Wormald Burrows Partnership Limited
Civil Engineering Consultants

HAVERHILL NORTH
SUFFOLK

DRAINAGE STRATEGY

JULY 2020

E3838-Haverhill-Drainage Strategy-Rev3

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HAVERHILL NORTH
SUFFOLK

DRAINAGE STRATEGY

Client: PERSIMMON HOMES (SUFFOLK) LIMITED

Engineer: Wormald, Burrows Partnership Limited
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Bedfordshire SG18 8AX
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Fax (01767) 315 434

Date: January 2019

Original Ref: E3838-Haverhill-Drainage Strategy-Rev0

Written By:	Checked By:	Approved By:
.....	.....	.....
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 3	13.05.21	Amendments to suit Phase 2 layout	Paul Whitlock	Nick Kohli
Rev 2	23.07.20	Drainage strategy updated	Tom Wilson	Nick Kohli
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 watercourses 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	5.064	11.7
Catchment 2	2.305	5.3
Catchment 3	2.699	6.3
Catchment 4	12.929	30.0

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 E3838/500B–508B 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 The sports pitches to the north east of the site will continue to drain overland as they do currently, with a newly cut swale running along the northern edge of the spine road directing flows into the adjacent watercourse.

3.1.14 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

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Certified by Afnor UK

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

Project: Haverhill North

Drawing Description: Location Plan

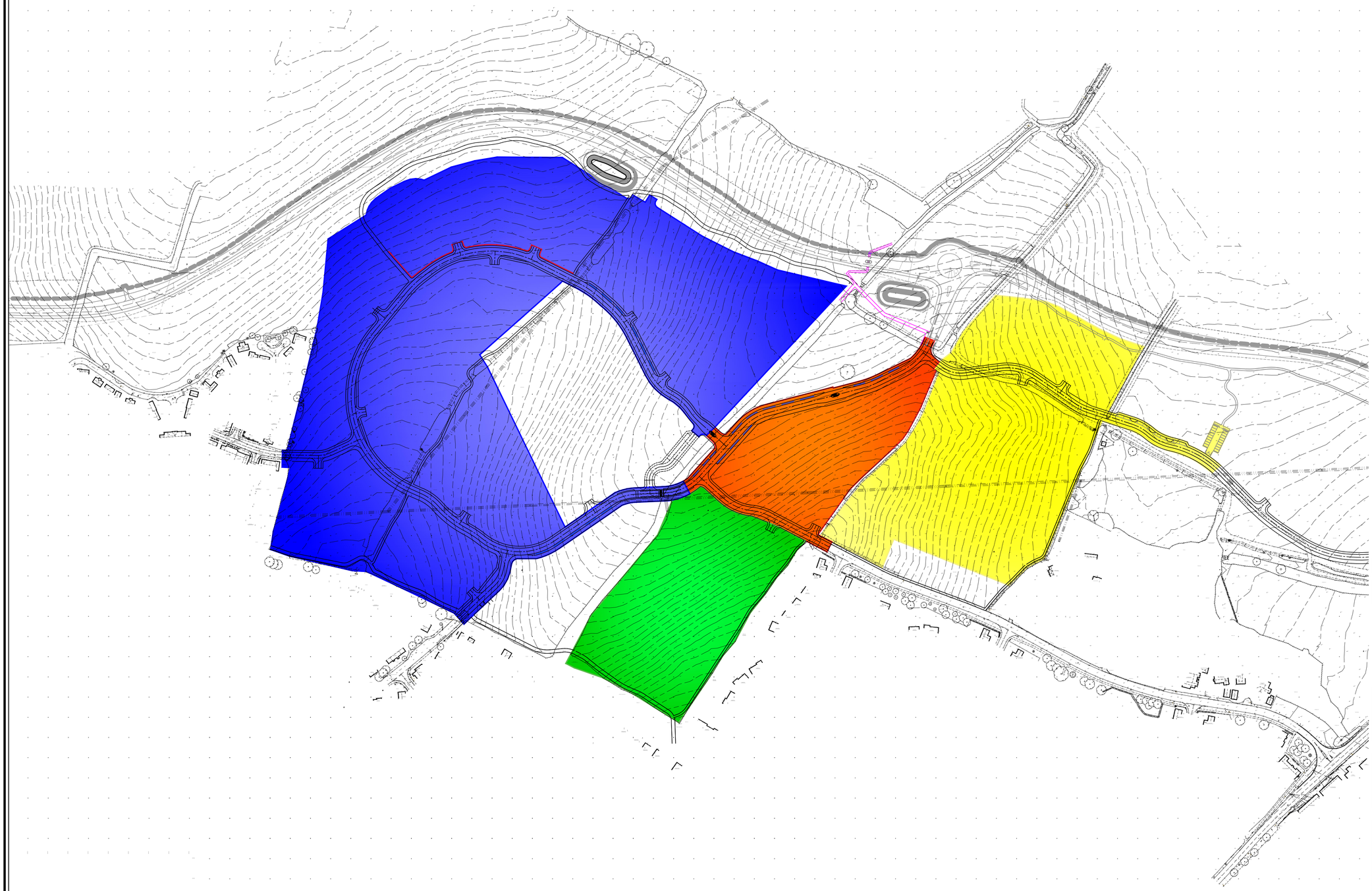
Drawing Number: E3838/100

Client: PERSIMMON

Client Reference:

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

Appendix B



LEGEND

- CATCHMENT AREA 1 - 5.064 Ha (Qbar - 11.7 litres/second)
- CATCHMENT AREA 2 - 2.305 Ha (Qbar - 5.3 litres/second)
- CATCHMENT AREA 3 - 2.699 Ha (Qbar - 6.3 litres/second)
- CATCHMENT AREA 4 - 12.929 Ha (Qbar - 30.0 litres/second)

Rev	Description	Date	Drawn	Checked
B	Catchment areas updated	22:07:20	TJW	TJW
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

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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/B

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 C

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.370
Area (ha)	5.064	Urban	0.000
SAAR (mm)	583	Region Number	Region 5

Results l/s

QBAR Rural	11.7
QBAR Urban	11.7
Q100 years	41.8
Q1 year	10.2
Q30 years	28.2
Q100 years	41.8

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.370
Area (ha)	2.305	Urban	0.000
SAAR (mm)	583	Region Number	Region 5

Results l/s

QBAR Rural	5.3
QBAR Urban	5.3
Q100 years	19.0
Q1 year	4.7
Q30 years	12.8
Q100 years	19.0

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.370
Area (ha)	2.699	Urban	0.000
SAAR (mm)	583	Region Number	Region 5

Results l/s

QBAR Rural	6.3
QBAR Urban	6.3
Q100 years	22.3
Q1 year	5.4
Q30 years	15.0
Q100 years	22.3

ICP SUDS Mean Annual Flood

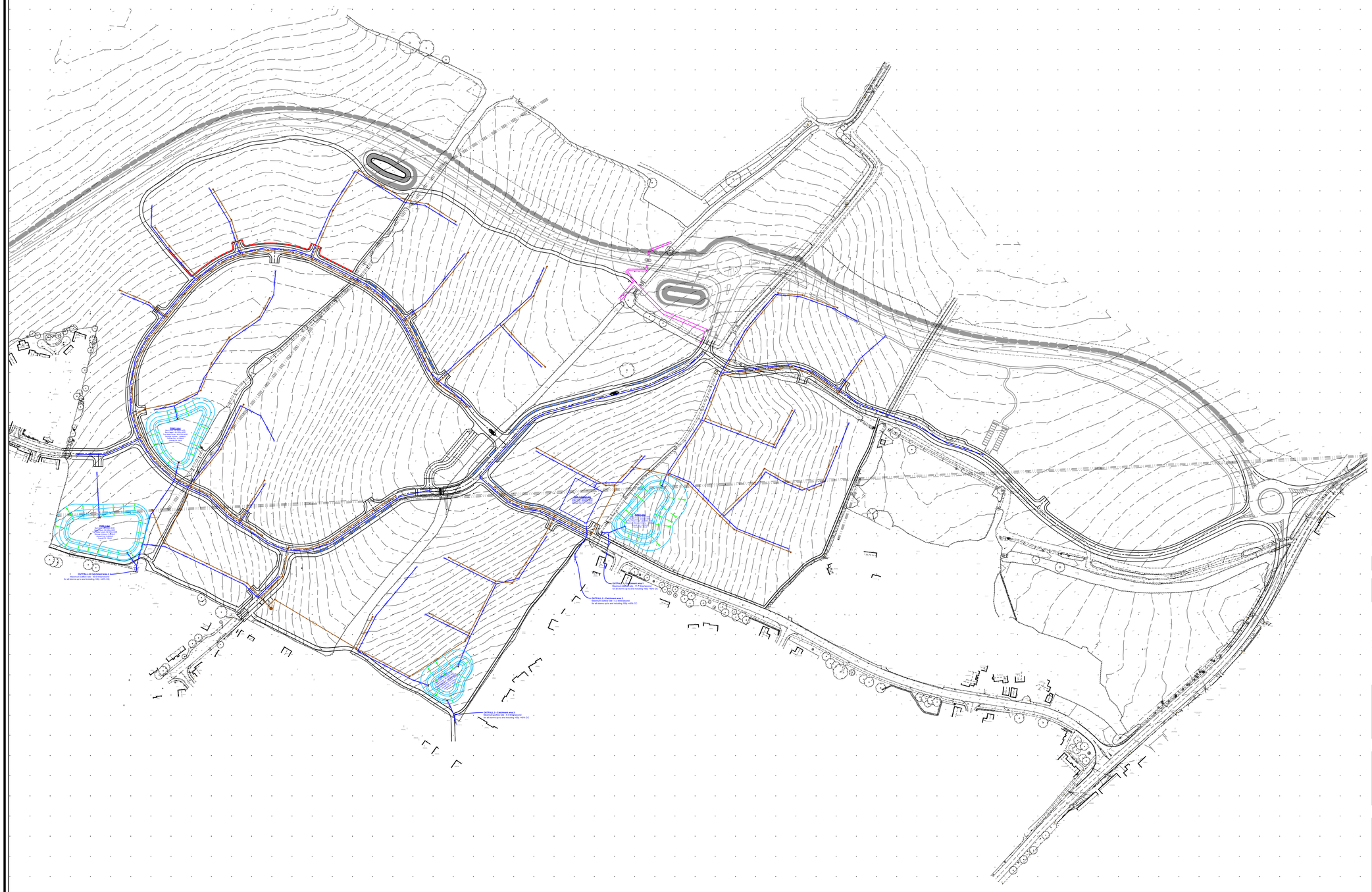
Input

Return Period (years)	100	Soil	0.370
Area (ha)	12.929	Urban	0.000
SAAR (mm)	583	Region Number	Region 5

Results l/s

QBAR Rural	30.0
QBAR Urban	30.0
Q100 years	106.8
Q1 year	26.1
Q30 years	72.0
Q100 years	106.8

Appendix D



0 20m 100m 200m

Scale 1:2000

Rev	Description	Date	Drawn	Checked
B	Drainage strategy updated to suit Local Flood Authority comments	23:07:20	JMW	TJW
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

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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/B

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:

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Certified by Afnor UK

Adoptable Drainage Legend

- Existing Foul Water Sewer
- Existing Surface Water Sewer
- Proposed Adoptable Foul Water Sewer (S104)
- Proposed Adoptable Surface Water Sewer (S104)
- Proposed Adoptable Surface Water Headwall (S104)
- Proposed Adoptable Pond (S104)
- Proposed stub connection
- Proposed sewer easement - 6m wide
- Proposed Highway Drain
- Proposed Highway trapped gully with 150mm connection
- Proposed Highway Culvert

0 5m 10m 20m 30m 40m

Scale 1:500

Rev	Description	Date	Drawn	Checked
D	Revised to suit updated Phase 2 layout and pond to suit LLFA comments	13:05:21	JMW	PMW
C	Updated to suit SCC comments	05:11:20	JMW	TJW
B	Drainage strategy updated to suit Local Flood Authority comments	23:07:20	JMW	TJW
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 APPROVAL

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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/D

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

Gabion wall to create sediment forebay

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

Interception storage areas, 300mm maximum depth with 1:4 side slopes
Additional storage - 128m³

OUTFALL 1 - Phase 2a and 2b
Maximum outflow rate - 11.7 litres/second for all storms up to and including 100y +40% CC

POND 1 (dry)
Bed Level - 89.200m AOD
Bank Level - 90.850m AOD
Top Water Level - 90.536m AOD
Maximum Storage Volume - 1,779m3
314mm freeboard
Overall Cut - 6,870.8m3
Overall Fill - 136.2m3

OUTFALL 1 - Catchment area 1
Maximum outflow rate - 11.7 litres/second for all storms up to and including 100y +40% CC

OUTFALL 2 - Catchment area 2
Maximum outflow rate - 5.3 litres/second for all storms up to and including 100y +40% CC

0.94 ACRES

Adoptable Drainage Legend

- Existing Foul Water Sewer
- Existing Surface Water Sewer
- Proposed Adoptable Foul Water Sewer (S104)
- Proposed Adoptable Surface Water Sewer (S104)
- Proposed Adoptable Surface Water Headwall (S104)
- Proposed Adoptable Pond (S104)
- Proposed stub connection
- Proposed sewer easement - 6m wide
- Proposed Highway Drain
- Proposed Highway trapped gully with 150mm connection
- Proposed Highway Culvert

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

Rev	Description	Date	Drawn	Checked
D	Revised to suit updated Phase 2 layout and pond to suit LLFA comments	13:05:21	JMW	PMW
C	Updated to suit SCC comments	05:11:20	JMW	TJW
B	Drainage strategy updated to suit Local Flood Authority comments	23:07:20	JMW	TJW
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 APPROVAL

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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/D

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:

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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
B	Drainage strategy updated to suit Local Flood Authority comments	23:07:20	JMW	TJW
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

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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/B

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:

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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 - 84.682m AOD
MaximumStorage Volume - 691m3
Overall Cut - 2,110m3
Overall Fill - 69m3

OUTFALL 1 - Catchment are
Maximum outflow rate - 11.7 l
for all storms up to and includ

OUTFALL 2 - Catchment area 2
Maximum outflow rate - 5.3 litres/second
for all storms up to and including 100y +40% CC

OUTFALL 3 - Catchment area 3
Maximum outflow rate - 6.3 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
B	Drainage strategy updated to suit Local Flood Authority comments	23:07:20	JMW	TJW
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

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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/B

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:

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UKAS MANAGEMENT SYSTEMS 022
Certified by Afnor UK

POND 3 (dry)
Bed Level - 82.500m AOD
Bank Level - 84.200m AOD
Top Water Level - 83.875m AOD
Storage Volume - 1,898m3
Overall Cut - 4,726m3
Overall Fill - 8m3

POND 4 (dry)
Bed Level - 80.900m AOD
Bank Level - 82.620m AOD
Top Water Level - 82.320m AOD
Storage Volume - 3,353m3
Overall Cut - 6,642m3
Overall Fill - 22m3

OUTFALL 4 - Catchment area 4
Maximum outflow rate - 30.0 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

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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

POND 3 (dry)
Bed Level - 82.500m AOD
Bank Level - 84.200m AOD
Top Water Level - 83.875m AOD
Storage Volume - 1,898m3
Overall Cut - 4,726m3
Overall Fill - 8m3

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

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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

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

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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/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 8 of 8

Client:

PERSIMMON

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

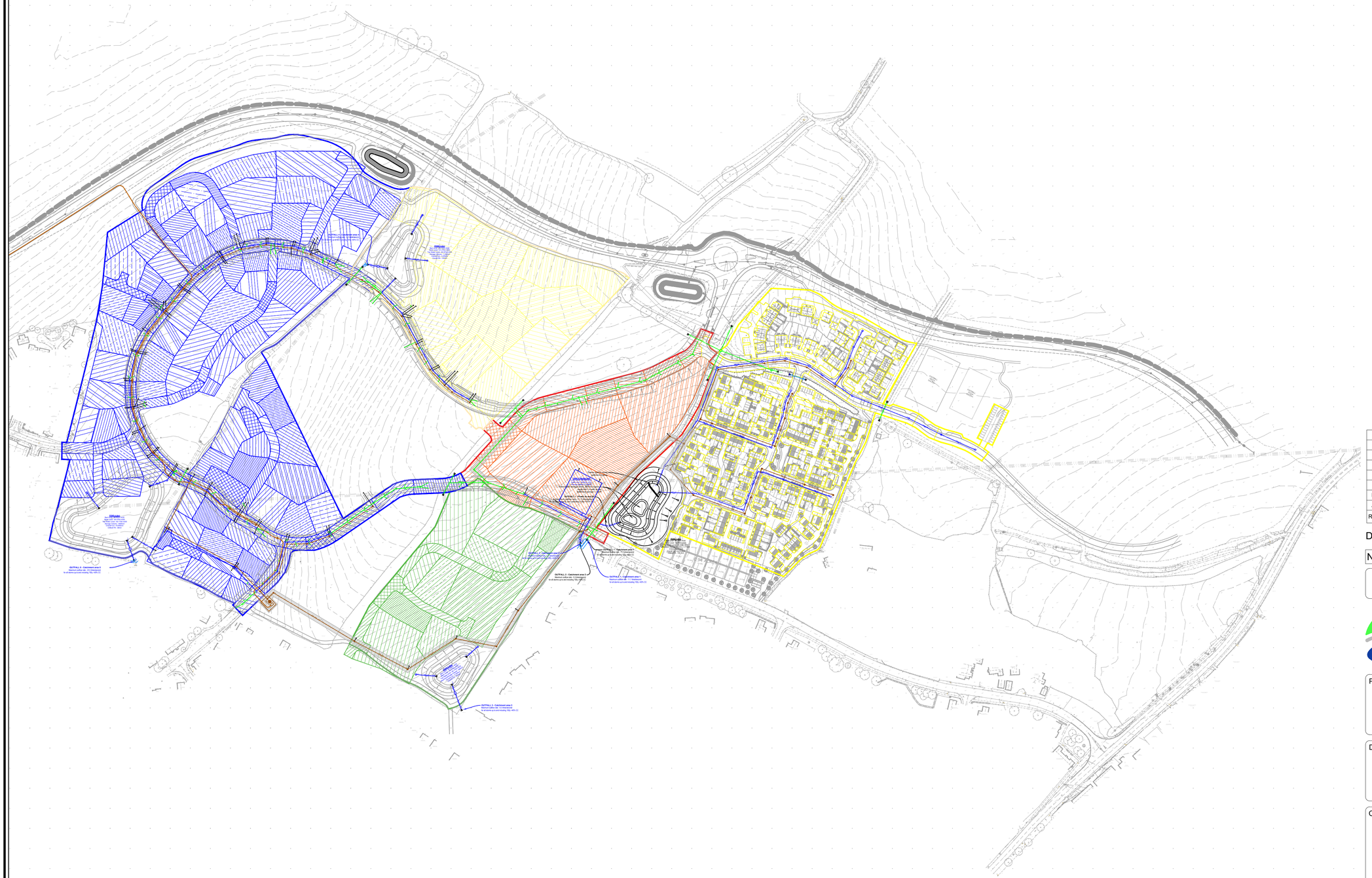
Drawing Number: E3838/508/A

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



0 20m 100m 200m

Scale 1:2000

Rev	Description	Date	Drawn	Checked
B	Revised to suit Phase 2 layout	19:05:21	PMW	PMW
A	Updated to suit SCC comments	05:11:20	JMW	TJW

Drawing Approval Status:-

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

FOR APPROVAL

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 Areas Plan (Overall)

Client:

PERSIMMON

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

Drawing Number:

E3838/520/B

Client Reference:

Scale:

1:2000 @ A1
NTS @ A3

Designed By:	Drawn By:	Checked By:
TJW	JMW	
Date: 20.12.18	Date: 23.07.20	Date:

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

Adoptable Drainage Legend

- Existing Foul Water Sewer
- Existing Surface Water Sewer
- Proposed Adoptable Foul Water Sewer (S104)
- Proposed Adoptable Surface Water Sewer (S104)
- Proposed Adoptable Surface Water Headwall (S104)
- Proposed Adoptable Pond (S104)
- Proposed stub connection
- Proposed sewer easement - 6m wide
- Proposed Highway Drain
- Proposed Highway trapped gully with 150mm connection
- Proposed Highway Culvert

0 5m 10m 20m 30m 40m

Scale 1:500

Rev	Description	Date	Drawn	Checked
B	Revised to suit Phase 2 layout	19.05.21	PMW	PMW
A	Updated to suit SCC comments	05:11:20	JMW	TJW

Drawing Approval Status:-

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

FOR APPROVAL

Wormald Burrows Partnership Ltd
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12a - 18a Hitchin Street, Biggleswade, SG18 8AX
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Web: www.wormburp.com
Email: engineer@wormburp.com

Project:

Haverhill, Boyton Place - Phases 2-6

Drawing Description:

Drainage Areas Plan - Sheet 1 of 8

Client:

PERSIMMON

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

Drawing Number: E3838/521/B

Client Reference:

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

Designed By:	Drawn By:	Checked By:
TJW	JMW	
Date: 20.12.18	Date: 23.07.20	Date:

afaq ISO 9001 Quality — UKAS MANAGEMENT SYSTEMS 022

Certified by Afnor UK

Adoptable Drainage Legend

- Existing Foul Water Sewer
- Existing Surface Water Sewer
- Proposed Adoptable Foul Water Sewer (S104)
- Proposed Adoptable Surface Water Sewer (S104)
- Proposed Adoptable Surface Water Headwall (S104)
- Proposed Adoptable Pond (S104)
- Proposed stub connection
- Proposed sewer easement - 6m wide
- Proposed Highway Drain
- Proposed Highway trapped gully with 150mm connection
- Proposed Highway Culvert

0 5m 10m 20m 30m 40m

Scale 1:500

Gabion wall to create sediment forebay

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

Interception storage areas, 300mm maximum depth with 1:4 side slopes
Additional storage - 128m³

OUTFALL 1 - Phase 2a and 2b
Maximum outflow rate - 11.7 litres/second for all storms up to and including 100y +40% CC

POND 1 (dry)
Bed Level - 89.200m AOD
Bank Level - 90.850m AOD
Top Water Level - 90.536m AOD
Maximum Storage Volume - 1,779m3
314mm freeboard
Overall Cut - 6,870.8m3
Overall Fill - 136.2m3

OUTFALL 1 - Catchment area 1
Maximum outflow rate - 11.7 litres/second for all storms up to and including 100y +40% CC

OUTFALL 2 - Catchment area 2
Maximum outflow rate - 5.3 litres/second for all storms up to and including 100y +40% CC

0.94 ACRES

Rev	Description	Date	Drawn	Checked
B	Revised to suit Phase 2 layout	19.05.21	PMW	PMW
A	Updated to suit SCC comments	05:11:20	JMW	TJW

Drawing Approval Status:-

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

FOR APPROVAL

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 Areas Plan - Sheet 2 of 8

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

Drawing Number:
E3838/522/B

Client Reference:

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

Designed By:	Drawn By:	Checked By:
TJW	JMW	
Date: 20.12.18	Date: 23.07.20	Date:

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Certified by Afnor UK

POND 3 (dry)
Bed Level - 89.700m AOD
Bank Level - 91.275m AOD
Top Water Level - 90.975m AOD
Storage Volume - 1,335m3
Overall Cut - 3,430m3
Overall Fill - 143m3

Adoptable Drainage Legend

- Existing Foul Water Sewer
- Existing Surface Water Sewer
- Proposed Adoptable Foul Water Sewer (S104)
- Proposed Adoptable Surface Water Sewer (S104)
- Proposed Adoptable Surface Water Headwall (S104)
- Proposed Adoptable Pond (S104)
- Proposed stub connection
- Proposed sewer easement - 6m wide
- Proposed Highway Drain
- Proposed Highway trapped gully with 150mm connection
- Proposed Highway Culvert

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

Rev	Description	Date	Drawn	Checked
B	Revised to suit Phase 2 layout	19.05.21	PMW	PMW
A	Updated to suit SCC comments	05:11:20	JMW	TJW

Drawing Approval Status:-

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

FOR APPROVAL

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 Areas Plan - Sheet 3 of 8

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

Drawing Number:
E3838/523/B

Client Reference:

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

Designed By:	Drawn By:	Checked By:
TJW	JMW	
Date: 20.12.18	Date: 23.07.20	Date:

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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 - 84.682m AOD
MaximumStorage Volume - 691m3
Overall Cut - 2,110m3
Overall Fill - 69m3

OUTFALL 1 - Catchment are
Maximum outflow rate - 11.7 l
for all storms up to and includ

OUTFALL 2 - Catchment area 2
Maximum outflow rate - 5.3 litres/second
for all storms up to and including 100y +40% CC

OUTFALL 3 - Catchment area 3
Maximum outflow rate - 6.3 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	Updated to suit SCC comments	05:11:20	JMW	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 Areas Plan - Sheet 4 of 8

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

Drawing Number:
E3838/524/A

Client Reference:

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

Designed By:	Drawn By:	Checked By:
TJW	JMW	
Date: 20.12.18	Date: 23.07.20	Date:

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

POND 4 (dry)
Bed Level - 80.900m AOD
Bank Level - 82.800m AOD
Top Water Level - 82.324m AOD
Storage Volume - 3,907m3
Overall Cut - 6,500m3
Overall Fill - 99m3

OUTFALL 5 - Catchment area 5
Maximum outflow rate - 23.5 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	Updated to suit SCC comments	05:11:20	JMW	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 Areas Plan - Sheet 5 of 8

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

Drawing Number:
E3838/525/A

Client Reference:

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

Designed By:	Drawn By:	Checked By:
TJW	JMW	
Date: 20.12.18	Date: 23.07.20	Date:

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

OUTFALL 4 - Catchment area 4
Maximum outflow rate - 7.7 litres/second
for all storms up to and including 100y +40% CC

POND 3 (dry)
Bed Level - 88.800m AOD
Bank Level - 91.300m AOD
Top Water Level - 91.000m AOD
Storage Volume - 1,050m3
Overall Cut - 2,043m3
Overall Fill - 134m3

ENTRANCE

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	Updated to suit SCC comments	05:11:20	JMW	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
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Tel: (01767) 317244 Fax: (01767) 315434
Web: www.wormburp.com
Email: engineer@wormburp.com

Project:
Haverhill, Boyton Place - Phases 2-6

Drawing Description:
Drainage Areas Plan - Sheet 6 of 8

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

Drawing Number:
E3838/526/A

Client Reference:

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

Designed By: TJW Date: 20.12.18
Drawn By: JMW Date: 23.07.20
Checked By: Date:

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

OUTFALL 4 - Catchment area 4
Maximum outflow rate - 7.7 litres/second
for all storms up to and including 100y +40% CC

POND 3 (dry)
Bed Level - 89.900m AOD
Bank Level - 91.300m AOD
Top Water Level - 91.000m AOD
Storage Volume - 1,050m3
Overall Cut - 2,043m3
Overall Fill - 134m3

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	Updated to suit SCC comments	05:11:20	JMW	TJW

Drawing Approval Status:-

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

FOR INFORMATION

Wormald Burrows Partnership Ltd
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Web: www.wormburp.com
Email: engineer@wormburp.com

Project:
Haverhill, Boyton Place - Phases 2-6

Drawing Description:
Drainage Areas Plan - Sheet 7 of 8

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

Drawing Number:
E3838/527/A

Client Reference:

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

Designed By:	Drawn By:	Checked By:
TJW	JMW	
Date: 20.12.18	Date: 23.07.20	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	Updated to suit SCC comments	05:11:20	JMW	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 Areas Plan - Sheet 8 of 8

Client:

PERSIMMON

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

Drawing Number: E3838/528

Client Reference:

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

Designed By:	Drawn By:	Checked By:
TJW	JMW	
Date: 20.12.18	Date: 23.07.20	Date:

afaq ISO 9001 Quality — UKAS MANAGEMENT SYSTEMS 022

Certified by Afnor UK

SYSTEM 1 - PHASE 2

	ROAD	HOUSE	URBAN CREEP	TOTAL
S1	655	480	48	1183
S2	340	0	0	340
S3	581	0	0	581
S4	279	0	0	279
S5	459	1066	107	1632
S6	317	476	48	841
S7	258	488	49	795
S8	529	0	0	529
S9	320	1862	186	2368
S10	290	0	0	290
S11	0	674	67	741
S12	211	88	9	308
S13	270	404	40	714
S14	307	0	0	307
S15	0	0	0	0
S16	190	1253	125	1568
S17	180	0	0	180
S18	220	759	76	1055
S19	94	1034	103	1231
S20	604	0	0	604
S21	0	2012	201	2213
S22	405	1101	110	1616
S23	427	892	89	1408
S24	0	322	32	354
S25	225	0	0	225
S26	103	763	76	942
S27	530	2688	269	3487
S28	281	1145	115	1541
S29	0	470	47	517
HW1	0	0	0	0
HW2	0	0	0	0
HW3	0	0	0	0
			TOTAL	27850

SYSTEM 2 - PHASE 3A

	ROAD	HOUSE	%AGE IMP	TOTAL	Ha
S100	621	0	55%	621	0.062
S101	558	0	55%	558	0.056
S102	457	0	55%	457	0.046
S103	480	0	55%	480	0.048
S104	651	0	55%	651	0.065
S105	0	0	55%	0	0
S106	583	0	55%	583	0.058
S107	0	0	55%	0	0
S108	996	0	55%	996	0.1
S109	421	0	55%	421	0.042
S110	198	0	55%	198	0.02
S111	358	0	55%	358	0.036
S112	614	2920	90%	3242	0.324
S113	390	0	55%	390	0.039
S114	0	0	55%	0	0
S115	0	3136	55%	1725	0.172
S116	0	0	55%	0	0
S117	0	0	55%	0	0
S118	0	4106	55%	2258	0.226
S119	0	2891	55%	1590	0.159
TANK1	0	0	55%	0	0
TANK2	0	2959	90%	2663	0.266
HW100	0	0	55%	0	0
				TOTAL	**1.719**

SYSTEM 3 - PHASE 6

	ROAD	HOUSE	%AGE IMP	TOTAL	Ha
S200	638	2163	55%	1828	0.183
S201	0	1173	55%	645	0.065
S202	198	3432	55%	2086	0.209
S203	551	550	55%	854	0.085
S204	262	386	55%	474	0.047
S205	487	2427	55%	1822	0.182
S206	357	0	55%	357	0.036
S207	419	627	55%	764	0.076
S208	637	0	55%	637	0.064
S209	0	0	55%	0	0
S210	0	3024	55%	1663	0.166
S211	0	0	55%	0	0
HW200	0	0	55%	0	0
HW201	0	1650	55%	908	0.091
HW202	0	0	55%	0	0
				TOTAL	**1.204**

SYSTEM 4 - PHASE 3b, 4 AND 5

	ROAD	HOUSE	%AGE IMP	TOTAL	Ha
S300	376	2359	55%	1673	0.167
S301	556	3020	55%	2217	0.222
S302	606	1628	55%	1501	0.15
S303	0	930	55%	512	0.051
S304	300	1635	55%	1199	0.12
S305	322	0	55%	322	0.032
S306	503	607	55%	837	0.084
S307	0	1087	55%	598	0.06
S308	538	2187	55%	1741	0.174
S309	0	672	55%	370	0.037
S310	424	1270	55%	1123	0.112
S311	270	528	55%	560	0.056
S312	398	1292	55%	1109	0.111
S313	216	718	55%	611	0.061
S314	258	453	55%	507	0.051
S315	290	892	55%	781	0.078
S316	320	875	55%	801	0.08
S317	261	282	55%	416	0.042
S318	261	261	55%	405	0.04
S319	327	1269	55%	1025	0.102
S320	283	1005	55%	836	0.084
S321	607	1003	55%	1159	0.116
S322	0	308	55%	169	0.017
S323	336	573	55%	651	0.065
S324	0	0	55%	0	0
S325	0	0	55%	0	0
S326	0	0	55%	0	0
S327	0	0	55%	0	0
S328	404	1261	55%	1098	0.11
S329	200	1161	55%	839	0.084
S340	329	1816	55%	1328	0.133
S341	308	503	55%	585	0.058
S342	627	1252	55%	1316	0.132
S343	304	1636	55%	1204	0.12
S344	425	841	55%	888	0.089
S345	225	893	55%	716	0.072
S348	638	575	55%	954	0.095
S349	567	1816	55%	1566	0.157
S350	458	3069	55%	2146	0.215
S351	630	2143	55%	1809	0.181
S352	365	2524	55%	1753	0.175
S353	374	0	55%	374	0.037
S354	229	1688	55%	1157	0.116
S355	394	1264	55%	1089	0.109
S356	412	1836	55%	1422	0.142
S357	153	886	55%	640	0.064
S358	343	800	55%	783	0.078
S359	383	1058	55%	965	0.096
S360	550	0	55%	550	0.055
S361	517	0	55%	517	0.052
S362	749	0	55%	749	0.075
S363	354	926	55%	863	0.086
S364	306	0	55%	306	0.031
S365	235	1005	55%	788	0.079
S366	384	457	55%	635	0.064
S367	0	1736	55%	955	0.095
S368	494	0	55%	494	0.049
S369	243	1646	55%	1148	0.115
S370	318	1232	55%	996	0.1
S371	548	2615	55%	1986	0.199
S372	421	1707	55%	1360	0.136
S373	383	1238	55%	1064	0.106
S374	0	0	55%	0	0
S375	0	1125	55%	619	0.062
S376	774	0	55%	774	0.077
S377	576	0	55%	576	0.058
S378	411	988	55%	954	0.095
S379	295	2023	55%	1408	0.141
S380	210	1673	55%	1130	0.113
S381	357	1237	55%	1037	0.104
S382	209	1745	55%	1169	0.117
S383	307	813	55%	754	0.075
S384	274	2026	55%	1388	0.139
S385	295	774	55%	721	0.072
S386	445	2332	55%	1728	0.173
S387	127	2077	55%	1269	0.127
S388	227	287	55%	385	0.038
S389	129	629	55%	475	0.047
S390	284	494	55%	556	0.056
			TOTAL		7.111

Appendix E

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Surface Network 1

- Indicates pipe length does not match coordinates
« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	37.098	0.247	150.0	0.118	5.00	0.0	0.600		o	225	Pipe/Conduit	
1.001	36.315	0.242	149.8	0.034	0.00	0.0	0.600		o	300	Pipe/Conduit	
1.002	60.489	2.023	29.9	0.058	0.00	0.0	0.600		o	300	Pipe/Conduit	
1.003	21.256	1.063	20.0	0.028	0.00	0.0	0.600		o	300	Pipe/Conduit	
2.000	18.207	0.910	20.0	0.045	5.00	0.0	0.600		o	225	Pipe/Conduit	
2.001	23.015	1.151	20.0	0.044	0.00	0.0	0.600		o	225	Pipe/Conduit	
2.002	18.714	0.936	20.0	0.030	0.00	0.0	0.600		o	225	Pipe/Conduit	
1.004	31.023	1.551	20.0	0.167	0.00	0.0	0.600		o	375	Pipe/Conduit	
1.005	24.034	1.202	20.0	0.084	0.00	0.0	0.600		o	375	Pipe/Conduit	
1.006	24.153	1.208	20.0	0.079	0.00	0.0	0.600		o	375	Pipe/Conduit	
1.007	45.287	2.264	20.0	0.052	0.00	0.0	0.600		o	375	Pipe/Conduit	
1.008	56.344	2.662	21.2	0.237	0.00	0.0	0.600		o	450	Pipe/Conduit	
3.000	11.382	0.474	24.0	0.156	5.00	0.0	0.600		o	225	Pipe/Conduit	
3.001	15.716	0.655	24.0	0.018	0.00	0.0	0.600		o	300	Pipe/Conduit	
3.002	20.772	0.866	24.0	0.105	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	5.58	105.368	0.118	0.0	0.0	0.0	1.07	42.4	16.0
1.001	50.00	6.05	105.045	0.152	0.0	0.0	0.0	1.28	90.6	20.6
1.002	50.00	6.40	104.803	0.210	0.0	0.0	0.0	2.89	204.0	28.4
1.003	50.00	6.50	102.780	0.238	0.0	0.0	0.0	3.53	249.6	32.2
2.000	50.00	5.10	104.714	0.045	0.0	0.0	0.0	2.94	116.9	6.1
2.001	50.00	5.23	103.804	0.089	0.0	0.0	0.0	2.94	116.9	12.1
2.002	50.00	5.34	102.653	0.119	0.0	0.0	0.0	2.94	116.9	16.1
1.004	50.00	6.63	101.642	0.524	0.0	0.0	0.0	4.07	449.2	71.0
1.005	50.00	6.73	100.091	0.608	0.0	0.0	0.0	4.07	449.2	82.3
1.006	50.00	6.83	98.889	0.687	0.0	0.0	0.0	4.07	449.3	93.0
1.007	50.00	7.01	97.682	0.739	0.0	0.0	0.0	4.07	449.2	100.1
1.008	50.00	7.22	95.342	0.976	0.0	0.0	0.0	4.43	705.3	132.2
3.000	50.00	5.07	99.310	0.156	0.0	0.0	0.0	2.68	106.6	21.1
3.001	50.00	5.15	98.761	0.174	0.0	0.0	0.0	3.22	227.8	23.6
3.002	50.00	5.26	98.106	0.279	0.0	0.0	0.0	3.22	227.8	37.8

STORM SEWER DESIGN by the Modified Rational Method

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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
3.003	12.587	0.524	24.0	0.123	0.00	0.0	0.600		o	300	Pipe/Conduit	
3.004	62.262	2.481	25.1	0.060	0.00	0.0	0.600		o	300	Pipe/Conduit	
3.005	16.463	1.405	11.7	0.221	0.00	0.0	0.600		o	375	Pipe/Conduit	
1.009	56.440	2.635	21.4	0.030	0.00	0.0	0.600		o	600	Pipe/Conduit	
1.010	13.825	0.046	303.8	0.074	0.00	0.0	0.600		o	600	Pipe/Conduit	
1.011	5.000#	0.650	7.7	0.000	0.00	0.0		0.045	3 \=/	1000	1:3 Swale	
4.000	30.631	1.802	17.0	0.161	5.00	0.0	0.600		o	225	Pipe/Conduit	
4.001	37.835	2.226	17.0	0.141	0.00	0.0	0.600		o	300	Pipe/Conduit	
4.002	8.458	0.211	40.0	0.035	0.00	0.0	0.600		o	300	Pipe/Conduit	
4.003	24.209	0.605	40.0	0.022	0.00	0.0	0.600		o	300	Pipe/Conduit	
4.004	16.835	0.421	40.0	0.094	0.00	0.0	0.600		o	300	Pipe/Conduit	
4.005	48.852	4.134	11.8	0.349	0.00	0.0	0.600		o	375	Pipe/Conduit	
4.006	9.626	0.963	10.0	0.154	0.00	0.0	0.600		o	375	Pipe/Conduit	
4.007	27.906	2.791	10.0	0.052	0.00	0.0	0.600		o	375	Pipe/Conduit	
4.008	5.000#	0.010	521.4	0.000	0.00	0.0		0.045	3 \=/	1000	1:3 Swale	
1.012	9.805	0.050	196.1	0.000	0.00	0.0	0.600		o	600	Pipe/Conduit	
1.013	9.949	0.075	132.7	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)
3.003	50.00	5.32	97.240	0.402	0.0	0.0	0.0	3.22	227.8	54.4
3.004	50.00	5.65	96.716	0.462	0.0	0.0	0.0	3.15	222.8	62.6
3.005	50.00	5.71	94.160	0.683	0.0	0.0	0.0	5.32	587.4	92.5
1.009	50.00	7.40	92.530	1.689	0.0	0.0	0.0	5.28	1492.1	228.7
1.010	50.00	7.57	89.896	1.763	0.0	0.0	0.0	1.39	393.5	238.7
1.011	50.00	7.61	89.850	1.763	0.0	0.0	0.0	1.86	404.0	238.7
4.000	50.00	5.16	102.602	0.161	0.0	0.0	0.0	3.19	126.8	21.8
4.001	50.00	5.32	100.726	0.302	0.0	0.0	0.0	3.83	270.8	40.9
4.002	50.00	5.38	98.500	0.337	0.0	0.0	0.0	2.49	176.2	45.6
4.003	50.00	5.54	98.289	0.359	0.0	0.0	0.0	2.49	176.3	48.6
4.004	50.00	5.66	97.683	0.453	0.0	0.0	0.0	2.49	176.2	61.3
4.005	50.00	5.81	97.188	0.802	0.0	0.0	0.0	5.30	584.9	108.6
4.006	50.00	5.84	93.053	0.956	0.0	0.0	0.0	5.76	635.9	129.5
4.007	50.00	5.92	92.091	1.008	0.0	0.0	0.0	5.76	635.9	136.5
4.008	50.00	6.29	89.300	1.008	0.0	0.0	0.0	0.23	49.1«	136.5
1.012	50.00	7.71	89.200	2.771	0.0	0.0	0.0	1.74	490.7	375.2
1.013	50.00	7.85	89.150	2.771	0.0	0.0	0.0	1.13	45.1«	375.2

STORM SEWER DESIGN by the Modified Rational Method

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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
5.000	24.866	1.200	20.7	0.000	5.00	0.0	0.600		o	600	Pipe/Conduit	
1.014	19.062	0.095	200.0	0.000	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)
5.000	50.00	5.08	89.900	0.000	0.0	0.0	0.0	5.37	1517.1	0.0
1.014	50.00	8.04	88.700	2.771	0.0	0.0	0.0	1.72	485.8	375.2

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)
S1	106.793	1.425	Open Manhole	1200	1.000	105.368	225				
S2	107.138	2.093	Open Manhole	1200	1.001	105.045	300	1.000	105.120	225	
S3	106.863	2.060	Open Manhole	1200	1.002	104.803	300	1.001	104.803	300	
S4	104.841	2.061	Open Manhole	1200	1.003	102.780	300	1.002	102.780	300	
S12	106.336	1.622	Open Manhole	1200	2.000	104.714	225				
S13	105.534	1.730	Open Manhole	1200	2.001	103.804	225	2.000	103.804	225	
S14	104.513	1.860	Open Manhole	1200	2.002	102.653	225	2.001	102.653	225	
S5	103.912	2.270	Open Manhole	1500	1.004	101.642	375	1.003	101.717	300	
								2.002	101.717	225	
S6	102.559	2.468	Open Manhole	1500	1.005	100.091	375	1.004	100.091	375	
S7	101.533	2.644	Open Manhole	1500	1.006	98.889	375	1.005	98.889	375	
S8	100.508	2.826	Open Manhole	1500	1.007	97.682	375	1.006	97.682	375	
S9	100.520	5.178	Open Manhole	1500	1.008	95.342	450	1.007	95.417	375	
S16	100.948	1.638	Open Manhole	1200	3.000	99.310	225				
S17	100.285	1.524	Open Manhole	1200	3.001	98.761	300	3.000	98.836	225	
S18	99.653	1.547	Open Manhole	1200	3.002	98.106	300	3.001	98.106	300	
S19	99.368	2.128	Open Manhole	1200	3.003	97.240	300	3.002	97.240	300	
S20	99.340	2.624	Open Manhole	1200	3.004	96.716	300	3.003	96.716	300	
S21	96.067	1.907	Open Manhole	1350	3.005	94.160	375	3.004	94.235	300	
S10	96.100	3.570	Open Manhole	1500	1.009	92.530	600	1.008	92.680	450	
								3.005	92.755	375	
S11	92.954	3.059	Open Manhole	1500	1.010	89.896	600	1.009	89.895	600	
HW1	92.741	2.891	Open Manhole	10000	1.011	89.850	1000	1.010	89.850	600	
S22	104.328	1.726	Open Manhole	1200	4.000	102.602	225				
S23	102.503	1.777	Open Manhole	1200	4.001	100.726	300	4.000	100.801	225	
S24	100.309	1.809	Open Manhole	1200	4.002	98.500	300	4.001	98.500	300	
S25	99.928	1.639	Open Manhole	1200	4.003	98.289	300	4.002	98.289	300	
S26	99.215	1.531	Open Manhole	1200	4.004	97.683	300	4.003	97.683	300	
S27	98.803	1.616	Open Manhole	1350	4.005	97.188	375	4.004	97.263	300	
S28	95.663	2.609	Open Manhole	1350	4.006	93.053	375	4.005	93.053	375	
S29	95.169	3.078	Open Manhole	1350	4.007	92.091	375	4.006	92.091	375	
HW2	93.200	3.900	Open Manhole	10000	4.008	89.300	1000	4.007	89.300	375	
HW3	90.900	1.700	Open Manhole	900 x 1050	1.012	89.200	600	1.011	89.200	1000	
								4.008	89.290	1000	
S15	90.700	1.550	Open Manhole	2100	1.013	89.150	225	1.012	89.150	600	
HWC11	90.792	0.892	Open Manhole	900 x 1050	5.000	89.900	600				
SC3	90.400	1.700	Open Manhole	1500	1.014	88.700	600	1.013	89.075	225	
								5.000	88.700	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)
HWC12	89.415	0.810	Open Manhole	900 x 1050		OUTFALL		1.014	88.605	600	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	567542.641	246817.178	567542.641	246817.178	Required	
S2	567508.751	246832.270	567508.751	246832.270	Required	
S3	567476.267	246848.506	567476.267	246848.506	Required	
S4	567420.017	246870.751	567420.017	246870.751	Required	
S12	567430.229	246935.684	567430.229	246935.684	Required	
S13	567421.642	246919.629	567421.642	246919.629	Required	
S14	567413.206	246898.216	567413.206	246898.216	Required	
S5	567402.536	246882.842	567402.536	246882.842	Required	
S6	567377.112	246900.621	567377.112	246900.621	Required	
S7	567354.177	246907.804	567354.177	246907.804	Required	
S8	567330.176	246905.099	567330.176	246905.099	Required	
S9	567285.277	246899.181	567285.277	246899.181	Required	
S16	567358.924	246876.182	567358.924	246876.182	Required	

Manhole Schedules for Surface Network 1

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S17	567353.915	246865.962	567353.915	246865.962	Required	
S18	567350.659	246850.586	567350.659	246850.586	Required	
S19	567343.699	246831.015	567343.699	246831.015	Required	
S20	567339.387	246819.189	567339.387	246819.189	Required	
S21	567280.949	246840.672	567280.949	246840.672	Required	
S10	567265.521	246846.415	567265.521	246846.415	Required	
S11	567232.627	246800.551	567232.627	246800.551	Required	
HW1	567227.238	246787.820	567227.238	246787.820	Required	
S22	567398.499	246770.413	567398.499	246770.413	Required	
S23	567369.678	246780.790	567369.678	246780.790	Required	
S24	567334.218	246793.983	567334.218	246793.983	Required	
S25	567325.871	246795.347	567325.871	246795.347	Required	
S26	567317.248	246772.726	567317.248	246772.726	Required	
S27	567311.546	246756.885	567311.546	246756.885	Required	
S28	567265.568	246773.392	567265.568	246773.392	Required	

Manhole Schedules for Surface Network 1

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S29	567255.971	246774.131	567255.971	246774.131	Required	
HW2	567228.074	246774.853	567228.074	246774.853	Required	
HW3	567186.345	246743.599	567186.345	246743.599	Required	
S15	567176.852	246741.145	567176.852	246741.145	Required	
HWC11	567181.797	246763.670	567181.797	246763.670	Required	
SC3	567167.196	246743.543	567167.196	246743.543	Required	
HWC12	567155.883	246728.201			No Entry	

PIPELINE SCHEDULES for Surface Network 1

Upstream Manhole

- Indicates pipe length does not match coordinates

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	S1	106.793	105.368	1.200	Open Manhole	1200
1.001	o	300	S2	107.138	105.045	1.793	Open Manhole	1200
1.002	o	300	S3	106.863	104.803	1.760	Open Manhole	1200
1.003	o	300	S4	104.841	102.780	1.761	Open Manhole	1200
2.000	o	225	S12	106.336	104.714	1.397	Open Manhole	1200
2.001	o	225	S13	105.534	103.804	1.505	Open Manhole	1200
2.002	o	225	S14	104.513	102.653	1.635	Open Manhole	1200
1.004	o	375	S5	103.912	101.642	1.895	Open Manhole	1500
1.005	o	375	S6	102.559	100.091	2.093	Open Manhole	1500
1.006	o	375	S7	101.533	98.889	2.269	Open Manhole	1500
1.007	o	375	S8	100.508	97.682	2.451	Open Manhole	1500
1.008	o	450	S9	100.520	95.342	4.728	Open Manhole	1500
3.000	o	225	S16	100.948	99.310	1.413	Open Manhole	1200
3.001	o	300	S17	100.285	98.761	1.224	Open Manhole	1200
3.002	o	300	S18	99.653	98.106	1.247	Open Manhole	1200
3.003	o	300	S19	99.368	97.240	1.828	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	37.098	150.0	S2	107.138	105.120	1.793	Open Manhole	1200
1.001	36.315	149.8	S3	106.863	104.803	1.760	Open Manhole	1200
1.002	60.489	29.9	S4	104.841	102.780	1.761	Open Manhole	1200
1.003	21.256	20.0	S5	103.912	101.717	1.895	Open Manhole	1500
2.000	18.207	20.0	S13	105.534	103.804	1.505	Open Manhole	1200
2.001	23.015	20.0	S14	104.513	102.653	1.635	Open Manhole	1200
2.002	18.714	20.0	S5	103.912	101.717	1.970	Open Manhole	1500
1.004	31.023	20.0	S6	102.559	100.091	2.093	Open Manhole	1500
1.005	24.034	20.0	S7	101.533	98.889	2.269	Open Manhole	1500
1.006	24.153	20.0	S8	100.508	97.682	2.451	Open Manhole	1500
1.007	45.287	20.0	S9	100.520	95.417	4.728	Open Manhole	1500
1.008	56.344	21.2	S10	96.100	92.680	2.970	Open Manhole	1500
3.000	11.382	24.0	S17	100.285	98.836	1.224	Open Manhole	1200
3.001	15.716	24.0	S18	99.653	98.106	1.247	Open Manhole	1200
3.002	20.772	24.0	S19	99.368	97.240	1.828	Open Manhole	1200
3.003	12.587	24.0	S20	99.340	96.716	2.324	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	S20	99.340	96.716	2.324	Open Manhole	1200
3.005	o	375	S21	96.067	94.160	1.532	Open Manhole	1350
1.009	o	600	S10	96.100	92.530	2.970	Open Manhole	1500
1.010	o	600	S11	92.954	89.896	2.458	Open Manhole	1500
1.011	3 \=/	1000	HW1	92.741	89.850	2.741	Open Manhole	10000
4.000	o	225	S22	104.328	102.602	1.501	Open Manhole	1200
4.001	o	300	S23	102.503	100.726	1.477	Open Manhole	1200
4.002	o	300	S24	100.309	98.500	1.509	Open Manhole	1200
4.003	o	300	S25	99.928	98.289	1.339	Open Manhole	1200
4.004	o	300	S26	99.215	97.683	1.231	Open Manhole	1200
4.005	o	375	S27	98.803	97.188	1.241	Open Manhole	1350
4.006	o	375	S28	95.663	93.053	2.234	Open Manhole	1350
4.007	o	375	S29	95.169	92.091	2.703	Open Manhole	1350
4.008	3 \=/	1000	HW2	93.200	89.300	3.750	Open Manhole	10000
1.012	o	600	HW3	90.900	89.200	1.100	Open Manhole	900 x 1050
1.013	o	225	S15	90.700	89.150	1.325	Open Manhole	2100
5.000	o	600	HWC11	90.792	89.900	0.292	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)
3.004	62.262	25.1	S21	96.067	94.235	1.532	Open Manhole	1350
3.005	16.463	11.7	S10	96.100	92.755	2.970	Open Manhole	1500
1.009	56.440	21.4	S11	92.954	89.895	2.459	Open Manhole	1500
1.010	13.825	303.8	HW1	92.741	89.850	2.291	Open Manhole	10000
1.011	5.000#	7.7	HW3	90.900	89.200	1.550	Open Manhole	900 x 1050
4.000	30.631	17.0	S23	102.503	100.801	1.477	Open Manhole	1200
4.001	37.835	17.0	S24	100.309	98.500	1.509	Open Manhole	1200
4.002	8.458	40.0	S25	99.928	98.289	1.339	Open Manhole	1200
4.003	24.209	40.0	S26	99.215	97.683	1.231	Open Manhole	1200
4.004	16.835	40.0	S27	98.803	97.263	1.241	Open Manhole	1350
4.005	48.852	11.8	S28	95.663	93.053	2.234	Open Manhole	1350
4.006	9.626	10.0	S29	95.169	92.091	2.703	Open Manhole	1350
4.007	27.906	10.0	HW2	93.200	89.300	3.525	Open Manhole	10000
4.008	5.000#	521.4	HW3	90.900	89.290	1.460	Open Manhole	900 x 1050
1.012	9.805	196.1	S15	90.700	89.150	0.950	Open Manhole	2100
1.013	9.949	132.7	SC3	90.400	89.075	1.100	Open Manhole	1500
5.000	24.866	20.7	SC3	90.400	88.700	1.100	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)
1.014	o	600	SC3	90.400	88.700	1.100	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)
1.014	19.062	200.0	HWC12	89.415	88.605	0.210	Open Manhole	900 x 1050

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)
1.014	HWC12	89.415	88.605	0.000	900	1050

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.900	Storm Duration (mins)	30
Ratio R	0.432		

Online Controls for Surface Network 1

Hydro-Brake® Optimum Manhole: S15, DS/PN: 1.013, Volume (m³): 7.7

Unit Reference	MD-SHE-0146-1160-1650-1160
Design Head (m)	1.650
Design Flow (l/s)	11.6
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	146
Invert Level (m)	89.150
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.650	11.6
Flush-Flo™	0.487	11.6
Kick-Flo®	1.022	9.3
Mean Flow over Head Range	-	10.1

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	5.3	1.200	10.0	3.000	15.4	7.000	23.1
0.200	10.2	1.400	10.7	3.500	16.6	7.500	23.9
0.300	11.1	1.600	11.4	4.000	17.7	8.000	24.6
0.400	11.5	1.800	12.1	4.500	18.7	8.500	25.4
0.500	11.6	2.000	12.7	5.000	19.7	9.000	26.1
0.600	11.5	2.200	13.3	5.500	20.6	9.500	26.8
0.800	11.0	2.400	13.8	6.000	21.4		
1.000	9.5	2.600	14.4	6.500	22.3		

Storage Structures for Surface Network 1

Tank or Pond Manhole: HW3, 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	829.4	0.600	1155.0	0.601	1376.9	1.650	2073.4

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.432
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.900	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 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	S1	15 Winter	1	+0%	30/15 Winter				105.473
1.001	S2	15 Winter	1	+0%	100/15 Summer				105.149
1.002	S3	15 Winter	1	+0%					104.879
1.003	S4	15 Winter	1	+0%					102.856
2.000	S12	15 Winter	1	+0%					104.751
2.001	S13	15 Winter	1	+0%					103.854
2.002	S14	15 Winter	1	+0%					102.712
1.004	S5	15 Winter	1	+0%					101.746
1.005	S6	15 Winter	1	+0%	100/15 Summer				100.206
1.006	S7	15 Winter	1	+0%	100/15 Summer				99.011
1.007	S8	15 Winter	1	+0%	100/15 Summer				97.803
1.008	S9	15 Winter	1	+0%					95.475
3.000	S16	15 Winter	1	+0%	100/15 Summer				99.388
3.001	S17	15 Winter	1	+0%	100/15 Summer				98.834
3.002	S18	15 Winter	1	+0%	100/15 Summer				98.196
3.003	S19	15 Winter	1	+0%	100/15 Summer				97.353
3.004	S20	15 Winter	1	+0%	100/15 Summer				96.827
3.005	S21	15 Winter	1	+0%					94.272

1 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	S1	-0.120	0.000	0.43		17.4	OK	
1.001	S2	-0.196	0.000	0.26		21.5	OK	
1.002	S3	-0.224	0.000	0.15		28.4	OK	
1.003	S4	-0.224	0.000	0.14		31.6	OK	
2.000	S12	-0.188	0.000	0.06		6.7	OK	
2.001	S13	-0.174	0.000	0.11		12.2	OK	
2.002	S14	-0.166	0.000	0.15		16.0	OK	
1.004	S5	-0.271	0.000	0.17		68.3	OK	
1.005	S6	-0.261	0.000	0.20		78.6	OK	
1.006	S7	-0.254	0.000	0.23		88.1	OK	
1.007	S8	-0.254	0.000	0.23		94.1	OK	
1.008	S9	-0.317	0.000	0.19		123.1	OK	
3.000	S16	-0.147	0.000	0.26		23.3	OK	
3.001	S17	-0.227	0.000	0.13		25.3	OK	
3.002	S18	-0.210	0.000	0.19		38.6	OK	
3.003	S19	-0.187	0.000	0.30		54.3	OK	
3.004	S20	-0.189	0.000	0.29		62.0	OK	
3.005	S21	-0.263	0.000	0.19		89.5	OK	

1 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.
1.009	S10	15 Winter	1	+0%				
1.010	S11	15 Winter	1	+0%	30/15 Summer			
1.011	HW1	15 Winter	1	+0%				
4.000	S22	15 Winter	1	+0%	100/15 Winter			
4.001	S23	15 Winter	1	+0%	100/15 Summer			
4.002	S24	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
4.003	S25	15 Winter	1	+0%	100/15 Summer			
4.004	S26	15 Winter	1	+0%	30/15 Summer			
4.005	S27	15 Winter	1	+0%	100/15 Summer			
4.006	S28	15 Winter	1	+0%	100/15 Summer			
4.007	S29	15 Winter	1	+0%	100/15 Summer			
4.008	HW2	240 Winter	1	+0%				
1.012	HW3	240 Winter	1	+0%	30/60 Winter			
1.013	S15	240 Winter	1	+0%	1/15 Summer			
5.000	HWC11	120 Winter	1	+0%				
1.014	SC3	360 Winter	1	+0%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.009	S10	92.692	-0.438	0.000	0.16		215.6	OK	
1.010	S11	90.318	-0.178	0.000	0.83		223.3	OK	
1.011	HW1	89.959	-2.782	0.000	0.00		224.5	OK	
4.000	S22	102.671	-0.156	0.000	0.20		24.1	OK	
4.001	S23	100.808	-0.218	0.000	0.17		41.7	OK	
4.002	S24	98.633	-0.167	0.000	0.40		46.1	OK	2
4.003	S25	98.405	-0.184	0.000	0.31		49.2	OK	
4.004	S26	97.817	-0.167	0.000	0.41		61.2	OK	
4.005	S27	97.300	-0.263	0.000	0.19		104.8	OK	
4.006	S28	93.200	-0.228	0.000	0.32		124.1	OK	
4.007	S29	92.214	-0.252	0.000	0.23		130.6	OK	
4.008	HW2	89.554	-3.646	0.000	0.00		28.7	OK	
1.012	HW3	89.554	-0.246	0.000	0.06		17.8	OK	
1.013	S15	89.566	0.191	0.000	0.31		11.5	SURCHARGED	
5.000	HWC11	89.900	-0.600	0.000	0.00		0.0	OK	
1.014	SC3	88.771	-0.529	0.000	0.03		11.5	OK	

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.432
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.900	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 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	S1	15 Winter	30	+0%	30/15 Winter				105.616
1.001	S2	15 Winter	30	+0%	100/15 Summer				105.221
1.002	S3	15 Winter	30	+0%					104.932
1.003	S4	15 Winter	30	+0%					102.909
2.000	S12	15 Winter	30	+0%					104.774
2.001	S13	15 Winter	30	+0%					103.890
2.002	S14	15 Winter	30	+0%					102.757
1.004	S5	15 Winter	30	+0%					101.828
1.005	S6	15 Winter	30	+0%	100/15 Summer				100.298
1.006	S7	15 Winter	30	+0%	100/15 Summer				99.113
1.007	S8	15 Winter	30	+0%	100/15 Summer				97.906
1.008	S9	15 Winter	30	+0%					95.585
3.000	S16	15 Winter	30	+0%	100/15 Summer				99.441
3.001	S17	15 Winter	30	+0%	100/15 Summer				98.881
3.002	S18	15 Winter	30	+0%	100/15 Summer				98.262
3.003	S19	15 Winter	30	+0%	100/15 Summer				97.454
3.004	S20	15 Winter	30	+0%	100/15 Summer				96.926
3.005	S21	15 Winter	30	+0%					94.362

30 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 (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	0.023	0.000	1.04		41.7	SURCHARGED	
1.001	S2	-0.124	0.000	0.63		52.9	OK	
1.002	S3	-0.171	0.000	0.38		73.0	OK	
1.003	S4	-0.171	0.000	0.38		82.7	OK	
2.000	S12	-0.165	0.000	0.16		16.5	OK	
2.001	S13	-0.138	0.000	0.31		33.7	OK	
2.002	S14	-0.121	0.000	0.43		45.3	OK	
1.004	S5	-0.190	0.000	0.47		188.8	OK	
1.005	S6	-0.168	0.000	0.57		219.6	OK	
1.006	S7	-0.151	0.000	0.64		248.0	OK	
1.007	S8	-0.151	0.000	0.65		266.9	OK	
1.008	S9	-0.207	0.000	0.55		354.9	OK	
3.000	S16	-0.094	0.000	0.63		57.2	OK	
3.001	S17	-0.180	0.000	0.33		63.7	OK	
3.002	S18	-0.144	0.000	0.52		104.4	OK	
3.003	S19	-0.086	0.000	0.84		152.1	OK	
3.004	S20	-0.090	0.000	0.81		172.7	OK	
3.005	S21	-0.173	0.000	0.56		257.6	OK	

30 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.
1.009	S10	15 Winter	30	+0%				
1.010	S11	15 Winter	30	+0%	30/15 Summer			
1.011	HW1	15 Winter	30	+0%				
4.000	S22	15 Winter	30	+0%	100/15 Winter			
4.001	S23	15 Winter	30	+0%	100/15 Summer			
4.002	S24	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
4.003	S25	15 Winter	30	+0%	100/15 Summer			
4.004	S26	15 Winter	30	+0%	30/15 Summer			
4.005	S27	15 Winter	30	+0%	100/15 Summer			
4.006	S28	15 Winter	30	+0%	100/15 Summer			
4.007	S29	15 Winter	30	+0%	100/15 Summer			
4.008	HW2	480 Winter	30	+0%				
1.012	HW3	480 Winter	30	+0%	30/60 Winter			
1.013	S15	480 Winter	30	+0%	1/15 Summer			
5.000	HWC11	120 Winter	30	+0%				
1.014	SC3	960 Winter	30	+0%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.009	S10	92.824	-0.306	0.000	0.47		617.6	OK	
1.010	S11	90.864	0.369	0.000	2.43		654.8	SURCHARGED	
1.011	HW1	90.051	-2.690	0.000	0.01		654.9	OK	
4.000	S22	102.716	-0.112	0.000	0.50		59.1	OK	
4.001	S23	100.868	-0.157	0.000	0.45		114.0	OK	
4.002	S24	98.842	0.042	0.000	1.10		126.7	SURCHARGED	2
4.003	S25	98.532	-0.056	0.000	0.85		134.0	OK	
4.004	S26	98.091	0.108	0.000	1.12		168.3	SURCHARGED	
4.005	S27	97.389	-0.173	0.000	0.54		293.5	OK	
4.006	S28	93.341	-0.087	0.000	0.92		351.6	OK	
4.007	S29	92.319	-0.147	0.000	0.66		370.2	OK	
4.008	HW2	89.992	-3.208	0.000	0.00		32.1	OK	
1.012	HW3	89.992	0.192	0.000	0.06		18.0	SURCHARGED	
1.013	S15	90.000	0.625	0.000	0.31		11.6	SURCHARGED	
5.000	HWC11	89.900	-0.600	0.000	0.00		0.0	OK	
1.014	SC3	88.771	-0.529	0.000	0.03		11.6	OK	

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.432
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.900	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 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	S1	15 Winter	100	+40%	30/15 Winter				106.228
1.001	S2	15 Winter	100	+40%	100/15 Summer				105.384
1.002	S3	15 Winter	100	+40%					104.978
1.003	S4	15 Winter	100	+40%					102.957
2.000	S12	15 Winter	100	+40%					104.796
2.001	S13	15 Winter	100	+40%					103.927
2.002	S14	15 Winter	100	+40%					102.805
1.004	S5	15 Winter	100	+40%					101.923
1.005	S6	15 Winter	100	+40%	100/15 Summer				100.873
1.006	S7	15 Winter	100	+40%	100/15 Summer				99.800
1.007	S8	15 Winter	100	+40%	100/15 Summer				98.400
1.008	S9	15 Winter	100	+40%					95.683
3.000	S16	15 Winter	100	+40%	100/15 Summer				100.041
3.001	S17	15 Winter	100	+40%	100/15 Summer				99.587
3.002	S18	15 Winter	100	+40%	100/15 Summer				99.328
3.003	S19	15 Winter	100	+40%	100/15 Summer				98.831
3.004	S20	15 Winter	100	+40%	100/15 Summer				98.056
3.005	S21	15 Winter	100	+40%					94.431

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 (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	0.636	0.000	1.81		72.6	SURCHARGED	
1.001	S2	0.039	0.000	1.08		90.7	SURCHARGED	
1.002	S3	-0.125	0.000	0.63		122.2	OK	
1.003	S4	-0.123	0.000	0.64		139.8	OK	
2.000	S12	-0.143	0.000	0.29		30.1	OK	
2.001	S13	-0.102	0.000	0.57		61.3	OK	
2.002	S14	-0.073	0.000	0.79		82.5	OK	
1.004	S5	-0.094	0.000	0.84		335.2	OK	
1.005	S6	0.407	0.000	0.97		374.5	SURCHARGED	
1.006	S7	0.535	0.000	1.07		412.9	SURCHARGED	
1.007	S8	0.344	0.000	1.07		441.9	SURCHARGED	
1.008	S9	-0.109	0.000	0.91		589.3	OK	
3.000	S16	0.506	0.000	1.06		95.9	SURCHARGED	
3.001	S17	0.526	0.000	0.55		105.6	SURCHARGED	
3.002	S18	0.922	0.000	0.79		157.6	SURCHARGED	
3.003	S19	1.290	0.000	1.20		217.8	SURCHARGED	
3.004	S20	1.040	0.000	1.18		251.1	SURCHARGED	
3.005	S21	-0.104	0.000	0.85		394.2	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.
1.009	S10	15 Winter	100	+40%				
1.010	S11	15 Winter	100	+40%	30/15 Summer			
1.011	HW1	720 Winter	100	+40%				
4.000	S22	15 Winter	100	+40%	100/15 Winter			
4.001	S23	15 Winter	100	+40%	100/15 Summer			
4.002	S24	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
4.003	S25	15 Winter	100	+40%	100/15 Summer			
4.004	S26	15 Winter	100	+40%	30/15 Summer			
4.005	S27	15 Winter	100	+40%	100/15 Summer			
4.006	S28	15 Winter	100	+40%	100/15 Summer			
4.007	S29	15 Winter	100	+40%	100/15 Summer			
4.008	HW2	720 Winter	100	+40%				
1.012	HW3	720 Winter	100	+40%	30/60 Winter			
1.013	S15	720 Winter	100	+40%	1/15 Summer			
5.000	HWC11	120 Winter	100	+40%				
1.014	SC3	1440 Summer	100	+40%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.009	S10	93.078	-0.052	0.000	0.76		1003.4	OK	
1.010	S11	91.524	1.028	0.000	3.90		1051.7	SURCHARGED	
1.011	HW1	90.533	-2.208	0.000	0.00		81.5	OK	
4.000	S22	102.899	0.072	0.000	0.88		103.9	SURCHARGED	
4.001	S23	101.605	0.579	0.000	0.75		188.5	SURCHARGED	
4.002	S24	100.312	1.512	3.498	1.73		199.1	FLOOD	2
4.003	S25	99.829	1.241	0.000	1.31		205.8	FLOOD RISK	
4.004	S26	98.931	0.948	0.000	1.66		248.9	FLOOD RISK	
4.005	S27	97.798	0.235	0.000	0.85		457.2	SURCHARGED	
4.006	S28	94.821	1.393	0.000	1.43		550.6	SURCHARGED	
4.007	S29	92.832	0.367	0.000	1.04		582.0	SURCHARGED	
4.008	HW2	90.533	-2.667	0.000	0.00		44.3	OK	
1.012	HW3	90.533	0.733	0.000	0.07		20.0	SURCHARGED	
1.013	S15	90.541	1.166	0.000	0.31		11.6	FLOOD RISK	
5.000	HWC11	89.900	-0.600	0.000	0.00		0.0	OK	
1.014	SC3	88.771	-0.529	0.000	0.03		11.6	OK	

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	1.101	4-8	0.609	8-12	0.009

Total Area Contributing (ha) = 1.719

Total Pipe Volume (m³) = 51.141

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	0.062	5.00	0.0	0.600	o	300	Pipe/Conduit	
1.001	39.360	1.411	27.9	0.056	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	33.144	0.221	150.0	0.046	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	25.587	0.171	149.6	0.048	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	45.817	0.305	150.2	0.065	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	0.062	0.0	0.0	0.0	3.53	249.6	8.4
1.001	50.00	5.33	98.211	0.118	0.0	0.0	0.0	2.99	211.2	16.0
1.002	50.00	5.76	96.800	0.164	0.0	0.0	0.0	1.28	90.6	22.2
1.003	50.00	6.10	96.579	0.212	0.0	0.0	0.0	1.28	90.7	28.7
1.004	50.00	6.69	96.408	0.277	0.0	0.0	0.0	1.28	90.5	37.5

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
1.005	13.665	0.091	150.2	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.006	13.216	0.088	150.2	0.058	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.007	26.025	0.173	150.4	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.008	40.240	0.268	150.1	0.100	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.009	36.495	1.397	26.1	0.042	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.010	16.601	0.900	18.4	0.020	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.011	17.694	1.205	14.7	0.036	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.012	52.755	3.610	14.6	0.324	0.00	0.0	0.600	o	450	Pipe/Conduit	
2.000	38.092	2.539	15.0	0.172	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.001	29.980	2.998	10.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.000	34.836	0.995	35.0	0.226	5.00	0.0	0.600	o	300	Pipe/Conduit	
3.001	24.295	0.694	35.0	0.159	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.002	7.189	0.205	35.1	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
2.003	38.522	2.005	19.2	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
2.004	8.349	0.042	198.8	0.266	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.013	21.856	0.185	118.1	0.039	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)
1.005	50.00	6.87	96.103	0.277	0.0	0.0	0.0	1.28	90.5	37.5
1.006	50.00	7.02	95.937	0.335	0.0	0.0	0.0	1.48	163.0	45.4
1.007	50.00	7.31	95.849	0.335	0.0	0.0	0.0	1.47	162.9	45.4
1.008	50.00	7.77	95.675	0.435	0.0	0.0	0.0	1.48	163.1	58.9
1.009	50.00	7.94	95.407	0.477	0.0	0.0	0.0	3.56	392.9	64.6
1.010	50.00	8.00	94.010	0.497	0.0	0.0	0.0	4.24	467.9	67.3
1.011	50.00	8.07	93.110	0.533	0.0	0.0	0.0	4.75	524.5	72.2
1.012	50.00	8.23	91.830	0.857	0.0	0.0	0.0	5.34	849.2	116.0
2.000	50.00	5.19	96.328	0.172	0.0	0.0	0.0	3.40	135.0	23.3
2.001	50.00	5.31	93.788	0.172	0.0	0.0	0.0	4.16	165.5	23.3
3.000	50.00	5.22	92.405	0.226	0.0	0.0	0.0	2.67	188.5	30.6
3.001	50.00	5.37	91.410	0.385	0.0	0.0	0.0	2.67	188.5	52.1
2.002	50.00	5.41	90.640	0.557	0.0	0.0	0.0	3.07	338.9	75.4
2.003	50.00	5.56	90.435	0.557	0.0	0.0	0.0	4.15	458.4	75.4
2.004	50.00	5.67	88.262	0.823	0.0	0.0	0.0	1.28	141.5	111.4
1.013	50.00	8.62	88.220	1.719	0.0	0.0	0.0	0.92	16.3«	232.8
1.014	50.00	8.73	88.035	1.719	0.0	0.0	0.0	0.82	14.5«	232.8

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	1.970	Open Manhole	1200	1.002	96.800	300	1.001	96.800	300	
S103	99.039	2.460	Open Manhole	1350	1.003	96.579	300	1.002	96.579	300	
S104	99.261	2.853	Open Manhole	1350	1.004	96.408	300	1.003	96.408	300	
S105	99.494	3.391	Open Manhole	1200	1.005	96.103	300	1.004	96.103	300	
S106	99.349	3.412	Open Manhole	1200	1.006	95.937	375	1.005	96.012	300	
S107	99.174	3.325	Open Manhole	1350	1.007	95.849	375	1.006	95.849	375	
S108	98.854	3.179	Open Manhole	1350	1.008	95.675	375	1.007	95.676	375	1
S109	98.335	2.928	Open Manhole	1350	1.009	95.407	375	1.008	95.407	375	
S110	96.824	2.814	Open Manhole	1350	1.010	94.010	375	1.009	94.010	375	
S111	95.756	2.646	Open Manhole	1350	1.011	93.110	375	1.010	93.110	375	
S112	94.597	2.767	Open Manhole	1350	1.012	91.830	450	1.011	91.905	375	
S115	98.504	2.176	Open Manhole	1200	2.000	96.328	225				
S116	96.191	2.403	Open Manhole	1200	2.001	93.788	225	2.000	93.789	225	1
S118	93.935	1.530	Open Manhole	1200	3.000	92.405	300				
S119	93.169	1.759	Open Manhole	1200	3.001	91.410	300	3.000	91.410	300	
S117	94.315	3.675	Open Manhole	1200	2.002	90.640	375	2.001	90.790	225	
								3.001	90.716	300	1
TANK1	93.034	2.599	Open Manhole	1350	2.003	90.435	375	2.002	90.435	375	
TANK2	91.200	2.938	Open Manhole	1350	2.004	88.262	375	2.003	88.430	375	168
S113	91.200	2.980	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	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S100	567267.209	246918.415	567267.209	246918.415	Required	
S101	567249.349	246902.738	567249.349	246902.738	Required	
S102	567213.628	246886.208	567213.628	246886.208	Required	

Manhole Schedules for Surface Network 2

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S103	567181.569	246877.797	567181.569	246877.797	Required	
S104	567156.711	246871.732	567156.711	246871.732	Required	
S105	567112.436	246859.948	567112.436	246859.948	Required	
S106	567100.021	246854.238	567100.021	246854.238	Required	
S107	567090.089	246845.520	567090.089	246845.520	Required	
S108	567072.498	246826.340	567072.498	246826.340	Required	
S109	567046.010	246796.047	567046.010	246796.047	Required	
S110	567073.398	246771.925	567073.398	246771.925	Required	
S111	567088.425	246764.872	567088.425	246764.872	Required	
S112	567105.915	246762.191	567105.915	246762.191	Required	
S115	567102.331	246821.761	567102.331	246821.761	Required	
S116	567135.946	246803.844	567135.946	246803.844	Required	
S118	567210.064	246816.980	567210.064	246816.980	Required	
S119	567186.783	246791.065	567186.783	246791.065	Required	
S117	567162.514	246789.954	567162.514	246789.954	Required	

Manhole Schedules for Surface Network 2

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
TANK1	567158.924	246783.726	567158.924	246783.726	Required	
TANK2	567156.794	246745.263	567156.794	246745.263	Required	
S113	567152.769	246737.948	567152.769	246737.948	Required	
S114	567140.714	246719.717	567140.714	246719.717	Required	
HW100	567141.070	246714.482			No Entry	

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	96.800	1.670	Open Manhole	1200
1.003	o	300	S103	99.039	96.579	2.160	Open Manhole	1350
1.004	o	300	S104	99.261	96.408	2.553	Open Manhole	1350
1.005	o	300	S105	99.494	96.103	3.091	Open Manhole	1200
1.006	o	375	S106	99.349	95.937	3.037	Open Manhole	1200
1.007	o	375	S107	99.174	95.849	2.950	Open Manhole	1350
1.008	o	375	S108	98.854	95.675	2.804	Open Manhole	1350
1.009	o	375	S109	98.335	95.407	2.553	Open Manhole	1350
1.010	o	375	S110	96.824	94.010	2.439	Open Manhole	1350
1.011	o	375	S111	95.756	93.110	2.271	Open Manhole	1350
1.012	o	450	S112	94.597	91.830	2.317	Open Manhole	1350
2.000	o	225	S115	98.504	96.328	1.951	Open Manhole	1200
2.001	o	225	S116	96.191	93.788	2.178	Open Manhole	1200
3.000	o	300	S118	93.935	92.405	1.230	Open Manhole	1200
3.001	o	300	S119	93.169	91.410	1.459	Open Manhole	1200
2.002	o	375	S117	94.315	90.640	3.300	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	27.9	S102	98.770	96.800	1.670	Open Manhole	1200
1.002	33.144	150.0	S103	99.039	96.579	2.160	Open Manhole	1350
1.003	25.587	149.6	S104	99.261	96.408	2.553	Open Manhole	1350
1.004	45.817	150.2	S105	99.494	96.103	3.091	Open Manhole	1200
1.005	13.665	150.2	S106	99.349	96.012	3.037	Open Manhole	1200
1.006	13.216	150.2	S107	99.174	95.849	2.950	Open Manhole	1350
1.007	26.025	150.4	S108	98.854	95.676	2.803	Open Manhole	1350
1.008	40.240	150.1	S109	98.335	95.407	2.553	Open Manhole	1350
1.009	36.495	26.1	S110	96.824	94.010	2.439	Open Manhole	1350
1.010	16.601	18.4	S111	95.756	93.110	2.271	Open Manhole	1350
1.011	17.694	14.7	S112	94.597	91.905	2.317	Open Manhole	1350
1.012	52.755	14.6	S113	91.200	88.220	2.530	Open Manhole	2100
2.000	38.092	15.0	S116	96.191	93.789	2.177	Open Manhole	1200
2.001	29.980	10.0	S117	94.315	90.790	3.300	Open Manhole	1200
3.000	34.836	35.0	S119	93.169	91.410	1.459	Open Manhole	1200
3.001	24.295	35.0	S117	94.315	90.716	3.299	Open Manhole	1200
2.002	7.189	35.1	TANK1	93.034	90.435	2.224	Open Manhole	1350

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)
2.003	o	375	TANK1	93.034	90.435	2.224	Open Manhole	1350
2.004	o	375	TANK2	91.200	88.262	2.563	Open Manhole	1350
1.013	o	150	S113	91.200	88.220	2.830	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)
2.003	38.522	19.2	TANK2	91.200	88.430	2.395	Open Manhole	1350
2.004	8.349	198.8	S113	91.200	88.220	2.605	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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	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): 19.2

Unit Reference	MD-SHE-0092-5300-2250-5300
Design Head (m)	2.250
Design Flow (l/s)	5.3
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	92
Invert Level (m)	88.220
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.250	5.3
Flush-Flo™	0.398	4.2
Kick-Flo®	0.818	3.3
Mean Flow over Head Range	-	4.1

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	2.9	1.200	4.0	3.000	6.1	7.000	9.0
0.200	3.8	1.400	4.2	3.500	6.5	7.500	9.3
0.300	4.1	1.600	4.5	4.000	6.9	8.000	9.6
0.400	4.2	1.800	4.8	4.500	7.3	8.500	9.9
0.500	4.1	2.000	5.0	5.000	7.7	9.000	10.2
0.600	4.0	2.200	5.2	5.500	8.1	9.500	10.5
0.800	3.4	2.400	5.5	6.000	8.4		
1.000	3.6	2.600	5.7	6.500	8.7		

Storage Structures for Surface Network 2

Cellular Storage Manhole: TANK2, DS/PN: 2.004

Invert Level (m) 88.862 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 Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.422
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	S100	15 Winter	100	+40%					99.487
1.001	S101	15 Winter	100	+40%	100/15 Winter				98.552
1.002	S102	15 Winter	100	+40%	100/15 Summer				98.383
1.003	S103	15 Winter	100	+40%	100/15 Summer				98.183
1.004	S104	15 Winter	100	+40%	100/15 Summer				97.885
1.005	S105	15 Winter	100	+40%	100/15 Summer				97.044
1.006	S106	15 Winter	100	+40%	100/15 Summer				96.744
1.007	S107	15 Winter	100	+40%	100/15 Summer				96.562
1.008	S108	15 Winter	100	+40%	100/15 Summer				96.335
1.009	S109	15 Winter	100	+40%					95.627
1.010	S110	15 Winter	100	+40%					94.227
1.011	S111	15 Winter	100	+40%					93.318
1.012	S112	15 Winter	100	+40%					92.083
2.000	S115	15 Winter	100	+40%					96.496
2.001	S116	15 Winter	100	+40%					93.934
3.000	S118	15 Winter	100	+40%	100/15 Summer				93.468
3.001	S119	15 Winter	100	+40%	100/15 Summer				92.833
2.002	S117	15 Winter	100	+40%	100/15 Summer				91.527

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	-0.212	0.000	0.19		41.4	OK	
1.001	S101	0.041	0.000	0.41		80.9	SURCHARGED	
1.002	S102	1.283	0.000	1.04		86.2	FLOOD RISK	
1.003	S103	1.304	0.000	1.32		107.1	SURCHARGED	
1.004	S104	1.177	0.000	1.63		138.6	SURCHARGED	
1.005	S105	0.641	0.000	1.86		139.2	SURCHARGED	
1.006	S106	0.432	0.000	1.42		165.2	SURCHARGED	
1.007	S107	0.338	0.000	1.16		164.9	SURCHARGED	
1.008	S108	0.285	0.000	1.40		207.9	SURCHARGED	
1.009	S109	-0.155	0.000	0.64		226.4	OK	
1.010	S110	-0.158	0.000	0.63		234.7	OK	
1.011	S111	-0.167	0.000	0.58		250.6	OK	
1.012	S112	-0.197	0.000	0.59		453.2	OK	
2.000	S115	-0.057	0.000	0.90		114.8	OK	
2.001	S116	-0.079	0.000	0.74		113.7	OK	
3.000	S118	0.763	0.000	0.80		138.8	SURCHARGED	
3.001	S119	1.123	0.000	1.34		224.4	FLOOD RISK	
2.002	S117	0.512	0.000	1.89		335.1	SURCHARGED	

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)
2.003	TANK1	15 Winter	100	+40%					90.692
2.004	TANK2	1440 Winter	100	+40%	100/15 Summer				90.175
1.013	S113	15 Winter	100	+40%	100/15 Summer				90.564
1.014	S114	15 Winter	100	+40%					88.106

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
2.003	TANK1	-0.118	0.000	0.80		333.7	OK	
2.004	TANK2	1.538	0.000	0.14		13.5	SURCHARGED	
1.013	S113	2.194	0.000	0.35		5.4	SURCHARGED	
1.014	S114	-0.079	0.000	0.46		5.3	OK	

STORM SEWER DESIGN by the Modified Rational Method

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	
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	

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
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

STORM SEWER DESIGN by the Modified Rational Method

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
1.007	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	
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	

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)
1.007	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
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

STORM SEWER DESIGN by the Modified Rational Method

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
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	
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	

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)
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
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

STORM SEWER DESIGN by the Modified Rational Method

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
10.000	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	
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	

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)
10.000	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
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

STORM SEWER DESIGN by the Modified Rational Method

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
13.000	15.970	0.735	21.7	0.000	5.00	0.0	0.600	o	900	Pipe/Conduit	
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)
13.000	50.00	5.04	82.500	0.000	0.0	0.0	0.0	6.74	4286.3	0.0
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				
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

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)
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	
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	1.700	Open Manhole	1800	13.000	82.500	900				
S324	84.240	2.825	Open Manhole	3000	1.024	81.415	450	1.023	81.415	900	
								10.010	81.865	750	750
								13.000	81.765	900	800
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				

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)
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	82.600	1.700	Open Manhole	1500	15.003	80.900	600	15.002	80.900	500	
S327	82.600	1.772	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	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S300	567109.727	247003.096	567109.727	247003.096	Required	
S301	567096.979	246976.022	567096.979	246976.022	Required	
S328	567107.574	246905.449	567107.574	246905.449	Required	
S329	567086.181	246925.526	567086.181	246925.526	Required	
S302	567065.981	246947.590	567065.981	246947.590	Required	
S340	567036.835	246865.344	567036.835	246865.344	Required	
S341	567020.820	246879.723	567020.820	246879.723	Required	
S303	567004.312	246892.436	567004.312	246892.436	Required	

Manhole Schedules for Surface Network 4

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S304	566993.330	246904.370	566993.330	246904.370	Required	
S305	566979.800	246932.162	566979.800	246932.162	Required	
S342	567031.234	247017.706	567031.234	247017.706	Required	
S343	566992.102	246968.702	566992.102	246968.702	Required	
S306	566968.575	246951.423	566968.575	246951.423	Required	
S307	566952.244	246973.395	566952.244	246973.395	Required	
S308	566934.849	246986.622	566934.849	246986.622	Required	
S309	566915.938	246996.754	566915.938	246996.754	Required	
S344	567023.370	247045.900	567023.370	247045.900	Required	
S345	566991.619	247065.574	566991.619	247065.574	Required	
S348	566971.262	247068.552	566971.262	247068.552	Required	
S349	566922.723	247099.272	566922.723	247099.272	Required	
S350	566898.022	247060.130	566898.022	247060.130	Required	
S310	566878.513	247015.271	566878.513	247015.271	Required	
S311	566863.668	247020.640	566863.668	247020.640	Required	

Manhole Schedules for Surface Network 4

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S312	566834.337	247023.590	566834.337	247023.590	Required	
S351	566777.728	247082.583	566777.728	247082.583	Required	
S352	566797.889	247048.970	566797.889	247048.970	Required	
S313	566807.739	247018.414	566807.739	247018.414	Required	
S314	566789.199	247010.875	566789.199	247010.875	Required	
S353	566721.170	247065.468	566721.170	247065.468	Required	
S354	566720.262	247045.188	566720.262	247045.188	Required	
S355	566737.480	247022.455	566737.480	247022.455	Required	
S315	566764.130	246992.152	566764.130	246992.152	Required	
S316	566750.411	246977.722	566750.411	246977.722	Required	
S356	566690.585	246978.057	566690.585	246978.057	Required	
S357	566717.756	246966.743	566717.756	246966.743	Required	
S317	566732.269	246955.178	566732.269	246955.178	Required	
S318	566716.330	246935.372	566716.330	246935.372	Required	
S319	566704.816	246913.270	566704.816	246913.270	Required	

Manhole Schedules for Surface Network 4

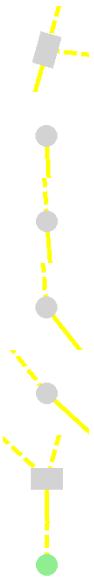
MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S320	566698.865	246885.449	566698.865	246885.449	Required	
S321	566700.176	246858.176	566700.176	246858.176	Required	
S358	566645.942	246818.258	566645.942	246818.258	Required	
S359	566674.800	246818.539	566674.800	246818.539	Required	
S322	566708.653	246833.658	566708.653	246833.658	Required	
S323	566722.094	246812.333	566722.094	246812.333	Required	
S360	566989.304	246798.876	566989.304	246798.876	Required	
S361	566969.439	246781.920	566969.439	246781.920	Required	
S362	566945.085	246762.387	566945.085	246762.387	Required	
S363	566897.790	246730.136	566897.790	246730.136	Required	
S364	566875.265	246722.490	566875.265	246722.490	Required	
S365	566852.906	246723.903	566852.906	246723.903	Required	
S366	566836.365	246730.718	566836.365	246730.718	Required	
S371	566833.471	246789.391	566833.471	246789.391	Required	
S367	566807.799	246749.458	566807.799	246749.458	Required	

Manhole Schedules for Surface Network 4

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S368	566795.731	246757.615	566795.731	246757.615	Required	
S369	566776.941	246776.372	566776.941	246776.372	Required	
S372	566842.195	246832.094	566842.195	246832.094	Required	
S373	566829.168	246856.581	566829.168	246856.581	Required	
S374	566809.030	246866.834	566809.030	246866.834	Required	
S375	566786.660	246823.197	566786.660	246823.197	Required	
S370	566756.335	246785.802	566756.335	246785.802	Required	
HW302	566746.939	246808.331	566746.939	246808.331	Required	
S324	566743.252	246792.793	566743.252	246792.793	Required	
S325	566719.552	246758.190	566719.552	246758.190	Required	
S376	566846.726	246697.257	566846.726	246697.257	Required	
S377	566825.665	246676.630	566825.665	246676.630	Required	
S378	566812.739	246689.473	566812.739	246689.473	Required	
S379	566772.955	246708.767	566772.955	246708.767	Required	
S380	566734.035	246727.120	566734.035	246727.120	Required	

Manhole Schedules for Surface Network 4

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S326	566711.724	246729.733	566711.724	246729.733	Required	
S381	566666.285	246800.511	566666.285	246800.511	Required	
S382	566668.218	246764.641	566668.218	246764.641	Required	
HW303	566669.210	246751.633	566669.210	246751.633	Required	
HW304	566696.746	246716.659	566696.746	246716.659	Required	
S327	566705.721	246708.379	566705.721	246708.379	Required	
HW300	566705.685	246704.191			No Entry	



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
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

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
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

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)
1.009	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
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

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)
1.009	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
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

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)
1.015	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
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

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)
1.015	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
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

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)
10.002	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
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	82.500	0.800	Open Manhole	1800

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)
10.002	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
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	81.765	1.575	Open Manhole	3000

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)
1.024	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
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	82.600	80.900	1.100	Open Manhole	1500
1.027	o	300	S327	82.600	80.828	1.472	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)
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
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	82.600	80.828	1.322	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	82.600	80.900	1.200	Open Manhole	1500
15.003	12.211	169.6	S327	82.600	80.828	1.172	Open Manhole	900 x 1050
1.027	4.188	149.6	HW300	82.100	80.800	1.000	Open Manhole	0

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	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

Orifice Manhole: S324, DS/PN: 1.024, Volume (m³): 50.8

Diameter (m) 0.220 Discharge Coefficient 0.600 Invert Level (m) 81.415

Hydro-Brake® Optimum Manhole: S327, DS/PN: 1.027, Volume (m³): 8.1

Unit Reference	MD-SHE-0230-3000-1500-3000
Design Head (m)	1.500
Design Flow (l/s)	30.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	230
Invert Level (m)	80.828
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	1800

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	30.0
Flush-Flo™	0.462	30.0
Kick-Flo®	1.016	24.9
Mean Flow over Head Range	-	25.7

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	7.7	1.200	27.0	3.000	41.9	7.000	63.1
0.200	23.1	1.400	29.0	3.500	45.1	7.500	65.2
0.300	29.0	1.600	30.9	4.000	48.1	8.000	67.3
0.400	29.9	1.800	32.7	4.500	50.9	8.500	69.3
0.500	29.9	2.000	34.4	5.000	53.6	9.000	71.3
0.600	29.6	2.200	36.0	5.500	56.1	9.500	73.2
0.800	28.5	2.400	37.6	6.000	58.5		
1.000	25.4	2.600	39.1	6.500	60.8		

Storage Structures for Surface Network 4

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

Invert Level (m) 82.500

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1200.0	1.100	1986.0	1.150	2261.0	1.700	2491.0

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	1907.0	1.000	2680.0	1.050	2996.0	1.700	3623.0

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.421
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.
1.000	S300	15 Winter	100	+40%	100/15 Summer			
1.001	S301	15 Winter	100	+40%	100/15 Summer			
2.000	S328	15 Winter	100	+40%				
2.001	S329	15 Winter	100	+40%				
1.002	S302	15 Winter	100	+40%	100/15 Summer			
3.000	S340	15 Winter	100	+40%				
3.001	S341	15 Winter	100	+40%				
1.003	S303	15 Winter	100	+40%	100/15 Summer			
1.004	S304	15 Winter	100	+40%	100/15 Summer			
1.005	S305	15 Winter	100	+40%	100/15 Summer			
4.000	S342	15 Winter	100	+40%				
4.001	S343	15 Winter	100	+40%	100/15 Summer			
1.006	S306	15 Winter	100	+40%	100/15 Summer	100/15 Winter		
1.007	S307	15 Winter	100	+40%	100/15 Summer	100/15 Winter		
1.008	S308	15 Winter	100	+40%	100/15 Summer			
1.009	S309	15 Winter	100	+40%	100/15 Summer	100/15 Winter		
5.000	S344	15 Winter	100	+40%	100/15 Summer			
5.001	S345	15 Winter	100	+40%	100/15 Summer	100/15 Summer		

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S300	99.512	0.734	0.000	0.67		101.0	SURCHARGED	
1.001	S301	99.238	1.200	0.000	1.44		223.7	SURCHARGED	
2.000	S328	98.880	-0.058	0.000	0.89		73.2	OK	
2.001	S329	97.990	-0.110	0.000	0.72		132.4	OK	
1.002	S302	97.324	0.534	0.000	0.87		420.9	SURCHARGED	
3.000	S340	97.278	-0.171	0.000	0.38		88.8	OK	
3.001	S341	96.160	-0.094	0.000	0.56		129.2	OK	
1.003	S303	95.966	0.795	0.000	0.99		530.8	SURCHARGED	
1.004	S304	95.148	0.878	0.000	0.88		580.8	SURCHARGED	
1.005	S305	93.873	1.320	0.000	0.92		575.1	FLOOD RISK	
4.000	S342	93.714	-0.151	0.000	0.48		86.4	OK	
4.001	S343	93.312	1.239	0.000	0.78		133.3	FLOOD RISK	
1.006	S306	92.819	1.580	7.072	1.10		715.4	FLOOD	1
1.007	S307	91.200	1.407	0.651	0.85		714.9	FLOOD	1
1.008	S308	90.421	1.767	0.000	1.70		787.9	FLOOD RISK	
1.009	S309	89.894	1.454	0.005	0.68		802.8	FLOOD	
5.000	S344	92.840	0.547	0.000	0.53		52.7	SURCHARGED	
5.001	S345	92.362	1.563	2.216	2.28		87.5	FLOOD	2

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.
5.002	S348	15 Winter	100	+40%	100/15 Summer			
5.003	S349	15 Winter	100	+40%	100/15 Summer			
5.004	S350	15 Winter	100	+40%	100/15 Summer			
1.010	S310	15 Winter	100	+40%	100/15 Summer	100/15 Winter		
1.011	S311	15 Winter	100	+40%	100/15 Summer			
1.012	S312	15 Winter	100	+40%	100/15 Summer			
6.000	S351	15 Winter	100	+40%	100/15 Summer			
6.001	S352	15 Winter	100	+40%	100/15 Summer	100/15 Summer		
1.013	S313	15 Winter	100	+40%	100/15 Summer			
1.014	S314	15 Winter	100	+40%	100/15 Summer			
7.000	S353	15 Winter	100	+40%				
7.001	S354	15 Winter	100	+40%	100/15 Summer			
7.002	S355	15 Winter	100	+40%	100/15 Summer			
1.015	S315	15 Winter	100	+40%	100/15 Summer			
1.016	S316	15 Winter	100	+40%	100/15 Summer			
8.000	S356	15 Winter	100	+40%				
8.001	S357	15 Winter	100	+40%				
1.017	S317	15 Winter	100	+40%	100/15 Summer			
1.018	S318	15 Winter	100	+40%	100/15 Summer			
1.019	S319	15 Winter	100	+40%	100/15 Summer			
1.020	S320	15 Winter	100	+40%	100/15 Summer			
1.021	S321	15 Winter	100	+40%	100/15 Summer			
9.000	S358	15 Winter	100	+40%	100/15 Winter			
9.001	S359	30 Winter	100	+40%	100/15 Summer			
1.022	S322	15 Winter	100	+40%	100/15 Summer			
1.023	S323	15 Winter	100	+40%	100/15 Summer	100/15 Summer		
10.000	S360	15 Winter	100	+40%				
10.001	S361	15 Winter	100	+40%				
10.002	S362	15 Winter	100	+40%				
10.003	S363	15 Winter	100	+40%				
10.004	S364	15 Winter	100	+40%				
10.005	S365	15 Winter	100	+40%				
10.006	S366	15 Winter	100	+40%	100/15 Summer			
11.000	S371	15 Winter	100	+40%	100/15 Summer			
10.007	S367	15 Winter	100	+40%	100/15 Summer			
10.008	S368	15 Winter	100	+40%	100/15 Summer			
10.009	S369	15 Winter	100	+40%	100/15 Summer			
12.000	S372	15 Winter	100	+40%	100/15 Summer			
12.001	S373	15 Winter	100	+40%	100/15 Summer			
12.002	S374	15 Winter	100	+40%	100/15 Summer			
12.003	S375	15 Winter	100	+40%	100/15 Summer			
10.010	S370	15 Winter	100	+40%	100/15 Summer			
13.000	HW302	120 Winter	100	+40%	100/15 Winter			
1.024	S324	15 Winter	100	+40%	100/15 Summer			
1.025	S325	360 Summer	100	+40%	100/15 Summer			
14.000	S376	15 Winter	100	+40%				
14.001	S377	15 Winter	100	+40%				
14.002	S378	15 Winter	100	+40%	100/15 Summer			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
5.002	S348	91.988	1.326	0.000	1.49		128.3	FLOOD RISK	
5.003	S349	91.370	1.016	0.000	1.42		213.4	SURCHARGED	
5.004	S350	90.841	0.796	0.000	0.89		314.0	SURCHARGED	
1.010	S310	89.799	1.638	2.064	1.17		1123.6	FLOOD	1
1.011	S311	89.582	1.526	0.000	1.14		1138.0	FLOOD RISK	
1.012	S312	89.366	1.506	0.000	1.22		1170.6	SURCHARGED	
6.000	S351	93.498	0.968	0.000	0.85		101.5	FLOOD RISK	
6.001	S352	91.817	1.557	7.558	1.28		165.9	FLOOD	3
1.013	S313	89.139	1.460	0.000	1.39		1333.6	SURCHARGED	
1.014	S314	88.843	1.298	0.000	1.31		1345.6	SURCHARGED	
7.000	S353	92.968	-0.154	0.000	0.21		24.7	OK	
7.001	S354	92.578	0.650	0.000	0.77		90.7	SURCHARGED	
7.002	S355	91.622	1.372	0.000	1.24		149.8	FLOOD RISK	
1.015	S315	88.527	1.190	0.000	1.58		1510.2	SURCHARGED	
1.016	S316	88.124	0.920	0.000	1.54		1525.8	SURCHARGED	
8.000	S356	89.827	-0.172	0.000	0.37		94.8	OK	
8.001	S357	88.025	-0.135	0.000	0.58		139.5	OK	
1.017	S317	87.698	0.687	0.000	0.91		1577.9	SURCHARGED	
1.018	S318	87.216	0.793	0.000	0.83		1580.8	SURCHARGED	
1.019	S319	86.728	1.017	0.000	0.79		1602.5	SURCHARGED	
1.020	S320	86.220	1.322	0.000	0.82		1627.8	SURCHARGED	
1.021	S321	85.690	1.572	0.000	0.85		1657.0	FLOOD RISK	
9.000	S358	85.303	0.192	0.000	0.29		49.7	SURCHARGED	
9.001	S359	85.263	0.977	0.000	0.44		75.7	FLOOD RISK	
1.022	S322	85.131	1.754	0.000	0.89		1709.2	FLOOD RISK	
1.023	S323	84.557	2.050	36.804	1.77		1753.0	FLOOD	4
10.000	S360	96.273	-0.134	0.000	0.34		36.7	OK	
10.001	S361	95.012	-0.089	0.000	0.67		73.4	OK	
10.002	S362	93.397	-0.143	0.000	0.53		126.6	OK	
10.003	S363	90.592	-0.086	0.000	0.85		187.6	OK	
10.004	S364	89.422	-0.067	0.000	0.95		209.2	OK	
10.005	S365	88.231	-0.138	0.000	0.72		264.6	OK	
10.006	S366	87.896	0.422	0.000	0.71		285.0	SURCHARGED	
11.000	S371	87.639	0.682	0.000	0.70		115.1	SURCHARGED	
10.007	S367	87.137	1.371	0.000	1.28		426.3	FLOOD RISK	
10.008	S368	85.947	0.909	0.000	0.74		450.7	SURCHARGED	
10.009	S369	85.223	1.513	0.000	1.02		505.5	FLOOD RISK	
12.000	S372	87.499	0.947	0.000	0.89		78.7	SURCHARGED	
12.001	S373	86.772	1.145	0.000	1.55		134.7	FLOOD RISK	
12.002	S374	84.994	0.120	0.000	0.50		131.5	SURCHARGED	
12.003	S375	84.751	0.858	0.000	0.60		156.6	SURCHARGED	
10.010	S370	84.385	1.155	0.000	0.58		706.5	FLOOD RISK	
13.000	HW302	83.875	0.475	0.000	0.06		108.2	FLOOD RISK	
1.024	S324	84.121	2.256	0.000	0.67		143.2	FLOOD RISK	
1.025	S325	82.987	1.354	0.000	0.48		127.0	FLOOD RISK	
14.000	S376	86.500	-0.116	0.000	0.47		51.4	OK	
14.001	S377	85.094	-0.048	0.000	0.88		92.0	OK	

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
14.002	S378	84.451	0.220	0.000	0.63		147.5	SURCHARGED	

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.
14.003	S379	15 Winter	100	+40%	100/15 Summer			
14.004	S380	15 Winter	100	+40%	100/15 Summer			
1.026	S326	720 Winter	100	+40%	100/15 Summer	100/15 Summer		
15.000	S381	15 Winter	100	+40%				
15.001	S382	15 Winter	100	+40%	100/15 Summer			
15.002	HW303	1440 Winter	100	+40%	100/480 Winter			
15.003	HW304	1440 Winter	100	+40%	100/120 Summer			
1.027	S327	720 Winter	100	+40%	100/15 Summer	100/360 Summer		

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
14.003	S379	83.608	1.513	0.000	1.25		228.3	FLOOD RISK	
14.004	S380	82.952	1.287	0.000	1.74		296.6	FLOOD RISK	
1.026	S326	82.496	1.131	2.445	0.82		136.3	FLOOD	17
15.000	S381	83.873	-0.007	0.000	0.67		66.2	OK	
15.001	S382	83.252	0.809	0.000	1.59		142.7	SURCHARGED	
15.002	HW303	82.320	0.120	0.000	0.01		6.3	SURCHARGED	
15.003	HW304	82.320	0.820	0.000	0.09		32.6	FLOOD RISK	
1.027	S327	82.600	1.472	0.532	1.59		90.5	FLOOD	4

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 (m³) = 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	
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	

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
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

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
1.005	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)
1.005	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	1200	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	1200	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	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S206	566983.810	246707.023	566983.810	246707.023	Required	
S207	566963.714	246682.998	566963.714	246682.998	Required	
S208	566943.558	246658.912	566943.558	246658.912	Required	
S209	566925.113	246623.199	566925.113	246623.199	Required	
S210	566979.752	246594.875	566979.752	246594.875	Required	

Manhole Schedules for Surface Network 3

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
HW203	566995.039	246589.832	566995.039	246589.832	Required	
S203	567112.789	246737.150	567112.789	246737.150	Required	
S204	567085.056	246695.805	567085.056	246695.805	Required	
S200	567010.926	246715.853	567010.926	246715.853	Required	
S201	567062.823	246690.181	567062.823	246690.181	Required	
S205	566992.342	246659.943	566992.342	246659.943	Required	
S202	567036.907	246638.002	567036.907	246638.002	Required	
HW201	567024.628	246608.727	567024.628	246608.727	Required	
HW202	567013.409	246576.268	567013.409	246576.268	Required	
S211	567020.369	246561.206	567020.369	246561.206	Required	
HW200	567022.383	246552.489			No Entry	

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	1200
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	1200
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)
1.000	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	1200
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	1200
2.004	34.343	89.4	HW202	85.000	83.500	1.200	Open Manhole	900 x 1050
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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.400	Storm Duration (mins)	30
Ratio R	0.438		

Online Controls for Surface Network 3

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

Unit Reference	MD-SHE-0098-6300-2500-6300
Design Head (m)	2.500
Design Flow (l/s)	6.3
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	98
Invert Level (m)	82.150
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.500	6.3
Flush-Flo™	0.428	4.8
Kick-Flo®	0.871	3.9
Mean Flow over Head Range	-	4.8

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	3.2	1.200	4.5	3.000	6.9	7.000	10.2
0.200	4.4	1.400	4.8	3.500	7.4	7.500	10.6
0.300	4.7	1.600	5.1	4.000	7.8	8.000	10.9
0.400	4.8	1.800	5.4	4.500	8.3	8.500	11.2
0.500	4.8	2.000	5.7	5.000	8.7	9.000	11.5
0.600	4.7	2.200	5.9	5.500	9.1	9.500	11.8
0.800	4.2	2.400	6.2	6.000	9.5		
1.000	4.1	2.600	6.4	6.500	9.9		

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)
0.000	354.0	1.010	902.0	1.510	1349.0
1.000	734.0	1.500	1148.0		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.422
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	600 Winter	100	+40%					84.682
1.006	HW202	600 Winter	100	+40%	100/15 Summer				84.682
1.007	S211	600 Winter	100	+40%	100/15 Summer				84.728

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		238.9	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	-1.222	0.000	0.00		49.8	OK	
1.006	HW202	0.582	0.000	0.01		10.0	FLOOD RISK	
1.007	S211	2.428	0.000	0.31		6.3	FLOOD RISK	

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

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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

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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

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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

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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

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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

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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

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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

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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

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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

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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

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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

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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

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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

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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

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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

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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

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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

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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

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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

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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

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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

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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,
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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

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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

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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

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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

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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

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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

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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

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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

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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

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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

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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

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Bightwell, Suffolk, IP10 0BJ
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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

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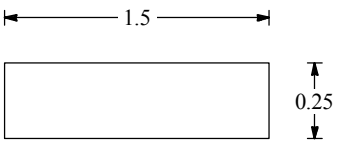
TRIAL PIT LOG

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

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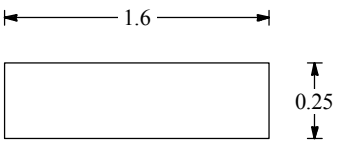
TRIAL PIT LOG

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

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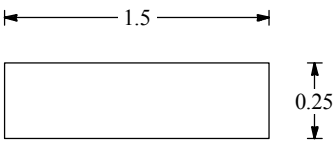
TRIAL PIT LOG

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

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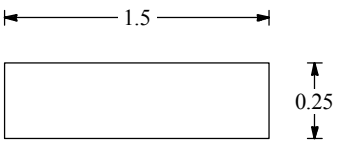
TRIAL PIT LOG

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

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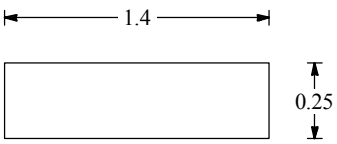
TRIAL PIT LOG

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

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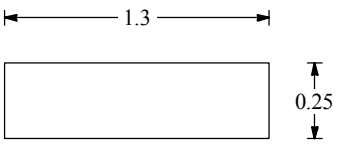
TRIAL PIT LOG

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

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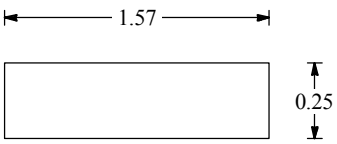
TRIAL PIT LOG

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

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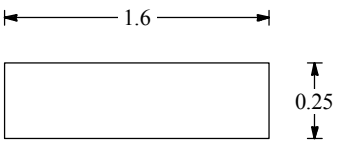
TRIAL PIT LOG

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

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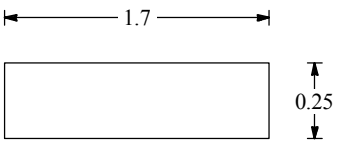
TRIAL PIT LOG

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

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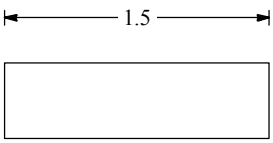
TRIAL PIT LOG

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

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Brightwell Barns, Ipswich Road
Birghtwell, Suffolk, IP10 0BJ
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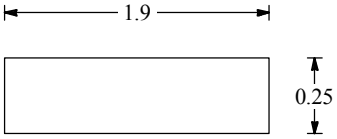
TRIAL PIT LOG

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
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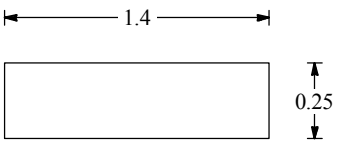
TRIAL PIT LOG

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

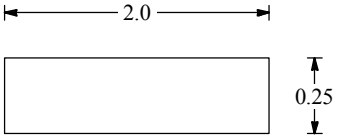
TRIAL PIT LOG

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

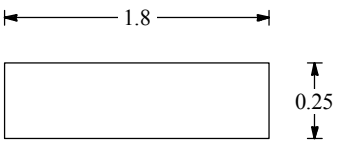
TRIAL PIT LOG

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

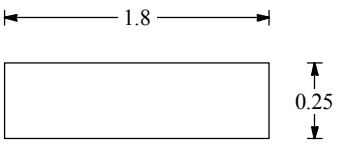
TRIAL PIT LOG

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

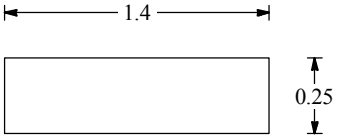
TRIAL PIT LOG

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

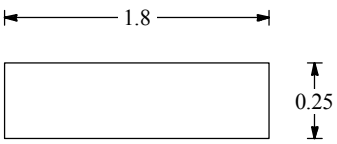
TRIAL PIT LOG

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

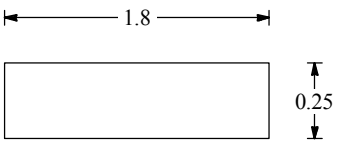
TRIAL PIT LOG

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

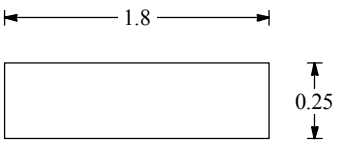
TRIAL PIT LOG

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

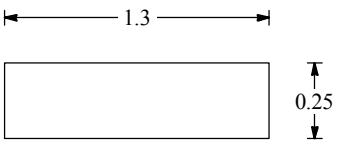
TRIAL PIT LOG

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

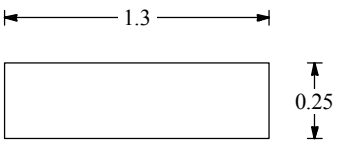
TRIAL PIT LOG

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

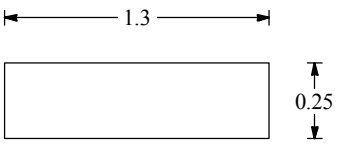
TRIAL PIT LOG

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

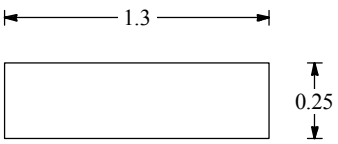
TRIAL PIT LOG

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
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Telephone: 01603 298 076
Fax: 01603 298 075

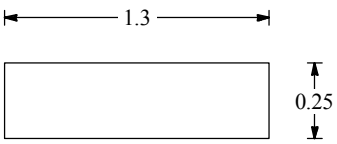
TRIAL PIT LOG

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

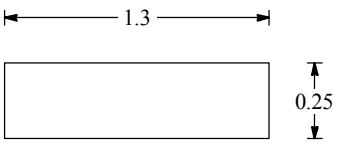
TRIAL PIT LOG

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

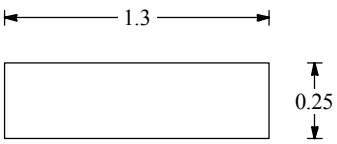
TRIAL PIT LOG

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

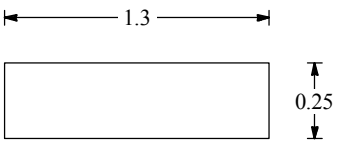
TRIAL PIT LOG

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

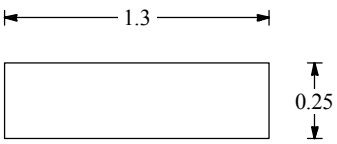
TRIAL PIT LOG

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

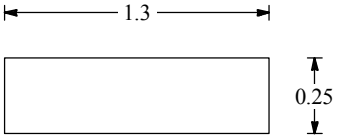
TRIAL PIT LOG

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

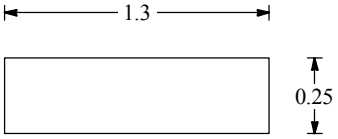
TRIAL PIT LOG

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

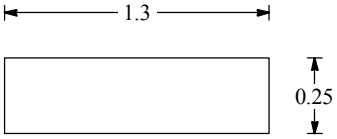
TRIAL PIT LOG

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

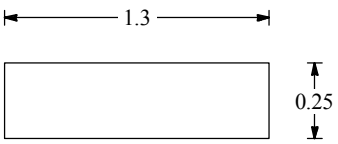
TRIAL PIT LOG

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

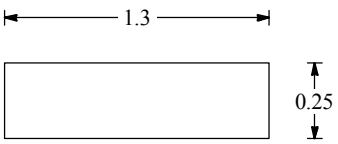
TRIAL PIT LOG

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

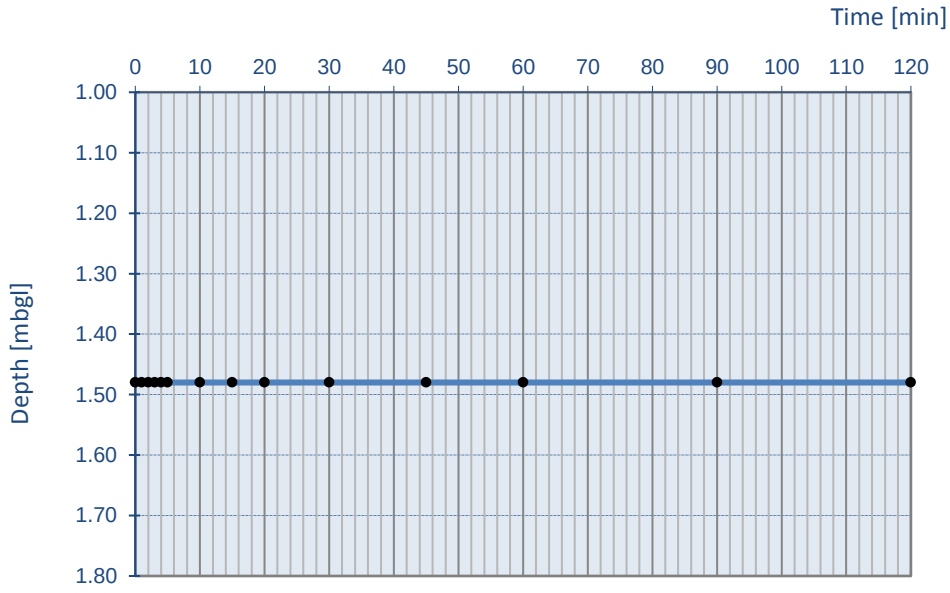
Borehole WS3

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

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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

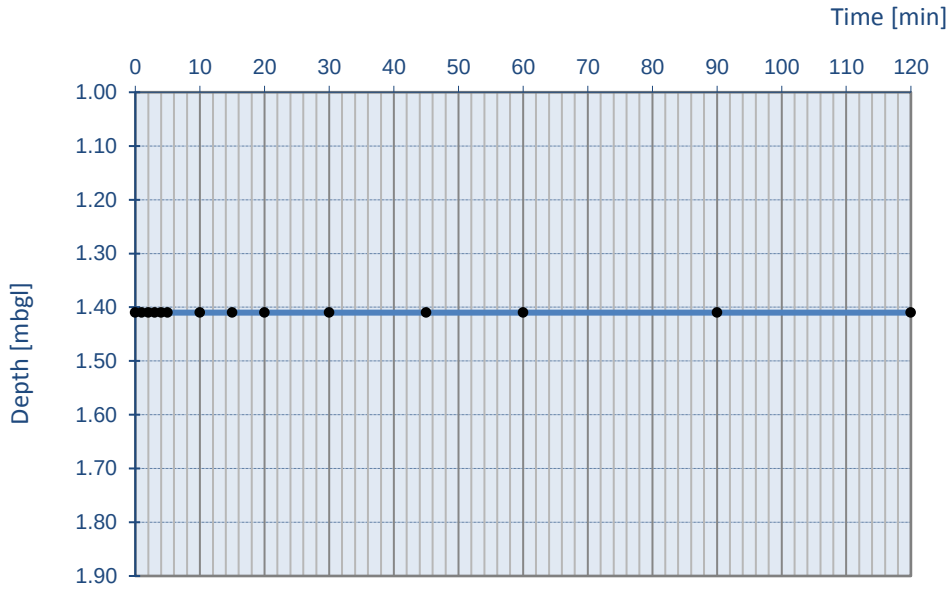
Borehole WS6

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

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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

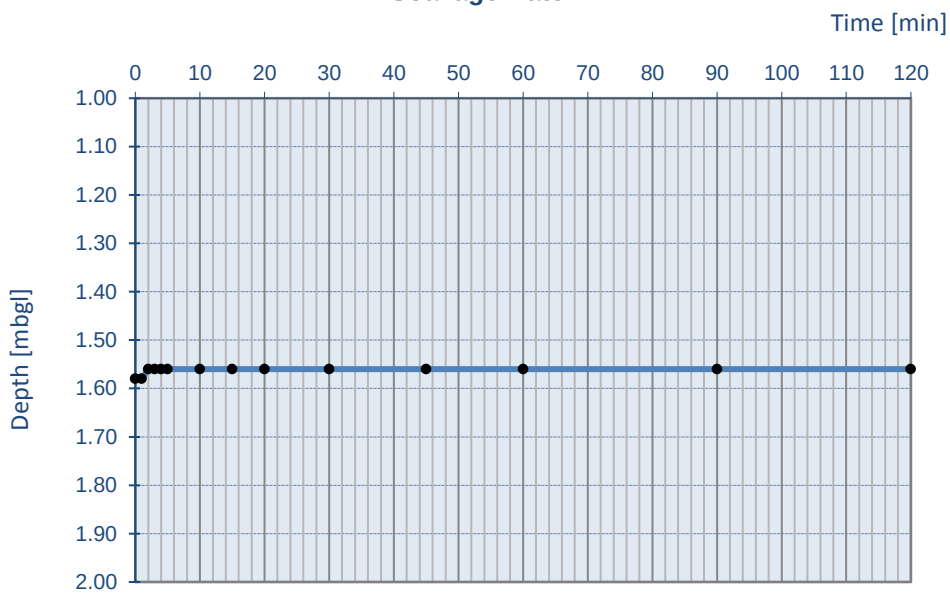
Borehole WS8

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

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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

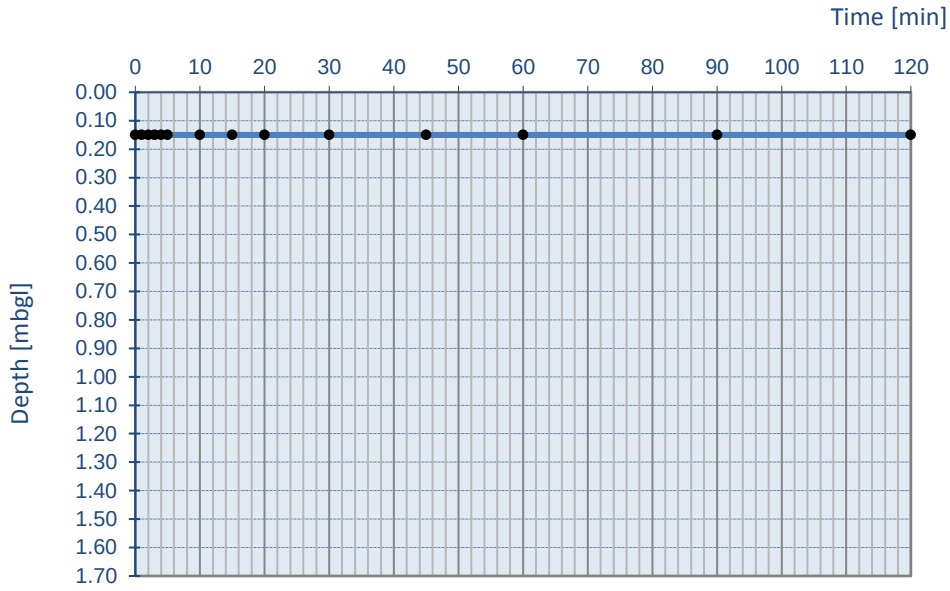
Borehole WS12

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

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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

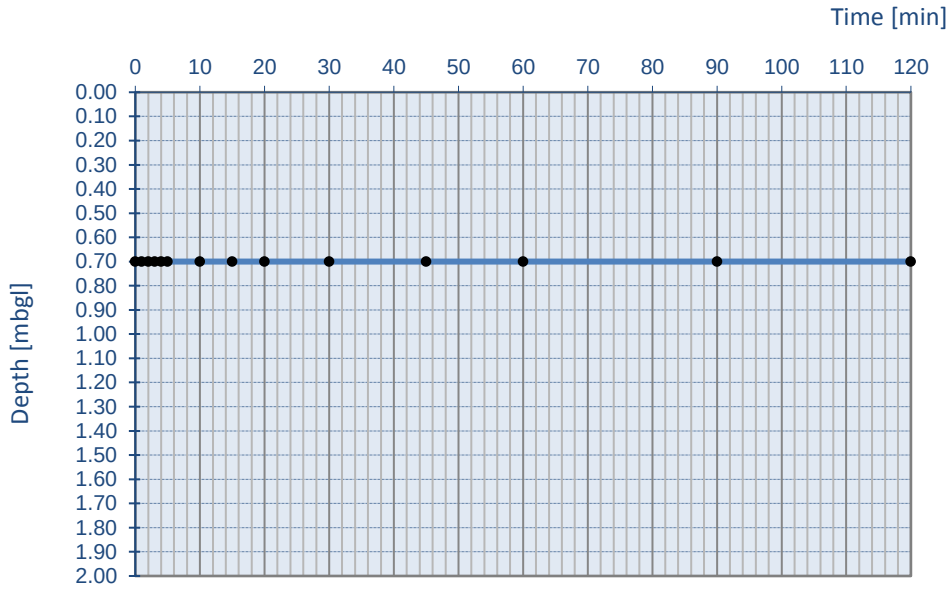
Borehole WS14

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

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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

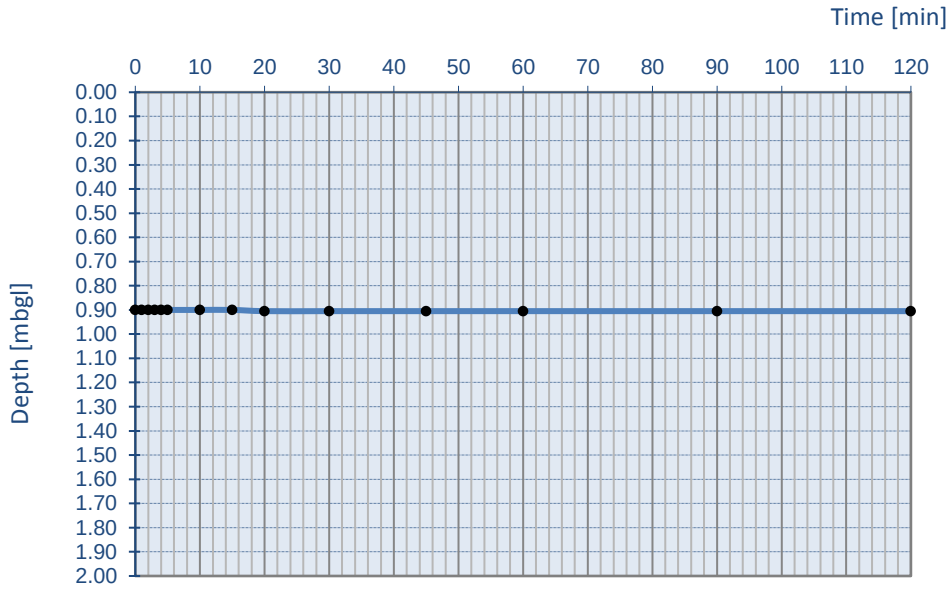
Borehole WS15

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

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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

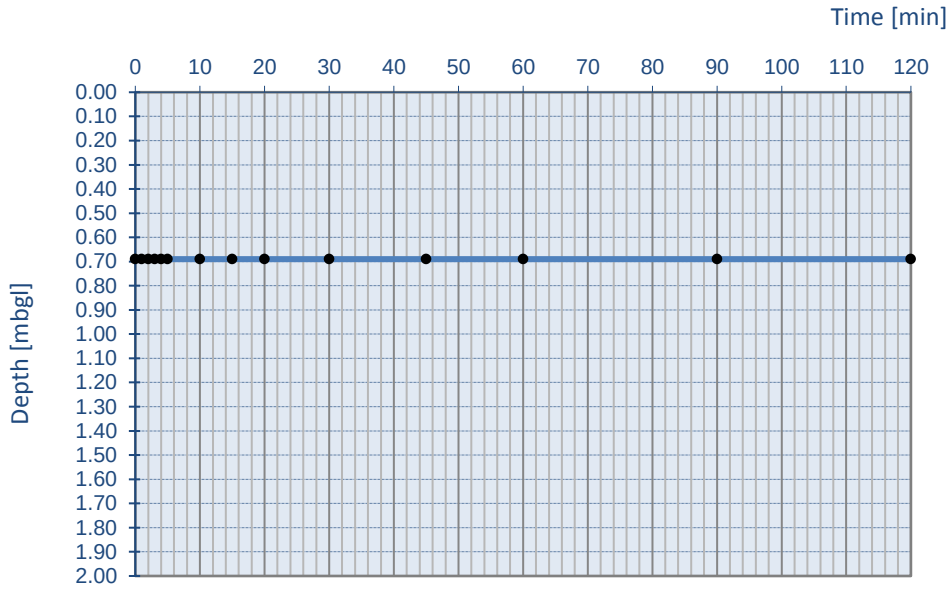
Borehole WSB

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

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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

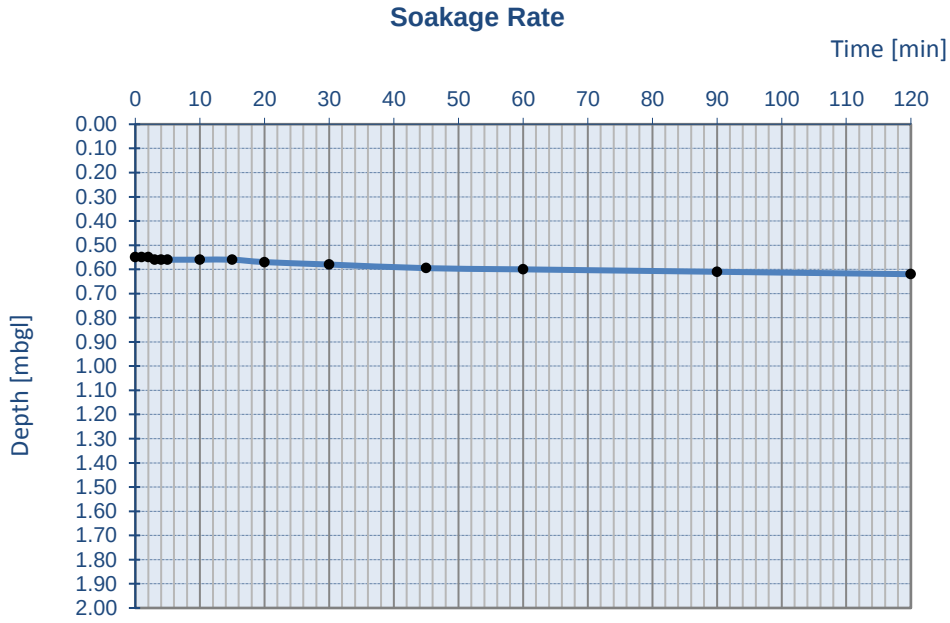
Infiltration Rate Calculations		
Parameter	Unit	Result
height		
h_{25}	[m]	0.9125
h_{75}	[m]	1.6375
h_{75}-h_{25}	[m]	0.725
time		
t_{75}	[s]	N/A
t_{25}	[s]	N/A
t_{75} - t_{25}	[s]	N/A
effective volume		
v_{75-25}	[m^3]	5.82E-03
effective area		
ap_{50}	[m^2]	2.38E-01
infiltration rate		
f	[m/s]	N/A

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

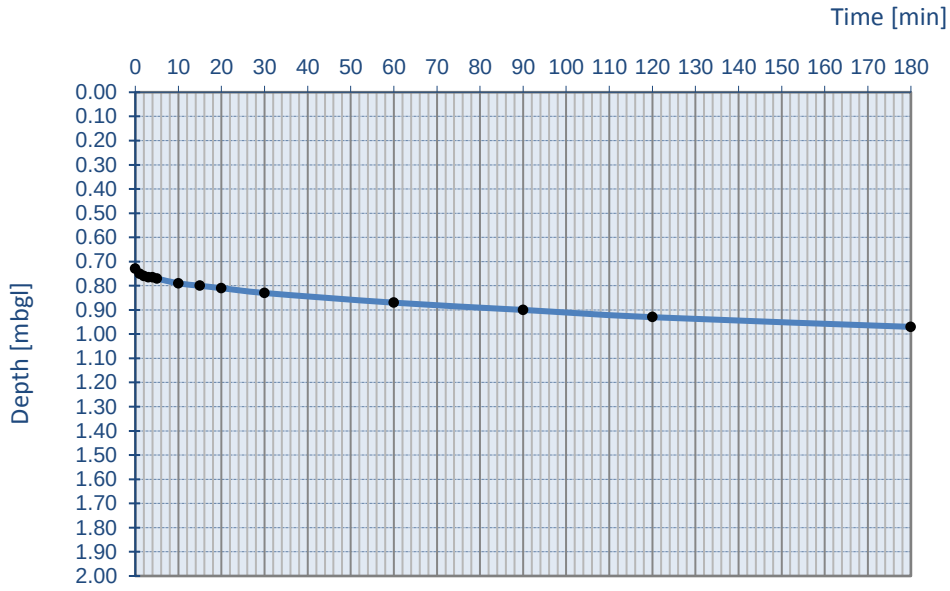
Borehole WSG

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

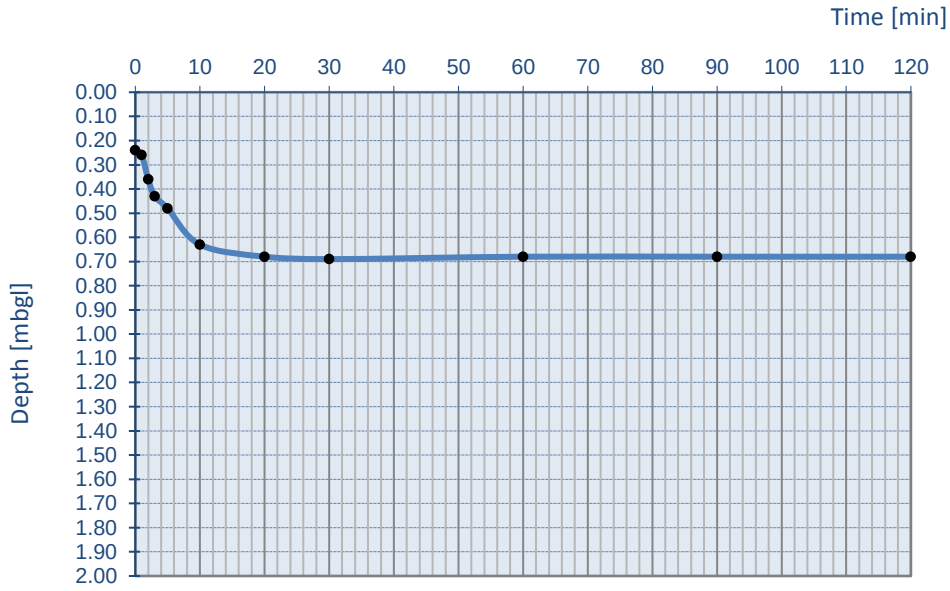
Borehole WSH

Run 1 of 1

Test Date 19/11/2014

Groundwater Encountered at: n/a

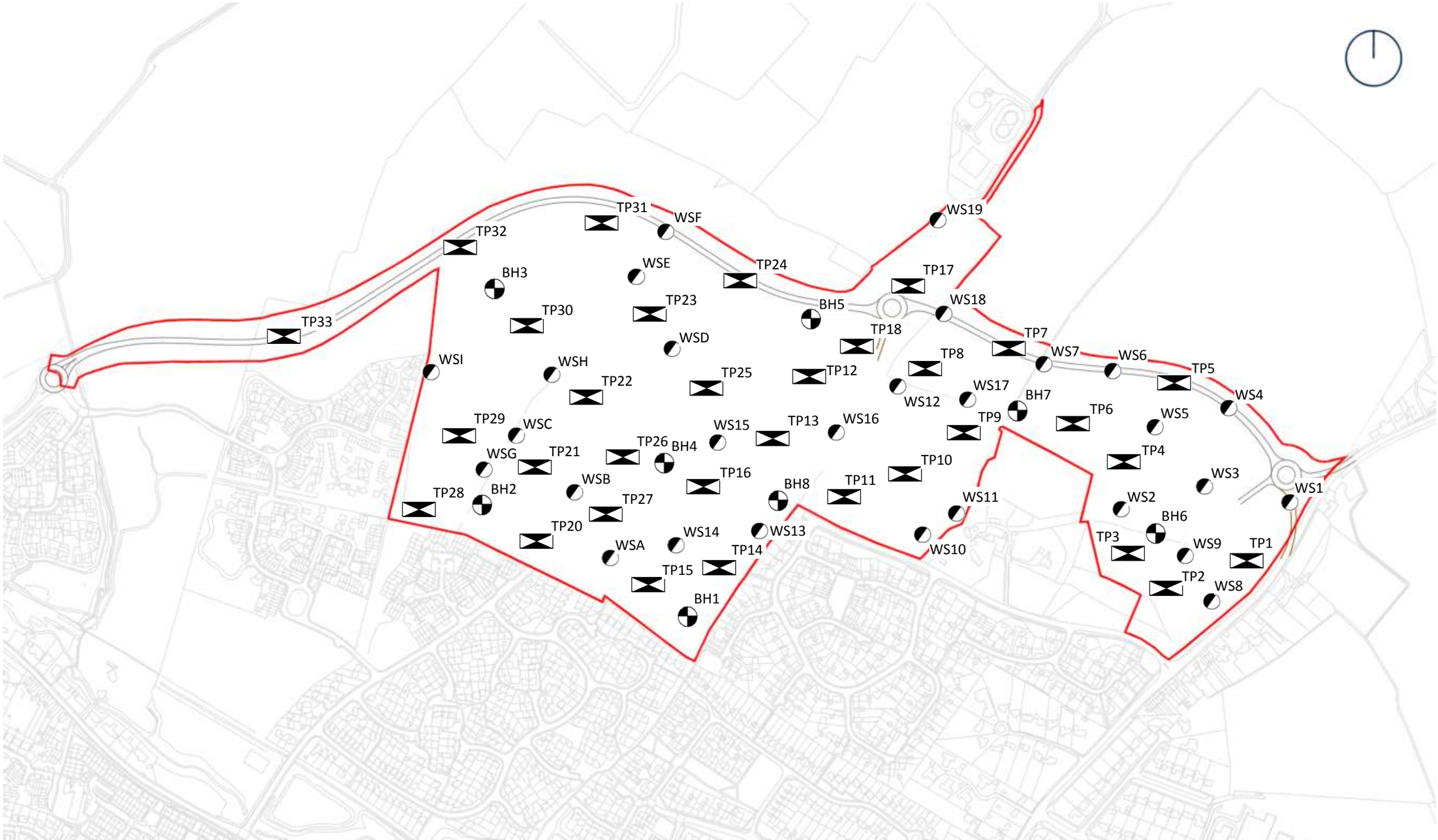
Soakage Rate



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

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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.