 29/10/2014	SHEET 1 OF 1 PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				TOPSOIL (Dark brown slightly sandy slightly gravelly clay. Gravel of angular to subrounded fine to medium flint and rare fine brick and charcoal fragments)			0.00		0												Groundwater not encountered during drilling
									0.10	J	1									Metals, PAH, TPH, Moisture content, pH and Sulphate
				Firm becoming stiff yellow brown grey mottled slightly sandy gravelly CLAY. Gravel of subrounded to rounded fine to coarse chalk and angular to subrounded fine to coarse flint. (LOWESTOFT FORMATION)			0.30														No collapse of sidewalls during drilling
									0.40	J	2									
				0.80 - Becoming yellow brown grey mottled with depth					0.80	D	1									
				1.00 - Becoming brown/grey mottled with depth					1											Shear vane test = 78kN/m²
									1.70	D	2									Infiltration test undertaken at 1.58m depth
							2.00		2											Shear vane test = 102kN/m²
																				Windowless sample hole completed at 2.0m depth
									3											
									4											

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal, Response zone, Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road,
Bightwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. WS8. | SHEET 1 OF 1 | PROJECT No. 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF,SG.GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills

PROJECT: Land to the North West of Haverhill

GROUND LEVEL

HOLE No. WS9

LOGGED BY: LF
FIELDWORK BY: GEL
TEMPLATE REF: GEL AGS BH BETA

CHECKED BY:
DATE:

EXCAVATION METHOD: Windowless sampler
Uncased to 2.0 m

COORDINATES E N

DATES 29/10/2014 - 29/10/2014

SHEET 1 OF 1

PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				TOPSOIL (Dark brown slightly sandy slightly gravelly clay. Gravel of angular to subrounded fine to medium flint and rare fine brick and charcoal fragments)			0.00		0											Groundwater not encountered during drilling
									0.10	J	1									No collapse of sidewalls during drilling
				Stiff becoming very stiff yellow brown grey mottled slightly sandy gravelly CLAY. Gravel of subrounded to rounded fine to coarse chalk and angular to subrounded fine to coarse flint. (LOWESTOFT FORMATION)			0.30		0.50	J	2									
									0.80	D	1									
				1.00 - Becoming brown/grey mottled with depth					1	C		3 5 3 5 7 8	23							
									1.60	D	2									
							2.00		2											Windowless sample hole completed at 2.0m depth 50mm diameter monitoring well installed to 2.0m
									3											
									4											

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal, Response zone, Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road,
Bightwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. WS9. SHEET 1 OF 1 PROJECT No. 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF.SG.GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills

PROJECT: Land to the North West of Haverhill

GROUND LEVEL

HOLE No. WS10

LOGGED BY: BG
FIELDWORK BY: GEL
TEMPLATE REF: GEL AGS BH BETA

CHECKED BY:
DATE:

EXCAVATION METHOD: Windowless sampler
Uncased to 2.0 m

COORDINATES E N

DATES 30/10/2014 - 30/10/2014

SHEET 1 OF 1

PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				TOPSOIL (Dark brown slightly sandy slightly gravelly clay. Gravel of subangular to subrounded fine to medium flint and rare chalk)			0.00		0												Groundwater not encountered during drilling
							0.15		0.10	J	1									Metals, PAH, TPH, Moisture content, pH and Sulphate
				Stiff pale brown gravelly CLAY. Gravel of subangular to rounded fine to coarse chalk. (LOWESTOFT FORMATION)																No collapse of sidewalls during drilling
									0.75	D	1									
									1	C		2 5 3 4 4 5	16							Shear vane test = 108kN/m²
				Stiff dark grey brown mottled gravelly CLAY. Gravel of angular to subrounded fine to coarse chalk. (LOWESTOFT FORMATION)			1.10													
									1.50	D	2									Shear vane test = 116kN/m²
																				Shear vane test = 132kN/m²
							2.00		2											Windowless sample hole completed at 2.0m depth
									3											
									4											

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal, Response zone, Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road,
Bightwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. WS10 | SHEET 1 OF 1 | PROJECT No 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF.SG.GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills	PROJECT: Land to the North West of Haverhill	GROUND LEVEL	HOLE No. WS11
LOGGED BY: BG FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: DATE:	EXCAVATION METHOD: Windowless sampler Uncased to 4.0 m	COORDINATES E N DATES 30/10/2014 - 30/10/2014	SHEET 1 OF 1 PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				TOPSOIL (Desiccated dark brown sandy slightly gravelly clay with rootlets. Gravel of subangular fine to coarse flint and chalk with very rare brick fragments)			0.00		0												Groundwater not encounterd during drilling
				Stiff pale brown grey mottled gravelly slightly cobbly desiccated CLAY. Gravel of angular to subangular fine to coarse chalk. (LOWESTOFT FORMATION)			0.30		0.20	J	1									No collapse of sidewalls during drilling
									0.75	D	1									
				1.10 Becoming brown dark grey mottled and very stiff to hard with depth					1	C		3 2 4 4 4 6	18							Shear vane test = 104kN/m²
				1.30 Orange brown sandy pockets present with depth					1.50	D	2									Shear vane test = 136kN/m²
									2	C		3 4 4 5 6 6	21							Shear vane test = 136kN/m²
									2.50	D	3									Shear vane test = 120kN/m²
				2.80 Becoming dark brown dark grey mottled with depth																Shear vane test = 128kN/m²
									3	C		4 4 5 6 7	26							Shear vane test = 128kN/m²
																				Shear vane test = 140kN/m²
							4.00		4	C		5 7 7 8 10 12	37							Windowless sample hole completed 4.0m depth 50mm diameter monitorng well installed to 4.0m

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal / Response zone / Lower seal

SAMPLE AND TEST KEY

D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road,
Bightwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. WS11 | SHEET 1 OF 1 | PROJECT No 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF,SG,GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills

PROJECT: Land to the North West of Haverhill

GROUND LEVEL

HOLE No. WS12

LOGGED BY: BG
FIELDWORK BY: GEL
TEMPLATE REF: GEL AGS BH BETA

CHECKED BY:
DATE:

EXCAVATION METHOD: Windowless sampler
Uncased to 1.7 m

COORDINATES E N

DATES 30/10/2014 - 30/10/2014

SHEET 1 OF 1

PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				TOPSOIL (Dark brown slightly gravelly clay. Gravel of subangular to subrounded fine to coarse flint with fragments of brick)			0.00		0											Groundwater not encontered during drilling
							0.10		0.10	J	1									Metals, PAH, TPH, Moisture content, pH and Sulphate
				Firm brown slightly gravelly CLAY. Gravel of subangular fine chalk. (LOWESTOFT FORMATION)																Infiltration test undertaken at 0.15m depth
																				No collapse of sidewalls during drilling
																				Shear vane test = 72kN/m²
									1											Shear vane test = 60kN/m²
																				Shear vane test = 52kN/m²
									1.50	D	1									Shear vane test = 72kN/m²
							1.68													Windowless sample hole completed at 1.68m depth
									2											
									3											
									4											

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal, Response zone, Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road,
Bightwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. WS12 | SHEET 1 OF 1 | PROJECT No. 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF,SG.GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills

PROJECT: Land to the North West of Haverhill

GROUND LEVEL

HOLE No. WS13

LOGGED BY: BG
FIELDWORK BY: GEL
TEMPLATE REF: GEL AGS BH BETA

CHECKED BY:
DATE:

EXCAVATION METHOD: Windowless sampler
Uncased to 4.0 m

COORDINATES E N

DATES 30/10/2014 - 30/10/2014

SHEET 1 OF 1

PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				TOPSOIL (Dark brown slightly silty slightly sandy slightly gravelly clay with rootlets. Gravel of subangular to subrounded fine to medium flint)			0.00		0											Groundwater not encountered during drilling
									0.20	J	1									No collapse of sidewalls with depth
				Stiff to very stiff gravelly CLAY. Gravel of subangular fine to coarse chalk and flint. (LOWESTOFT FORMATION)			0.40													
									0.75	D	1									
				Soft to firm brown and orange brown mottled slightly sandy slightly gravelly CLAY. Gravel of subangular coarse flint. (LOWESTOFT FORMATION)			1.00		1											
																				Shear vane test = 52kN/m²
				Very stiff to hard pale brown grey mottled gravelly CLAY. Gravel of subangular to subrounded fine to coarse chalk. (LOWESTOFT FORMATION)			1.50		1.50	D	2									
																				Shear vane test = 52kN/m²
									2											Shear vane test = 68kN/m²
																				Shear vane test = 128kN/m²
									3											
									3.50	D	3									
							4.00		4											Windowless sample hole completed at 4.0m depth 50mm diameter monitorng well installed to 4.0m

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal, Response zone, Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road,
Bightwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. WS13 | SHEET 1 OF 1 | PROJECT No 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF.SG.GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills	**PROJECT: Land to the North West of Haverhill**	**GROUND LEVEL**	**HOLE No. WS14**
LOGGED BY: BG FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: DATE:	EXCAVATION METHOD: Windowless sampler Uncased to 2.0 m	COORDINATES E N DATES 30/10/2014 - 30/10/2014	SHEET 1 OF 1 PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				TOPSOIL (Dark brown slightly silty slightly sandy slightly gravelly CLAY with rootlets. Gravel of subangular fine to medium flint and chalk)			0.00		0											Groundwater not encountered during drilling
				Stiff pale brown slightly gravelly CLAY. Gravel of subangular to subrounded fine to coarse chalk. (LOWESTOFT FORMATION)			0.30		0.15	J	1									Metals, PAH, TPH, Moisture content, pH and Sulphate No collapse of sidewalls during drilling
				Stiff dark brown and dark grey mottled gravelly CLAY. Gravel of subangular to subrounded fine to coarse chalk. (LOWESTOFT FORMATION)			0.60													Shear vane test = 88kN/m²
				1.10 Becoming hard with depth					1											Infiltration test undertaken at 0.70m depth Shear vane test = 132kN/m²
																				Shear vane test = 140kN/m²
				1.70 Orange brown sandy clay pocket present					1.50	D	1									Shear vane test = 100kN/m²
							1.97		2											Windowless sample hole completed at 1.97m depth
									3											
									4											

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal, Response zone, Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road,
Bightwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. WS14 | SHEET 1 OF 1 | PROJECT No. 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF,SG.GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills

PROJECT: Land to the North West of Haverhill

GROUND LEVEL

HOLE No. WS15

LOGGED BY: BG
FIELDWORK BY: GEL
TEMPLATE REF: GEL AGS BH BETA

CHECKED BY:
DATE:

EXCAVATION METHOD: Windowless sampler
Uncased to 2.0 m

COORDINATES E N

DATES 30/10/2014 - 30/10/2014

SHEET 1 OF 1

PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				TOPSOIL (Desiccated dark brown slightly silty slightly gravelly desiccated CLAY with rootlets. Gravel of subangular to subrounded fine to coarse flint)			0.00		0											Groundwater not encountered during drilling
				Stiff to desiccated pale brown and grey mottled gravelly slightly cobbly desiccated CLAY. Gravel of subangular to rounded fine to coarse chalk (LOWESTOFT FORMATION)			0.20		0.10	J	1									No collapse of sidewalls during drilling
									0.75	D	1									Infiltration test undertaken at 0.9m depth
				1.00 Becoming hard and dark grey with depth					1											
									1.50	D	2									
							2.00		2											Windowless sample hole completed at 2.0m depth
									3											
									4											

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal, Response zone, Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road,
Bightwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. WS15 | SHEET 1 OF 1 | PROJECT No. 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF,SG.GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills	PROJECT: Land to the North West of Haverhill	GROUND LEVEL	HOLE No. WS16
LOGGED BY: SG FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: DATE:	EXCAVATION METHOD: Windowless sampler Uncased to 4.0 m	COORDINATES E N DATES 31/10/2014 - 31/10/2014	SHEET 1 OF 1 PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				TOPSOIL (Dark grey brown slightly gravelly clay. Gravel of fine to medium flint with occasional brick).			0.00		0											Groundwater not encountered during drilling
									0.10	J	1									No collapse of sidewalls during drilling
				Firm becoming stiff dark yellow brown slightly gravelly desiccated CLAY. Gravel of fine to medium flint with occasional medium chalk. (LOWESTOFT FORMATION) 0.50 Rootlets present			0.30												
				1.50 No desiccation below 1.5m and becoming slightly sandy and firm with depth					1											
				2.20 Becoming gravelly and pale grey orange brown mottled below 2.2m. Gravel is fine to coarse chalk and flint					2											
									3											
							4.00		4											Windowless sample hole completed at 4.0m

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal, Response zone, Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road,
Bightwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. WS16 | SHEET 1 OF 1 | PROJECT No 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF,SG.GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills	**PROJECT: Land to the North West of Haverhill**	**GROUND LEVEL**	**HOLE No. WS17**
LOGGED BY: SG FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: DATE:	EXCAVATION METHOD: Windowless sampler Uncased to 2.0 m	COORDINATES E N DATES 31/10/2014 - 31/10/2014	SHEET 1 OF 1 PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				TOPSOIL (Dark brown slightly gravelly clay. Gravel is fine to medium flint with occasional brick).			0.00		0											Groundwater not encountered with depth
									0.10	J	1									No collapse of sidewalls during drilling
				Firm dark brown slightly gravelly CLAY. Gravel of fine to coarse flint and chalk. (HEAD DEPOSITS)			0.35													
				Firm becoming stiff dark yellow brown gravelly CLAY. Gravel of fine to coarse flint and chalk. (LOWESTOFT FORMATION)			0.80		1											
				1.30 Becoming dark grey and dark orange brown mottled with depth																
				1.65 Cobbles of chalk present																
							2.00		2											Windowless sample hole completed at 2.0m
									3											
									4											

*WATER: Standing water level; Water strikes

PIEZOMETER: Upper seal; Response zone; Lower seal

SAMPLE AND TEST KEY

D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road,
Bightwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. WS17 | SHEET 1 OF 1 | PROJECT No. 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF,SG.GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills	**PROJECT: Land to the North West of Haverhill**	**GROUND LEVEL**	**HOLE No. WS18**
LOGGED BY: LF FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: DATE:	EXCAVATION METHOD: Windowless sampler Uncased to 4.0 m	COORDINATES E N DATES 31/10/2014 - 31/10/2014	SHEET 1 OF 1 PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				TOPSOIL (Dark brown slightly gravelly clay with rootlets. Gravel of angular to subrounded fine to medium flint and infrequent charcoal fragments).			0.00		0											No collapse of sidewalls during drilling
				Firm becoming stiff dark brown slightly gravelly CLAY. Gravel of angular to subrounded fine to medium flint. (HEAD DEPOSITS)			0.30													
31/10	▽	1.00							0.80	D	1									
									1											Seepage inflow of water at 1m
									1.20	D	2									
				Firm becoming stiff orange brown gravelly CLAY. Gravel of subrounded to rounded fine to coarse chalk and angular to subrounded fine to coarse flint. (LOWESTOFT FORMATION)			1.50													
				2.20 Becoming brown grey mottled with depth					2											
									3.00	D	3									
									3											
									4											Windowless sample hole completed at 4.0m
							4.00													

*WATER ▼ Standing water level ▽ Water strikes PIEZOMETER Upper seal Response zone Lower seal

SAMPLE AND TEST KEY

D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road,
Bightwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. WS18 | SHEET 1 OF 1 | PROJECT No 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF.SG.GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills	PROJECT: Land to the North West of Haverhill	GROUND LEVEL	HOLE No. WS19
LOGGED BY: SG FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: DATE:	EXCAVATION METHOD: Windowless sampler Uncased to 4.0 m	COORDINATES E N DATES 31/10/2014 - 31/10/2014	SHEET 1 OF 1 PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				TOPSOIL (Dark brown gravelly very desiccated clay. Gravel of frequent fine to coarse flint and chalk).			0.00		0											Groundwater not encountered during drilling No collapse of sidewalls during drilling
				Dark brown pale grey mottled gravelly cobbly very desiccated CLAY. Gravel of fine to coarse flint and chalk with frequent cobbles of chalk. (LOWESTOFT FORMATION)			0.40		1											
				2.80 Becoming dark grey with depth 3.00 No desiccation below 3.0m					2											
									3											
							4.00		4											Windowless sample hole completed at 4.0m 50mm diameter monitorng well installed to 4.0m

*WATER ▼ Standing water level ▽ Water strikes
PIEZOMETER Upper seal, Response zone, Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road,
Bightwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. WS19 | SHEET 1 OF 1 | PROJECT No 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF,SG.GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills	PROJECT: Land to the North West of Haverhill	GROUND LEVEL	HOLE No. WSA
LOGGED BY: LF FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: DATE:	EXCAVATION METHOD: Windowless sampler Uncased to 4.0 m	COORDINATES E N DATES 18/11/2014 - 18/11/2014	SHEET 1 OF 1 PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				TOPSOIL (Dark brown gravelly slightly silty clayey sand with occasional rootlets. Gravel is angular to subrounded fine to medium flint)			0.00		0												Groundwater not encountered during drilling
				Firm becoming very stiff yellow brown gravelly CLAY. Gravel of angular to subrounded fine to coarse flint and subrounded to rounded fine to coarse chalk (LOWESTOFT FORMATION) 0.50 - Becoming desiccated with depth 0.60 - 1.00 - Becoming dark grey brown with depth			0.25		0.10	J	1								No collapse of sidewalls during drilling
									0.30	J	2									Metals, PAH, TPH, Moisture content, pH and Sulphate
				1.00 - 4.00 - Becoming grey brown mottled with depth					1	C		11 12 9 8 8 9	34							
									2	C		6 6 7 7 8 9	31							
									3	C		6 8 9 9 10 12	40							
							4.00		4	C		8 9 10 12 13 14	49							Windowless sample hole completed at 4.0m

*WATER ▼ Standing water level ▽ Water strikes PIEZOMETER Upper seal Response zone Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road,
Bightwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. WSA | SHEET 1 OF 1 | PROJECT No 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF.SG.GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills	PROJECT: Land to the North West of Haverhill	GROUND LEVEL	HOLE No. WSB
LOGGED BY: LF FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: DATE:	EXCAVATION METHOD: Windowless sampler Uncased to 2.0 m	COORDINATES E N DATES 18/11/2014 - 18/11/2014	SHEET 1 OF 1 PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Depths	Sampling/In-Situ Testing: Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				TOPSOIL (Dark brown slightly gravelly clay with rootlets. Gravel of angular to subrounded fine to medium flint)			0.00		0											Groundwater not encountered during drilling No collapse of sidewalls during drilling
				Firm becoming stiff light orange brown gravelly CLAY. Gravel of angular to subrounded fine to coarse flint and subrounded fine to coarse chalk (LOWESTOFT FORMATION)			0.30		0.20	J	1									Metals, PAH, TPH, Moisture content, pH and Sulphate
									0.40	J	2									Metals, PAH, TPH, Moisture content, pH and Sulphate
				0.80 - Becoming brown grey mottled with depth					1											Infiltration test undertaken at 0.69m depth
							2.00		2											Windowless sample hole completed at 2.00m depth
									3											
									4											

*WATER: Standing water level; Water strikes

PIEZOMETER: Upper seal; Response zone; Lower seal

SAMPLE AND TEST KEY

D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road,
Bightwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. WSB. | SHEET 1 OF 1 | PROJECT No. 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF.SG.GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills

PROJECT: Land to the North West of Haverhill

GROUND LEVEL

HOLE No. WSC

LOGGED BY: LF
FIELDWORK BY: GEL
TEMPLATE REF: GEL AGS BH BETA

CHECKED BY:
DATE:

EXCAVATION METHOD: Windowless sampler
Uncased to 4.0 m

COORDINATES E N

DATES 18/11/2014 - 18/11/2014

SHEET 1 OF 1

PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				TOPSOIL (Dark brown slightly gravelly clay with occasional rootlets. Gravel of angular to subrounded fine to medium flint and occasional fine brick fragments)			0.00		0											
				Firm brown slightly gravelly CLAY. Gravel of angular to subrounded fine to medium flint (HEAD DEPOSITS)			0.30		0.20	J	1									No collapse of sidewalls during drilling
				0.60 - Becoming slightly sandy with depth					0.40	J	2									
				1.00 - 1.50 - Becoming soft with depth					1	C		1 1 1 1 2 2	6							
				Firm becoming stiff yellow brown/grey mottled gravelly CLAY. Gravel of angular to subrounded fine to coarse flint and frequent subrounded to rounded fine to coarse chalk (LOWESTOFT FORMATION)			1.50		2	C		4 3 4 3 5 5	17							
									3	C		3 3 4 4 5 6	19							50mm diameter monitoring well installed to 3.0m
18/11		3.50																		Inflow of water at 3.5m
							4.00		4	C		4 4 6 6 6 8	26							Windowless sample hole completed at 4.00m depth

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal, Response zone, Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road,
Bightwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. WSC. | SHEET 1 OF 1 | PROJECT No 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF.SG.GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills

PROJECT: Land to the North West of Haverhill

GROUND LEVEL

HOLE No. WSD

LOGGED BY: SG
FIELDWORK BY: GEL
TEMPLATE REF: GEL AGS BH BETA

CHECKED BY:
DATE:

EXCAVATION METHOD: Windowless sampler
Uncased to 2.0 m

COORDINATES E N

DATES 18/11/2014 - 18/11/2014

SHEET 1 OF 1

PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				TOPSOIL (Brown slightly sandy clay with occasional fine to medium gravel of flint)			0.00		0											Groundwater not encountered during drilling No collapse of sidewalls during drilling
				Firm becoming stiff yellow brown CLAY with occasional fine to coarse gravel of flint and chalk (LOWESTOFT FORMATION)			0.30		0.20	J	1									Metals, PAH, TPH, Moisture content, pH and Sulphate
									0.40	J	2									Infiltration test undertaken at 0.55m depth
				0.70 - 2.00 - Becoming pale grey/orange brown mottled.					1											
							2.00		2											Windowless sample hole completed at 2.00m depth
									3											
									4											

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal, Response zone, Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road,
Bightwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. WSD | SHEET 1 OF 1 | PROJECT No. 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF,SG.GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills	**PROJECT: Land to the North West of Haverhill**	**GROUND LEVEL**	**HOLE No. WSE**
LOGGED BY: SG FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: DATE:	EXCAVATION METHOD: Windowless sampler Uncased to 4.0 m	COORDINATES E N DATES 18/11/2014 - 18/11/2014	SHEET 1 OF 1 PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				TOPSOIL (Dark grey slightly sandy clay with occasional fine gravel of flint and brick)			0.00		0											No collapse of sidewalls during drilling
				Firm yellow brown sandy CLAY with occasional black speckling (HEAD DEPOSITS)			0.40													
				Stiff dark brown/pale grey mottled gravelly CLAY. Gravel is fine to coarse flint and chalk (HEAD DEPOSITS)			1.20		1	C		1 1 2 3 2 3	10							Rising to 0.8m on completion
18/11 + 20 mins		1.80 0.80		Orange brown fine to medium gravelly SAND. Gravel is fine to medium flint (HEAD DEPOSITS)			1.80													Moderate inflow of water at 1.8m
				Stiff dark brown/pale grey mottled gravelly CLAY. Gravel is fine flint and chalk (LOWESTOFT FORMATION) 2.25 - becoming dark grey			2.00		2	C		3 4 4 5 5 5	19							
									3	C		3 3 4 4 5 7	20							50mm diameter monitoring well installed to 2.6m
							4.00		4	C		3 3 4 5 5 9	23							Windowless sample hole completed at 4.0m depth

*WATER: Standing water level; Water strikes

PIEZOMETER: Upper seal; Response zone; Lower seal

SAMPLE AND TEST KEY

D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows: SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N: N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425: Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road,
Bightwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. WSE. | SHEET 1 OF 1 | PROJECT No. 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF.SG.GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills

PROJECT: Land to the North West of Haverhill

GROUND LEVEL

HOLE No. WSF

LOGGED BY: SG
FIELDWORK BY: GEL
TEMPLATE REF: GEL AGS BH BETA

CHECKED BY:
DATE:

EXCAVATION METHOD: Windowless sampler
Uncased to 2.0 m

COORDINATES E N

DATES 18/11/2014 - 18/11/2014

SHEET 1 OF 1

PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				TOPSOIL (Dark grey slightly sandy clay with occasional fine gravel of flint and brick)			0.00		0											No collapse of sidewalls during drilling
				Firm becoming soft orange brown sandy CLAY with occasional fine to medium gravel of flint (HEAD DEPOSITS)			0.25		0.20	J	1									Metals, PAH, TPH, Moisture content, pH and Sulphate
									0.45	J	2									
18/11		1.30							1											Inflow of water at 1.3m
				Stiff dark brown/pale grey mottled slightly gravelly CLAY. Gravel is fine to medium flint and chalk (LOWESTOFT FORMATION)			1.60													
							2.00		2											Window sample hole completed at 2.00m depth
									3											
									4											

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal / Response zone / Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road,
Bightwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. WSF

SHEET 1 OF 1

PROJECT No. 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF,SG.GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills

PROJECT: Land to the North West of Haverhill

GROUND LEVEL

HOLE No. WSG

LOGGED BY: LF
FIELDWORK BY: GEL
TEMPLATE REF: GEL AGS BH BETA

CHECKED BY:
DATE:

EXCAVATION METHOD: Windowless sampler
Uncased to 2.0 m

COORDINATES E N

DATES 19/11/2014 - 19/11/2014

SHEET 1 OF 1

PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				TOPSOIL (Dark brown slightly gravelly slightly sandy clay with occasional rootlets. Gravel of angular to subrounded fine to medium flint)			0.00		0											Groundwater not encountered during drilling Metals, PAH, TPH, Moisture content, pH and Sulphate No collapse of sidewalls during drilling
				Dark orange brown fine to medium SAND (HEAD DEPOSITS)			0.40													
				Firm dark orange brown very sandy slightly gravelly CLAY. Gravel of angular to subrounded fine to medium flint (HEAD DEPOSITS) 1.00 - Becoming gravelly with depth. Gravel is coarse flint 1.10 - 1.70 - Becoming black speckled			0.70		1											Shear vane test = 70kN/m² Infiltration test undertaken at 0.73m depth Shear vane test = 50kN/m²
				Orange brown clayey gravelly SAND. Gravel of angular to rounded fine to coarse chalk and flint (HEAD DEPOSITS)			1.70													
							2.00		2											Windowless sample hole completed at 2.00m depth
									3											
									4											

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal / Response zone / Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road,
Bightwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. WSG | SHEET 1 OF 1 | PROJECT No. 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF.SG.GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills	PROJECT: Land to the North West of Haverhill	GROUND LEVEL	HOLE No. WSH
LOGGED BY: LF FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: DATE:	EXCAVATION METHOD: Windowless sampler Uncased to 2.0 m	COORDINATES E N DATES 19/11/2014 - 19/11/2014	SHEET 1 OF 1 PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				TOPSOIL (Dark brown slightly gravelly clay. Gravel of angular to subrounded fine to medium flint)			0.00		0											Groundwater not encountered during drilling
				Firm orange brown slightly gravelly CLAY with occasional sandy pockets. Gravel of angular to subrounded fine to medium flint (HEAD DEPOSITS) 0.40 - Becoming orange brown/grey mottled with depth 0.90 - Becoming slightly sandy with depth 1.70 - 2.00 - With a sandy clay pocket			0.30		0.20	J	1								Borehole collapsed to 1.7m on completion Infiltration test undertaken at 0.24m depth
									0.40	J	2									Shear vane test = 61kN/m²
									1											Shear vane test = 40kN/m²
																				Shear vane test = 36kN/m²
				Soft yellow brown/grey mottled sandy gravelly CLAY. Gravel of angular to rounded fine to coarse flint and chalk (LOWESTOFT FORMATION)			1.80													
							2.00		2											Shear vane test = 23kN/m² Windowless sample hole completed at 2.0m depth
									3											
									4											

*WATER: Standing water level; Water strikes

PIEZOMETER: Upper seal; Response zone; Lower seal

SAMPLE AND TEST KEY

D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road,
Bightwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. WSH | SHEET 1 OF 1 | PROJECT No. 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF.SG.GPJ GINT STD AGS 3_1.GDT 11/12/14

CLIENT: c/o Savills

PROJECT: Land to the North West of Haverhill

GROUND LEVEL

HOLE No. WSI

LOGGED BY: LF
FIELDWORK BY: GEL
TEMPLATE REF: GEL AGS BH BETA

CHECKED BY:
DATE:

EXCAVATION METHOD: Windowless sampler
Uncased to 2.0 m

COORDINATES E N

DATES 19/11/2014 - 19/11/2014

SHEET 1 OF 1

PROJECT NO. 995,SI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				TOPSOIL (Dark brown slightly gravelly clay. Gravel of angular to subrounded fine to medium flint)			0.00		0											
									0.10	J	1									Groundwater not encountered during drilling Metals, PAH, TPH, Moisture content, pH and Sulphate
				Firm brown slightly sandy slightly gravelly CLAY. Gravel of angular to subrounded fine to medium flint (HEAD DEPOSITS)			0.25		0.30	J	2									No collapse of sidewalls during drilling
																				Shear vane test = 62kN/m²
				Firm becoming stiff brown/grey mottled gravelly CLAY. Gravel of angular to subrounded fine to coarse flint and subrounded to rounded chalk (LOWESTOFT FORMATION)			0.90		1	C		2 2 2 2 2 3	9							Shear vane test = 78kN/m²
																				Shear vane test = 80kN/m²
							2.00		2											Shear vane test = 76kN/m² Widow sample hole completed at 2.0m depth
									3											
									4											

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal, Response zone, Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road,
Bightwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

HOLE No. WSI | SHEET 1 OF 1 | PROJECT No. 995,SI

GEL AGS BH BETA 995,SI - NW HAVERHILL, 31-10-14, LF.SG.GPJ GINT STD AGS 3_1.GDT 11/12/14

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

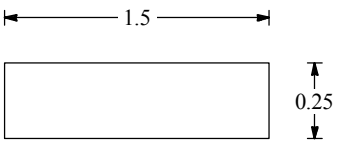
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP1**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	28-10-14 28-10-14		

Fieldwork By	Logged By	Sheet
GEL	SG	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.35	TOPSOIL (Dark brown slightly gravelly clay. Gravel is fine to medium flint with occasional fine to medium brick fragments)				Groundwater not encountered during excavation No collapse of sidewalls during excavation
0.35-1.50	Stiff dark yellow brown slightly gravelly CLAY. Gravel is fine to medium flint and chalk (LOWESTOFT FORMATION)				
	0.80 - 1.50 - Becoming gravelly				
	1.00 - 1.50 - Becoming dark grey with occasional cobble of flint and chalk				
					Trial pit completed at 1.5m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

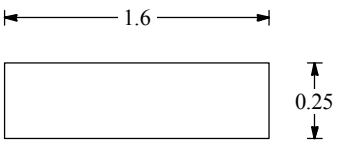
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP2**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	28-10-14 28-10-14		

Fieldwork By	Logged By	Sheet
GEL	SG	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.30	TOPSOIL (Dark brown clay with occasional medium gravel of flint				Groundwater not encountered during excavation No collapse of sidewalls during excavation
0.30-1.40	Firm becoming stiff dark yellow brown slightly gravelly CLAY. Gravel of fine to coarse flint and chalk with occasional cobble of chalk and flint (LOWESTOFT FORMATION)				
	0.60 - Becoming pale grey/orange brown mottled		0.60-0.80	1B	CBR
	1.00 - Becoming very gravelly				
					Trial pit completed at 1.4m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

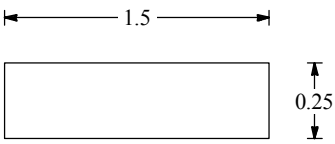
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP3**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	28-10-14 28-10-14		

Fieldwork By	Logged By	Sheet
GEL	SG	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.25	TOPSOIL (Dark brown clay with occasional medium gravel of flint)				Groundwater not encountered during excavation
0.25-1.50	Firm becoming stiff dark yellow brown CLAY with frequent fine to coarse gravel of flint and chalk and occasional roots (2mm) (LOWESTOFT FORMATION)				No collapse of sidewalls during excavation
	0.65 - Becoming gravelly				
	0.90 - Becoming pale grey/orange brown mottled				
					Trial pit completed at 1.5m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

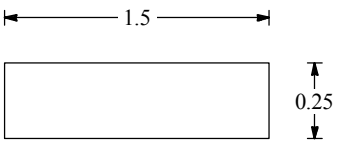
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP4**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	28-10-14 28-10-14		

Fieldwork By	Logged By	Sheet
GEL	SG	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.25	TOPSOIL (Dark grey brown clay with frequent fine to medium gravel of chalk, flint and occasional coarse gravel of brick fragments)				Groundwater not encountered during excavation
0.25-1.50	Firm becoming stiff dark yellow brown slightly gravelly CLAY. Gravel is fine to coarse chalk and flint (LOWESTOFT FORMATION)				No collapse of sidewalls during excavation
	0.55 - Becoming gravelly		0.60-0.70	1B	Moisture content, CBR
	0.90 - Becoming pale grey with occasional cobbles of chalk, flint and ironstone				
					Trial pit completed at 1.5m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

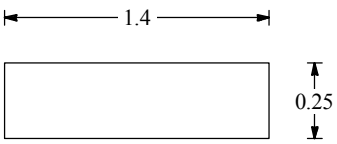
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP5**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	28-10-14 28-10-14		

Fieldwork By	Logged By	Sheet
GEL	SG	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.30	TOPSOIL (Dark grey brown clay with frequent fine to medium gravel of flint, chalk and occasional coarse gravel of brick fragments)				Groundwater not encountered during excavation No collapse of sidewalls during excavation
0.30-1.50	Firm becoming stiff dark yellow brown CLAY with occasional fine to medium gravel of flint and chalk (LOWESTOFT FORMATION) 0.60 - Becoming gravelly 0.90 - Becoming pale grey with occasional cobbles of flint and chalk				Trial pil completed at 1.5m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

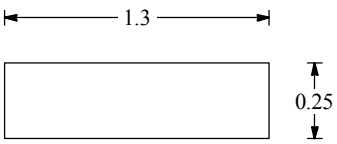
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP6**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	29-10-14 29-10-14		

Fieldwork By	Logged By	Sheet
GEL	SG	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.30	TOPSOIL (Dark grey brown clay with frequent fine to medium gravel of flint, chalk and occasional coarse gravel of brick fragments)				No collapse of sidewalls during excavation
0.30-1.50	Firm becoming stiff dark yellow brown very gravelly CLAY. Gravel is fine to coarse flint, chalk and occasionalvcobble of chalk (LOWESTOFT FORMATION)		0.70-1.00	1B	
	1.05 - Becoming pale grey				Very slow inflow of water at 1.5 m Rising to 1.45m after 20 minutes Trial pit completed at 1.5m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

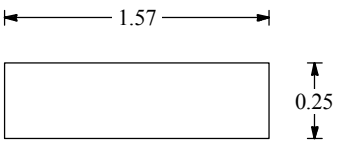
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP7**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	30-10-14 30-10-14		

Fieldwork By	Logged By	Sheet
GEL	SG	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.30	TOPSOIL (Dark grey brown clay with frequent fine to medium gravel of flint, chalk and occasionalcoarse gravel of brick fragments				No collapse of sidewalls during excavation
0.30-1.20	Firm dark yellow brown very gravelly CLAY. Gravel is fine to coarse flint, chalk and occasional cobble of flint (HEAD DEPOSITS) 0.80 - Becoming pale grey				Moisture content, CBR
1.20-1.80	Soft orange brown very gravelly sandy CLAY. Gravel is fine to coarse chalk and flint (HEAD DEPOSITS)				
1.80-1.90	Stiff dark grey CLAY with frequent fine to coarse gravel of chalk and flint (LOWESTOFT FORMATION)				Slight seepage inflow of water at 1.8 m Trial pit completed at 1.9m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

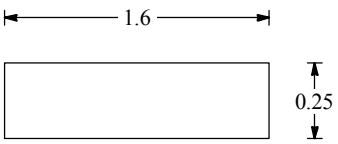
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP8**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	30-10-14 30-10-14		

Fieldwork By	Logged By	Sheet
GEL	SG	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.30	TOPSOIL (Dark grey brown clay with frequent fine to medium gravel of flint, chalk and occasional gravel of brick fragments)				Groundwater not encountered during excavation No collapse of sidewalls during excavation
0.30-1.05	Firm becoming stiff dark yellow brown gravelly CLAY. Gravel is fine to coarse flint and chalk (LOWESTOFT FORMATION) 0.60 - Becoming dark yellow brown/pale grey mottled with occasional cobble of chalk 0.80 - Becoming pale grey				Trial pit completed at 1.05m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

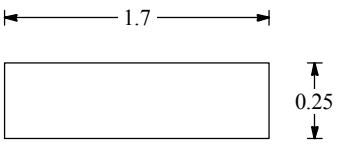
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP9**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	30-10-14 30-10-14		

Fieldwork By	Logged By	Sheet
GEL	SG	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.30	TOPSOIL (Dark grey brown clay with frequent fine to medium gravel of flint, chalk and occasional coarse gravel of brick fragments)				Groundwater not encountered during excavation No collapse of sidewalls during excavation
0.30-0.70	Firm dark brown CLAY with occasional fine to coarse gravel of flint (HEAD DEPOSITS)				
0.70-1.50	Firm becoming stiff dark yellow brown gravelly CLAY. Gravel of fine to coarse flint and chalk (LOWESTOFT FORMATION)				Trial pit completed at 1.5m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

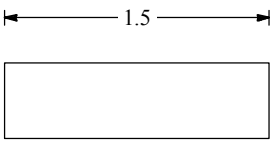
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP10**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	30-10-14 30-10-14		

Fieldwork By	Logged By	Sheet
GEL	SG	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.30	TOPSOIL (Dark grey brown clay with frequent fine to medium gravel of flint, chalk and occasional coarse gravel of brick)				Groundwater not encountered during excavation No collapse of sidewalls during excavation
0.30-0.70	Firm dark brown CLAY with occasional fine to coarse gravel of flint (HEAD DEPOSITS)				
0.70-1.40	Firm becoming stiff dark yellow brown gravelly CLAY. Gravel is fine to coarse flint and chalk (LOWESTOFT FORMATION) 0.95 - Becoming pale grey/dark yellow brown mottled				Trial pit completed at 1.4m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

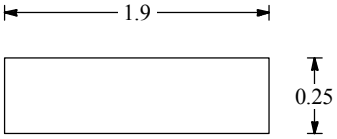
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP11**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	30-10-14 30-10-14		

Fieldwork By	Logged By	Sheet
GEL	SG	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.30	TOPSOIL (Dark grey brown clay with frequent fine to medium gravel of flint, chalk and occasional coarse gravel of brick fragments)				Groundwater not encountered during excavation No collapse of sidewalls during excavation
0.30-1.30	Firm becoming stiff dark yellow brown CLAY with frequent fine to coarse gravel of flint and chalk (LOWESTOFT FORMATION)				Trial pit completed at 1.3m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

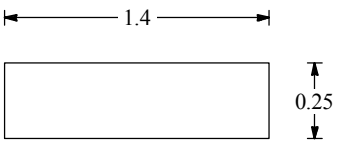
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP12**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	30-10-14 30-10-14		

Fieldwork By	Logged By	Sheet
GEL	SG	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.35	TOPSOIL (Dark grey brown clay with frequent fine to medium gravel of flint, chalk and occasional coarse gravel of brick fragments)				Groundwater not encountered during excavation No collapse of sidewalls during excavation
0.35-1.40	Firm becoming stiff dark yellow brown gravelly CLAY. Gravel is fine to coarse flint and chalk (LOWESTOFT FORMATION) 0.80 - Becoming dark yellow brown/pale grey mottled				Trial pit completed at 1.4m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

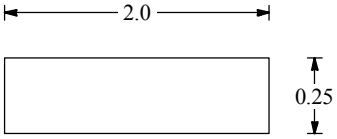
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP13**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	30-10-14 30-10-14		

Fieldwork By	Logged By	Sheet
GEL	SG	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.25	TOPSOIL (Dark grey brown clay with frequent fine to medium gravel of flint, chalk and occasional coarse gravel of brick fragments)				Groundwater not encountered during excavation
0.25-1.40	Firm becoming stiff dark yellow brown CLAY with frequent fine to coarse gravel of chalk and flint (LOWESTOFT FORMATION)				No collapse of sidewalls during excavation
			0.70-0.80	1B	Moisture content, CBR
	0.80 - Becoming dark grey/dark yellow brown mottled				
	0.90 - With occasional cobble of flint and chalk				
					Trial pit completed at 1.4m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

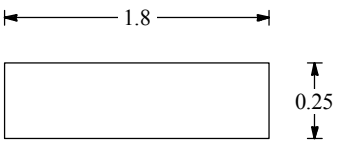
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP14**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	31-10-14 31-10-14		

Fieldwork By	Logged By	Sheet
GEL	LF	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.30	TOPSOIL (Dark brown slightly gravelly clay with occasional rootlets. Gravel of angular to subrounded fine to coarse flint and occasional fine brick and charcoal fragments)				Groundwater not encountered during excavation No collapse of sidewalls during excavation
0.30-1.40	Firm becoming stiff orange brown gravelly CLAY. Gravel of subrounded to rounded fine to coarse chalk and angular to subrounded fine to coarse flint (LOWESTOFT FORMATION)				
	1.00 - Becoming pale brown				
					Trial pit completed at 1.4m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

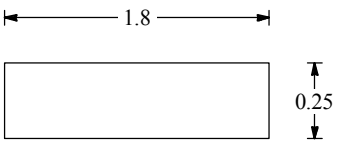
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP15**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	31-10-14 31-10-14		

Fieldwork By	Logged By	Sheet
GEL	LF	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.25	TOPSOIL (Dark brown slightly gravelly clay with occasional rootlets. Gravel of angular to subrounded fine to coarse flint and occasional fine brick and charcoal fragments				Groundwater not encountered during excavation No collapse of sidewalls during excavation
0.25-1.10	Firm becoming stiff brown gravelly CLAY. Gravel of subrounded to rounded fine to coarse chalk and angular to subrounded fine to coarse flint (LOWESTOFT FORMATION) 0.50 - With occasional cobbles of chalk 0.70 - Becoming brown/grey mottled				Trial pit completed at 1.1m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

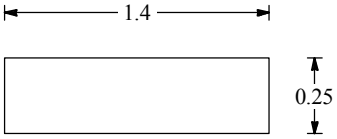
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP16**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	31-10-14 31-10-14		

Fieldwork By	Logged By	Sheet
GEL	LF	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.30	TOPSOIL (Dark brown slightly gravelly clay with occasional rootlets. Gravel of angular to subrounded fine to coarse flint and occasional fine brick and charcoal fragments				Groundwater not encountered during excavation No collapse of sidewalls during excavation
0.30-1.40	Firm becoming stiff orange brown gravelly CLAY. Gravel of subrounded to rounded fine to coarse chalk and angular to subrounded fine to coarse flint (LOWESTOFT FORMATION) 0.70 - With a cobble of metamorphic material 0.90 - Becoming brown/grey mottled 1.00 - With occasional iron oxide staining				Trial pit completed at 1.4m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

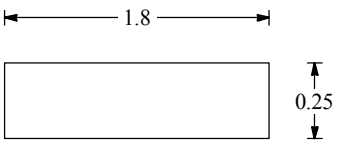
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP17**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	31-10-14 31-10-14		

Fieldwork By	Logged By	Sheet
GEL	LF	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.30	TOPSOIL (Dark brown slightly gravelly clay with occasional rootlets. Gravel of fine to coarse angular to subrounded flint and occasional fine charcoal fragments)				Groundwater not encountered during excavation No collapse of sidewalls during excavation
0.30-1.40	Firm becoming stiff yellow brown gravelly CLAY. Gravel of subrounded to rounded fine to coarse chalk and angular to subrounded fine to coarse flint (LOWESTOFT FORMATION) 0.80 - Becoming yellow brown/grey mottled				Trial pit completed at 1.4m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

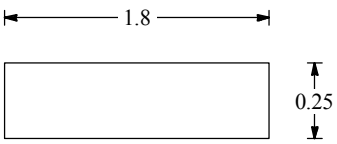
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP18**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	31-10-14 31-10-14		

Fieldwork By	Logged By	Sheet
GEL	LF	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.30	TOPSOIL (Dark brown slightly gravelly clay with occasional rootlets. Gravel of fine to coarse angular to subrounded flint and occasional fine charcoal fragments				Groundwater not encountered during excavation No collapse of sidewalls during excavation
0.30-1.50	Firm becoming stiff yellow brown gravelly CLAY. Gravel of fine to coarse subrounded to rounded chalk and angular to subrounded fine to coarse flint (LOWESTOFT FORMATION)				Trial pit completed at 1.5m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

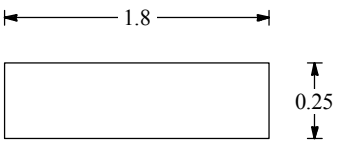
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP19**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	31-10-14 31-10-14		

Fieldwork By	Logged By	Sheet
GEL	LF	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.25	TOPSOIL (Dark brown slightly gravelly clay with occasional rootlets. Gravel of fine to coarse angular to subrounded flint and occasional fine charcoal fragments)				Groundwater not encountered during excavation No collapse of sidewalls during excavation
0.25-1.50	Firm becoming stiff yellow brown gravelly CLAY. Gravel of subrounded to rounded fine to coarse chalk and angular to subrounded fine to coarse flint (LOWESTOFT FORMATION) 0.90 - Becoming grey/brown mottled				Trial completed at 1.5m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

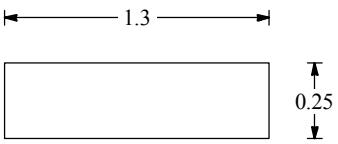
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP20**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	18-11-14 18-11-14		

Fieldwork By	Logged By	Sheet
GEL	LF	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.30	TOPSOIL (Dark grey brown slightly gravelly silty clay. Gravel of fine to coarse angular to sub rounded flint)				
					No collapse of sidewalls during excavation
0.30-1.45	Firm yellow brown grey CLAY. Gravel of angular to subrounded fine to coarse flint and subrounded fine to coarse chalk (LOWESTOFT FORMATION)				
	0.60 - Becoming brown/grey mottled				
	1.00 - With frequent iron oxide staining				
					Seepage inflow of water at 1.45 m Trial completed at 1.45m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

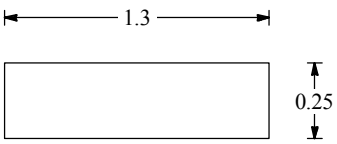
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP21**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	18-11-14 18-11-14		

Fieldwork By	Logged By	Sheet
GEL	LF	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.30	TOPSOIL (Dark grey brown slightly gravelly silty clay. Gravel of fine to coarse angular to sub rounded flint)				Groundwater not encountered during excavation No collapse of sidewalls during excavation
0.30-1.35	Firm becoming stiff brown gravelly CLAY. Gravel of angular to subrounded fine to coarse flint and subrounded to rounded fine to coarse chalk (LOWESTOFT FORMATION)				
	1.00 - Becoming light brown				Trial completed at 1.35m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

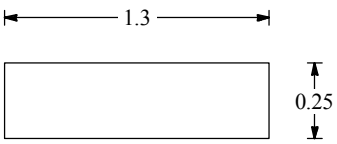
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP22**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	18-11-14 18-11-14		

Fieldwork By	Logged By	Sheet
GEL	LF	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.30	TOPSOIL (Dark grey brown slightly gravelly silty clay. Gravel of fine to coarse angular to sub rounded flint)				Groundwater not encountered during excavation No collapse of sidewalls during excavation
0.30-1.45	Firm orange brown Clay (HEAD DEPOSITS) 1.30 - Becoming sandy				Trial completed at 1.45m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

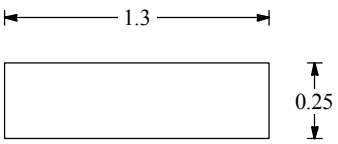
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP23**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	18-11-14 18-11-14		

Fieldwork By	Logged By	Sheet
GEL	LF	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.30	TOPSOIL (Dark brown slightly gravelly clay with rootlets. Gravel of angular to subrounded fine to medium flint)				
					No collapse of sidewalls during excavation
0.30-1.50	Firm orange brown slightly gravelly CLAY. Gravel of angular to subrounded fine to medium flint and chalk (LOWESTOFT FORMATION)				
	1.00 - Becoming slightly sandy with frequent gravel				
					Seepage inflow of water at 1.2 m
					Trial completed at 1.5m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

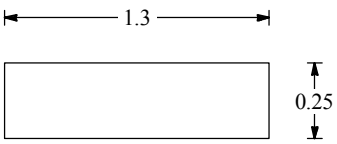
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP24**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	18-11-14 18-11-14		

Fieldwork By	Logged By	Sheet
GEL	LF	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.28	TOPSOIL (Dark brown slightly gravelly clay with rootlets. Gravel of angular to subrounded fine to medium flint)				Groundwater not encountered during excavation No collapse of sidewalls during excavation
0.28-1.20	Firm becoming stiff brown gravelly CLAY. Gravel of angular to subrounded fine to coarse flint with frequent subrounded fine to coarse chalk (LOWESTOFT FORMATION)				
	1.00 - Becoming grey/brown mottled				Trial completed at 1.2m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

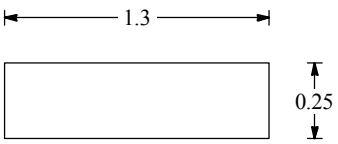
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP25**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	18-11-14 18-11-14		

Fieldwork By	Logged By	Sheet
GEL	SG	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.30	TOPSOIL (Brown slightly sandy clay with occasional fine to medium gravel of flint and flint)				
0.30-1.40	Firm becoming stiff brown CLAY with occasional fine to coarse gravel of flint and chalk (LOWESTOFT FORMATION)				No collapse of sidewalls during excavation Perched inflow of water at 0.3 m
	0.80 - Becoming pale grey/orange brown mottled				
					Trial completed at 1.4m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

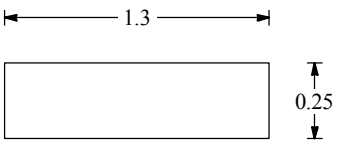
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP26**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	18-11-14 18-11-14		

Fieldwork By	Logged By	Sheet
GEL	LF	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.20	TOPSOIL (Brown slightly sandy clay with occasional fine to medium gravel of flint and flint)				
0.20-1.20	Firm becoming stiff orange brown gravelly CLAY. Gravel of angular to rounded fine to coarse flint with frequent chalk (LOWESTOFT FORMATION)				No collapse of sidewalls during excavation
	0.90 - Becoming grey/brown mottled				
					Perched inflow of water at 1.2 m Trial completed at 1.2m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

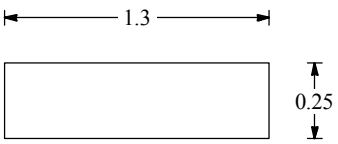
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP27**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	18-11-14 18-11-14		

Fieldwork By	Logged By	Sheet
GEL	LF	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.20	TOPSOIL (Brown slightly sandy clay with occasional fine to medium gravel of flint and flint)				Groundwater not encountered during excavation
0.20-1.45	Firm becoming stiff yellow brown gravelly CLAY. Gravel of angular to subrounded fine to coarse flint with frequent subrounded to rounded fine to coarse gravel and cobbles of chalk (LOWESTOFT FORMATION)				No collapse of sidewalls during excavation
	0.80 - Becoming grey/brown mottled				
					Trial completed at 1.45m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

GEL AGS TP BETA 995,SI - NW HAVERHILL, 31-10-14, LF.SG.GPJ GINT STD AGS 3_1.GDT 11/12/14

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

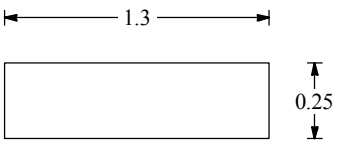
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP28**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	19-11-14 19-11-14		

Fieldwork By	Logged By	Sheet
GEL	SG	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.30	TOPSOIL (Dark grey brown slightly sandy clay with occasional fine gravel of flint)				Groundwater not encountered during excavation No collapse of sidewalls during excavation
0.30-1.50	Firm dark orange brown gravelly CLAY. Gravel of fine to coarse flint and chalk (HEAD DEPOSITS) 0.60 - becoming very gravelly 1.10 - with cobble of flint				Trial completed at 1.5m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

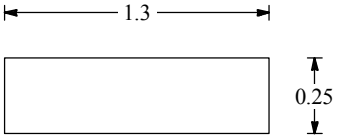
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP29**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	19-11-14 19-11-14		

Fieldwork By	Logged By	Sheet
GEL	SG	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.25	TOPSOIL (Dark grey brown slightly sandy clay with occasional fine gravel of flint)				Groundwater not encountered during excavation
0.25-0.60	Firm dark orange brown slightly sandy CLAY with occasional fine to coarse gravel of chalk and flint (HEAD DEPOSITS)				No collapse of sidewalls during excavation
0.60-1.20	Firm becoming stiff pale grey brown/orange brown mottled very gravelly CLAY. Gravel of fine to coarse flint and chalk (HEAD DEPOSITS)		0.70-0.80	1B	CBR
1.20-1.50	Stiff pale grey/pale orange brown mottled gravelly CLAY. Gravel of fine to coarse chalk (LOWESTOFT FORMATION)				
					Trial completed at 1.5m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

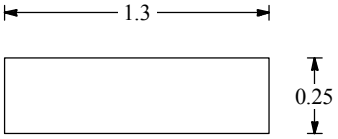
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP30**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	19-11-14 19-11-14		

Fieldwork By	Logged By	Sheet
GEL	SG	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.20	TOPSOIL (Dark grey brown slightly sandy clay with occasional fine gravel of flint)				Groundwater not encountered during excavation
0.20-0.60	Firm dark orange brown slightly sandy CLAY (HEAD DEPOSITS)		0.20 0.40	1J 2J	No collapse of sidewalls during excavation
0.60-1.50	Stiff pale grey/dark orange brown mottled gravelly CLAY. Gravel of fine to coarse chalk with occasional fine to medium flint (LOWESTOFT FORMATION)				
					Trial completed at 1.5m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

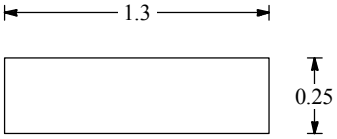
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP31**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	19-11-14 19-11-14		

Fieldwork By	Logged By	Sheet
GEL	SG	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.30	TOPSOIL (Dark grey brown slightly sandy clay with occasional fine gravel of flint)				Groundwater not encountered during excavation
			0.20	1J	No collapse of sidewalls during excavation
0.30-0.65	Firm becoming stiff pale grey/yellow brown mottled gravelly CLAY. Gravel of fine to medium chalk and flint (LOWESTOFT FORMATION)				
0.65-1.50	Stiff dark grey gravelly CLAY. Gravel of fine to medium flint (LOWESTOFT FORMATION)		0.70	2J	
					Trial completed at 1.5m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

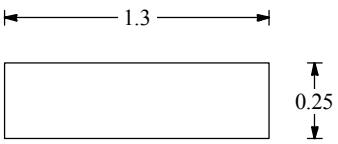
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP32**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	19-11-14 19-11-14		

Fieldwork By	Logged By	Sheet
GEL	SG	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.35	TOPSOIL (Dark grey brown slightly sandy clay with occasional fine gravel of flint)				Groundwater not encountered during excavation No collapse of sidewalls during excavation
0.35-1.50	Firm becoming stiff pale grey/yellow brown mottled gravelly CLAY. Gravel is fine to medium chalk with occasional fine to medium flint (LOWESTOFT FORMATION)				
					Trial completed at 1.5m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

Geosphere Environmental Ltd
Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
Telephone: 01603 298 076
Fax: 01603 298 075

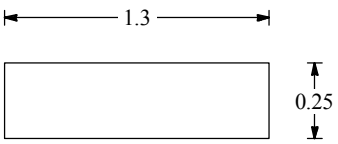
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land to the North West of Haverhill	c/o Savills	**TP33**

Job No	Date	Ground Level (m)	Co-Ordinates ()
995,SI	19-11-14 19-11-14		

Fieldwork By	Logged By	Sheet
GEL	SG	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.25	TOPSOIL (Dark grey brown slightly sandy clay with occasional fine gravel of flint)				Groundwater not encountered during excavation No collapse of sidewalls during excavation
0.25-1.50	Firm becoming stiff pale grey/yellow brown gravelly CLAY. Gravel is fine to medium chalk with occasional fine to medium flint (LOWESTOFT FORMATION)				
					Trial completed at 1.5m depth



Shoring/Support: NONE
Stability: STABLE

All dimensions in metres Scale 1:20.8333333333333	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By AD

APPENDIX 7 – INFILTRATION TEST RESULTS

BOREHOLE INFILTRATIOIN TEST - BRE DIGEST 365

geosphere environmental ltd
Geosphere Environmental Ltd, Brightwell Barns, Ipswich Road, Brightwell, Suffolk, IP10 0BJ
T 01603 298 076 E info@geosphere-environmental.co.uk

Time [min]	Depth to Water [mbgl]
0	1.48
1	1.48
2	1.48
3	1.48
4	1.48
5	1.48
10	1.48
15	1.48
20	1.48
30	1.48
45	1.48
60	1.48
90	1.48
120	1.48

Borehole Dimensions [m]	
Diameter	Depth
0.101	1.80

Infiltration Rate Calculations		
Parameter	Unit	Result
height		
h_{25}	[m]	1.5600
h_{75}	[m]	1.7200
h_{75}-h_{25}	[m]	0.160
time		
t_{75}	[s]	N/A
t_{25}	[s]	N/A
t_{75} - t_{25}	[s]	N/A
effective volume		
$v_{75\text{-}25}$	[m^3]	1.28E-03
effective area		
ap_{50}	[m^2]	5.88E-02
infiltration rate		
f	[m/s]	N/A

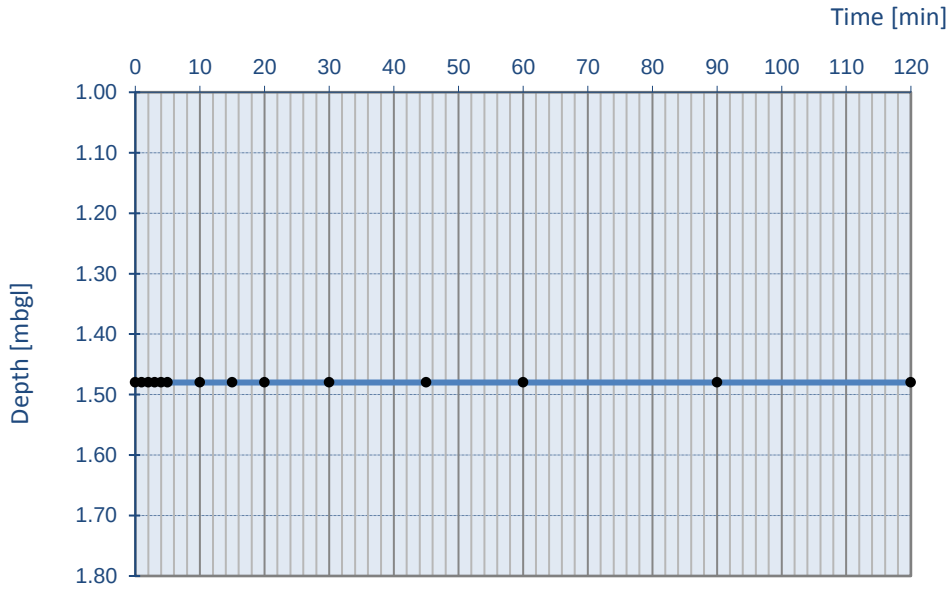
Borehole WS3

Run 1 of 1

Test Date 29/10/2014

Groundwater Encountered at: n/a

Soakage Rate



mbgl - metres below ground level

SITE	CLIENT	REPORT NO	SITE SUPERVISION	CALCULATIONS	CHECKED BY	DATE
NW Haverhill	Savills	995,GI	LF	SG	AD	05 December 2014

C:\Geocloud\Shared\GeoCloud\Reports\995,SI, NW Haverhill, Savills, 08-10-14, SG\GEL Report\Soak\995,SI - BHFH Soak - WS3

BOREHOLE INFILTRATIOIN TEST - BRE DIGEST 365

geosphere environmental ltd
Geosphere Environmental Ltd, Brightwell Barns, Ipswich Road, Brightwell, Suffolk, IP10 0BJ
T 01603 298 076 E info@geosphere-environmental.co.uk

Time [min]	Depth to Water [mbgl]
0	1.41
1	1.41
2	1.41
3	1.41
4	1.41
5	1.41
10	1.41
15	1.41
20	1.41
30	1.41
45	1.41
60	1.41
90	1.41
120	1.41

Borehole Dimensions [m]	
Diameter	Depth
0.101	1.89

Infiltration Rate Calculations		
Parameter	Unit	Result
height		
h_{25}	[m]	1.5300
h_{75}	[m]	1.7700
h_{75}-h_{25}	[m]	0.240
time		
t_{75}	[s]	N/A
t_{25}	[s]	N/A
t_{75} - t_{25}	[s]	N/A
effective volume		
$v_{75\text{-}25}$	[m^3]	1.93E-03
effective area		
ap_{50}	[m^2]	8.41E-02
infiltration rate		
f	[m/s]	N/A

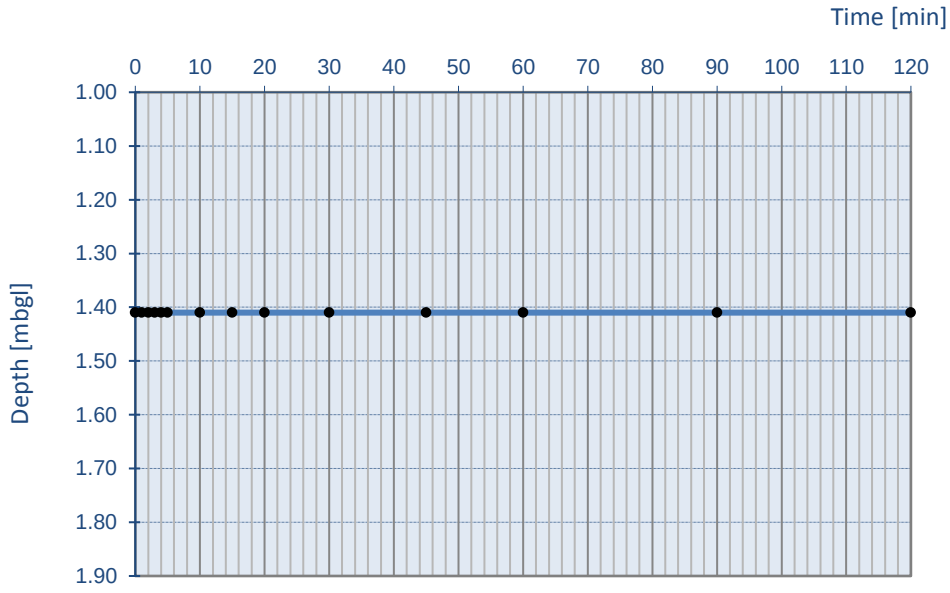
Borehole WS6

Run 1 of 1

Test Date 29/10/2014

Groundwater Encountered at: n/a

Soakage Rate



mbgl - metres below ground level

SITE	CLIENT	REPORT NO	SITE SUPERVISION	CALCULATIONS	CHECKED BY	DATE
NW Haverhill	Savills	995,GI	LF	SG	AD	05 December 2014

C:\Geocloud\Shared\GeoCloud\Reports\995,SI, NW Haverhill, Savills, 08-10-14, SG\GEL Report\Soak\995,SI - BHFH Soak - WS6

BOREHOLE INFILTRATIOIN TEST - BRE DIGEST 365

geosphere environmental ltd
Geosphere Environmental Ltd, Brightwell Barns, Ipswich Road, Brightwell, Suffolk, IP10 0BJ
T 01603 298 076 E info@geosphere-environmental.co.uk

Time [min]	Depth to Water [mbgl]
0	1.58
1	1.58
2	1.56
3	1.56
4	1.56
5	1.56
10	1.56
15	1.56
20	1.56
30	1.56
45	1.56
60	1.56
90	1.56
120	1.56

Borehole Dimensions [m]	
Diameter	Depth
0.101	2.00

Infiltration Rate Calculations		
Parameter	Unit	Result
height		
h_{25}	[m]	1.6500
h_{75}	[m]	1.8500
h_{75}-h_{25}	[m]	0.200
time		
t_{75}	[s]	N/A
t_{25}	[s]	N/A
t_{75} - t_{25}	[s]	N/A
effective volume		
$v_{75\text{-}25}$	[m^3]	1.61E-03
effective area		
ap_{50}	[m^2]	8.73E-02
infiltration rate		
f	[m/s]	N/A

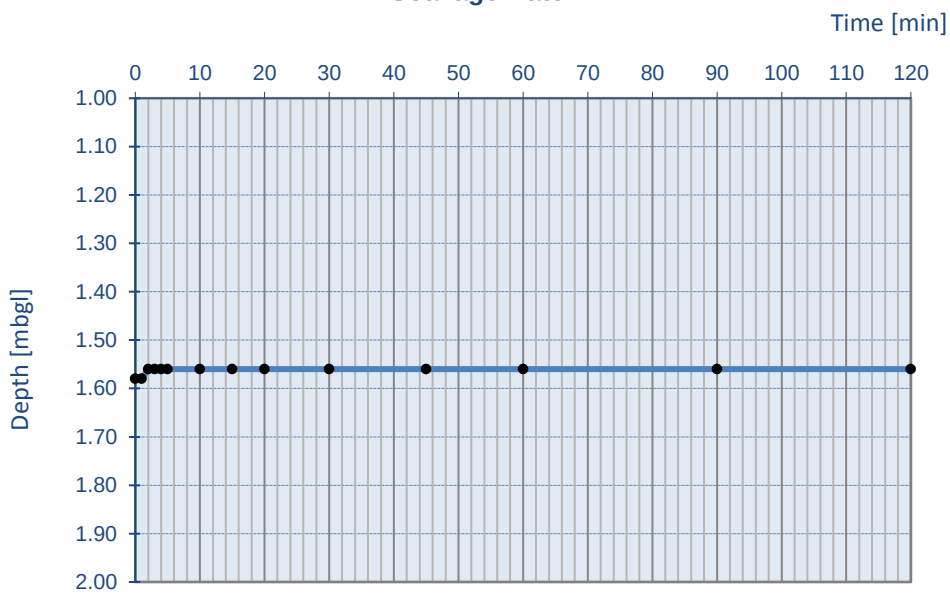
Borehole WS8

Run 1 of 1

Test Date 29/10/2014

Groundwater Encountered at: n/a

Soakage Rate



mbgl - metres below ground level

SITE	CLIENT	REPORT NO	SITE SUPERVISION	CALCULATIONS	CHECKED BY	DATE
NW Haverhill	Savills	995,GI	LF	SG	AD	05 December 2014

C:\Geocloud\Shared\GeoCloud\Reports\995,SI, NW Haverhill, Savills, 08-10-14, SG\GEL Report\Soak\995,SI - BHFH Soak - WS8

BOREHOLE INFILTRATIOIN TEST - BRE DIGEST 365

geosphere environmental ltd
Geosphere Environmental Ltd, Brightwell Barns, Ipswich Road, Brightwell, Suffolk, IP10 0BJ
T 01603 298 076 E info@geosphere-environmental.co.uk

Time [min]	Depth to Water [mbgl]
0	0.15
1	0.15
2	0.15
3	0.15
4	0.15
5	0.15
10	0.15
15	0.15
20	0.15
30	0.15
45	0.15
60	0.15
90	0.15
120	0.15

Borehole Dimensions [m]	
Diameter	Depth
0.101	1.68

Infiltration Rate Calculations		
Parameter	Unit	Result
height		
h_{25}	[m]	0.5325
h_{75}	[m]	1.2975
h_{75}-h_{25}	[m]	0.765
time		
t_{75}	[s]	N/A
t_{25}	[s]	N/A
t_{75} - t_{25}	[s]	N/A
effective volume		
$v_{75\text{-}25}$	[m^3]	6.14E-03
effective area		
ap_{50}	[m^2]	2.51E-01
infiltration rate		
f	[m/s]	N/A

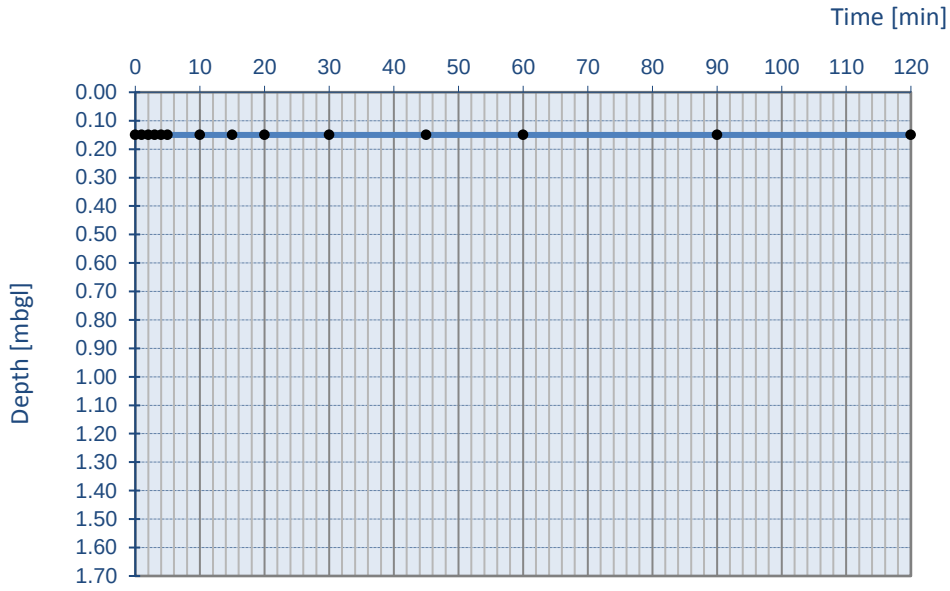
Borehole WS12

Run 1 of 1

Test Date 30/10/2014

Groundwater Encountered at: n/a

Soakage Rate



mbgl - metres below ground level

SITE	CLIENT	REPORT NO	SITE SUPERVISION	CALCULATIONS	CHECKED BY	DATE
NW Haverhill	Savills	995,GI	LF	SG	AD	05 December 2014

C:\Geocloud\Shared\GeoCloud\Reports\995,SI, NW Haverhill, Savills, 08-10-14, SG\GEL Report\Soak\995,SI - BHFH Soak - WS12

BOREHOLE INFILTRATIOIN TEST - BRE DIGEST 365

geosphere environmental ltd
Geosphere Environmental Ltd, Brightwell Barns, Ipswich Road, Brightwell, Suffolk, IP10 0BJ
T 01603 298 076 E info@geosphere-environmental.co.uk

Time [min]	Depth to Water [mbgl]
0	0.70
1	0.70
2	0.70
3	0.70
4	0.70
5	0.70
10	0.70
15	0.70
20	0.70
30	0.70
45	0.70
60	0.70
90	0.70
120	0.70

Borehole Dimensions [m]	
Diameter	Depth
0.101	1.97

Infiltration Rate Calculations		
Parameter	Unit	Result
height		
h_{25}	[m]	1.0250
h_{75}	[m]	1.6750
h_{75}-h_{25}	[m]	0.650
time		
t_{75}	[s]	N/A
t_{25}	[s]	N/A
t_{75} - t_{25}	[s]	N/A
effective volume		
v_{75-25}	[m^3]	5.22E-03
effective area		
ap_{50}	[m^2]	2.05E-01
infiltration rate		
f	[m/s]	N/A

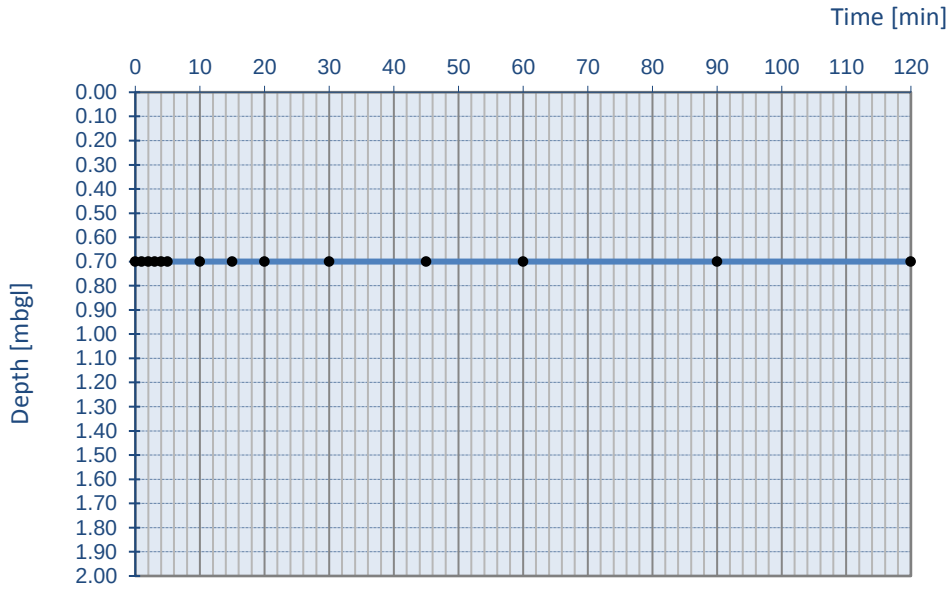
Borehole WS14

Run 1 of 1

Test Date 30/10/2014

Groundwater Encountered at: n/a

Soakage Rate



mbgl - metres below ground level

SITE	CLIENT	REPORT NO	SITE SUPERVISION	CALCULATIONS	CHECKED BY	DATE
NW Haverhill	Savills	995,GI	LF	SG	AD	05 December 2014

C:\Geocloud\Shared\GeoCloud\Reports\995,SI, NW Haverhill, Savills, 08-10-14, SG\GEL Report\Soak\995,SI - BHFH Soak - WS14

BOREHOLE INFILTRATIOIN TEST - BRE DIGEST 365

geosphere environmental ltd
Geosphere Environmental Ltd, Brightwell Barns, Ipswich Road, Brightwell, Suffolk, IP10 0BJ
T 01603 298 076 E info@geosphere-environmental.co.uk

Time [min]	Depth to Water [mbgl]
0	0.900
1	0.900
2	0.900
3	0.900
4	0.900
5	0.900
10	0.900
15	0.900
20	0.905
30	0.905
45	0.905
60	0.905
90	0.905
120	0.905

Borehole Dimensions [m]	
Diameter	Depth
0.101	2.00

Infiltration Rate Calculations		
Parameter	Unit	Result
height		
h_{25}	[m]	1.1737
h_{75}	[m]	1.7250
h_{75}-h_{25}	[m]	0.551
time		
t_{75}	[s]	N/A
t_{25}	[s]	N/A
t_{75} - t_{25}	[s]	N/A
effective volume		
v_{75-25}	[m^3]	4.43E-03
effective area		
ap_{50}	[m^2]	1.83E-01
infiltration rate		
f	[m/s]	N/A

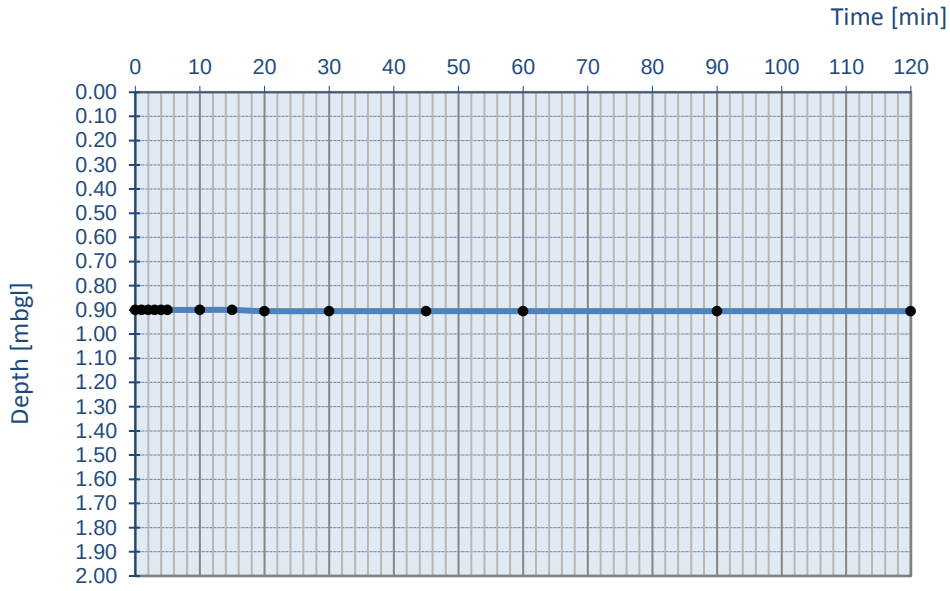
Borehole WS15

Run 1 of 1

Test Date 30/10/2014

Groundwater Encountered at: n/a

Soakage Rate



mbgl - metres below ground level

SITE	CLIENT	REPORT NO	SITE SUPERVISION	CALCULATIONS	CHECKED BY	DATE
NW Haverhill	Savills	995,GI	LF	SG	AD	05 December 2014

C:\Geocloud\Shared\GeoCloud\Reports\995,SI, NW Haverhill, Savills, 08-10-14, SG\GEL Report\Soak\995,SI - BHFH Soak - WS15

BOREHOLE INFILTRATIOIN TEST - BRE DIGEST 365

geosphere environmental ltd
Geosphere Environmental Ltd, Brightwell Barns, Ipswich Road, Brightwell, Suffolk, IP10 0BJ
T 01603 298 076 E info@geosphere-environmental.co.uk

Time [min]	Depth to Water [mbgl]
0	0.69
1	0.69
2	0.69
3	0.69
4	0.69
5	0.69
10	0.69
15	0.69
20	0.69
30	0.69
45	0.69
60	0.69
90	0.69
120	0.69

Borehole Dimensions [m]	
Diameter	Depth
0.101	2.00

Infiltration Rate Calculations		
Parameter	Unit	Result
height		
h_{25}	[m]	1.0175
h_{75}	[m]	1.6725
h_{75}-h_{25}	[m]	0.655
time		
t_{75}	[s]	N/A
t_{25}	[s]	N/A
t_{75} - t_{25}	[s]	N/A
effective volume		
$v_{75\text{-}25}$	[m^3]	5.26E-03
effective area		
ap_{50}	[m^2]	2.16E-01
infiltration rate		
f	[m/s]	N/A

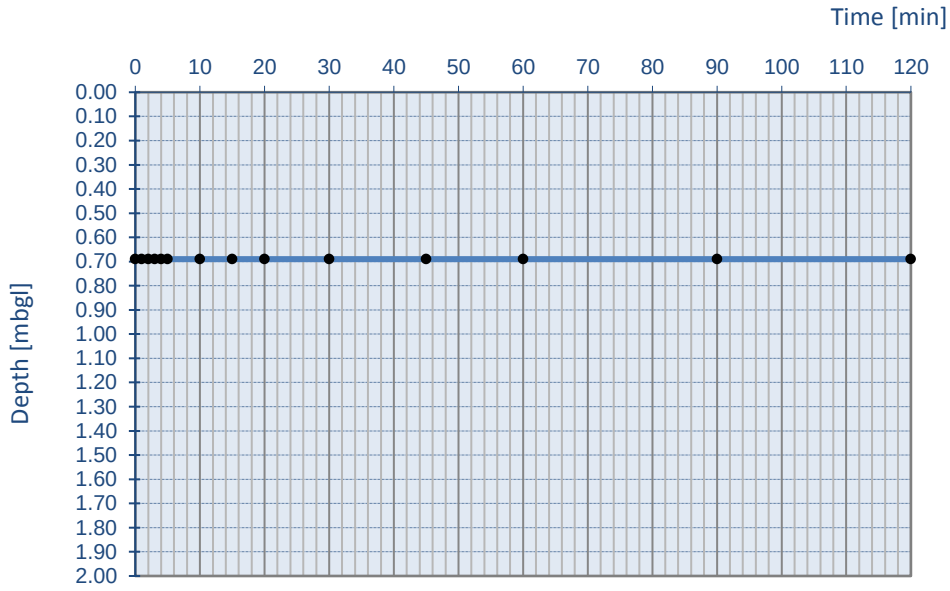
Borehole WSB

Run 1 of 1

Test Date 18/11/2014

Groundwater Encountered at: n/a

Soakage Rate



mbgl - metres below ground level

SITE	CLIENT	REPORT NO	SITE SUPERVISION	CALCULATIONS	CHECKED BY	DATE
NW Haverhill	Savills	995,GI	LF	SG	AD	05 December 2014

C:\Geocloud\Shared\GeoCloud\Reports\995,SI, NW Haverhill, Savills, 08-10-14, SG\GEL Report\Soak\995,SI - BHFH Soak - WSB

BOREHOLE INFILTRATIOIN TEST - BRE DIGEST 365

geosphere environmental ltd
Geosphere Environmental Ltd, Brightwell Barns, Ipswich Road, Brightwell, Suffolk, IP10 0BJ
T 01603 298 076 E info@geosphere-environmental.co.uk

Time [min]	Depth to Water [mbgl]
0	0.550
1	0.550
2	0.550
3	0.560
4	0.560
5	0.560
10	0.560
15	0.560
20	0.570
30	0.580
45	0.595
60	0.600
90	0.610
120	0.620

Borehole Dimensions [m]	
Diameter	Depth
0.101	2.00

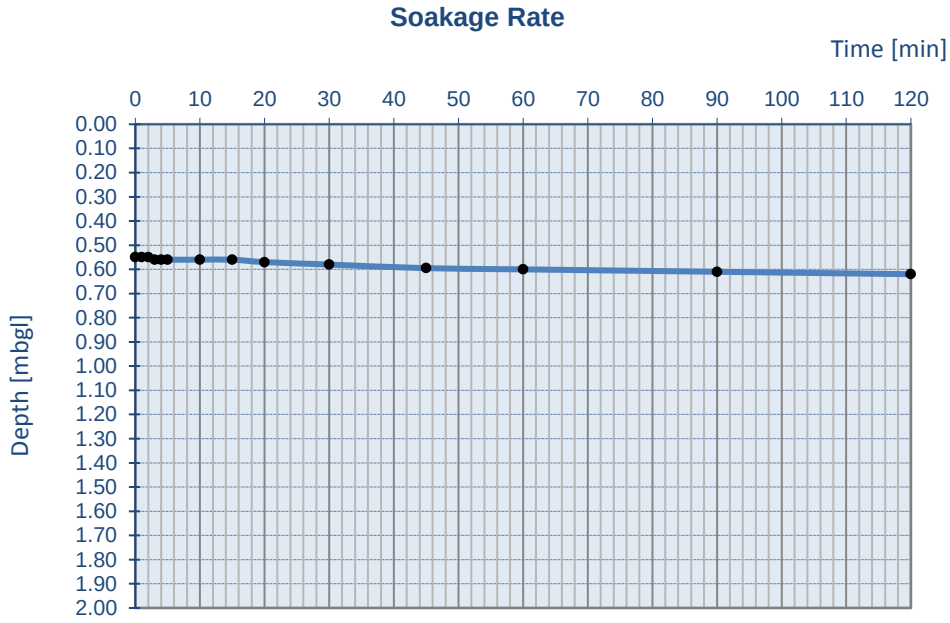
Infiltration Rate Calculations		
Parameter	Unit	Result
height		
h_{25}	[m]	0.9125
h_{75}	[m]	1.6375
h_{75}-h_{25}	[m]	0.725
time		
t_{75}	[s]	N/A
t_{25}	[s]	N/A
t_{75} - t_{25}	[s]	N/A
effective volume		
v_{75-25}	[m^3]	5.82E-03
effective area		
ap_{50}	[m^2]	2.38E-01
infiltration rate		
f	[m/s]	N/A

Borehole WSD

Run 1 of 1

Test Date 18/11/2014

Groundwater Encountered at: n/a



mbgl - metres below ground level

SITE	CLIENT	REPORT NO	SITE SUPERVISION	CALCULATIONS	CHECKED BY	DATE
NW Haverhill	Savills	995,GI	LF	SG	AD	05 December 2014

C:\Geocloud\Shared\GeoCloud\Reports\995,SI, NW Haverhill, Savills, 08-10-14, SG\GEL Report\Soak\995,SI - BHFH Soak - WSD

BOREHOLE INFILTRATIOIN TEST - BRE DIGEST 365

geosphere environmental ltd
Geosphere Environmental Ltd, Brightwell Barns, Ipswich Road, Brightwell, Suffolk, IP10 0BJ
T 01603 298 076 E info@geosphere-environmental.co.uk

Time [min]	Depth to Water [mbgl]
0	0.730
1	0.750
2	0.760
3	0.765
4	0.765
5	0.770
10	0.790
15	0.800
20	0.810
30	0.830
60	0.870
90	0.900
120	0.930
180	0.970

Borehole Dimensions [m]	
Diameter	Depth
0.090	2.00

Infiltration Rate Calculations		
Parameter	Unit	Result
height		
h_{25}	[m]	1.0475
h_{75}	[m]	1.6825
h_{75}-h_{25}	[m]	0.635
time		
t_{75}	[s]	N/A
t_{25}	[s]	N/A
t_{75} - t_{25}	[s]	N/A
effective volume		
$v_{75\text{-}25}$	[m^3]	4.05E-03
effective area		
ap_{50}	[m^2]	1.86E-01
infiltration rate		
f	[m/s]	N/A

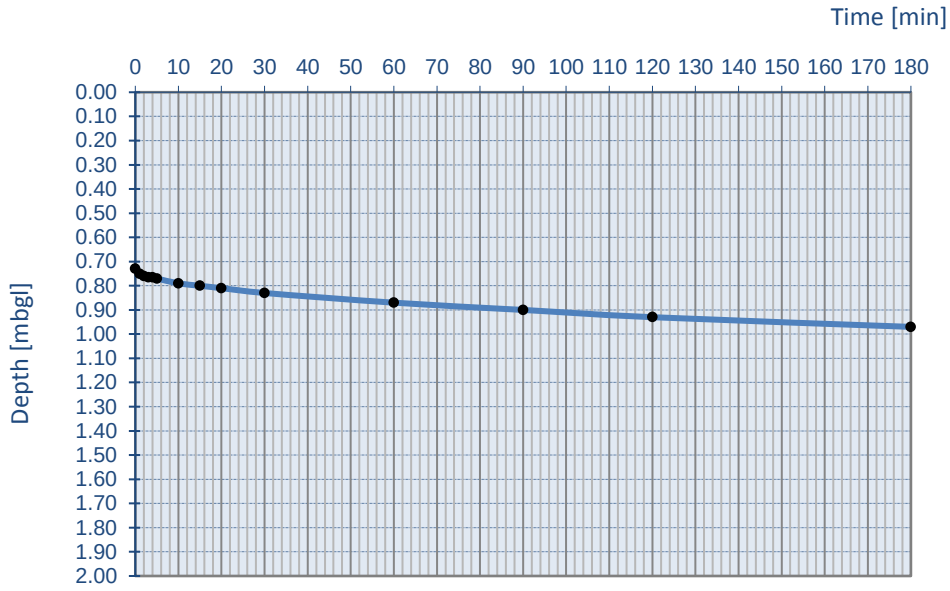
Borehole WSG

Run 1 of 1

Test Date 19/11/2014

Groundwater Encountered at: n/a

Soakage Rate



mbgl - metres below ground level

SITE	CLIENT	REPORT NO	SITE SUPERVISION	CALCULATIONS	CHECKED BY	DATE
NW Haverhill	Savills	995,GI	LF	SG	AD	05 December 2014

C:\Geocloud\Shared\GeoCloud\Reports\995,SI, NW Haverhill, Savills, 08-10-14, SG\GEL Report\Soak\995,SI - BHFH Soak - WSG

BOREHOLE INFILTRATIOIN TEST - BRE DIGEST 365

geosphere environmental ltd
Geosphere Environmental Ltd, Brightwell Barns, Ipswich Road, Brightwell, Suffolk, IP10 0BJ
T 01603 298 076 E info@geosphere-environmental.co.uk

Time [min]	Depth to Water [mbgl]
0	0.24
1	0.26
2	0.36
3	0.43
5	0.48
10	0.63
20	0.68
30	0.69
60	0.68
90	0.68
120	0.68

Borehole Dimensions [m]	
Diameter	Depth
0.090	2.00

Infiltration Rate Calculations		
Parameter	Unit	Result
height		
h_{25}	[m]	0.6050
h_{75}	[m]	1.3350
h_{75}-h_{25}	[m]	0.730
time		
t_{75}	[s]	N/A
t_{25}	[s]	540.00
t_{75} - t_{25}	[s]	N/A
effective volume		
v_{75-25}	[m^3]	4.65E-03
effective area		
ap_{50}	[m^2]	2.97E-01
infiltration rate		
f	[m/s]	N/A

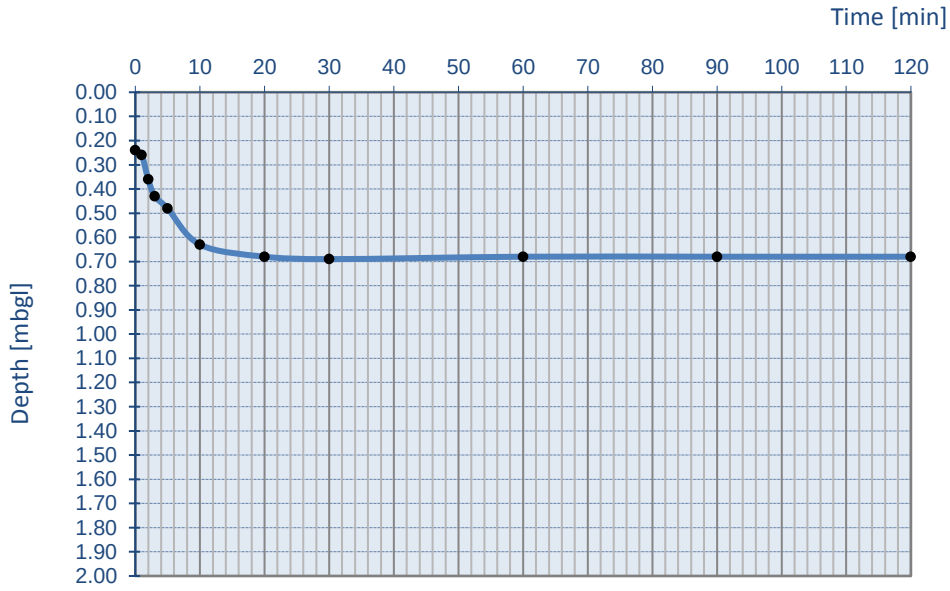
Borehole WSH

Run 1 of 1

Test Date 19/11/2014

Groundwater Encountered at: n/a

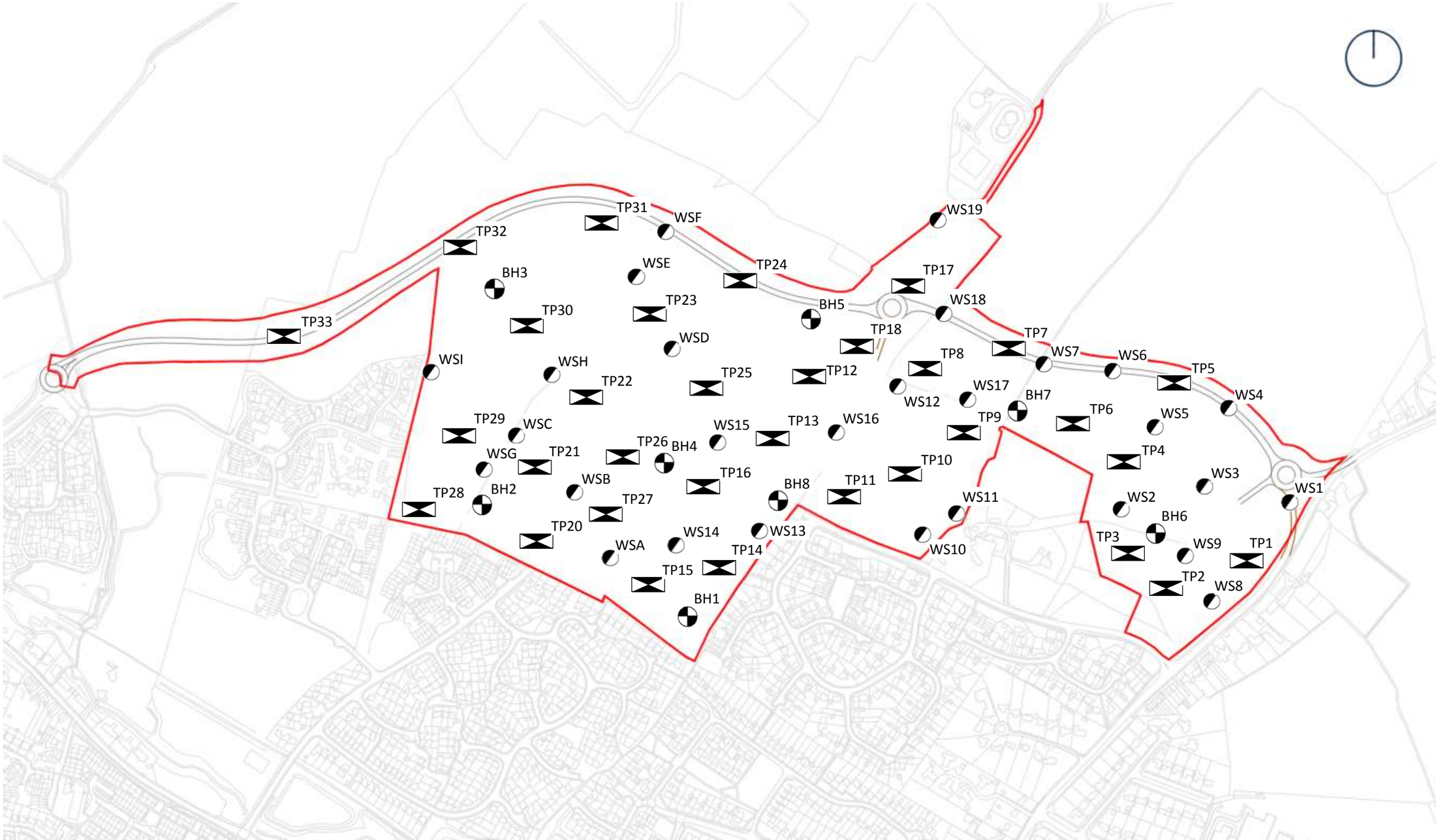
Soakage Rate



mbgl - metres below ground level

SITE	CLIENT	REPORT NO	SITE SUPERVISION	CALCULATIONS	CHECKED BY	DATE
NW Haverhill	Savills	995,GI	LF	SG	AD	05 December 2014

C:\Geocloud\Shared\GeoCloud\Reports\995,SI, NW Haverhill, Savills, 08-10-14, SG\GEL Report\Soak\995,SI - BHFH Soak - WSH



LEGEND:

- Proposed borehole locations
- Proposed window sample locations
- Proposed Trial Pit Locations
- Site Boundary

N

geosphere environmental ltd

Brightwell Barns, Ipswich Road, Brightwell, Suffolk. IP10 0BJ
T 01603 298 076 E info@geosphere-environmental.co.uk

SITE	TITLE	Ref.	DRAWING NO.	DATE
Land to the north west of Haverhill, Suffolk	Exploratory Hole Location Plan	995,SI	995,SI / Rev 0	December 2014
	CLIENT c/o Savills	**DRAWN BY** SG	**CHECKED** AD	**SCALE** Not to scale

geosphere environmental ltd

Appendix G

Wormald Burrows Partnership Limited
Civil Engineering Consultants
12a-18a Hitchin Street, Biggleswade, SG18 8AX Tel: (01767) 317244 Fax: (01767) 315434

Haverhill North

Drainage Maintenance Proposals

Road Gullies

The highway drainage system will be offered to Suffolk County Council for adoption. They will then be responsible for the regular maintenance of road gullies and connecting pipework and ensuring that the public highway drains properly.

Any sections of highway which are not adopted will be maintained by either a private management company who will be responsible for the regular maintenance of gullies and connecting pipework and ensuring that that these areas of private highway drain properly or the eventual owners of the properties.

Sewers and Flow Control

The main surface and foul water drainage systems will be offered to Anglian Water for adoption. This will include the flow control devices which will limit surface water flows to an agreed greenfield rate.

Anglian Water will then be responsible for the regular maintenance of these systems which receive flows from all parts of the development.

Attenuation Tank (Geocellular crates)

The attenuation tank is located within the Local Centre parking areas. This element of the sustainable drainage system will be managed by a private management company. The geocellular crates will be fitted with a central access pipe to allow for CCTV surveys and jetting out of the tank. Access manholes are provided at either end for easy access.

The tank has been designed for easy maintenance which will comprise:

- Inspect inlet manhole on a monthly basis for the first 6 months, and then 6 monthly after that and identify any areas which are not operating correctly.
- Occasional tasks – clean out silt traps and CCTV survey tank annually
- Remedial work - repairing damage where necessary

Attenuation Ponds

The surface water attenuation ponds will ordinarily be dry and should only fill during heavy rainfall events, so will more than often appear as a grassed depression in he public open space rather than a water feature. However, as it is difficult to predict when a heavy rainfall event is likely to occur it is important that the ponds are maintained all year round.

Maintenance will be the responsibility of a private management company and will comprise of the following:

- Undertake an inspection of the ponds at annual intervals to assess the stability of the ponds banks and remedial activities carries out when necessary.

- Regular litter picking and grass cutting and checking of inlet and outlet headwalls.

- De-silting of the inlet and outlet pipes and headwalls should be carried out during a period of low rainfall, at a time that it can be anticipated that major storms will not occur. It should always be noted that the ponds will fill up rapidly over a period of a few hours in the event that a critical storm occurs.

Headwalls

There shall be a pre-cast headwall at each inlet and outlet of each pond, as the ponds; and headwalls form part of a combined system, one headwall being blocked up could prevent the entire system from drainage as desired therefore it is imperative that flows are not impeded by blocked up headwalls.

Maintenance of the headwalls will be the responsibility of a private management company and will comprise of the following:

- At quarterly intervals and following extreme storm events; check each headwall and grill for signs of blockage.

- At annual intervals; the inlets, connecting pipework and outlets from the pond should be checked and all ends of the pipes are clear of weed growth, silt and debris. Also check that the outfall into the ordinary watercourse is clear and unobstructed.

- Remove any accumulated vegetation and rubbish off site.

- At annual intervals and following extreme storm events, undertake an assessment of the structural integrity of the headwalls and safety grille and fittings; repair or replace as necessary.