

②

AKSWard

AKSWard®

CONSTRUCTION CONSULTANTS

**Yeomans Limited
Worthing
Honda/Office/Peugeot**

Drainage Strategy
AKSW-XX-XX-RP-C-0005

Prepared for
Yeomans Ltd.

March 2019

Job №: S188010

Seacourt Tower West Way Oxford OX2 0JJ

LONDON • HITCHIN • OXFORD • POOLE • SOUTHAMPTON

Contents

Section 1.0	Introduction	Page 1
Section 2.0	Development Site Details	Page 1
Section 3.0	Site Drainage Strategy	Page 2
Section 4.0	Water Quality Management	Page 4

Appendices

Appendix A	Survey & Historic Information
Appendix B	Existing Drainage Calculations
Appendix C	Proposed Site Plans
Appendix D	Proposed Drainage Calculations
Appendix E	Surface Water Drainage Pro-Forma
Appendix F	SuDS Maintenance Schedule

Revision	Amendments	Prepared By	Checked	Date
P01	Preliminary	NJ	GT	09.02.18
P02	Minor amendments to car park surface	NJ	GT	15.02.18
P03	Infiltration tests included	NJ	GT	24.09.18
P04	Drainage revised following ground water monitoring results	NJ	GT	18.03.19
P05	Drainage revised following ground water monitoring results	NJ	GT	19.03.19

1.0 Introduction

- 1.1 AKS Ward have been commissioned to undertake a Drainage Strategy to support the planning application for the redevelopment of a new Honda Motor Dealership adjoining the existing Peugeot Dealership on site.
- 1.2 The proposals consist of a part 2-storey/part 1-storey building with associated external hard paving and car park.
- 1.3 The development is located at Littlehampton Rd, Ferring, Worthing and it is currently a developed site with 0.108 Hectares of impermeable area. The site is in Flood Zone 1 (low risk of fluvial flooding) and is 0.267 Hectares in area with 0.247 Hectares served by drainage therefore no flood risk assessment is required.
- 1.4 Proposed building will be bounded to the north by residential and industrial areas, to the west by Hangleton lane, to the south and east by the existing Peugeot Dealership.

2.0 Development Site Details

- 2.1 Development Description & Location
The site is located at NGR TQ 08916 03457.

The plans of the development are contained within Appendix B.



3.0 Site Drainage Strategy

3.1 Existing Surface Water

There is no information regarding the existing drainage on site therefore it has been assumed that current runoff water from the site soaks into the ground. During exceedance events when the ground is saturated, it is understood that the runoff volume would drain towards the east to Hangleton Lane. The existing car showroom adjacent to the new development is drained via soakaways and permeable paving.

BGS Boreholes near to the development indicate that the site is located on gravel and chalk layers. In addition, current parking areas within Peugeot Dealership are drained via permeable paving therefore it has been assumed infiltration is feasible on site.

Soakage tests have been carried out on site and the results vary between 1.542×10^{-6} m/s and 2.707×10^{-6} m/s. A value lower than 1×10^{-6} m/s was obtained in one of the tests although the site investigation company confirmed the test was left overnight therefore this value has been dismissed. Second infiltration tests were also carried out in winter (January 2019) and the results vary between 4.70×10^{-6} m/s and 5.26×10^{-5} m/s.

Infiltration rate of 1.542×10^{-6} m/s has been used as design value for the permeable paving calculations.

Ground water monitoring during winter has recorded the following ground water levels in December, January, February and March:

	December		January		February		March	
	Standing Water Level (mbgl)	AOD Levels	Standing Water Level (mbgl)	AOD Levels	Standing Water Level (mbgl)	AOD Levels	Standing Water Level (mbgl)	AOD Levels
WS102	2.26	47.69	2.16	47.79	2.14	47.81	--	--
WS103	2.44	47.53	2.2	47.77	2.16	47.81	1.55	48.42
WS104	2.41	47.52	2.17	47.76	2.05	47.88	1.61	48.32

Greenfield runoff rates and volumes have been calculated as follows:

Qbar: 1.0 l/s

Greenfield volume 1 in 100 year event: 58.681 m³

Topographical survey and BGS boreholes are contained in Appendix A. Microdrainage calculations are contained in Appendix B.

3.2 Proposed Surface Water

Surface water systems will be designed to agree with the National Standards for Sustainable Drainage.

Due to the high ground water level, it is not feasible to install an underground infiltration device therefore a new cellular attenuation tank with capacity of 71.35m³ will be installed under parking areas to attenuate and store runoff volume from new roof and hard paving located to the north of the building.

In addition to this, approximately 92m³ of storage in permeable sub-base under parking bays and access roads will drain and infiltrate runoff water from the new car park.

Surface water drainage has been designed with no flooding in the 30 year event and no flood water leaving the site for the 100 year + 40% climate change critical storm event.

Refer to drainage drawings and Microdrainage calculations in Appendix C and D. Surface Water Pro-forma has been completed with a copy contained in Appendix E to ensure that the design is in accordance with the current SuDS requirements.

3.2.1 Runoff Destination

Due to the ground condition obtained from BGS boreholes and site investigation, existing soil is considered permeable. However, due to the ground water levels, infiltration is only feasible on site at high level.

Surface water drainage from the new building and hard paving area to the north of the building will connect to a new cellular attenuation tank and flow control prior to discharging into the surface water sewer located in the public footpath along the southern boundary.

1030 m² of permeable sub-base under parking bays and access roads will drain the new car park and hard standing areas to the east of the building.

100 m² of new hard paving located to the south of the building will drain towards the existing permeable paving on site.

3.2.2 Peak flow control

SuDS will be utilised on site in the form of cellular attenuation tank and permeable paving. Flow rates off site will be restricted using pumping chamber to 2 l/s for all storms up to and including the 1 in 100 year rainfall event + 40% climate change.

Flow off the site for each storm:

1 year return period:	0.7 l/s
30 years return period:	2.0 l/s
100 years + 40% climate change return period:	2.0 l/s

3.2.3 Volume control

Cellular attenuation tank with capacity of 71.35m³ will be utilised to keep on site the additional discharge volume. This will be discharged at 2l/s therefore not increasing flood risk downstream.

The runoff volume discharged for 6 hour rainfall event from the site:

1 year return period:	6.934 m ³
30 years return period:	34.815 m ³
100 years return period:	48.999 m ³
100 years + 40% climate change return period:	67.697 m ³

3.2.4 Flood risk within the development.

The system will be designed in accordance with CIRIA SuDS manual with no flooding in the 30 year event and no flood water leaving the site for the 100 year + 40% climate change critical storm event.

3.2.5 Exceedance Events

In storm events exceeding the designed storm events above the 100 year + 40 % climate change the flow of water would run towards the west and discharge to Hangleton Lane.

3.2.6 Structural integrity and construction

Surface system will be designed and constructed using approved materials in line with Building Regulation's and current British Standards appropriate for the location and proposed use.

3.2.7 Maintenance and operation

The drainage system will be CCTV surveyed on completion to ensure that the system is fully operational and maintenance schedules provided in the O&M manual for the owner to maintain the dry swale and ring soakaways.

Maintenance schedules have been provided in Appendix F for the SuDS. The owner of the site will be responsible for maintaining the SuDS on site.

3.3 Existing and Proposed Foul Water.

New proposed foul drainage will connect to the existing private sewer located within the site. Workshop drains will be connected to the foul system via a Class II separator.

Foul water will discharge via gravity indirect connection into Southern Water foul sewer.

Any new foul drainage will be connected to public system and S106 connection applications made to Southern Water.

4.0 Water Quality Management

The surface system will be designed in order to not affect the water quality of the receiving groundwater.

CIRIA SuDS Manual Chapter 26 assigns pollution hazard indices for different land use types and SuDS mitigation index for every SuDS component depending on where the discharge is, surface or ground water.

TABLE 26.2 Pollution hazard indices for different land use classifications

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

TABLE 26.4 Indicative SuDS mitigation indices for discharges to groundwater				
Characteristics of the material overlying the proposed infiltration surface, through which the runoff percolates ^a	TSS	Metals	Hydrocarbons	
A layer of dense vegetation underlain by a soil with good contaminant attenuation potential ^b of at least 300 mm in depth ^c	0.6 ^a	0.5	0.6	
A soil with good contaminant attenuation potential ^b of at least 300 mm in depth ^c	0.4 ^a	0.3	0.3	
Infiltration trench (where a suitable depth of filtration material is included that provides treatment, ie graded gravel with sufficient smaller particles but not single size coarse aggregate such as 20 mm gravel) underlain by a soil with good contaminant attenuation potential ^b of at least 300 mm in depth ^c	0.4 ^a	0.4	0.4	
Constructed permeable pavement (where a suitable filtration layer is included that provides treatment, and including a geotextile at the base separating the foundation from the subgrade) underlain by a soil with good contaminant attenuation potential ^b of at least 300 mm in depth ^c	0.7	0.6	0.7	
Bioretention underlain by a soil with good contaminant attenuation potential ^b of at least 300 mm in depth ^c	0.8 ^a	0.6	0.8	
Proprietary treatment systems ^{a, c}	These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage areas.			

CIRIA SuDS Manual states that 'To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index that equals or exceeds the pollution hazard index'

Total SuDS mitigation index ≥ pollution hazard index
(for each contaminant type) (for each contaminant type)

Pollution hazard indices for land use are as follows:

Roof and hard standing areas:	TSS 0.3	Metals 0.2	Hydrocarbons 0.05
Non-residential car parking:	TSS 0.7	Metals 0.6	Hydrocarbons 0.7

SuDS mitigation indices are determined by the material overlaying the proposed infiltration surface. The proposals for this site are permeable paving therefore the indices are:

Permeable paving	TSS 0.7	Metals 0.6	Hydrocarbons 0.7
------------------	---------	------------	------------------

In addition to these SuDS, the channel drain sump boxes and catchpit installed upstream of cellular soakaway will retain suspended sediments therefore providing enough treatment for the surface water drained from the roof areas and hard standing located to the north of the proposed building.

Workshop drains will be connected to the foul system via a Class II separator.

Appendix A

Surveys & Historic Information



EXISTING
DEVELOPMENT



PROPOSED
DEVELOPMENT

This drawing is the property of AKSWard Limited. The drawing is issued on the condition that it is not copied, reproduced, retained or disclosed to any unauthorised person, either wholly or in part without the written consent of AKSWard Limited.
Do NOT scale from this drawing. AKSWard takes no responsibility for errors during photographic reproduction or printing. Any discrepancy's are to be reported to the engineer immediately.

GENERAL NOTES

- All setting out to be in accordance with the Architects drawings. Any discrepancies between the Engineers and the Architects drawings to be referred to the Architect before proceeding. Dimensions must not be scaled.
- All drainage to be installed in accordance with relevant Building Regulations documents and Current Sewers for Adoption where applicable.
- Connections to Public sewers to be agreed and inspected by Water Authority.
- Invert level, size and cover levels to existing manholes and sewers to be checked prior to any construction. Any discrepancies to be reported immediately.
- Invert to base of soil stack bends to be 450mm below lowest branch connection for up to 3 storeys buildings. For buildings up to 5 storeys the invert to base of soil stack bends should be not less than 750mm.
- All RWP and Foul Water drain point setting out is to be confirmed by Architect.
- All RWP & SVP sizes & setting out by Architect / M&E Engineer. All below ground connections to match above ground outlet size, Min 100/110mm diameter.
- Foul drains to project 100mm above finished floor level.
- All internal Manholes and Inspection Chambers to have double sealed recessed covers to suit floor finishes by Architect.
- All external covers in footpaths and roads in non tarmac areas to have recessed trays to suit the paving material.
- Refer to drainage specification for pipe materials.
- All pipework to be 100/110Ø UNO. Refer to note 7 connection sizes.
- All foul and surface water drainage stacks to have above ground rodding access, refer to above ground drainage layout by others.
- This drawing has been produced in colour and should be reproduced in colour for clarity.
- A CCTV Survey and report in WINCAN format for all new drainage will be required before the "As Built" drawings will be issued.

IDENTIFIES RISKS DURING THE CONSTRUCTION PROCESS ON THE DRAWINGS:

NOTE: The list below and notes on the drawing identify risks which are deemed to be unusual, abnormal, residual or unexpected to a competent contractor carrying out the works. These notes relate to risks which we have been unable to design out.

P01	Preliminary Issue	NJ	GT	09.02.18
Rev.	Amendment	Dn	Chkd	Date

Dwg. Status	Suitability
Preliminary	S2

AKSWard

CONSTRUCTION CONSULTANTS

Seacourt Tower West Way Oxford OX2 0JJ	☐ London ☐ Hitchin ☒ Oxford ☐ Southampton ☐ Birmingham
Tel: 01865 240071 Fax: 01865 248006 e-mail: oxford@aksward.com web: www.aksward.com	

Client **Yeomans Ltd**

Project **Yeomans Limited
Worthing
Honda/Office/Peugeot**

Title **Site Plan**

Reviewed Scheme	GT	Date	09.02.18
-----------------	----	------	----------

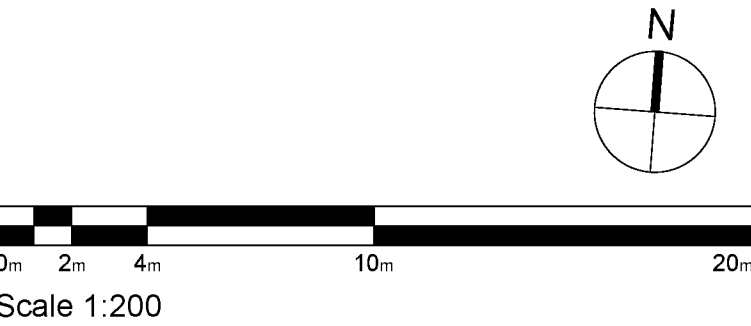
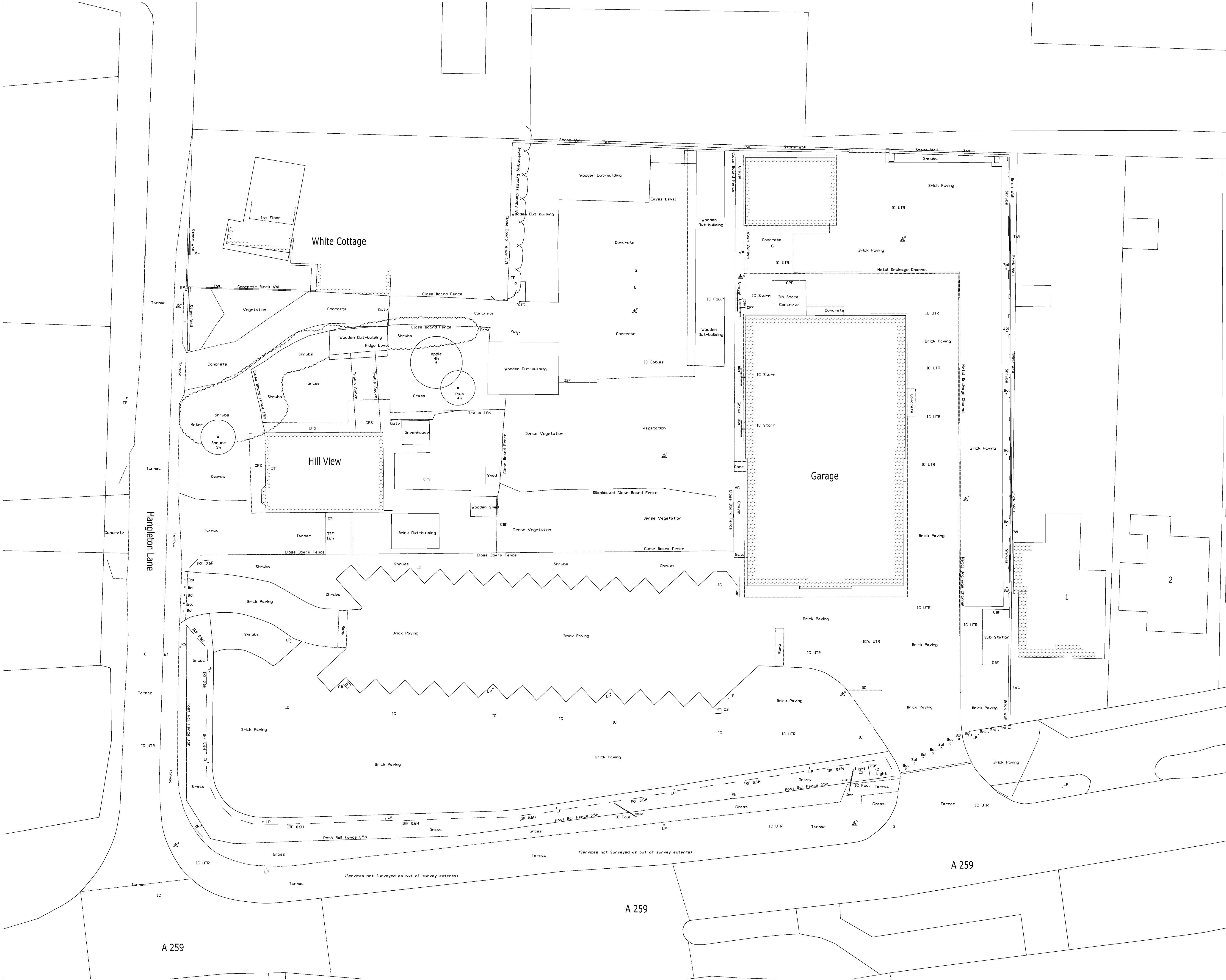
Reviewed Final	Date
----------------	------

Scales at A1	1:200	Project No.	S188010
--------------	-------	-------------	----------------

Project Ref.	Originator	Zone	Level	Type	Role	Dwg No.	Rev.
--------------	------------	------	-------	------	------	---------	------

AKSW XX GF DR C 9209 - P01

Rev	Amendments	By	Chkd	Date



- NOTES:**
- Site information based on OS map data & Topographical survey from Yeomans ref. '1643'. Extent of Red Line still TBC.
 - Preliminary layout for client discussion.
 - Assumes existing power/services sufficient for new building footprint.
 - All subject to full below ground services/utilities searches.

hnw
architects

HNW Architects, 61 North Street, Chichester, West Sussex, PO19 1NB
Telephone: 01243 533300 E-mail: hnw@hnw.co.uk www.hnw.co.uk

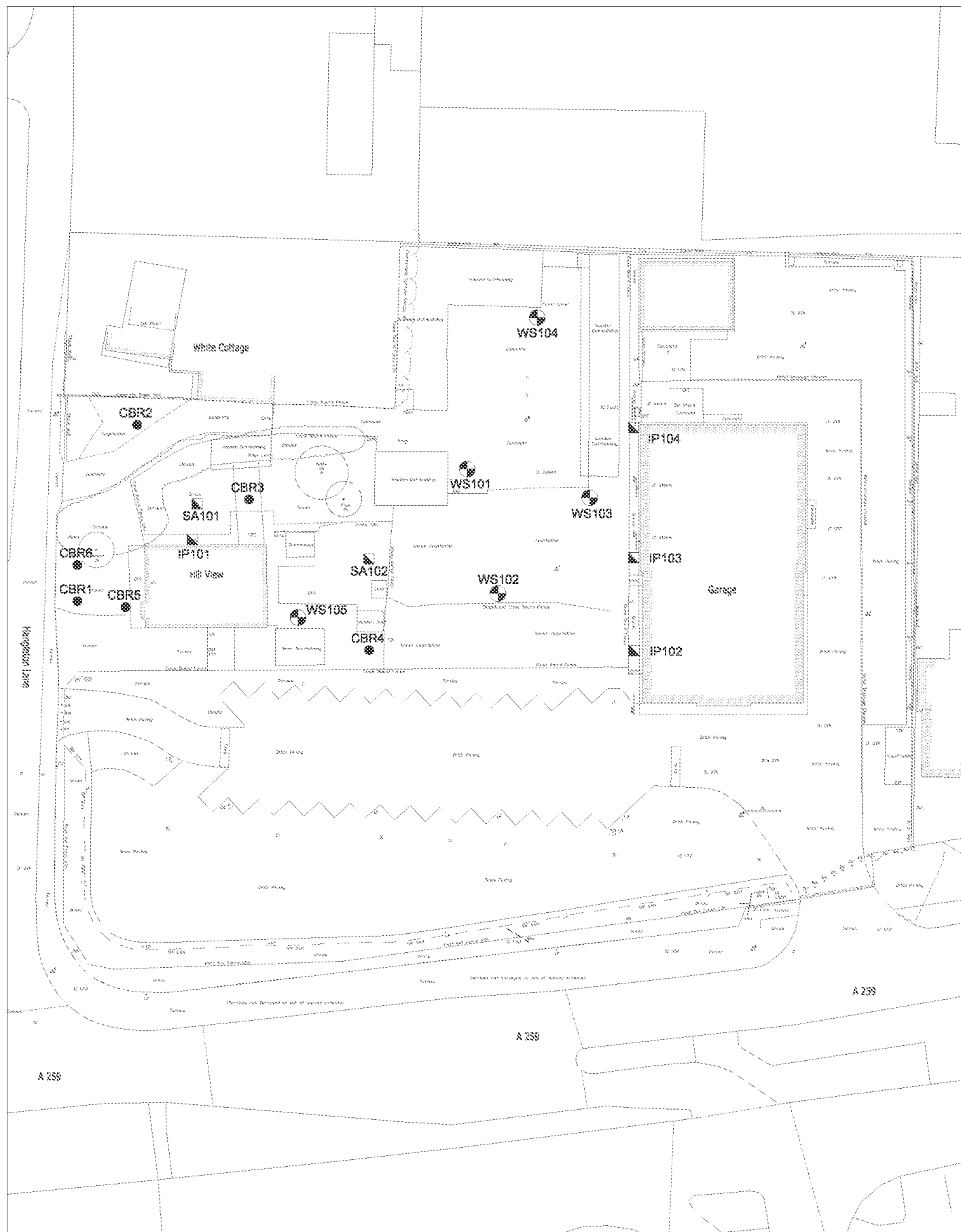
Project
**YEOMANS LIMITED
WORTHING
HONDA / OFFICE / PEUGEOT**

Drawing Title
**SITE PLAN
AS EXISTING**

Drawing Status	HNW Project No.
PRELIMINARY	17036
Scale	Revision
A1 - 1:200	-
Drawn By	Checked By
RPN	SD
Date	NOV 2017

Drawing Name
P151

HNW Architects Ltd - Registered No. 3589904 T0317



Ground Condition Consultants Ltd
10 Waldegrave Close Southampton SO19 9RY
Telephone 07971 450113
ask@groundcc.co.uk www.groundcc.co.uk

client
AKS WARD

site
YEOMANS HONDA, WORTHING

title
INVESTIGATION LOCATION PLAN

scale NTS drawn by AP checked by RP

date 28 JUN 2018 job no J18-035

drawing number
FIGURE 2

rev.
-

Soakaway Calculations

Soakaway Test No. SA101 - Test 1
 Contract: Yeoman's Honda
 Contract No. J18-035

Field Test

Depth of Pit 0.86 m
 Width of Pit 0.25 m
 Length of Pit 0.30 m
 Depth of Pit Soaked 0.40 m

ap50 0.295 m²
 Vp75-25 0.015 m³
 t75-25 549.5 min
 water used 0.0300 m³
 f 1.542E-06 m/sec.

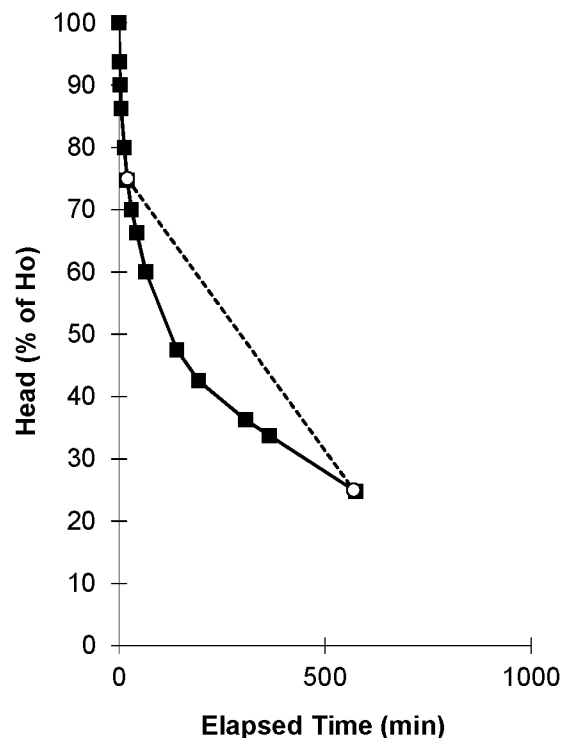
Trial Pit Log (include details of groundwater):

0.0-0.47m - Brown friable slightly clayey sandy gravelly SILT. Gravel is fine to medium angular chalk and angular to rounded flint.
 0.47-0.85m - Structureless CHALK composed of light brown to off-white sandy gravelly SILT with occasional cobbles. Gravel and cobbles are of angular to sub angular chalk and occasional angular to rounded flint.
 (Grade Dm)

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
0.46	0	100	0.40
0.49	1	94	0.38
0.50	3	90	0.36
0.52	5	86	0.35
0.54	13	80	0.32
0.56	20	75	0.30
0.58	30	70	0.28
0.60	43	66	0.27
0.62	65.0	60	0.24
0.67	140.0	48	0.19
0.69	193.0	43	0.17
0.72	307.0	36	0.15
0.73	365.0	34	0.14
0.76	575.0	25	0.10

T75 19.667 75
 T25 569.167 25
 T75-25 549.500 Derived from Best Fit



Comments

Final data point extrapolated due to slow infiltration. Therefore f value is indicative only.

GROUND CONDITION CONSULTANTS LTD

10 Waldegrave Close
 Southampton, SO19 9RY

Telephone: 07971 450113

Soakaway Calculations

Soakaway Test No. SA101 - Test 2
 Contract: Yeoman's Honda
 Contract No. J18-035

Field Test

Depth of Pit 0.85 m
 Width of Pit 0.25 m
 Length of Pit 0.30 m
 Depth of Pit Soaked 0.28 m

ap50 0.229 m²
 Vp75-25 0.0105 m³
 t75-25 282.3 min
 water used 0.0210 m³
 f 2.707E-06 m/sec.

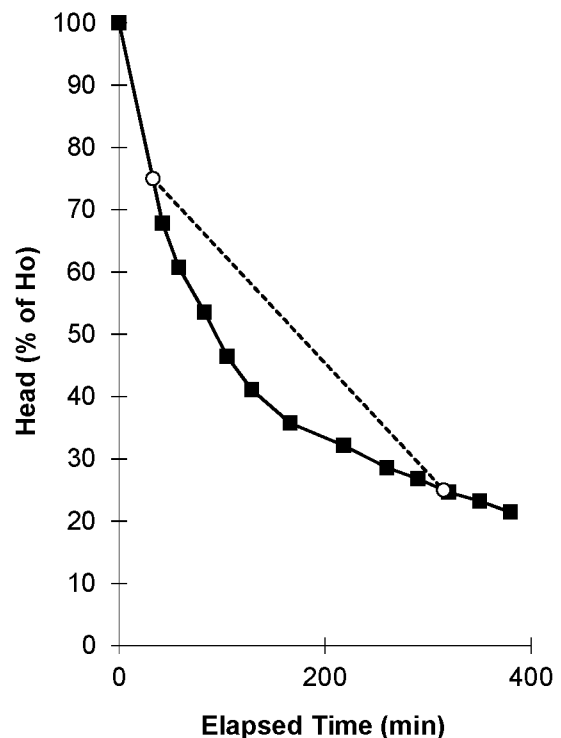
Trial Pit Log (include details of groundwater):

0.0-0.47m - Brown friable slightly clayey sandy gravelly SILT. Gravel is fine to medium angular chalk and angular to rounded flint.
 0.47-0.85m - Structureless CHALK composed of light brown to off-white sandy gravelly SILT with occasional cobbles. Gravel and cobbles are of angular to sub angular chalk and occasional angular to rounded flint.
 (Grade Dm)

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
0.57	0	100	0.28
0.66	42	68	0.19
0.68	58	61	0.17
0.70	83	54	0.15
0.72	105	46	0.13
0.74	129	41	0.12
0.75	166	36	0.10
0.76	218	32	0.09
0.77	260.0	29	0.08
0.78	290.0	27	0.08
0.78	320.0	25	0.07
0.79	350.0	23	0.06
0.79	380.0	21	0.06

T75 32.667 75
 T25 315.000 25
 T75-25 282.333 Derived from Best Fit



Comments

GROUND CONDITION CONSULTANTS LTD

10 Waldegrave Close
 Southampton, SO19 9RY

Telephone: 07971 450113

Soakaway Calculations

Soakaway Test No. SA101 - Test 3
 Contract: Yeoman's Honda
 Contract No. J18-035

Field Test

Depth of Pit 0.83 m
 Width of Pit 0.25 m
 Length of Pit 0.30 m
 Depth of Pit Soaked 0.26 m

ap50 0.21525 m²
 Vp75-25 0.0095625 m³
 t75-25 306.3 min
 water used 0.0191 m³
 f 2.418E-06 m/sec.

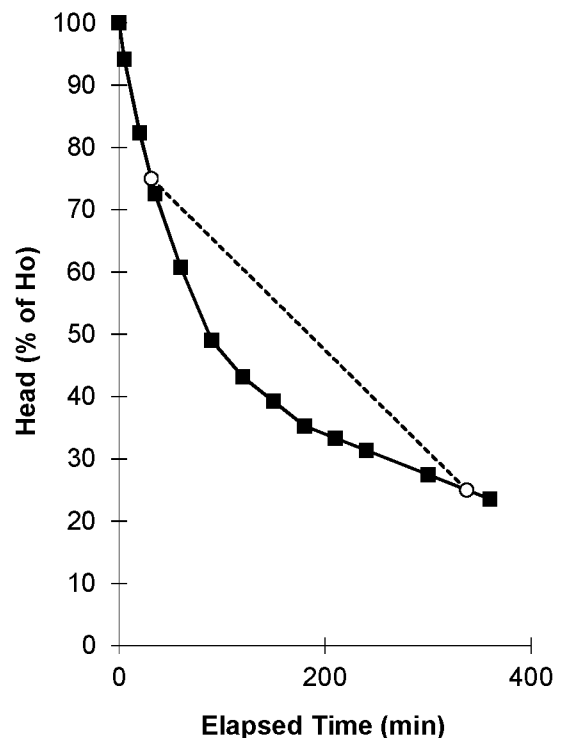
Trial Pit Log (include details of groundwater):

0.0-0.47m - Brown friable slightly clayey sandy gravelly SILT. Gravel is fine to medium angular chalk and angular to rounded flint.
 0.47-0.85m - Structureless CHALK composed of light brown to off-white sandy gravelly SILT with occasional cobbles. Gravel and cobbles are of angular to sub angular chalk and occasional angular to rounded flint.
 (Grade Dm)

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
0.58	0	100	0.26
0.59	5	94	0.24
0.62	20	82	0.21
0.65	35	73	0.19
0.68	60	61	0.16
0.71	90	49	0.13
0.72	120	43	0.11
0.73	150	39	0.10
0.74	180.0	35	0.09
0.75	210.0	33	0.09
0.75	240.0	31	0.08
0.76	300.0	27	0.07
0.77	360.0	24	0.06

T75 31.250 75
 T25 337.500 25
 T75-25 306.250 Derived from Best Fit



Comments

GROUND CONDITION CONSULTANTS LTD

10 Waldegrave Close
 Southampton, SO19 9RY

Telephone: 07971 450113

Soakaway Calculations

Soakaway Test No. SA102 - Test 1
 Contract: Yeoman's Honda
 Contract No. J18-035

Field Test

Depth of Pit 0.90 m
 Width of Pit 0.30 m
 Length of Pit 0.35 m
 Depth of Pit Soaked 0.37 m

ap50 0.34225 m²
 Vp75-25 0.0191625 m³
 t75-25 1186.5 min
 water used 0.0383 m³
 f 7.865E-07 m/sec.

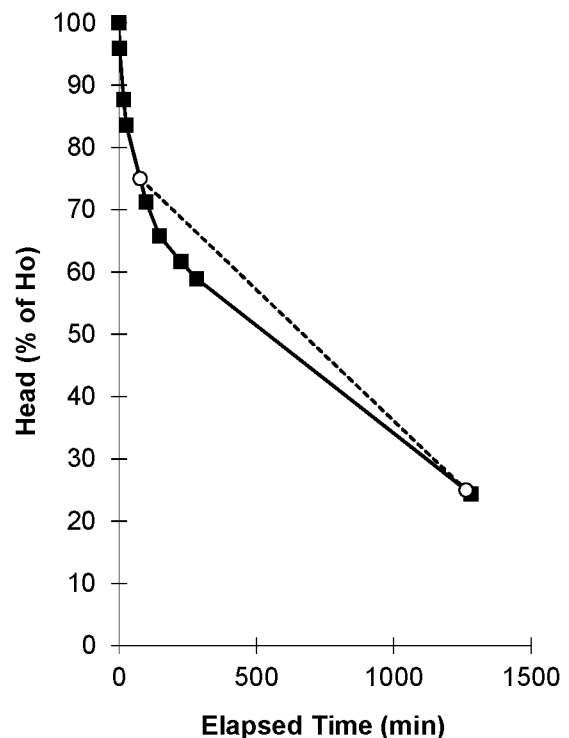
Trial Pit Log (include details of groundwater):

0.0-0.40m - Brown friable slightly clayey sandy gravelly SILT. Gravel is fine to medium angular chalk and angular to rounded flint. 0.40
 0.60m - Light brown sandy gravelly SILT. Gravel is fine to medium subangular to rounded chalk and flint.
 0.60-0.90m - Structureless CHALK composed of light brown to off-white sandy gravelly SILT with occasional cobbles. Gravel and cobbles are of angular to sub angular chalk and occasional angular to rounded flint. (Grade Dm)

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
0.54	0	100	0.37
0.55	2	96	0.35
0.58	17	88	0.32
0.60	26	84	0.31
0.64	99	71	0.26
0.66	148	66	0.24
0.68	226	62	0.23
0.69	283	59	0.22
0.81	1281.0	24	0.09

T75 76.694 75
 T25 1263.179 25
 T75-25 1186.484 Derived from Best Fit



Comments

GROUND CONDITION CONSULTANTS LTD

10 Waldegrave Close
 Southampton, SO19 9RY

Telephone: 07971 450113

Soakaway Calculations

Soakaway Test No. SA102 - Test 2
Contract: Yeoman's Honda
Contract No. J18-035

Field Test

Depth of Pit 0.86 m
Width of Pit 0.30 m
Length of Pit 0.35 m
Depth of Pit Soaked 0.42 m

ap50 0.378 m²
Vp75-25 0.02205 m³
t75-25 365.9 min
water used 0.0441 m³
f 2.657E-06 m/sec.

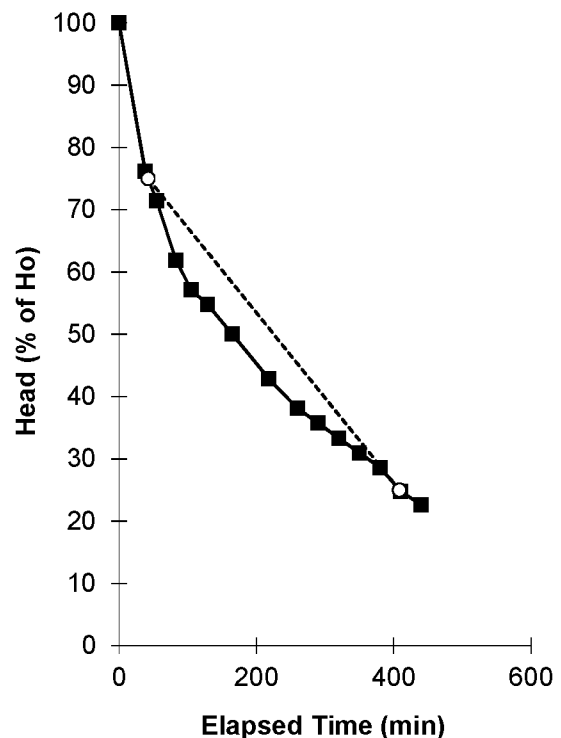
Trial Pit Log (include details of groundwater):

0.0-0.40m - Brown friable slightly clayey sandy gravelly SILT. Gravel is fine to medium angular chalk and angular to rounded flint. 0.40
0.60m - Light brown sandy gravelly SILT. Gravel is fine to medium subangular to rounded chalk and flint.
0.60-0.90m - Structureless CHALK composed of light brown to off-white sandy gravelly SILT with occasional cobbles. Gravel and cobbles are of angular to sub angular chalk and occasional angular to rounded flint. (Grade Dm)

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
0.44	0	100	0.42
0.54	38	76	0.32
0.56	55	71	0.30
0.60	83	62	0.26
0.62	105	57	0.24
0.63	129	55	0.23
0.65	165	50	0.21
0.68	218	43	0.18
0.70	260.0	38	0.16
0.71	290.0	36	0.15
0.72	320.0	33	0.14
0.73	350.0	31	0.13
0.74	380.0	29	0.12
0.76	410.0	25	0.10
0.77	440.0	23	0.10

T75 42.250 75
T25 408.125 25
T75-25 365.875 Derived from Best Fit



Comments

GROUND CONDITION CONSULTANTS LTD

10 Waldegrave Close
Southampton, SO19 9RY

Telephone: 07971 450113

Soakaway Calculations

Soakaway Test No. SA102 - Test 3
 Contract: Yeoman's Honda
 Contract No. J18-035

Field Test

Depth of Pit 0.86 m
 Width of Pit 0.30 m
 Length of Pit 0.35 m
 Depth of Pit Soaked 0.34 m

ap50 0.326 m²
 Vp75-25 0.01785 m³
 t75-25 505.0 min
 water used 0.0357 m³
 f 1.807E-06 m/sec.

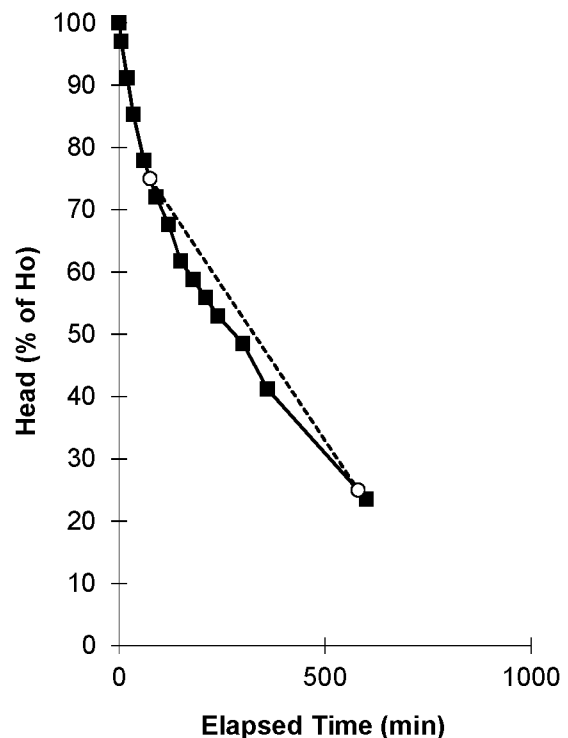
Trial Pit Log (include details of groundwater):

0.0-0.40m - Brown friable slightly clayey sandy gravelly SILT. Gravel is fine to medium angular chalk and angular to rounded flint. 0.40
 0.60m - Light brown sandy gravelly SILT. Gravel is fine to medium subangular to rounded chalk and flint.
 0.60-0.90m - Structureless CHALK composed of light brown to off-white sandy gravelly SILT with occasional cobbles. Gravel and cobbles are of angular to sub angular chalk and occasional angular to rounded flint. (Grade Dm)

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
0.52	0	100	0.34
0.53	5	97	0.33
0.55	20	91	0.31
0.57	35	85	0.29
0.60	60	78	0.27
0.62	90	72	0.25
0.63	120	68	0.23
0.65	150	62	0.21
0.66	180.0	59	0.20
0.67	210.0	56	0.19
0.68	240.0	53	0.18
0.70	300.0	49	0.17
0.72	360.0	41	0.14
0.78	600.0	24	0.08

T75 75.000 75
 T25 580.000 25
 T75-25 505.000 Derived from Best Fit



Comments

Final data point extrapolated due to slow infiltration. Therefore f value is indicative only.

GROUND CONDITION CONSULTANTS LTD

10 Waldegrave Close
 Southampton, SO19 9RY

Telephone: 07971 450113

BOREHOLE LOG WS101

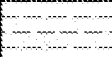
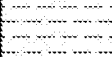
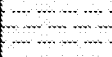
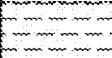
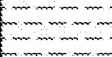
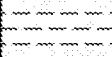
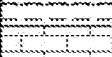
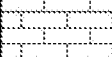
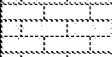
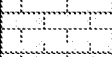
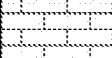
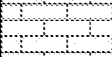
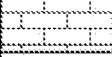
PROJECT NUMBER J18-035
PROJECT NAME Yeomans Honda
CLIENT AKS Ward
ADDRESS Worthing
DRILLING DATE 26/06/18

DRILLING COMPANY South Coast Drilling
DRILLING METHOD Windowless Sampling
DRILL RIG Terrier Mk2
LOGGED BY RP

COMPLETION

CASING

COMMENTS

Depth (m)	Samples	SPT N	Water	Graphic Log	Material Description	Well Installation
0.2	ES1 - 0.2-0.4				Firm brown silty slightly gravelly CLAY. Gravel is fine to medium sub-angular chalk (TOPSOIL)	
0.4					Stiff dark brown very clayey slightly gravelly SILT. Gravel is fine to coarse sub-angular to rounded flint	
0.6	B1 - 0.5-0.7					
0.8						
1.0		N = 17				
1.2					Stiff light brown very silty very gravelly CLAY. Gravel is fine sub-angular chalk and fine to coarse angular to rounded flint.	
1.4						
1.6	ES2 - 1.5-1.6					
1.8						
2.0		N = 20				
2.2	B2 - 2.1-2.5					
2.4						
2.6					Structureless CHALK composed of light brown to off-white sandy gravelly SILT with occasional cobbles. Gravel and cobbles are of angular to sub angular chalk and occasional angular to rounded flint. (Grade Dm)	
2.8						
3.0		N = 27				
3.2	B3 - 3.2-4					
3.4						
3.6						
3.8						
4.0					Termination Depth at: 4.0 m	
4.2						
4.4						
4.6						
4.8						
5.0						
5.2						
5.4						

BOREHOLE LOG WS102

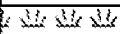
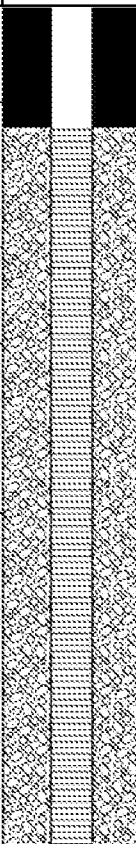
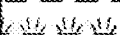
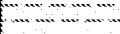
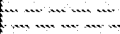
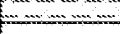
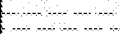
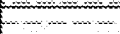
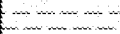
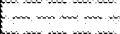
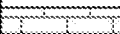
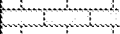
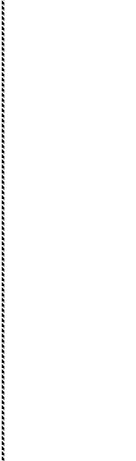
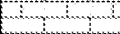
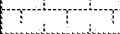
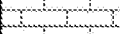
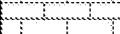
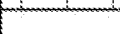
PROJECT NUMBER J18-035
PROJECT NAME Yeomans Honda
CLIENT AKS Ward
ADDRESS Worthing
DRILLING DATE 26/06/18

DRILLING COMPANY South Coast Drilling
DRILLING METHOD Windowless Sampling
DRILL RIG Terrier Mk2
LOGGED BY RP

COMPLETION

CASING

COMMENTS Refusal at 3.5m

Depth (m)	Samples	SPT N	Water	Graphic Log	Material Description	Well Installation
0.2					Brown mulched wood chippings	
0.4						
0.6	ES1 - 0.5-0.6				Soft to firm dark brown slightly silty gravelly CLAY. Gravel is fine to medium sub-angular chalk.	
0.8						
1.0		N = 8			Soft brown slightly silty slightly gravelly CLAY. Gravel is fine to coarse sub-angular to rounded flint	
1.2						
1.4						
1.6	L1 - 1.5-2.0				Firm light brown very silty very gravelly CLAY. Gravel is fine sub-angular chalk and fine to coarse angular to rounded flint.	
1.8						
2.0		N = 25				
2.2						
2.4					Structureless CHALK composed of light brown to off-white sandy gravelly SILT with occasional cobbles. Gravel and cobbles are of angular to sub angular chalk and occasional angular to rounded flint. (Grade Dm)	
2.6	B2 - 2.5-3.0					
2.8						
3.0		N = 50				
3.2						
3.4						
3.6					Termination Depth at: 3.5 m	
3.8						
4.0						
4.2						
4.4						
4.6						
4.8						
5.0						
5.2						
5.4						

BOREHOLE LOG WS103

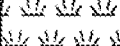
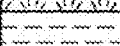
PROJECT NUMBER J18-035
PROJECT NAME Yeomans Honda
CLIENT AKS Ward
ADDRESS Worthing
DRILLING DATE 26/06/18

DRILLING COMPANY South Coast Drilling
DRILLING METHOD Windowless Sampling
DRILL RIG Terrier Mk2
LOGGED BY RP

COMPLETION

CASING

COMMENTS

Depth (m)	Samples	SPT N	Water	Graphic Log	Material Description	Well Installation
0.2					Brown mulched wood chippings	
0.4	ES1 - 0.4-0.5				Firm to stiff dark brown slightly silty gravelly CLAY. Gravel is fine to coarse sub-angular to rounded chalk.	
0.6						
0.8	B1 - 0.7-1.0					
1.0		N = 11				
1.2	ES2 - 1.2-1.3					
1.4						
1.6					Soft light brown very silty slightly gravelly CLAY. Gravel is fine sub-angular chalk.	
1.8	B2 - 1.6-2.0				Structureless CHALK composed of light brown to off-white sandy gravelly SILT with occasional cobbles. Gravel and cobbles are of angular to sub angular chalk and occasional angular to rounded flint. (Grade Dm)	
2.0		N = 25				
2.2					Hydrocarbon staining and slight odour at 2.8-3.0m	
2.4						
2.6						
2.8	ES3 - 2.8-3.0					
3.0		N = 40				
3.2						
3.4						
3.6	B3 - 3.5-4.0					
3.8						
4.0						
4.2	ES4 - 4.2-4.4					
4.4						
4.6						
4.8						
5.0					Termination Depth at: 5.0 m	
5.2						
5.4						

BOREHOLE LOG WS104

PROJECT NUMBER J18-035
PROJECT NAME Yeomans Honda
CLIENT AKS Ward
ADDRESS Worthing
DRILLING DATE 26/06/18

DRILLING COMPANY South Coast Drilling
DRILLING METHOD Windowless Sampling
DRILL RIG Terrier Mk2
LOGGED BY RP

COMPLETION

CASING

COMMENTS

Depth (m)	Samples	SPT N	Water	Graphic Log	Material Description	Well Installation
0.2					Concrete	
0.4	ES1 - 0.4-0.5				Soft to firm brown slightly silty gravelly CLAY with hydrocarbon odour. Gravel is fine to coarse sub-angular to rounded chalk.	
0.6						
0.8	B1 - 0.7-1.0					
1.0		N = 17				
1.2						
1.4	ES2 - 1.4-1.8				Firm brown grey slightly gravelly CLAY with hydrocarbon odour. Gravel is fine to coarse sub-angular chalk.	
1.6						
1.8	B2 - 1.8-2.1	N = 34			Structureless CHALK composed of light brown to grey and off-white sandy gravelly SILT with occasional cobbles. Gravel and cobbles are of angular to sub angular chalk and occasional angular to rounded flint. (Grade Dm)	
2.0						
2.2						
2.4					Hydrocarbon staining and odour to 3.7m	
2.6						
2.8						
3.0						
3.2						
3.4						
3.6						
3.8						
4.0						
4.2						
4.4						
4.6						
4.8						
5.0					Termination Depth at: 5.0 m	
5.2						
5.4						

BOREHOLE LOG WS105

PROJECT NUMBER J18-035	DRILLING COMPANY South Coast Drilling
PROJECT NAME Yeomans Honda	DRILLING METHOD Windowless Sampling
CLIENT AKS Ward	DRILL RIG Terrier Mk2
ADDRESS Worthing	LOGGED BY RP
DRILLING DATE 26/06/18	

COMPLETION	CASING
-------------------	---------------

COMMENTS

Depth (m)	Samples	SPT N	Water	Graphic Log	Material Description	Well Installation
0.2					Concrete	
0.4	ES1 - 0.3-0.4				Stiff brown CLAY with brick and concrete fragments (Made Ground). Stiff dark brown slightly gravelly CLAY. Gravel is fine to coarse sub-angular chalk and flint.	
0.6						
0.8						
1.0		N = 14				
1.2	ES2 - 1.1-1.2				Firm to stiff light brown slightly silty gravelly CLAY. Gravel is fine to coarse sub rounded chalk.	
1.4						
1.6						
1.8						
2.0						
2.2						
2.4						
2.6						
2.8						
3.0					Termination Depth at: 3.0 m	
3.2						
3.4						
3.6						
3.8						
4.0						
4.2						
4.4						
4.6						
4.8						
5.0						
5.2						
5.4						

Ref: J18-081-R01

Date: 7th January 2019

FAO: Mr Kevin Conlon
Yeomans Ltd
c/o HNW Architects Ltd.
61 North Street,
Chichester,
West Sussex,
PO19 1NB

Dear Kevin,

Re: Infiltration Testing – Yeoman Honda, Littlehampton Road, Worthing

GCC was commissioned by HNV Architects on behalf of Yeoman Ltd in December 2018 to undertake infiltration testing to support the proposed commercial development at the above site.

Three trial-pits (SA201, SA202 and TP203) were excavated on the 2nd January 2019 at the site (locations shown on Figure 1) and SA201 and SA202 were subsequently filled with water in order to undertake the infiltration testing in general accordance with the principals of BRE365. The infiltration rates allowed three fills in one day in SA202 (2nd January) and over 3 days in SA201 (2nd, 3rd and 4th January). The infiltration calculations sheets are presented in Appendix A and the rates are summarised below.

Location	Stratum	Trial Pit Base Depth	Infiltration Rate (m/sec)	Notes
SA201 Test 1	USD/UWC	1.24	7.36×10^{-6}	Three tests conducted
SA201 Test 2		1.20	4.96×10^{-6}	
SA201 Test 3		1.17	4.70×10^{-6}	
SA202 Test 1	USD/UWC	1.30	5.14×10^{-5}	Three tests conducted
SA202 Test 2		1.30	4.80×10^{-5}	
SA202 Test 3		1.30	5.26×10^{-5}	

Reference to the British Geological Survey (BGS) maps and previous investigations indicates the site to directly Topsoil overlying Undifferentiated Superficial Deposits over the Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation, Culver Chalk Formation and Portsdown Chalk Formation (Undifferentiated) subsequently referred to Undifferentiated White Chalk (UWC).

The infiltration tests were conducted within the Undifferentiated Superficial Deposits and very weathered Undifferentiated White Chalk. The ground conditions encountered for SA201 and SA202 are presented on the calculation sheets in Appendix A. TP203 was excavated to determine if more advantageous ground conditions were present to facilitate infiltration and encountered 0.2m of topsoil over firm orange brown silty slightly gravelly Clay to 1.3mbgl. Infiltration testing was not undertaken in TP203.



Groundwater was not encountered in any of the soakaway trial pits excavated. The water levels in the wells located to the east of the infiltration test locations were measured to be between 2.16m and 2.20mbgl. A target depth of 1.2-1.3mbgl was therefore chosen for the infiltration tests.

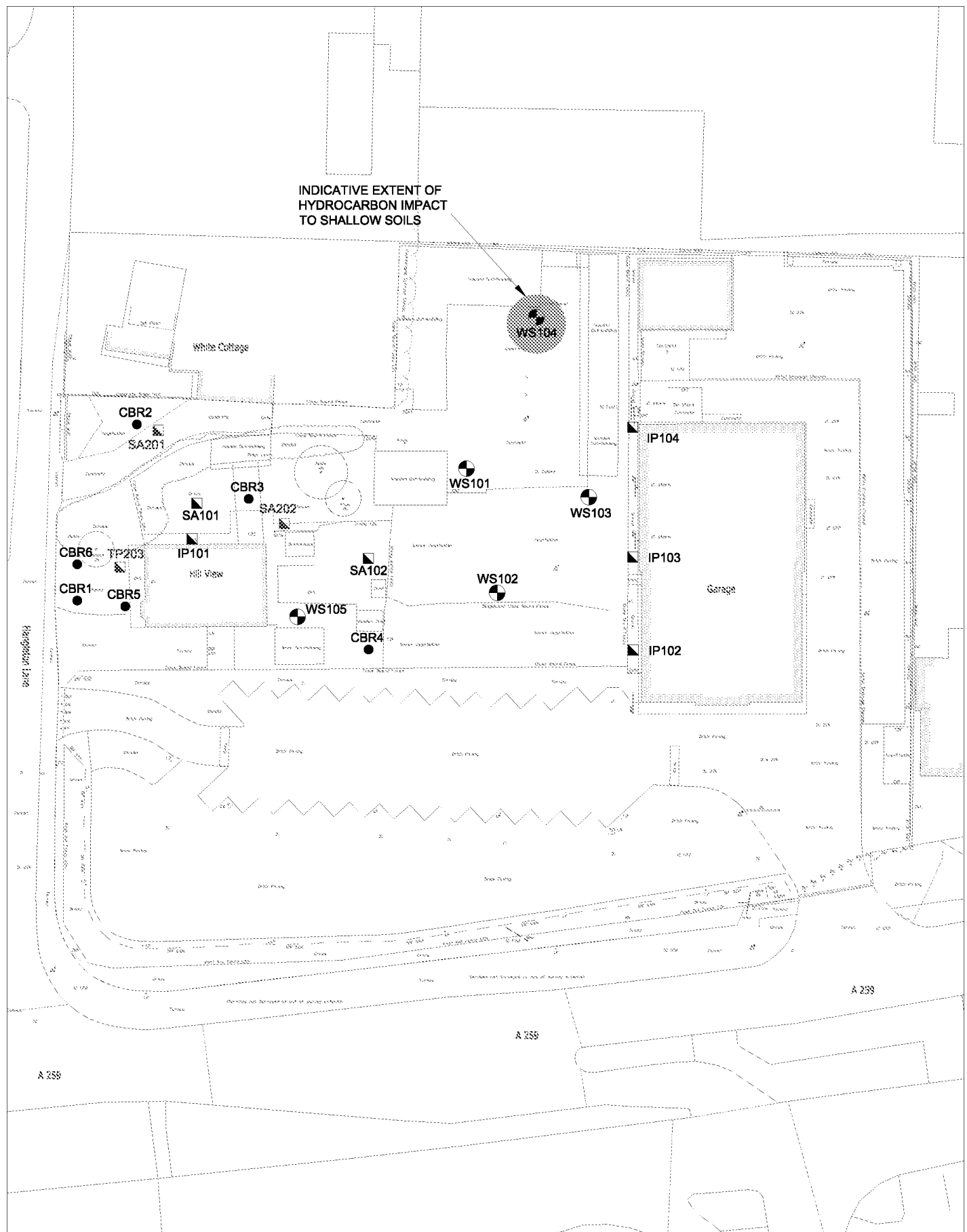
Yours sincerely

A large black rectangular box redacting the signature area of the letter.

ANTONY PLATT
Director
For Ground Condition Consultants Ltd

RASMUS PALMGREN
Director
For Ground Condition Consultants Ltd

Encl: Figure 1: Location plan
Appendix A: Soakage test data



Ground Condition Consultants Ltd
10 Waldegrave Close Southampton SO19 9RY
Telephone 07971 450113
ask@groundcc.co.uk www.groundcc.co.uk

client
YEOMAN LTD

site
YEOMANS HONDA, WORTHING

title
INVESTIGATION LOCATION PLAN

scale	NTS	drawn by	AP	checked by	RP
date	07 JAN 2019	job no	J18-081		
drawing number	FIGURE 1			rev.	-

Soakaway Calculations

Soakaway Test No. SA201 - Test 1
 Contract: Yeoman's Honda
 Contract No. J18-035

Field Test

Depth of Pit 1.24 m
 Width of Pit 0.40 m
 Length of Pit 1.70 m
 Depth of Pit Soaked 0.59 m

ap50 1.919 m²
 Vp75-25 0.2006 m³
 t75-25 236.9 min
 water used 0.4012 m³
 f 7.355E-06 m/sec.

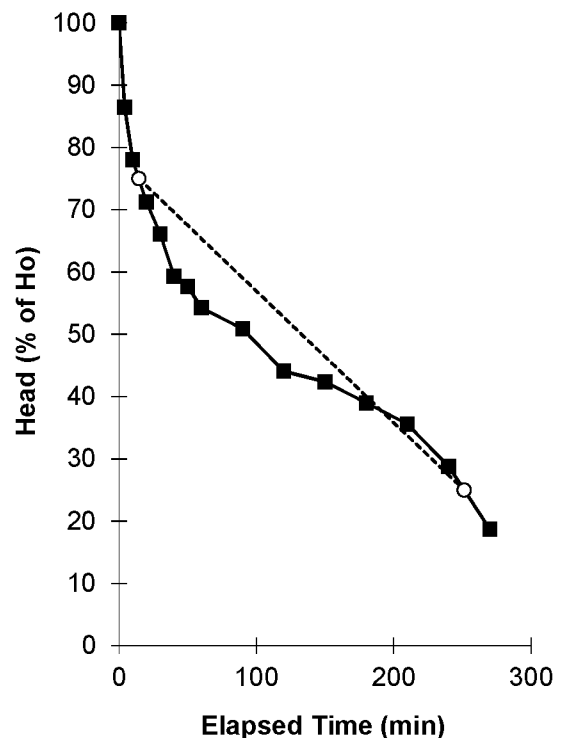
Trial Pit Log (include details of groundwater):

0.0-0.20m - Soft dark brown silty sandy CLAY with brick and concrete fragments. (Made Ground)
 0.20-0.40m - Firm dark brown silty gravelly CLAY. Gravel is fine to medium subangular to rounded chalk and flint. 0.40-1.30m - Structureless CHALK composed of orange brown becoming light brown to off-white slightly clayey sandy gravelly SILT. Gravel and cobbles are of angular to sub angular chalk and occasional angular to rounded flint. (Grade Dm)

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
0.65	0	100	0.59
0.73	4	86	0.51
0.78	10	78	0.46
0.82	20	71	0.42
0.85	30	66	0.39
0.89	40	59	0.35
0.90	50	58	0.34
0.92	60	54	0.32
0.94	90.0	51	0.30
0.98	120.0	44	0.26
0.99	150.0	42	0.25
1.01	180.0	39	0.23
1.03	210.0	36	0.21
1.07	240.0	29	0.17
1.13	270.0	19	0.11

T75 14.375 75
 T25 251.250 25
 T75-25 236.875 Derived from Best Fit



Comments

GROUND CONDITION CONSULTANTS LTD

10 Waldegrave Close
 Southampton, SO19 9RY

Telephone: 07971 450113

Soakaway Calculations

Soakaway Test No. SA101 - Test 2
 Contract: Yeoman's Honda
 Contract No. J18-035

Field Test

Depth of Pit 1.20 m
 Width of Pit 0.40 m
 Length of Pit 1.70 m
 Depth of Pit Soaked 0.43 m

ap50 1.583 m²
 Vp75-25 0.1462 m³
 t75-25 310.2 min
 water used 0.2924 m³
 f 4.962E-06 m/sec.

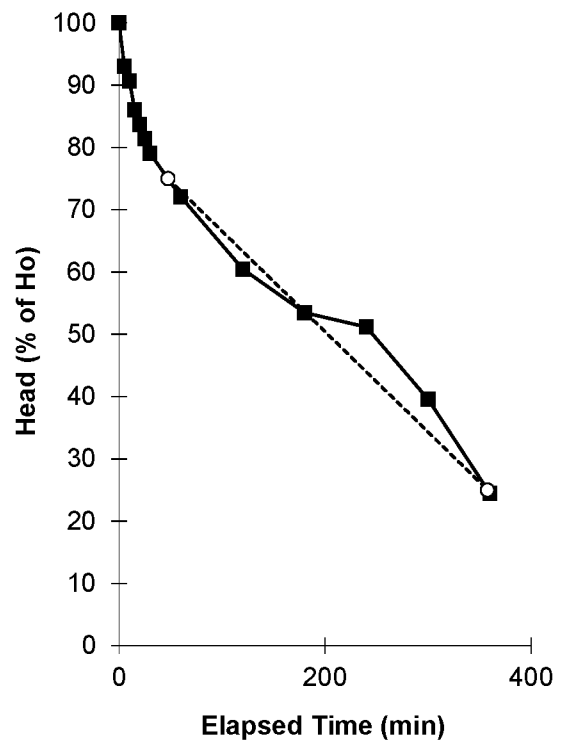
Trial Pit Log (include details of groundwater):

0.0-0.20m - Soft dark brown silty sandy CLAY with brick and concrete fragments. (Made Ground)
 0.20-0.40m - Firm dark brown silty gravelly CLAY. Gravel is fine to medium subangular to rounded chalk and flint. 0.40-1.30m - Structureless CHALK composed of orange brown becoming light brown to off-white slightly clayey sandy gravelly SILT. Gravel and cobbles are of angular to sub angular chalk and occasional angular to rounded flint. (Grade Dm)

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
0.77	0	100	0.43
0.80	5	93	0.40
0.81	10	91	0.39
0.83	15	86	0.37
0.84	20	84	0.36
0.85	25	81	0.35
0.86	30	79	0.34
0.89	60	72	0.31
0.94	120.0	60	0.26
0.97	180.0	53	0.23
0.98	240.0	51	0.22
1.03	300.0	40	0.17
1.10	360.0	24	0.11

T75 47.500 75
 T25 357.692 25
 T75-25 310.192 Derived from Best Fit



Comments

GROUND CONDITION CONSULTANTS LTD

10 Waldegrave Close
 Southampton, SO19 9RY

Telephone: 07971 450113

Soakaway Calculations

Soakaway Test No. SA101 - Test 3
 Contract: Yeoman's Honda
 Contract No. J18-035

Field Test

Depth of Pit 1.17 m
 Width of Pit 0.40 m
 Length of Pit 1.70 m
 Depth of Pit Soaked 0.37 m

ap50 1.457 m²
 Vp75-25 0.1258 m³
 t75-25 306.5 min
 water used 0.2516 m³
 f 4.695E-06 m/sec.

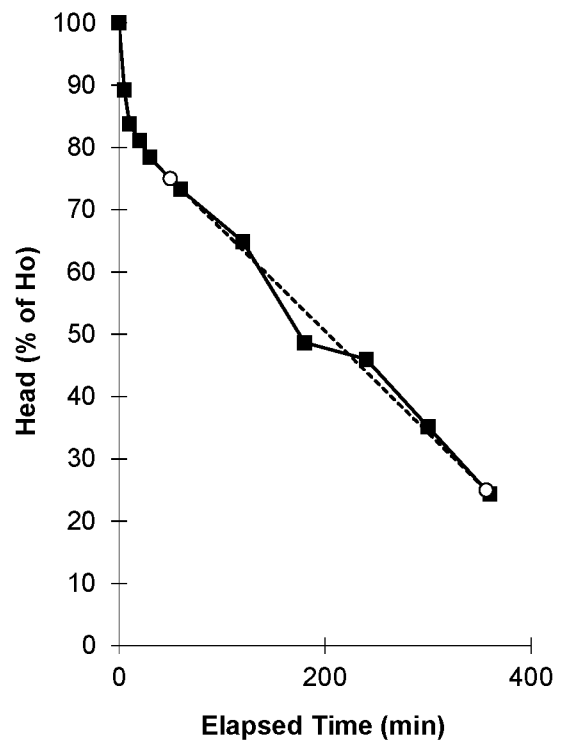
Trial Pit Log (include details of groundwater):

0.0-0.20m - Soft dark brown silty sandy CLAY with brick and concrete fragments. (Made Ground)
 0.20-0.40m - Firm dark brown silty gravelly CLAY. Gravel is fine to medium subangular to rounded chalk and flint. 0.40-1.30m - Structureless CHALK composed of orange brown becoming light brown to off-white slightly clayey sandy gravelly SILT. Gravel and cobbles are of angular to sub angular chalk and occasional angular to rounded flint. (Grade Dm)

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
0.80	0	100	0.37
0.84	5	89	0.33
0.86	10	84	0.31
0.87	20	81	0.30
0.88	30	78	0.29
0.90	60	73	0.27
0.93	120	65	0.24
0.99	180	49	0.18
1.00	240.0	46	0.17
1.04	300.0	35	0.13
1.08	360.0	24	0.09

T75 49.737 75
 T25 356.250 25
 T75-25 306.513 Derived from Best Fit



Comments

GROUND CONDITION CONSULTANTS LTD

10 Waldegrave Close
 Southampton, SO19 9RY

Telephone: 07971 450113

Soakaway Calculations

Soakaway Test No. SA202 - Test 1
 Contract: Yeoman's Honda
 Contract No. J18-035

Field Test

Depth of Pit 1.30 m
 Width of Pit 0.40 m
 Length of Pit 1.70 m
 Depth of Pit Soaked 0.49 m

ap50 1.709 m²
 Vp75-25 0.1666 m³
 t75-25 31.6 min
 water used 0.3332 m³
 f 5.137E-05 m/sec.

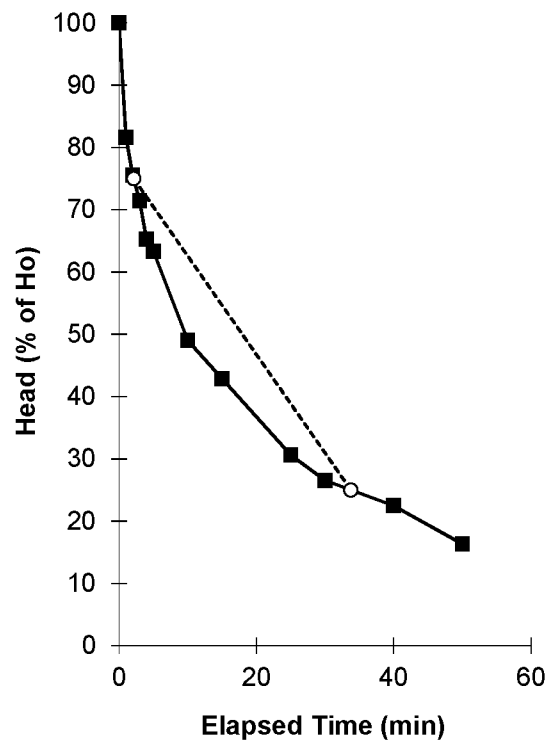
Trial Pit Log (include details of groundwater):

0.0-0.20m - Soft dark brown silty sandy CLAY with brick and concrete fragments. (Made Ground)
 0.20-0.90m - Firm brown slightly gravelly CLAY. Gravel is fine to medium subangular to rounded chalk and flint. 0.90-1.30m - Structureless CHALK composed of light brown to off-white sandy gravelly SILT. Gravel and cobbles are of angular to sub angular chalk and occasional angular to rounded flint. (Grade Dm)

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
0.81	0	100	0.49
0.90	1	82	0.40
0.93	2	76	0.37
0.95	3	71	0.35
0.98	4	65	0.32
0.99	5	63	0.31
1.06	10	49	0.24
1.09	15	43	0.21
1.15	25.0	31	0.15
1.17	30.0	27	0.13
1.19	40.0	22	0.11
1.22	50.0	16	0.08

T75 2.125 75
 T25 33.750 25
 T75-25 31.625 Derived from Best Fit



Comments

GROUND CONDITION CONSULTANTS LTD

10 Waldegrave Close
 Southampton, SO19 9RY

Telephone: 07971 450113

Soakaway Calculations

Soakaway Test No. SA202 - Test 2
 Contract: Yeoman's Honda
 Contract No. J18-035

Field Test

Depth of Pit 1.30 m
 Width of Pit 0.40 m
 Length of Pit 1.70 m
 Depth of Pit Soaked 0.45 m

ap50 1.625 m²
 Vp75-25 0.153 m³
 t75-25 32.7 min
 water used 0.3060 m³
 f 4.798E-05 m/sec.

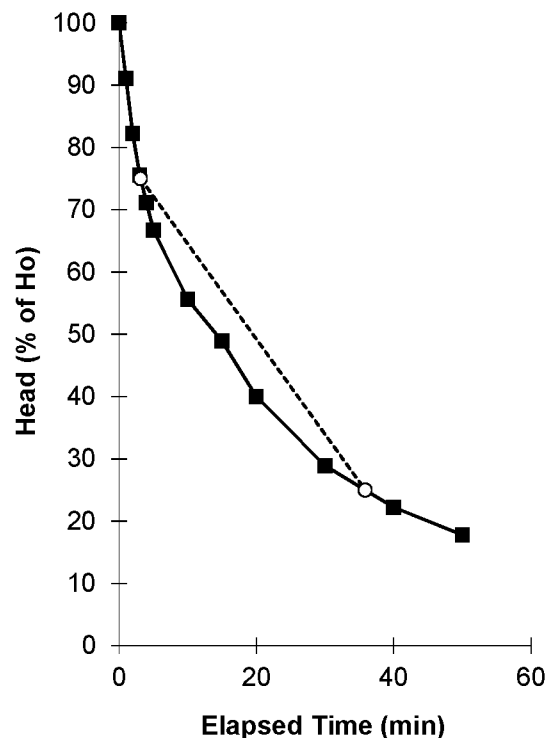
Trial Pit Log (include details of groundwater):

0.0-0.20m - Soft dark brown silty sandy CLAY with brick and concrete fragments. (Made Ground)
 0.20-0.90m - Firm brown slightly gravelly CLAY. Gravel is fine to medium subangular to rounded chalk and flint. 0.90-1.30m - Structureless CHALK composed of light brown to off-white sandy gravelly SILT. Gravel and cobbles are of angular to sub angular chalk and occasional angular to rounded flint. (Grade Dm)

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
0.85	0	100	0.45
0.89	1	91	0.41
0.93	2	82	0.37
0.96	3	76	0.34
0.98	4	71	0.32
1.00	5	67	0.30
1.05	10	56	0.25
1.08	15	49	0.22
1.12	20.0	40	0.18
1.17	30.0	29	0.13
1.20	40.0	22	0.10
1.22	50.0	18	0.08

T75 3.125 75
 T25 35.833 25
 T75-25 32.708 Derived from Best Fit



Comments

GROUND CONDITION CONSULTANTS LTD

10 Waldegrave Close
 Southampton, SO19 9RY

Telephone: 07971 450113

Soakaway Calculations

Soakaway Test No. SA202 - Test 3
 Contract: Yeoman's Honda
 Contract No. J18-035

Field Test

Depth of Pit 1.30 m
 Width of Pit 0.40 m
 Length of Pit 1.70 m
 Depth of Pit Soaked 0.43 m

ap50 1.583 m²
 Vp75-25 0.1462 m³
 t75-25 29.3 min
 water used 0.2924 m³
 f 5.262E-05 m/sec.

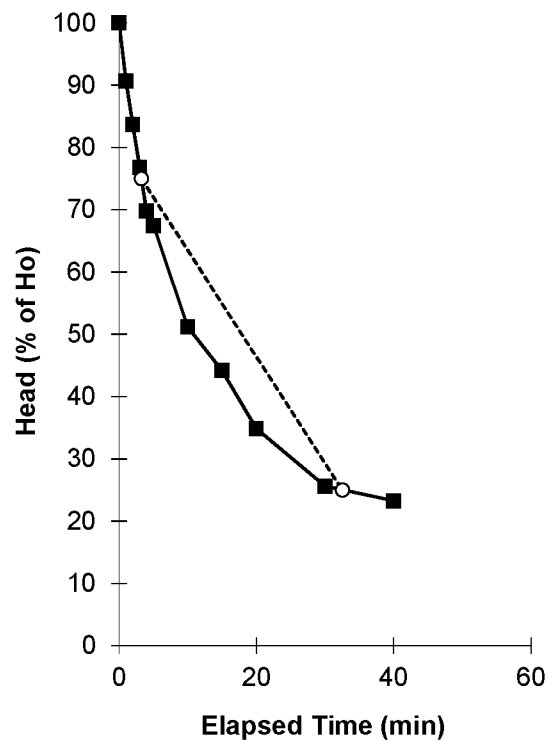
Trial Pit Log (include details of groundwater):

0.0-0.20m - Soft dark brown silty sandy CLAY with brick and concrete fragments. (Made Ground)
 0.20-0.90m - Firm brown slightly gravelly CLAY. Gravel is fine to medium subangular to rounded chalk and flint. 0.90-1.30m - Structureless CHALK composed of light brown to off-white sandy gravelly SILT. Gravel and cobbles are of angular to sub angular chalk and occasional angular to rounded flint. (Grade Dm)

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
0.87	0	100	0.43
0.91	1	91	0.39
0.94	2	84	0.36
0.97	3	77	0.33
1.00	4	70	0.30
1.01	5	67	0.29
1.08	10	51	0.22
1.11	15	44	0.19
1.15	20.0	35	0.15
1.19	30.0	26	0.11
1.20	40.0	23	0.10

T75 3.250 75
 T25 32.500 25
 T75-25 29.250 Derived from Best Fit



Comments

GROUND CONDITION CONSULTANTS LTD

10 Waldegrave Close
 Southampton, SO19 9RY

Telephone: 07971 450113

GROUND GAS AND GROUNDWATER MONITORING RESULTS



SITE/REF: Yeomans Honda						General Site comments									
DATE: 05/12/2018		1... of 1...													
OPERATOR(S): RP															
Ambient Conditions:		Barometric Pressure (mb)	CH ₄ (%v/v)	CO ₂ (%v/v)	O ₂ (%v/v)				PID (ppm)						
Before Monitoring							EQUIPMENT								
After Monitoring															
Atmospheric Pressure Trend:							Instrument / Model Type			Serial Number			Comments		
Ground Conditions:		Wet					Standard Dipmeter			79301					
Weather Conditions:		Wet and windy													

Ground Gas Note: "0" readings to be recorded as instrument detection limit

Borehole ID	Time	Flow (l/hr)	Relative Pressure (mb)	Steady CH ₄ (%v/v)	CO ₂ (%v/v)	O ₂ (%v/v)	Peak CH ₄ (%v/v)	% of Lower Explosive Limit	CO (ppm)	H ₂ S (ppm)	Balance (%)	PID (ppm)	Response Zone		Response Strata	Gas screening value CH ₄	Gas screening value CO ₂
													From (mbgl)	To (mbgl)			

Groundwater

Borehole ID	Standing Water Level (mbgl)	Installation Base Dip (mbgl)	Free Phase LNAPL Thickness (m)	Free Phase DNAPL Thickness (m)	Water Quality Indicators					Well Volume (l)	Purge Volume (l)	Comments (samples)
					EH	EC	pH	DO	Temp			
WS101	-	-										Could not be located
WS102	2.26	3.67										
WS103	2.44	2.86										
WS104	2.41	3.42										

Well volume (l) = $(3.14 \times (\text{hole diameter (m)} / 2)^2 \times (\text{base dip (m)} - \text{standing water level (m)})) \times 1000$ (2l/m in 50mm well)

Gas screening value = gas concentration (%) x gas flow rate (l/hr)

%v/v - Percentage volume by total volume; mbgl - metres below ground level; ppm - parts per million; mb - millibars; l/hr - litres per hour; vv - water vial; gb - 1l glass bottle; pb - 1l plastic bottle

GROUND GAS AND GROUNDWATER MONITORING RESULTS



SITE/REF: Yeomans Honda						General Site comments									
DATE: 02/01/2019		1... of 1...													
OPERATOR(S): AP															
Ambient Conditions:		Barometric Pressure (mb)	CH ₄ (%v/v)	CO ₂ (%v/v)	O ₂ (%v/v)				PID (ppm)						
Before Monitoring							EQUIPMENT								
After Monitoring															
Atmospheric Pressure Trend:							Instrument / Model Type			Serial Number			Comments		
Ground Conditions:		Damp					Standard Dipmeter			79301					
Weather Conditions:		Dry and cold													

Ground Gas Note: "0" readings to be recorded as instrument detection limit

Borehole ID	Time	Flow (l/hr)	Relative Pressure (mb)	Steady CH ₄ (%v/v)	CO ₂ (%v/v)	O ₂ (%v/v)	Peak CH ₄ (%v/v)	% of Lower Explosive Limit	CO (ppm)	H ₂ S (ppm)	Balance (%)	PID (ppm)	Response Zone		Response Strata	Gas screening value CH ₄	Gas screening value CO ₂
													From (mbgl)	To (mbgl)			

Groundwater

Borehole ID	Standing Water Level (mbgl)	Installation Base Dip (mbgl)	Free Phase LNAPL Thickness (m)	Free Phase DNAPL Thickness (m)	Water Quality Indicators					Well Volume (l)	Purge Volume (l)	Comments (samples)
					EH	EC	pH	DO	Temp			
WS101	-	-										Could not be located
WS102	2.16	3.62										
WS103	2.20	2.83										
WS104	2.17	3.43										

Well volume (l) = (3.14 x (hole diameter (m)/2)² x (base dip (m) - standing water level (m)))x1000 (2l/m in 50mm well)

Gas screening value = gas concentration (%) x gas flow rate (l/hr)

%v/v - Percentage volume by total volume; mbgl - metres below ground level; ppm - parts per million; mb - millibars; l/hr - litres per hour; vv - water vial; gb - 1l glass bottle; pb - 1l plastic bottle

GROUND GAS AND GROUNDWATER MONITORING RESULTS



SITE/REF: Yeomans Honda						General Site comments			
DATE: 04/02/2019		1... of 1...							
OPERATOR(S): RP									
Ambient Conditions:		Barometric Pressure (mb)	CH ₄ (%v/v)	CO ₂ (%v/v)	O ₂ (%v/v)				PID (ppm)
Before Monitoring							EQUIPMENT		
After Monitoring									
Atmospheric Pressure Trend:							Instrument / Model Type Serial Number Comments		
Ground Conditions:		Damp							
Weather Conditions:		Drizzle							
		Standard Dipmeter					79301		

Ground Gas Note: "0" readings to be recorded as instrument detection limit

Borehole ID	Time	Flow (l/hr)	Relative Pressure (mb)	Steady CH ₄ (%v/v)	CO ₂ (%v/v)	O ₂ (%v/v)	Peak CH ₄ (%v/v)	% of Lower Explosive Limit	CO (ppm)	H ₂ S (ppm)	Balance (%)	PID (ppm)	Response Zone		Response Strata	Gas screening value CH ₄	Gas screening value CO ₂
													From (mbgl)	To (mbgl)			

Groundwater

Borehole ID	Standing Water Level (mbgl)	Installation Base Dip (mbgl)	Free Phase LNAPL Thickness (m)	Free Phase DNAPL Thickness (m)	Water Quality Indicators					Well Volume (l)	Purge Volume (l)	Comments (samples)
					Eh	EC	pH	DO	Temp			
WS101	-	-										Could not be located
WS102	2.14	3.62										
WS103	2.16	2.82										
WS104	2.05	3.42										

Well volume (l) = (3.14 x (hole diameter (m)/2)² x (base dip (m) - standing water level (m)))x1000 (2l/m in 50mm well)

Gas screening value = gas concentration (%) x gas flow rate (l/hr)

%v/v - Percentage volume by total volume; mbgl - metres below ground level; ppm - parts per million; mb - milibars; l/hr - litres per hour; wv - water vial; gb - 1l glass bottle; pb - 1l plastic bottle

GROUND GAS AND GROUNDWATER MONITORING RESULTS



SITE/REF: Yeomans Honda						General Site comments									
DATE: 04/03/2019		1... of 1...													
OPERATOR(S): RP															
Ambient Conditions:		Barometric Pressure (mb)	CH ₄ (%v/v)	CO ₂ (%v/v)	O ₂ (%v/v)				PID (ppm)						
Before Monitoring							EQUIPMENT								
After Monitoring															
Atmospheric Pressure Trend:							Instrument / Model Type			Serial Number			Comments		
Ground Conditions:		Damp					Standard Dipmeter			79301					
Weather Conditions:		Clear													

Ground Gas Note: "0" readings to be recorded as instrument detection limit

Borehole ID	Time	Flow (l/hr)	Relative Pressure (mb)	Steady CH ₄ (%v/v)	CO ₂ (%v/v)	O ₂ (%v/v)	Peak CH ₄ (%v/v)	% of Lower Explosive Limit	CO (ppm)	H ₂ S (ppm)	Balance (%)	PID (ppm)	Response Zone		Response Strata	Gas screening value CH ₄	Gas screening value CO ₂
													From (mbgl)	To (mbgl)			

Groundwater

Borehole ID	Standing Water Level (mbgl)	Installation Base Dip (mbgl)	Free Phase LNAPL Thickness (m)	Free Phase DNAPL Thickness (m)	Water Quality Indicators					Well Volume (l)	Purge Volume (l)	Comments (samples)
					EH	EC	pH	DO	Temp			
WS101	-	-										Could not be located
WS102	Damaged	-										
WS103	1.55	2.47										
WS104	1.61	3.20										

Well volume (l) = (3.14 x (hole diameter (m)/2)² x (base dip (m) - standing water level (m)))x1000 (2l/m in 50mm well)

Gas screening value = gas concentration (%) x gas flow rate (l/hr)

%v/v - Percentage volume by total volume; mbgl - metres below ground level; ppm - parts per million; mb - millibars; l/hr - litres per hour; vv - water vial; gb - 1l glass bottle; pb - 1l plastic bottle

Appendix B

Existing Drainage Calculations

AKSWard		Page 1
Seacourt Tower	Yeomans Limited	
West Way	Worthing	
Oxford	Honda/Office/Peugeot	
Date 09/02/2018	Designed by NJ	
File	Checked by GT	
Micro Drainage		Source Control 2017.1.2
<u>ICP SUDS Mean Annual Flood</u> Input Return Period (years) 1 Soil 0.300 Area (ha) 0.267 Urban 0.400 SAAR (mm) 719 Region Number Region 7 Results l/s QBAR Rural 0.5 QBAR Urban 1.0 Q1 year 0.9 Q1 year 0.9 Q30 years 1.9 Q100 years 2.4		
©1982-2017 XP Solutions		

AKSWard		Page 1
Seacourt Tower	Yeomans Limited	
West Way	Worthing	
Oxford	Honda/Office/Peugeot	
Date 09/02/2018	Designed by NJ	
File	Checked by GT	
Micro Drainage	Source Control 2017.1.2	

Greenfield Runoff Volume

FSR Data

Return Period (years)	1
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	19.200
Ratio R	0.350
Areal Reduction Factor	1.00
Area (ha)	0.267
SAAR (mm)	719
CWI	107.452
Urban	0.400
SPR	30.000

Results

Percentage Runoff (%)	30.94
Greenfield Runoff Volume (m ³)	18.474

AKSWard		Page 1
Seacourt Tower	Yeomans Limited	
West Way	Worthing	
Oxford	Honda/Office/Peugeot	
Date 09/02/2018	Designed by NJ	
File	Checked by GT	
Micro Drainage	Source Control 2017.1.2	

Greenfield Runoff Volume

FSR Data

Return Period (years)	30
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	19.200
Ratio R	0.350
Areal Reduction Factor	1.00
Area (ha)	0.267
SAAR (mm)	719
CWI	107.452
Urban	0.400
SPR	30.000

Results

Percentage Runoff (%)	32.80
Greenfield Runoff Volume (m³)	42.997

AKSWard		Page 1
Seacourt Tower	Yeomans Limited	
West Way	Worthing	
Oxford	Honda/Office/Peugeot	
Date 09/02/2018	Designed by NJ	
File	Checked by GT	
Micro Drainage	Source Control 2017.1.2	

Greenfield Runoff Volume

FSR Data

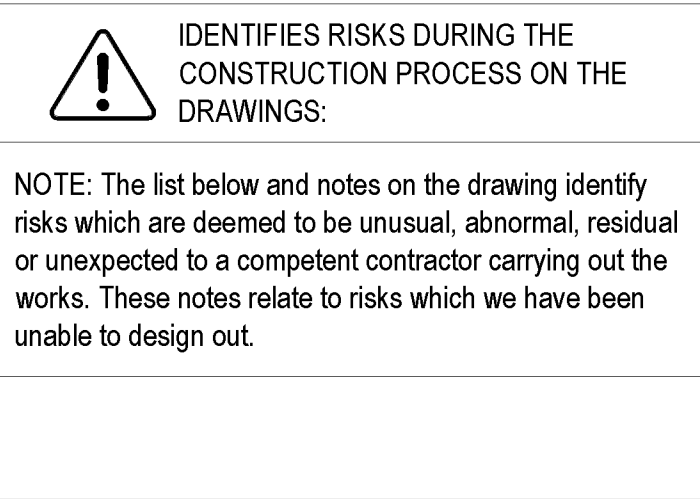
Return Period (years)	100
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	19.200
Ratio R	0.350
Areal Reduction Factor	1.00
Area (ha)	0.267
SAAR (mm)	719
CWI	107.452
Urban	0.400
SPR	30.000

Results

Percentage Runoff (%)	34.56
Greenfield Runoff Volume (m³)	58.681

Appendix C

Proposed Site Plans



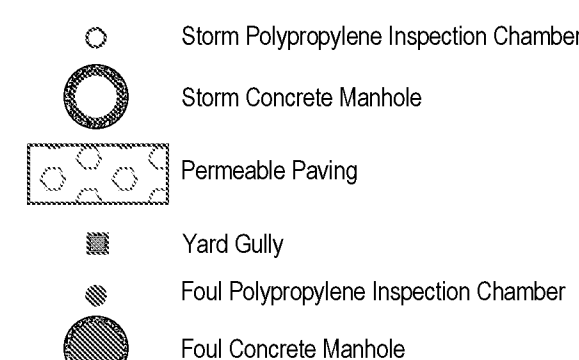
This drawing is the property of AKSWard Limited. The drawing is issued on the condition that it is not copied, reproduced, retained or disclosed to any unauthorised person, either wholly or in part without the written consent of AKSWard Limited.

Do NOT scale from this drawing. AKSWard takes no responsibility for errors during photographic reproduction or printing. Any discrepancy's are to be reported to the engineer immediately.

GENERAL NOTES

1. All setting out to be in accordance with the Architects drawings. Any discrepancies between the Engineers and the Architects Drawings to be referred to the Architect before proceeding. Dimensions must not be scaled.
2. All drainage to be installed in accordance with relevant Building Regulations documents and Current Sewers for Adoption where applicable.
3. Connections to Public sewers to be agreed and inspected by Water Authority.
4. Invert level, size and cover levels to existing manholes and sewers to be checked prior to any construction. Any discrepancies to be reported immediately.
5. Invert level of soil stack bands to be 450mm below lowest branch connection for up to 3 storeys buildings. For buildings up to 5 storeys the invert to base of soil stack bands should be not less than 750mm.
6. All RWP and Foul Water drain point setting out to be confirmed by Architect.
7. All RWP & SVP sizes & setting out by Architect / M/E Engineer. All below ground connections to match above ground outlet size. Min 100/110mm diameter.
8. Foul drains to project 100mm above finished floor level.
9. All internal Manholes and Inspection Chambers to have double sealed recessed covers to suit floor finishes by Architect.
10. All external covers in footpaths and roads in non tarmac areas to have recessed trays to suit the paving material.
11. Refer to drainage specification for pipe materials.
12. All pipework to be 100/110/120 UNF. Refer to note 7 connection sizes.
13. All foul and surface water drainage stacks to have above ground routing access, refer to above ground drainage layout by others.
14. This drawing has been produced in colour and should be reproduced in colour for clarity.
15. A CCTV Survey and report in WINSCAN format for all new drainage will be required before the 'As Built' drawings will be issued.

Key



- Foul Sewer
- Surface Water Sewer
- ACO Channel Drain M100D 10.0
- Existing Manholes
- Existing Foul Sewer
- Existing Surface Water Sewer
- Existing Sewers to be abandoned
grouted up either end

C04	Surface water drainage revised following ground water monitoring	NJ	GT	18.03.19
C03	Surface water drainage revised following ground water monitoring	NJ	GT	12.03.19
C02	Foul drainage revised to suit outlet point	NH	GT	13.02.19
C01	Issue for Construction	DJ	GT	03.12.18
Rev.	Amendment	Drn	Chkd	Date

Org. Status	Suitability
Construction	A2

Org. Status **Construction** Suitability **A2**

AKS Ward[®]

CONSTRUCTION CONSULTANTS

Seacourt Tower
West Way
Oxford
OX2 0JJ

☐ London
☐ Hitchin
☒ Oxford

Tel: 01865 240071 ☐ Southampton
Fax: 01865 248006 ☐ Birmingham
e-mail: oxford@aksward.com
web: www.aksward.com

Client **Yeomans Limited**

Project **Honda/Office/Peugeot**

Title **Drainage Layout**

Reviewed Scheme	GT	Date	09.02.18
Reviewed Final	GT	Date	03.12.18
Scales at A1 1:200		Project No.	S188010
Project Ref.	Originator	Zone	Level
		Type	Role
		Drg No.	Rev.

YEO · AKSW · XX · GF · DR · C · 9201 - C04

IDENTIFIES RISKS DURING THE CONSTRUCTION PROCESS ON THE DRAWINGS:

NOTE: The list below and notes on the drawing identify risks which are deemed to be unusual, abnormal, residual or unexpected to a competent contractor carrying out the works. These notes relate to risks which we have been unable to design out.

This drawing is the property of AKSWard Limited. The drawing is issued on the condition that it is not copied, reproduced, retained or disclosed to any unauthorised person, either wholly or in part without the written consent of AKSWard Limited.

Do NOT scale from this drawing. AKSWard takes no responsibility for errors during photographic reproduction or printing. Any discrepancy's are to be reported to the engineer immediately.

GENERAL NOTES

- All setting out to be in accordance with the Architects drawings. Any discrepancies between the Engineers and the Architects drawings to be referred to the Architect before proceeding. Dimensions must not be scaled.
- All drainage to be installed in accordance with relevant Building Regulations documents and Current Sewers for Adoption where applicable.
- Connections to Public sewers to be agreed and inspected by Water Authority.
- Invert level, size and cover levels to existing manholes and sewers to be checked prior to any construction. Any discrepancies to be reported immediately.
- Invert to base of soil stack bends to be 450mm below lowest branch connection for up to 3 storeys buildings. For buildings up to 5 storeys the invert to base of soil stack bends should be not less than 750mm.
- All RWP and Foul Water drain point setting out is to be confirmed by Architect.
- All RWP & SVP sizes & setting out by Architect / M&E Engineer. All below ground connections to match above ground outlet size, Min 100/110mm diameter.
- Foul drains to project 100mm above finished floor level.
- All internal Manholes and Inspection Chambers to have double sealed recessed covers to suit floor finishes by Architect.
- All external covers in footpaths and roads in non tarmac areas to have recessed trays to suit the paving material.
- Refer to drainage specification for pipe materials.
- All pipework to be 100/110Ø UNO. Refer to note 7 connection sizes.
- All foul and surface water drainage stacks to have above ground rodding access, refer to above ground drainage layout by others.
- This drawing has been produced in colour and should be reproduced in colour for clarity.
- A CCTV Survey and report in WINCAN format for all new drainage will be required before the "As Built" drawings will be issued.

Key

Storm Polypropylene Inspection Chamber

Storm Concrete Manhole

Permeable Paving

New Surface Water Sewer

ACO Channel Drain M100D 10.0

Exceedance floodpath

P01 Preliminary Issue

NJ GT 18.03.19

Rev.

Amendment

Dm

Chkd

Date

Org. Status

Suitability

Preliminary

S2

AKSWard

CONSTRUCTION CONSULTANTS

Seacourt Tower

West Way

Oxford

OX2 0JJ

Tel: 01865 240071

Fax: 01865 248006

e-mail: oxford@aksward.com

web: www.aksward.com

☐ London

☐ Hitchin

☒ Oxford

☐ Southampton

☐ Birmingham

Client

Yeomans Limited

Project **Honda/Office/Peugeot**

Title

Exceedance Flow

Events Greater than 1 in 100

Year + 40%CC Critical Storm

Reviewed Scheme

GT

Date

18.03.19

Reviewed Final

Date

Scales at A1

1:200

Project No.

S188010

Project Ref.

Originator

Zone

Level

Type

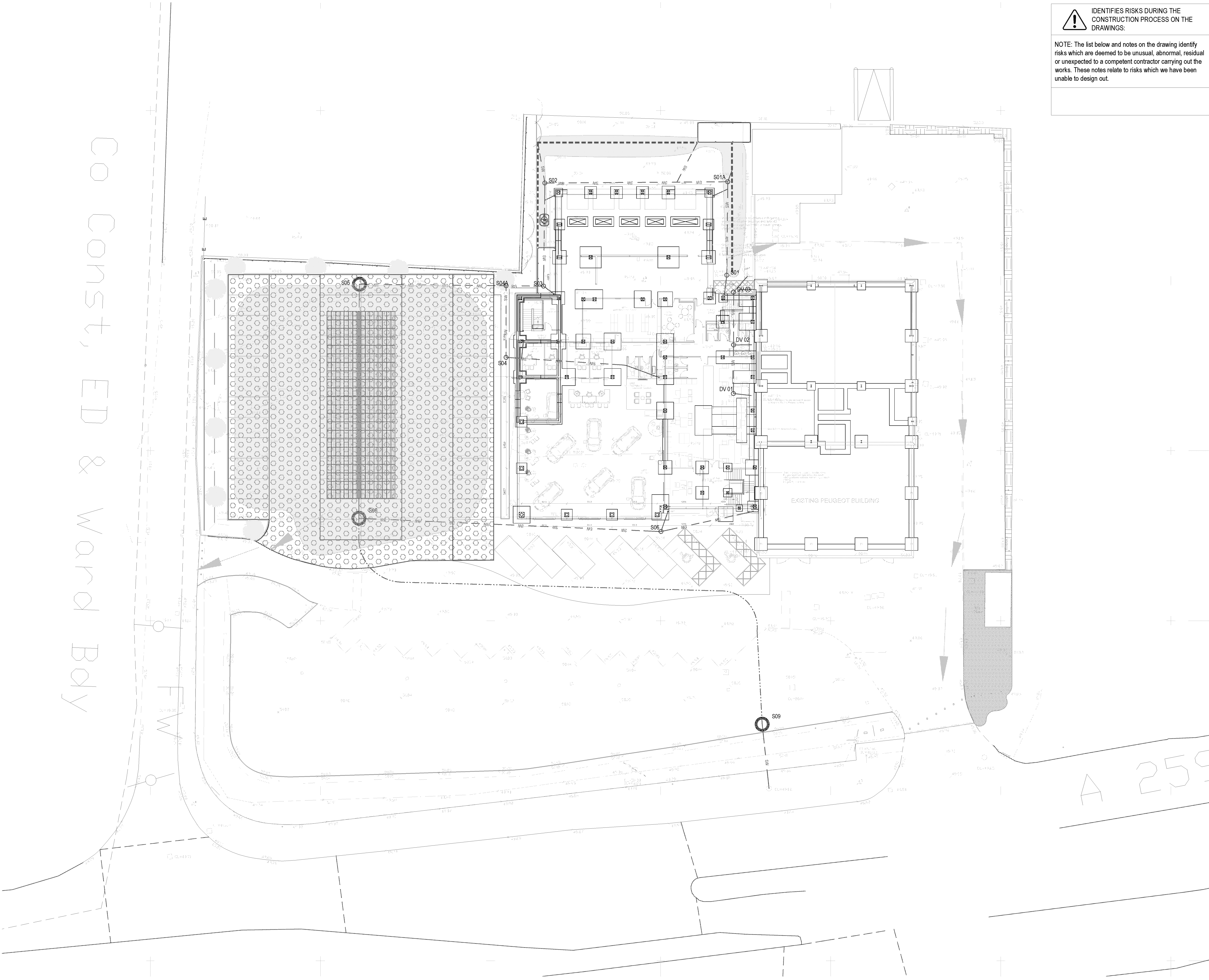
Role

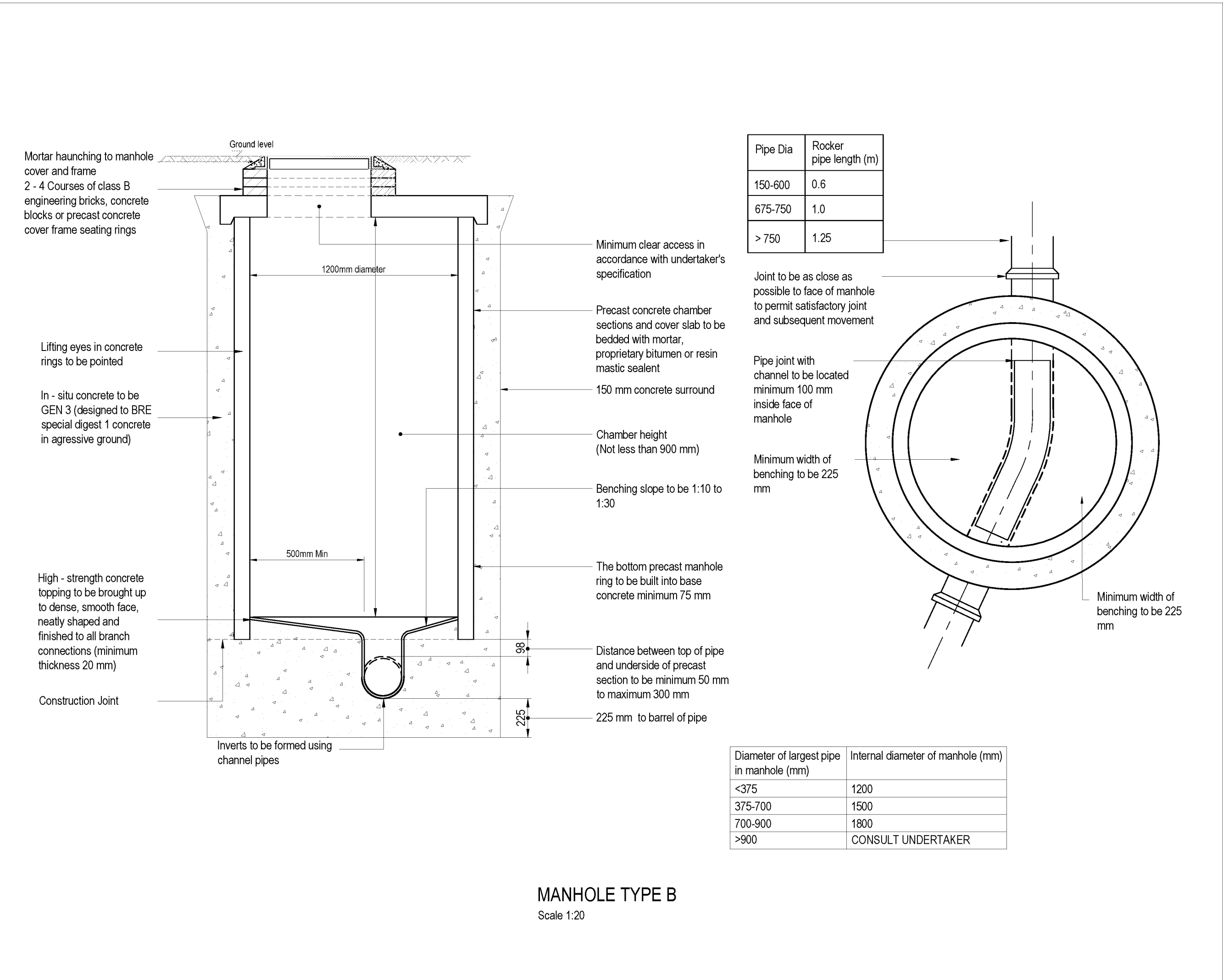
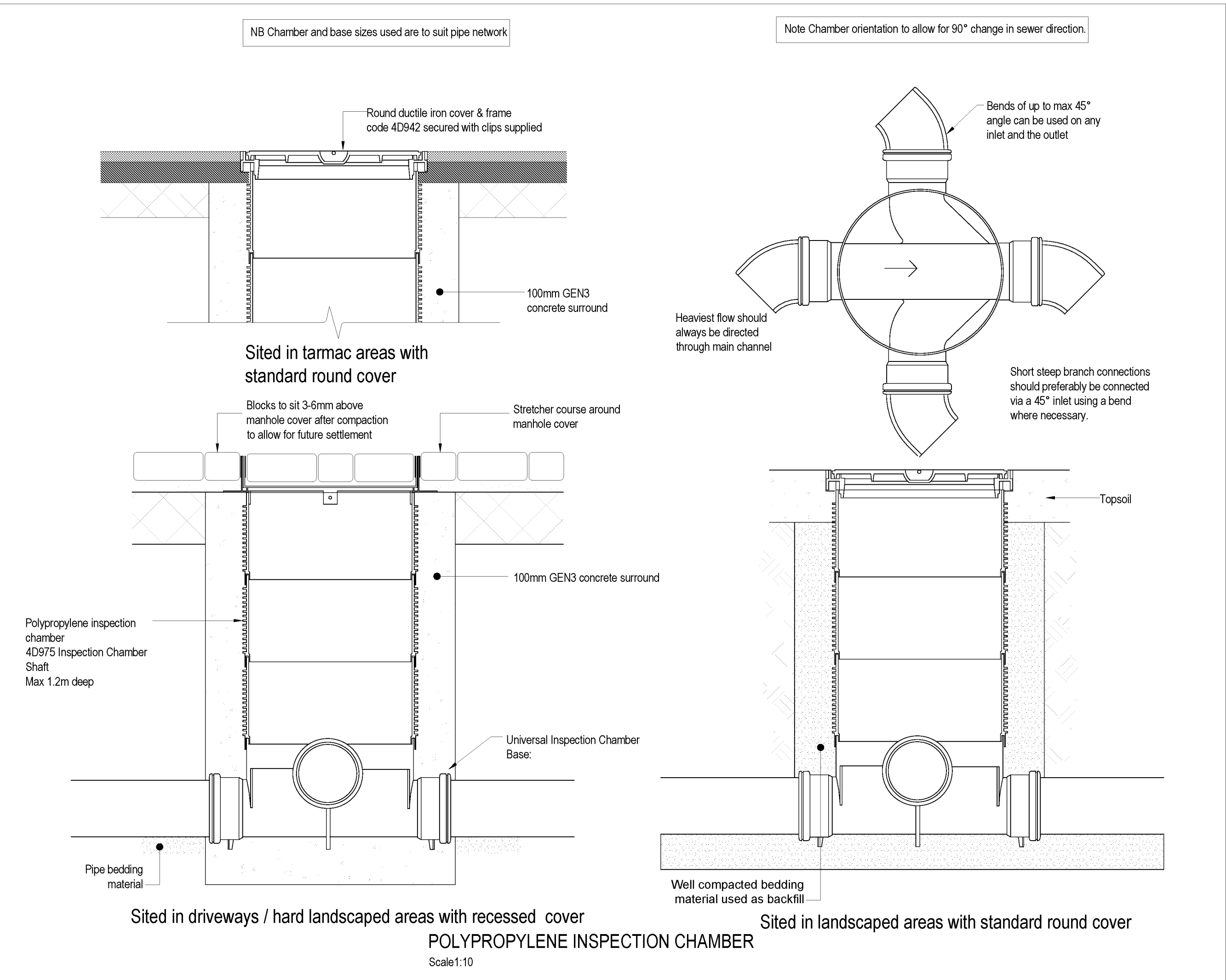
Drg No.

Rev.

YEO AKSW XX GF DR C 9205

P01

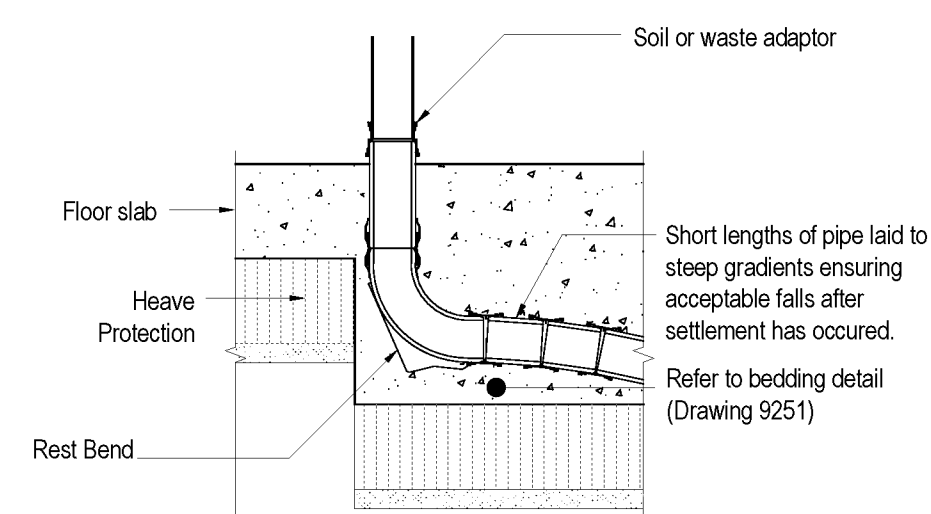
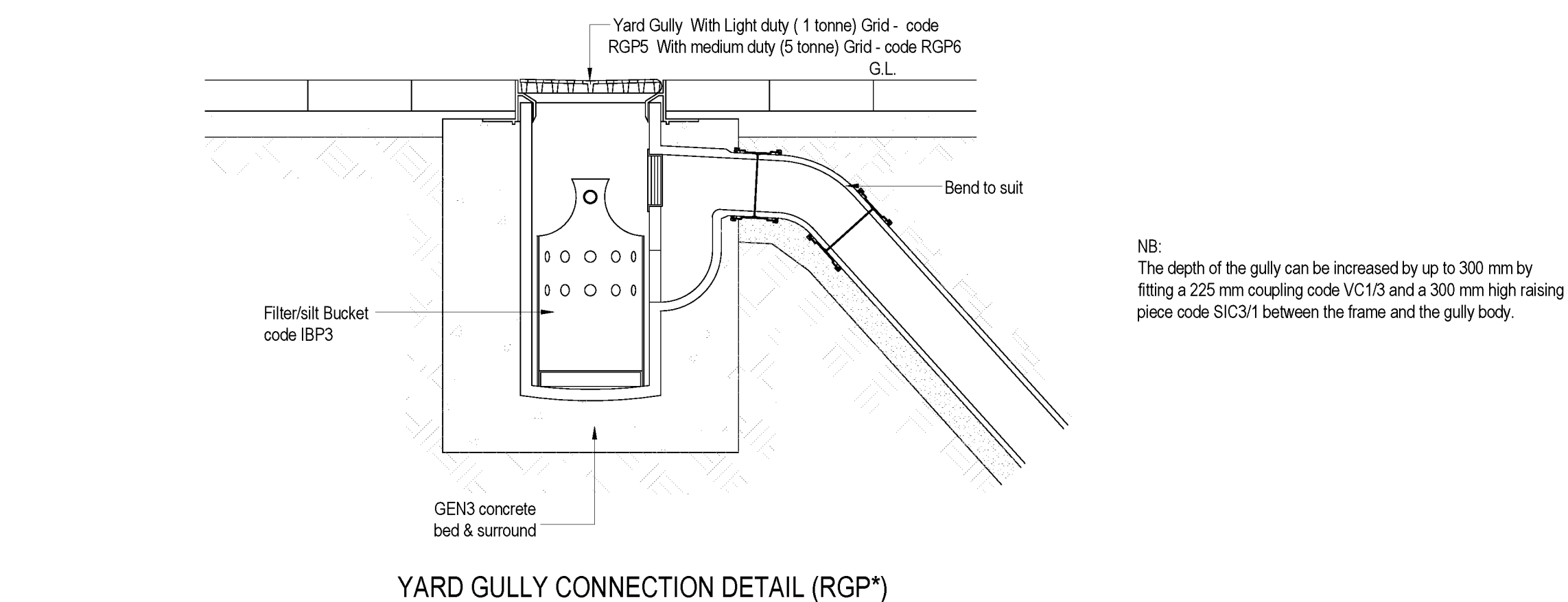






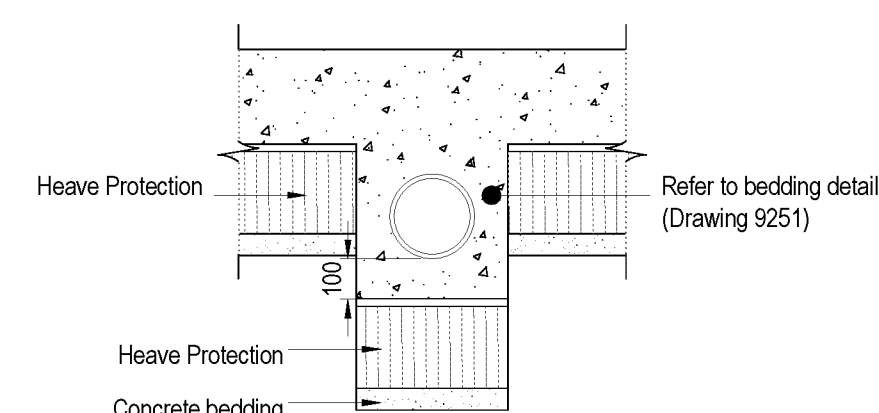
Pipe $\varnothing$	Rocker pipe length (m)
150-600	0.6
675-750	1.0
> 750	1.25

Diameter of largest pipe in manhole (mm)	Internal diameter of manhole (mm)
Less than 375	1200
375-450	1350
500-700	1500
>900	CONSULT UNDERTAKER

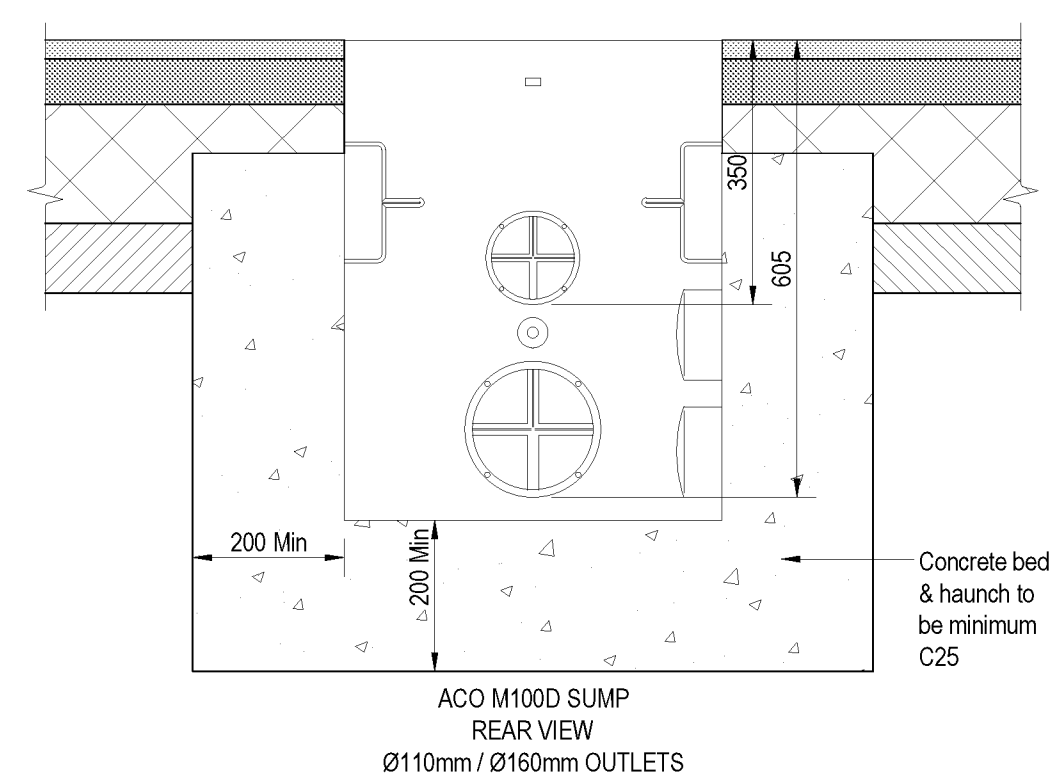
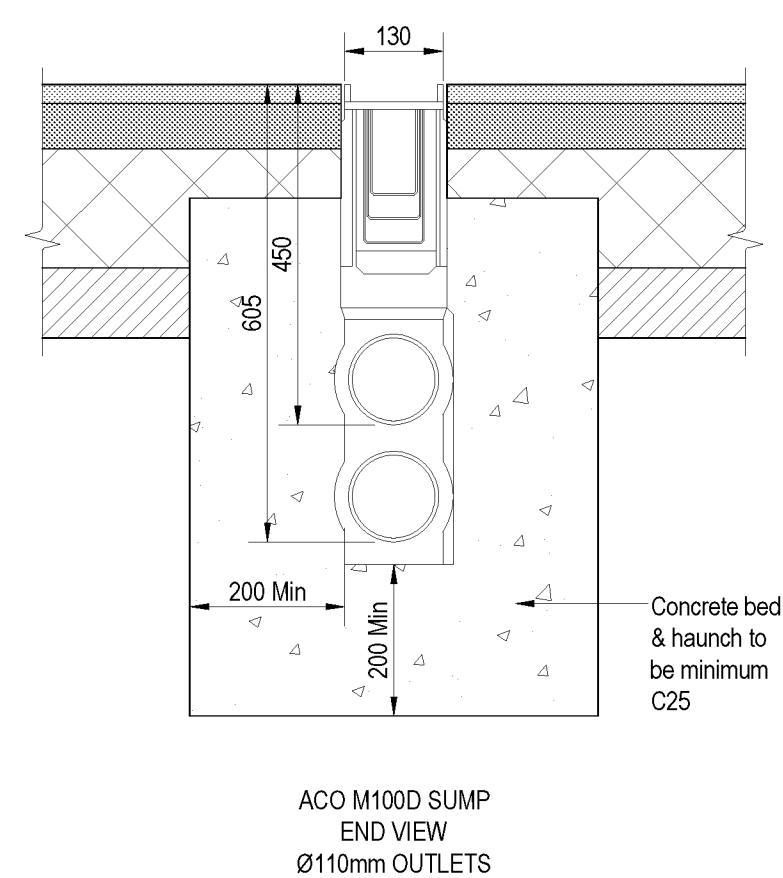
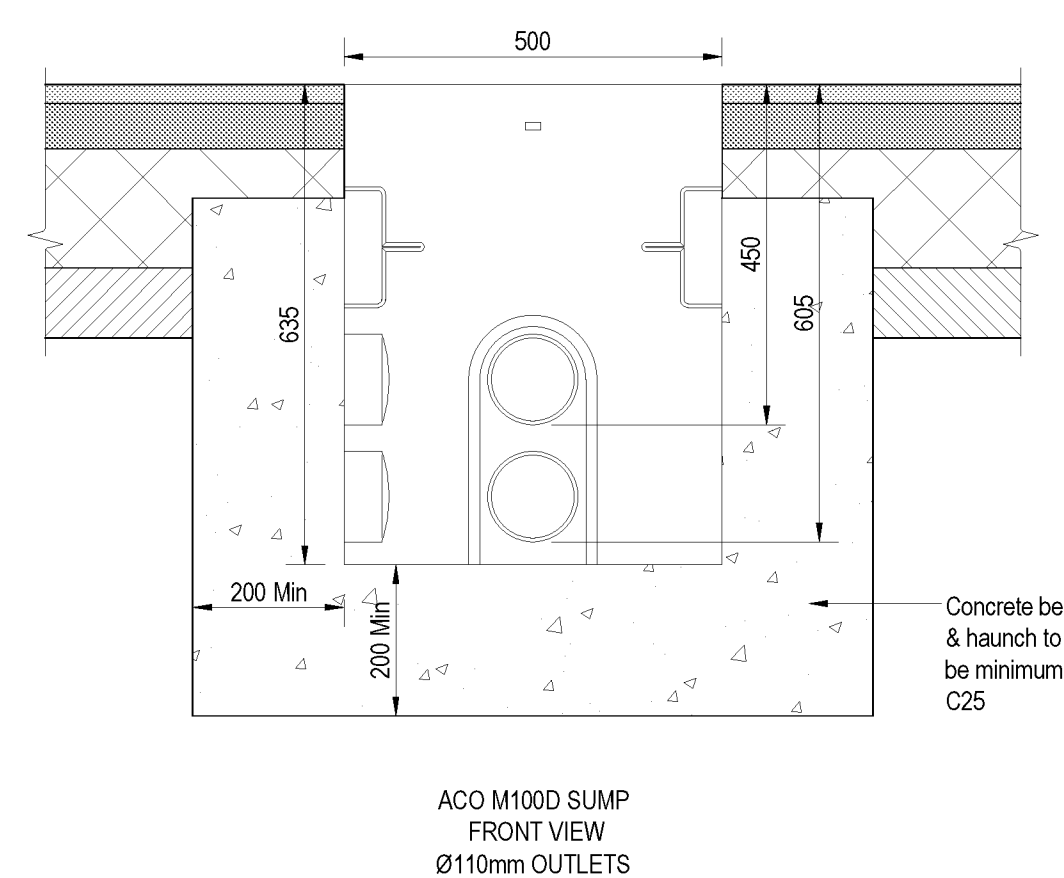
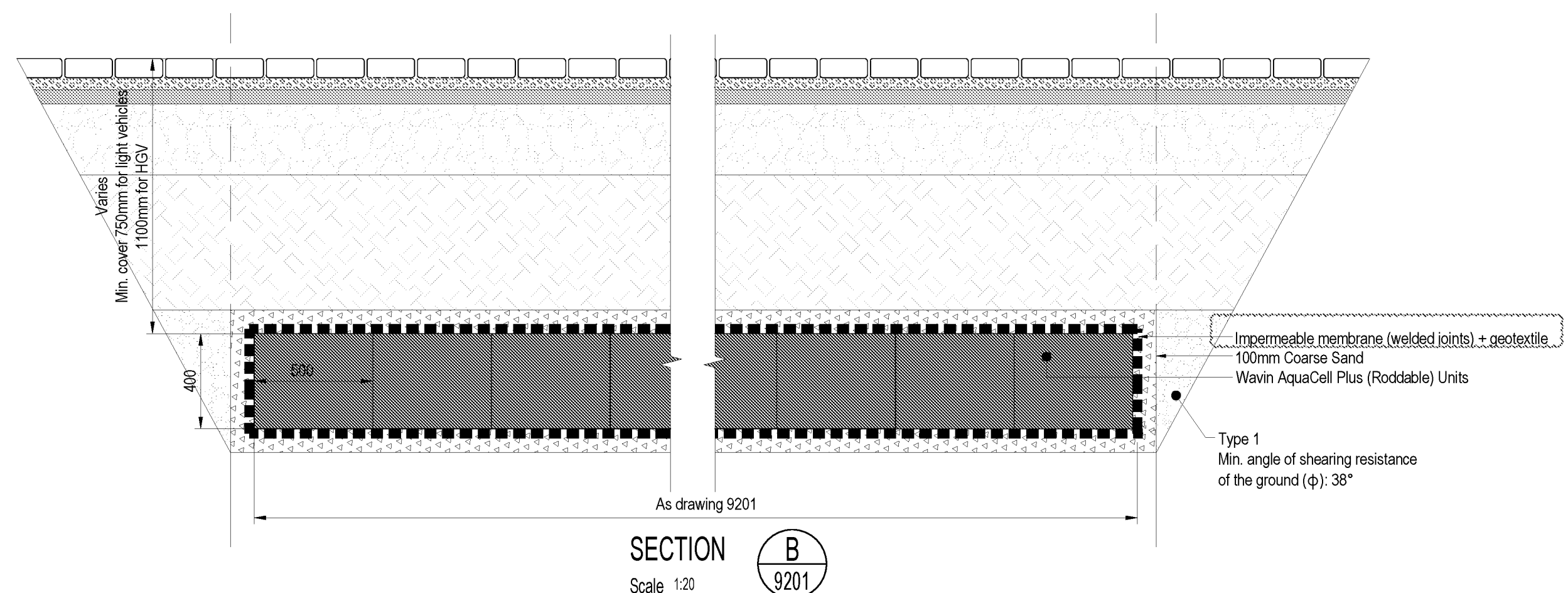
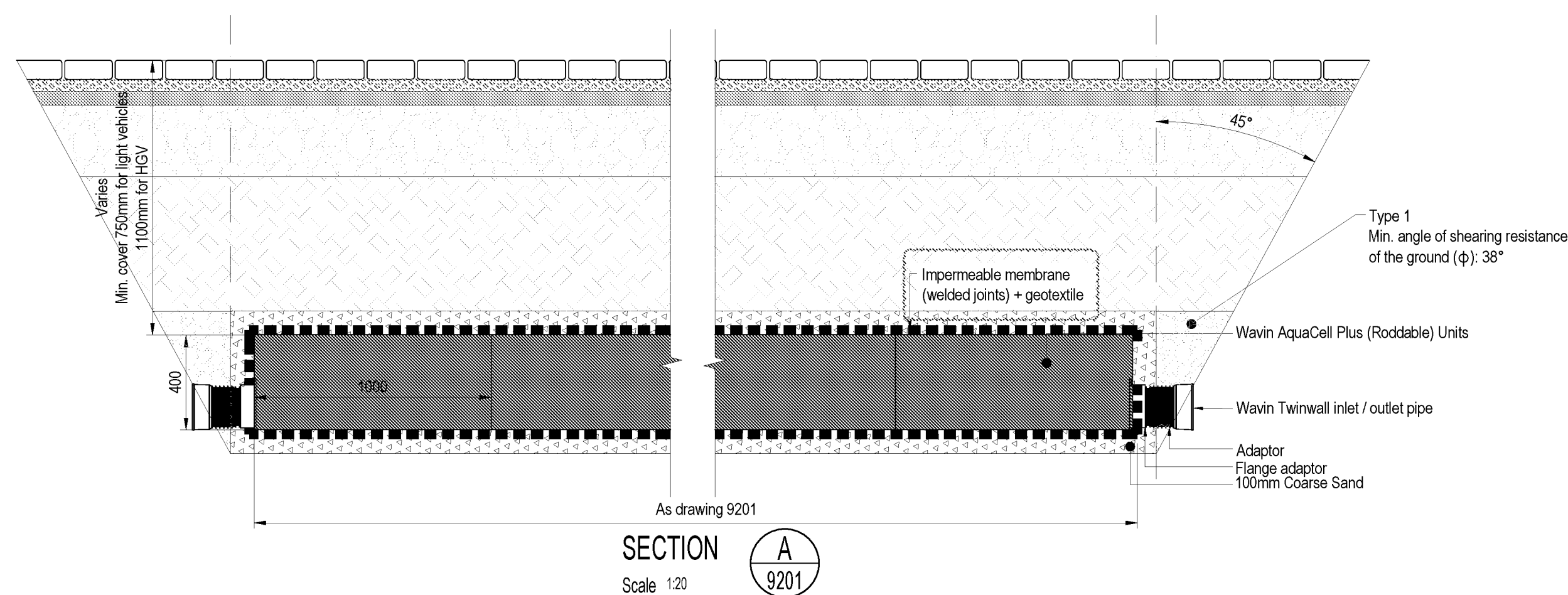


Connection Detail

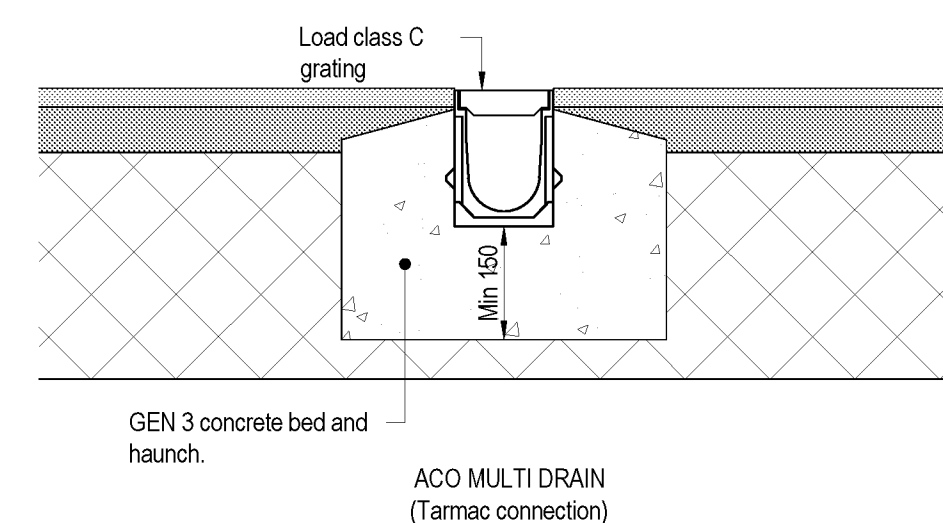
Scale 1:20



Pipe Through Heave Protection Detail



MULTIDRAIN CHANNEL
Scale 1:10



GENERAL NOTES

1. All setting out to be in accordance with the Architects drawings. Any discrepancies between the Engineers and the Architects drawings to be referred to the Architect before proceeding. Dimensions must not be scaled.
2. All drainage to be installed in accordance with relevant Building Regulations documents and Sewers for Adoption 7 where applicable.
3. Connections to Public sewers to be agreed and inspected by Water Authority.



IDENTIFIES RISKS DURING THE CONSTRUCTION PROCESS ON THE DRAWINGS:

NOTE: The list below and notes on the drawing identify risks which are deemed to be unusual, abnormal, residual or unexpected to a competent contractor carrying out the works. These notes relate to risks which we have been unable to design out.

C02	Cellular tank details amended	NJ	GT	12.03.19
C01	Issue for Construction	DH	GT	30.11.18
Rev.	Amendment	Drn	Chkd	Date

Drg. Status **Construction** Suitability **A2**

AKS Ward[®]

CONSTRUCTION CONSULTANTS

Seacourt Tower
West Way
Oxford
OX2 0JJ

Tel: 01865 240071
Fax: 01865 248006
e-mail: oxford@aksward.com
web: www.aksward.com

☐ London
☐ Hitchin
☒ Oxford
☐ Southampton
☐ Birmingham

Client **Yeomans Limited**

Project **Honda/Office/Peugeot**

Title **Drainage Standard Details**
Sheet 2 of 3

Reviewed Scheme	GT	Date	27.07.18
-----------------	----	------	----------

Reviewed Final	GT	Date	31.11.18
----------------	----	------	----------

Scales at A1 NTS Project No. **S188010**

Project Ref.	Originator	Zone	Level	Type	Role	Drg No.	Rev.
--------------	------------	------	-------	------	------	---------	------

YEO · AKSW · XX · XX · DR · C · 9252 - C02

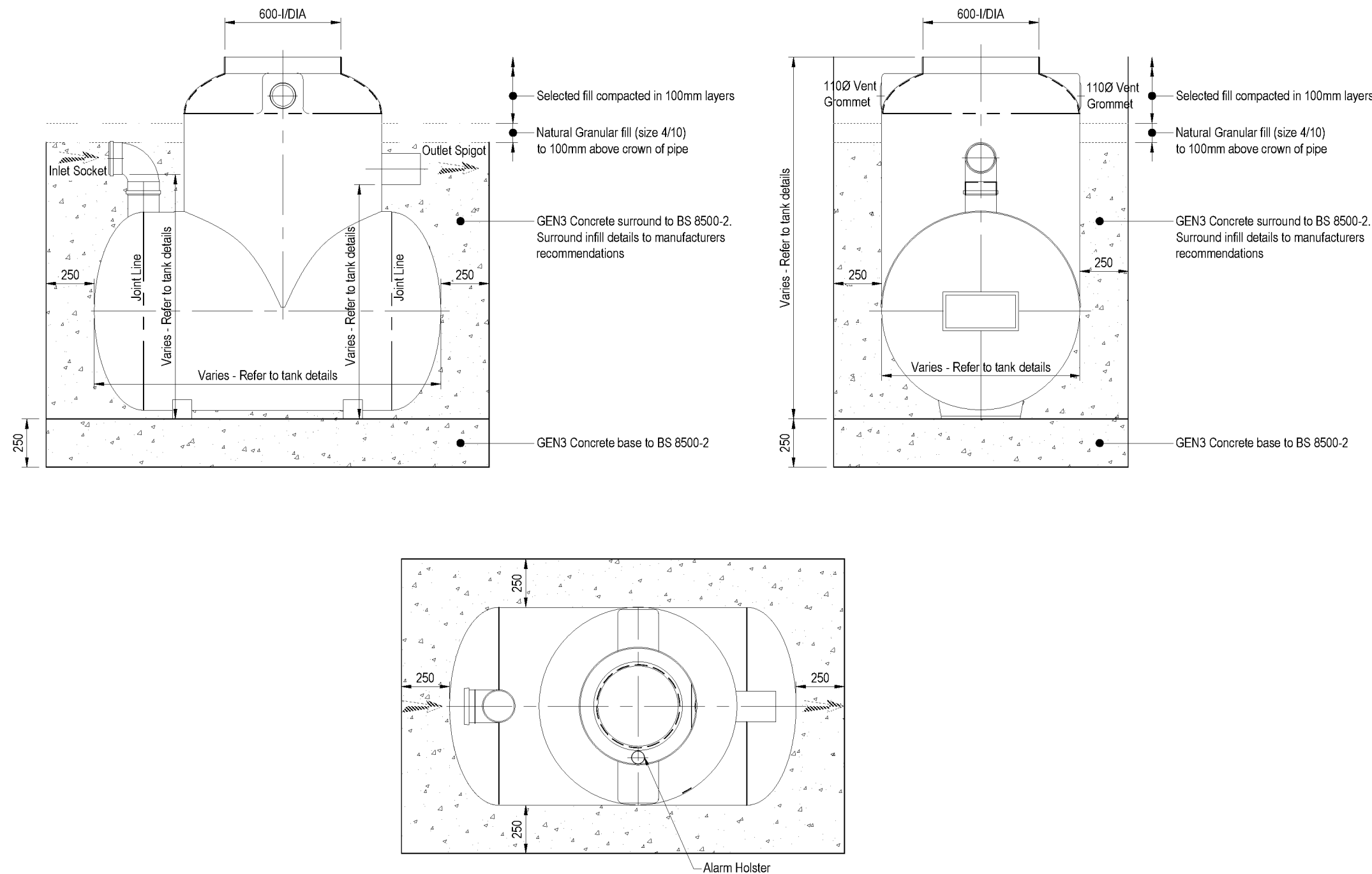
GENERAL NOTES

- All setting out to be in accordance with the Architects drawings. Any discrepancies between the Engineers and the Architects drawings to be referred to the Architect before proceeding. Dimensions must not be scaled.
- All drainage to be installed in accordance with relevant Building Regulations documents and Sewers for Adoption 7 where applicable.
- Connections to Public sewers to be agreed and inspected by Water Authority.

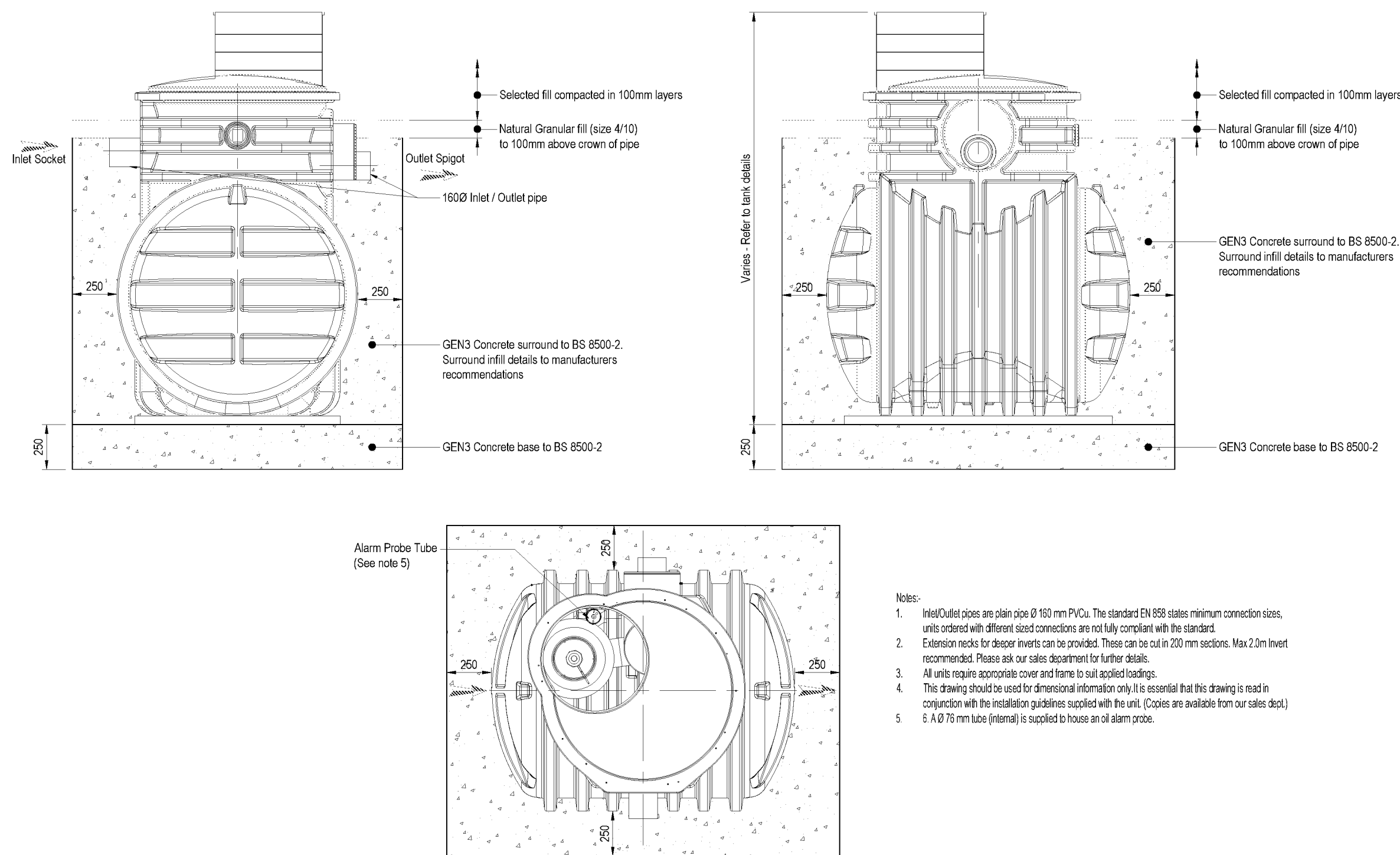


IDENTIFIES RISKS DURING THE CONSTRUCTION PROCESS ON THE DRAWINGS:

NOTE: The list below and notes on the drawing identify risks which are deemed to be unusual, abnormal, residual or unexpected to a competent contractor carrying out the works. These notes relate to risks which we have been unable to design out.



CONDOR CNSB4.5s/21S CLASS I BYPASS SEPARATOR



KLARGESTER NSBP003 CLASS II BYPASS SEPARATOR

C01	Issue for Construction	DH	GT	30.11.18
Rev.	Amendment	Dm	Chkd	Date

Dwg. Status	Construction	Suitability	A2
-------------	--------------	-------------	----

AKSWard[®]

CONSTRUCTION CONSULTANTS

Seacourt Tower West Way Oxford OX2 0JJ	☐ London ☐ Hitchin ☒ Oxford ☐ Southampton ☐ Birmingham
Tel: 01865 240071 Fax: 01865 248006 e-mail: oxford@aksward.com web: www.aksward.com	

Client **Yeomans Limited**

Project **Honda/Office/Peugeot**

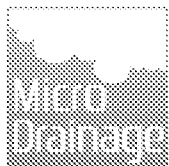
Title **Drainage Standard Details
Sheet 3 of 3**

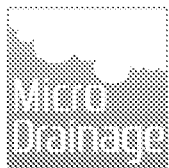
Reviewed Scheme	GT	Date	30.11.18				
Reviewed Final	GT	Date	30.11.18				
Scales at A1	NTS	Project No.	S188010				
Project Ref.	Originator	Zone	Level	Type	Role	Dwg No.	Rev.

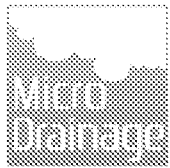
YEO AKSW XX XX DR C 9253 - C01

Appendix D

Proposed Drainage Calculations

AKSWard Ltd			Page 1																																																																																																																																																																																																																				
Seacourt Tower		Yeomans Limited																																																																																																																																																																																																																					
West Way Oxford		Worthing																																																																																																																																																																																																																					
OX2 0JJ		Honda/Office/Peugeot																																																																																																																																																																																																																					
Date 21/09/2018		Designed by NJ																																																																																																																																																																																																																					
File Permeable Paving.srcx		Checked by GT																																																																																																																																																																																																																					
Micro Drainage		Source Control 2018.1																																																																																																																																																																																																																					
<u>Summary of Results for 1 year Return Period</u> Half Drain Time : 512 minutes. <table><thead><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr></thead><tbody><tr><td>15 min Summer</td><td>49.564</td><td>0.044</td><td>0.1</td><td>0.9</td><td>O K</td></tr><tr><td>30 min Summer</td><td>49.596</td><td>0.076</td><td>0.1</td><td>2.8</td><td>O K</td></tr><tr><td>60 min Summer</td><td>49.621</td><td>0.101</td><td>0.2</td><td>5.0</td><td>O K</td></tr><tr><td>120 min Summer</td><td>49.642</td><td>0.122</td><td>0.2</td><td>7.4</td><td>O K</td></tr><tr><td>180 min Summer</td><td>49.653</td><td>0.133</td><td>0.2</td><td>8.8</td><td>O K</td></tr><tr><td>240 min Summer</td><td>49.660</td><td>0.140</td><td>0.2</td><td>9.7</td><td>O K</td></tr><tr><td>360 min Summer</td><td>49.668</td><td>0.148</td><td>0.2</td><td>10.8</td><td>O K</td></tr><tr><td>480 min Summer</td><td>49.672</td><td>0.152</td><td>0.2</td><td>11.4</td><td>O K</td></tr><tr><td>600 min Summer</td><td>49.675</td><td>0.155</td><td>0.3</td><td>11.8</td><td>O K</td></tr><tr><td>720 min Summer</td><td>49.677</td><td>0.157</td><td>0.3</td><td>12.2</td><td>O K</td></tr><tr><td>960 min Summer</td><td>49.681</td><td>0.161</td><td>0.3</td><td>12.7</td><td>O K</td></tr><tr><td>1440 min Summer</td><td>49.684</td><td>0.164</td><td>0.3</td><td>13.2</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>49.684</td><td>0.164</td><td>0.3</td><td>13.2</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>49.681</td><td>0.161</td><td>0.3</td><td>12.8</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>49.674</td><td>0.154</td><td>0.3</td><td>11.7</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>49.666</td><td>0.146</td><td>0.2</td><td>10.5</td><td>O K</td></tr><tr><td>7200 min Summer</td><td>49.658</td><td>0.138</td><td>0.2</td><td>9.5</td><td>O K</td></tr><tr><td>8640 min Summer</td><td>49.651</td><td>0.131</td><td>0.2</td><td>8.5</td><td>O K</td></tr><tr><td>10080 min Summer</td><td>49.644</td><td>0.124</td><td>0.2</td><td>7.6</td><td>O K</td></tr><tr><td>15 min Winter</td><td>49.578</td><td>0.058</td><td>0.1</td><td>1.7</td><td>O K</td></tr></tbody></table> <table><thead><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Time-Peak (mins)</th></tr></thead><tbody><tr><td>15 min Summer</td><td>28.417</td><td>0.0</td><td>19</td></tr><tr><td>30 min Summer</td><td>18.860</td><td>0.0</td><td>34</td></tr><tr><td>60 min Summer</td><td>12.227</td><td>0.0</td><td>64</td></tr><tr><td>120 min Summer</td><td>7.783</td><td>0.0</td><td>122</td></tr><tr><td>180 min Summer</td><td>5.952</td><td>0.0</td><td>182</td></tr><tr><td>240 min Summer</td><td>4.917</td><td>0.0</td><td>242</td></tr><tr><td>360 min Summer</td><td>3.727</td><td>0.0</td><td>360</td></tr><tr><td>480 min Summer</td><td>3.055</td><td>0.0</td><td>418</td></tr><tr><td>600 min Summer</td><td>2.619</td><td>0.0</td><td>478</td></tr><tr><td>720 min Summer</td><td>2.309</td><td>0.0</td><td>542</td></tr><tr><td>960 min Summer</td><td>1.894</td><td>0.0</td><td>674</td></tr><tr><td>1440 min Summer</td><td>1.433</td><td>0.0</td><td>952</td></tr><tr><td>2160 min Summer</td><td>1.083</td><td>0.0</td><td>1364</td></tr><tr><td>2880 min Summer</td><td>0.888</td><td>0.0</td><td>1760</td></tr><tr><td>4320 min Summer</td><td>0.672</td><td>0.0</td><td>2552</td></tr><tr><td>5760 min Summer</td><td>0.552</td><td>0.0</td><td>3296</td></tr><tr><td>7200 min Summer</td><td>0.474</td><td>0.0</td><td>4040</td></tr><tr><td>8640 min Summer</td><td>0.417</td><td>0.0</td><td>4760</td></tr><tr><td>10080 min Summer</td><td>0.374</td><td>0.0</td><td>5544</td></tr><tr><td>15 min Winter</td><td>28.417</td><td>0.0</td><td>19</td></tr></tbody></table>						Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	15 min Summer	49.564	0.044	0.1	0.9	O K	30 min Summer	49.596	0.076	0.1	2.8	O K	60 min Summer	49.621	0.101	0.2	5.0	O K	120 min Summer	49.642	0.122	0.2	7.4	O K	180 min Summer	49.653	0.133	0.2	8.8	O K	240 min Summer	49.660	0.140	0.2	9.7	O K	360 min Summer	49.668	0.148	0.2	10.8	O K	480 min Summer	49.672	0.152	0.2	11.4	O K	600 min Summer	49.675	0.155	0.3	11.8	O K	720 min Summer	49.677	0.157	0.3	12.2	O K	960 min Summer	49.681	0.161	0.3	12.7	O K	1440 min Summer	49.684	0.164	0.3	13.2	O K	2160 min Summer	49.684	0.164	0.3	13.2	O K	2880 min Summer	49.681	0.161	0.3	12.8	O K	4320 min Summer	49.674	0.154	0.3	11.7	O K	5760 min Summer	49.666	0.146	0.2	10.5	O K	7200 min Summer	49.658	0.138	0.2	9.5	O K	8640 min Summer	49.651	0.131	0.2	8.5	O K	10080 min Summer	49.644	0.124	0.2	7.6	O K	15 min Winter	49.578	0.058	0.1	1.7	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	15 min Summer	28.417	0.0	19	30 min Summer	18.860	0.0	34	60 min Summer	12.227	0.0	64	120 min Summer	7.783	0.0	122	180 min Summer	5.952	0.0	182	240 min Summer	4.917	0.0	242	360 min Summer	3.727	0.0	360	480 min Summer	3.055	0.0	418	600 min Summer	2.619	0.0	478	720 min Summer	2.309	0.0	542	960 min Summer	1.894	0.0	674	1440 min Summer	1.433	0.0	952	2160 min Summer	1.083	0.0	1364	2880 min Summer	0.888	0.0	1760	4320 min Summer	0.672	0.0	2552	5760 min Summer	0.552	0.0	3296	7200 min Summer	0.474	0.0	4040	8640 min Summer	0.417	0.0	4760	10080 min Summer	0.374	0.0	5544	15 min Winter	28.417	0.0	19
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status																																																																																																																																																																																																																		
15 min Summer	49.564	0.044	0.1	0.9	O K																																																																																																																																																																																																																		
30 min Summer	49.596	0.076	0.1	2.8	O K																																																																																																																																																																																																																		
60 min Summer	49.621	0.101	0.2	5.0	O K																																																																																																																																																																																																																		
120 min Summer	49.642	0.122	0.2	7.4	O K																																																																																																																																																																																																																		
180 min Summer	49.653	0.133	0.2	8.8	O K																																																																																																																																																																																																																		
240 min Summer	49.660	0.140	0.2	9.7	O K																																																																																																																																																																																																																		
360 min Summer	49.668	0.148	0.2	10.8	O K																																																																																																																																																																																																																		
480 min Summer	49.672	0.152	0.2	11.4	O K																																																																																																																																																																																																																		
600 min Summer	49.675	0.155	0.3	11.8	O K																																																																																																																																																																																																																		
720 min Summer	49.677	0.157	0.3	12.2	O K																																																																																																																																																																																																																		
960 min Summer	49.681	0.161	0.3	12.7	O K																																																																																																																																																																																																																		
1440 min Summer	49.684	0.164	0.3	13.2	O K																																																																																																																																																																																																																		
2160 min Summer	49.684	0.164	0.3	13.2	O K																																																																																																																																																																																																																		
2880 min Summer	49.681	0.161	0.3	12.8	O K																																																																																																																																																																																																																		
4320 min Summer	49.674	0.154	0.3	11.7	O K																																																																																																																																																																																																																		
5760 min Summer	49.666	0.146	0.2	10.5	O K																																																																																																																																																																																																																		
7200 min Summer	49.658	0.138	0.2	9.5	O K																																																																																																																																																																																																																		
8640 min Summer	49.651	0.131	0.2	8.5	O K																																																																																																																																																																																																																		
10080 min Summer	49.644	0.124	0.2	7.6	O K																																																																																																																																																																																																																		
15 min Winter	49.578	0.058	0.1	1.7	O K																																																																																																																																																																																																																		
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)																																																																																																																																																																																																																				
15 min Summer	28.417	0.0	19																																																																																																																																																																																																																				
30 min Summer	18.860	0.0	34																																																																																																																																																																																																																				
60 min Summer	12.227	0.0	64																																																																																																																																																																																																																				
120 min Summer	7.783	0.0	122																																																																																																																																																																																																																				
180 min Summer	5.952	0.0	182																																																																																																																																																																																																																				
240 min Summer	4.917	0.0	242																																																																																																																																																																																																																				
360 min Summer	3.727	0.0	360																																																																																																																																																																																																																				
480 min Summer	3.055	0.0	418																																																																																																																																																																																																																				
600 min Summer	2.619	0.0	478																																																																																																																																																																																																																				
720 min Summer	2.309	0.0	542																																																																																																																																																																																																																				
960 min Summer	1.894	0.0	674																																																																																																																																																																																																																				
1440 min Summer	1.433	0.0	952																																																																																																																																																																																																																				
2160 min Summer	1.083	0.0	1364																																																																																																																																																																																																																				
2880 min Summer	0.888	0.0	1760																																																																																																																																																																																																																				
4320 min Summer	0.672	0.0	2552																																																																																																																																																																																																																				
5760 min Summer	0.552	0.0	3296																																																																																																																																																																																																																				
7200 min Summer	0.474	0.0	4040																																																																																																																																																																																																																				
8640 min Summer	0.417	0.0	4760																																																																																																																																																																																																																				
10080 min Summer	0.374	0.0	5544																																																																																																																																																																																																																				
15 min Winter	28.417	0.0	19																																																																																																																																																																																																																				
©1982-2018 Innovyze																																																																																																																																																																																																																							

AKSWard Ltd				Page 2	
Seacourt Tower West Way Oxford OX2 0JJ		Yeomans Limited Worthing Honda/Office/Peugeot			
Date 21/09/2018 File Permeable Paving.srcx		Designed by NJ Checked by GT			
Micro Drainage		Source Control 2018.1			
<u>Summary of Results for 1 year Return Period</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	49.608	0.088	0.1	3.8	O K
60 min Winter	49.633	0.113	0.2	6.3	O K
120 min Winter	49.654	0.134	0.2	8.9	O K
180 min Winter	49.666	0.146	0.2	10.5	O K
240 min Winter	49.674	0.154	0.3	11.6	O K
360 min Winter	49.682	0.162	0.3	12.9	O K
480 min Winter	49.686	0.166	0.3	13.6	O K
600 min Winter	49.688	0.168	0.3	14.0	O K
720 min Winter	49.691	0.171	0.3	14.4	O K
960 min Winter	49.693	0.173	0.3	14.8	O K
1440 min Winter	49.694	0.174	0.3	15.0	O K
2160 min Winter	49.691	0.171	0.3	14.4	O K
2880 min Winter	49.686	0.166	0.3	13.6	O K
4320 min Winter	49.673	0.153	0.3	11.6	O K
5760 min Winter	49.661	0.141	0.2	9.9	O K
7200 min Winter	49.650	0.130	0.2	8.4	O K
8640 min Winter	49.640	0.120	0.2	7.1	O K
10080 min Winter	49.631	0.111	0.2	6.1	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	18.860	0.0	33		
60 min Winter	12.227	0.0	62		
120 min Winter	7.783	0.0	120		
180 min Winter	5.952	0.0	178		
240 min Winter	4.917	0.0	236		
360 min Winter	3.727	0.0	348		
480 min Winter	3.055	0.0	454		
600 min Winter	2.619	0.0	536		
720 min Winter	2.309	0.0	566		
960 min Winter	1.894	0.0	722		
1440 min Winter	1.433	0.0	1024		
2160 min Winter	1.083	0.0	1468		
2880 min Winter	0.888	0.0	1876		
4320 min Winter	0.672	0.0	2684		
5760 min Winter	0.552	0.0	3464		
7200 min Winter	0.474	0.0	4248		
8640 min Winter	0.417	0.0	4936		
10080 min Winter	0.374	0.0	5656		
©1982-2018 Innovyze					

AKSWard Ltd		Page 3
Seacourt Tower West Way Oxford OX2 0JJ	Yeomans Limited Worthing Honda/Office/Peugeot	
Date 21/09/2018 File Permeable Paving.srcx	Designed by NJ Checked by GT	
Micro Drainage		Source Control 2018.1

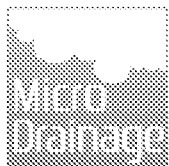
Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.200	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

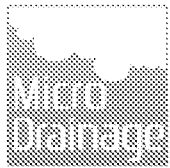
Total Area (ha) 0.115

Time (mins)	Area
From:	To: (ha)
0	4 0.115

AKSWard Ltd		Page 4
Seacourt Tower West Way Oxford OX2 0JJ	Yeomans Limited Worthing Honda/Office/Peugeot	
Date 21/09/2018 File Permeable Paving.srcx	Designed by NJ Checked by GT	
Micro Drainage		

AKSWard Ltd				Page 1																																																																																																																																																																																																																			
Seacourt Tower		Yeomans Limited																																																																																																																																																																																																																					
West Way Oxford		Worthing																																																																																																																																																																																																																					
OX2 0JJ		Honda/Office/Peugeot																																																																																																																																																																																																																					
Date 21/09/2018		Designed by NJ																																																																																																																																																																																																																					
File Permeable Paving.srcx		Checked by GT																																																																																																																																																																																																																					
Micro Drainage		Source Control 2018.1																																																																																																																																																																																																																					
<u>Summary of Results for 30 year Return Period</u> Half Drain Time : 832 minutes. <table><thead><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr></thead><tbody><tr><td>15 min Summer</td><td>49.660</td><td>0.140</td><td>0.2</td><td>9.7</td><td>O K</td></tr><tr><td>30 min Summer</td><td>49.691</td><td>0.171</td><td>0.3</td><td>14.5</td><td>O K</td></tr><tr><td>60 min Summer</td><td>49.719</td><td>0.199</td><td>0.3</td><td>19.6</td><td>Flood Risk</td></tr><tr><td>120 min Summer</td><td>49.744</td><td>0.224</td><td>0.4</td><td>24.8</td><td>Flood Risk</td></tr><tr><td>180 min Summer</td><td>49.757</td><td>0.237</td><td>0.4</td><td>27.6</td><td>Flood Risk</td></tr><tr><td>240 min Summer</td><td>49.764</td><td>0.244</td><td>0.4</td><td>29.4</td><td>Flood Risk</td></tr><tr><td>360 min Summer</td><td>49.773</td><td>0.253</td><td>0.4</td><td>31.5</td><td>Flood Risk</td></tr><tr><td>480 min Summer</td><td>49.777</td><td>0.257</td><td>0.4</td><td>32.7</td><td>Flood Risk</td></tr><tr><td>600 min Summer</td><td>49.779</td><td>0.259</td><td>0.4</td><td>33.2</td><td>Flood Risk</td></tr><tr><td>720 min Summer</td><td>49.781</td><td>0.261</td><td>0.4</td><td>33.6</td><td>Flood Risk</td></tr><tr><td>960 min Summer</td><td>49.783</td><td>0.263</td><td>0.4</td><td>34.1</td><td>Flood Risk</td></tr><tr><td>1440 min Summer</td><td>49.784</td><td>0.264</td><td>0.4</td><td>34.3</td><td>Flood Risk</td></tr><tr><td>2160 min Summer</td><td>49.781</td><td>0.261</td><td>0.4</td><td>33.6</td><td>Flood Risk</td></tr><tr><td>2880 min Summer</td><td>49.776</td><td>0.256</td><td>0.4</td><td>32.3</td><td>Flood Risk</td></tr><tr><td>4320 min Summer</td><td>49.764</td><td>0.244</td><td>0.4</td><td>29.3</td><td>Flood Risk</td></tr><tr><td>5760 min Summer</td><td>49.752</td><td>0.232</td><td>0.4</td><td>26.5</td><td>Flood Risk</td></tr><tr><td>7200 min Summer</td><td>49.740</td><td>0.220</td><td>0.4</td><td>23.9</td><td>Flood Risk</td></tr><tr><td>8640 min Summer</td><td>49.730</td><td>0.210</td><td>0.3</td><td>21.7</td><td>Flood Risk</td></tr><tr><td>10080 min Summer</td><td>49.720</td><td>0.200</td><td>0.3</td><td>19.7</td><td>Flood Risk</td></tr><tr><td>15 min Winter</td><td>49.673</td><td>0.153</td><td>0.3</td><td>11.5</td><td>O K</td></tr></tbody></table> <table><thead><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Time-Peak (mins)</th></tr></thead><tbody><tr><td>15 min Summer</td><td>69.605</td><td>0.0</td><td>19</td></tr><tr><td>30 min Summer</td><td>46.335</td><td>0.0</td><td>34</td></tr><tr><td>60 min Summer</td><td>29.553</td><td>0.0</td><td>64</td></tr><tr><td>120 min Summer</td><td>18.298</td><td>0.0</td><td>122</td></tr><tr><td>180 min Summer</td><td>13.667</td><td>0.0</td><td>182</td></tr><tr><td>240 min Summer</td><td>11.055</td><td>0.0</td><td>242</td></tr><tr><td>360 min Summer</td><td>8.183</td><td>0.0</td><td>362</td></tr><tr><td>480 min Summer</td><td>6.606</td><td>0.0</td><td>480</td></tr><tr><td>600 min Summer</td><td>5.592</td><td>0.0</td><td>572</td></tr><tr><td>720 min Summer</td><td>4.877</td><td>0.0</td><td>620</td></tr><tr><td>960 min Summer</td><td>3.929</td><td>0.0</td><td>742</td></tr><tr><td>1440 min Summer</td><td>2.893</td><td>0.0</td><td>1008</td></tr><tr><td>2160 min Summer</td><td>2.127</td><td>0.0</td><td>1408</td></tr><tr><td>2880 min Summer</td><td>1.708</td><td>0.0</td><td>1820</td></tr><tr><td>4320 min Summer</td><td>1.253</td><td>0.0</td><td>2636</td></tr><tr><td>5760 min Summer</td><td>1.005</td><td>0.0</td><td>3408</td></tr><tr><td>7200 min Summer</td><td>0.846</td><td>0.0</td><td>4184</td></tr><tr><td>8640 min Summer</td><td>0.736</td><td>0.0</td><td>4928</td></tr><tr><td>10080 min Summer</td><td>0.654</td><td>0.0</td><td>5656</td></tr><tr><td>15 min Winter</td><td>69.605</td><td>0.0</td><td>19</td></tr></tbody></table>						Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	15 min Summer	49.660	0.140	0.2	9.7	O K	30 min Summer	49.691	0.171	0.3	14.5	O K	60 min Summer	49.719	0.199	0.3	19.6	Flood Risk	120 min Summer	49.744	0.224	0.4	24.8	Flood Risk	180 min Summer	49.757	0.237	0.4	27.6	Flood Risk	240 min Summer	49.764	0.244	0.4	29.4	Flood Risk	360 min Summer	49.773	0.253	0.4	31.5	Flood Risk	480 min Summer	49.777	0.257	0.4	32.7	Flood Risk	600 min Summer	49.779	0.259	0.4	33.2	Flood Risk	720 min Summer	49.781	0.261	0.4	33.6	Flood Risk	960 min Summer	49.783	0.263	0.4	34.1	Flood Risk	1440 min Summer	49.784	0.264	0.4	34.3	Flood Risk	2160 min Summer	49.781	0.261	0.4	33.6	Flood Risk	2880 min Summer	49.776	0.256	0.4	32.3	Flood Risk	4320 min Summer	49.764	0.244	0.4	29.3	Flood Risk	5760 min Summer	49.752	0.232	0.4	26.5	Flood Risk	7200 min Summer	49.740	0.220	0.4	23.9	Flood Risk	8640 min Summer	49.730	0.210	0.3	21.7	Flood Risk	10080 min Summer	49.720	0.200	0.3	19.7	Flood Risk	15 min Winter	49.673	0.153	0.3	11.5	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	15 min Summer	69.605	0.0	19	30 min Summer	46.335	0.0	34	60 min Summer	29.553	0.0	64	120 min Summer	18.298	0.0	122	180 min Summer	13.667	0.0	182	240 min Summer	11.055	0.0	242	360 min Summer	8.183	0.0	362	480 min Summer	6.606	0.0	480	600 min Summer	5.592	0.0	572	720 min Summer	4.877	0.0	620	960 min Summer	3.929	0.0	742	1440 min Summer	2.893	0.0	1008	2160 min Summer	2.127	0.0	1408	2880 min Summer	1.708	0.0	1820	4320 min Summer	1.253	0.0	2636	5760 min Summer	1.005	0.0	3408	7200 min Summer	0.846	0.0	4184	8640 min Summer	0.736	0.0	4928	10080 min Summer	0.654	0.0	5656	15 min Winter	69.605	0.0	19
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status																																																																																																																																																																																																																		
15 min Summer	49.660	0.140	0.2	9.7	O K																																																																																																																																																																																																																		
30 min Summer	49.691	0.171	0.3	14.5	O K																																																																																																																																																																																																																		
60 min Summer	49.719	0.199	0.3	19.6	Flood Risk																																																																																																																																																																																																																		
120 min Summer	49.744	0.224	0.4	24.8	Flood Risk																																																																																																																																																																																																																		
180 min Summer	49.757	0.237	0.4	27.6	Flood Risk																																																																																																																																																																																																																		
240 min Summer	49.764	0.244	0.4	29.4	Flood Risk																																																																																																																																																																																																																		
360 min Summer	49.773	0.253	0.4	31.5	Flood Risk																																																																																																																																																																																																																		
480 min Summer	49.777	0.257	0.4	32.7	Flood Risk																																																																																																																																																																																																																		
600 min Summer	49.779	0.259	0.4	33.2	Flood Risk																																																																																																																																																																																																																		
720 min Summer	49.781	0.261	0.4	33.6	Flood Risk																																																																																																																																																																																																																		
960 min Summer	49.783	0.263	0.4	34.1	Flood Risk																																																																																																																																																																																																																		
1440 min Summer	49.784	0.264	0.4	34.3	Flood Risk																																																																																																																																																																																																																		
2160 min Summer	49.781	0.261	0.4	33.6	Flood Risk																																																																																																																																																																																																																		
2880 min Summer	49.776	0.256	0.4	32.3	Flood Risk																																																																																																																																																																																																																		
4320 min Summer	49.764	0.244	0.4	29.3	Flood Risk																																																																																																																																																																																																																		
5760 min Summer	49.752	0.232	0.4	26.5	Flood Risk																																																																																																																																																																																																																		
7200 min Summer	49.740	0.220	0.4	23.9	Flood Risk																																																																																																																																																																																																																		
8640 min Summer	49.730	0.210	0.3	21.7	Flood Risk																																																																																																																																																																																																																		
10080 min Summer	49.720	0.200	0.3	19.7	Flood Risk																																																																																																																																																																																																																		
15 min Winter	49.673	0.153	0.3	11.5	O K																																																																																																																																																																																																																		
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)																																																																																																																																																																																																																				
15 min Summer	69.605	0.0	19																																																																																																																																																																																																																				
30 min Summer	46.335	0.0	34																																																																																																																																																																																																																				
60 min Summer	29.553	0.0	64																																																																																																																																																																																																																				
120 min Summer	18.298	0.0	122																																																																																																																																																																																																																				
180 min Summer	13.667	0.0	182																																																																																																																																																																																																																				
240 min Summer	11.055	0.0	242																																																																																																																																																																																																																				
360 min Summer	8.183	0.0	362																																																																																																																																																																																																																				
480 min Summer	6.606	0.0	480																																																																																																																																																																																																																				
600 min Summer	5.592	0.0	572																																																																																																																																																																																																																				
720 min Summer	4.877	0.0	620																																																																																																																																																																																																																				
960 min Summer	3.929	0.0	742																																																																																																																																																																																																																				
1440 min Summer	2.893	0.0	1008																																																																																																																																																																																																																				
2160 min Summer	2.127	0.0	1408																																																																																																																																																																																																																				
2880 min Summer	1.708	0.0	1820																																																																																																																																																																																																																				
4320 min Summer	1.253	0.0	2636																																																																																																																																																																																																																				
5760 min Summer	1.005	0.0	3408																																																																																																																																																																																																																				
7200 min Summer	0.846	0.0	4184																																																																																																																																																																																																																				
8640 min Summer	0.736	0.0	4928																																																																																																																																																																																																																				
10080 min Summer	0.654	0.0	5656																																																																																																																																																																																																																				
15 min Winter	69.605	0.0	19																																																																																																																																																																																																																				
©1982-2018 Innovyze																																																																																																																																																																																																																							

AKSWard Ltd				Page 2	
Seacourt Tower West Way Oxford OX2 0JJ		Yeomans Limited Worthing Honda/Office/Peugeot			
Date 21/09/2018 File Permeable Paving.srcx		Designed by NJ Checked by GT			
Micro Drainage		Source Control 2018.1			
<u>Summary of Results for 30 year Return Period</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	49.705	0.185	0.3	16.9	Flood Risk
60 min Winter	49.734	0.214	0.4	22.6	Flood Risk
120 min Winter	49.760	0.240	0.4	28.4	Flood Risk
180 min Winter	49.773	0.253	0.4	31.7	Flood Risk
240 min Winter	49.781	0.261	0.4	33.7	Flood Risk
360 min Winter	49.791	0.271	0.4	36.3	Flood Risk
480 min Winter	49.797	0.277	0.5	37.7	Flood Risk
600 min Winter	49.799	0.279	0.5	38.5	Flood Risk
720 min Winter	49.801	0.281	0.5	38.9	Flood Risk
860 min Winter	49.801	0.281	0.5	39.1	Flood Risk
1440 min Winter	49.801	0.281	0.5	39.0	Flood Risk
2160 min Winter	49.795	0.275	0.5	37.4	Flood Risk
2880 min Winter	49.787	0.267	0.4	35.2	Flood Risk
4320 min Winter	49.769	0.249	0.4	30.6	Flood Risk
5760 min Winter	49.752	0.232	0.4	26.5	Flood Risk
7200 min Winter	49.736	0.216	0.4	22.9	Flood Risk
8640 min Winter	49.721	0.201	0.3	19.9	Flood Risk
10080 min Winter	49.708	0.188	0.3	17.4	Flood Risk
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	46.335	0.0	33		
60 min Winter	29.553	0.0	62		
120 min Winter	18.298	0.0	120		
180 min Winter	13.667	0.0	180		
240 min Winter	11.055	0.0	238		
360 min Winter	8.183	0.0	352		
480 min Winter	6.606	0.0	464		
600 min Winter	5.592	0.0	574		
720 min Winter	4.877	0.0	678		
860 min Winter	3.929	0.0	772		
1440 min Winter	2.893	0.0	1080		
2160 min Winter	2.127	0.0	1536		
2880 min Winter	1.708	0.0	1964		
4320 min Winter	1.253	0.0	2812		
5760 min Winter	1.005	0.0	3632		
7200 min Winter	0.846	0.0	4400		
8640 min Winter	0.736	0.0	5184		
10080 min Winter	0.654	0.0	5944		
©1982-2018 Innovyze					

AKSWard Ltd		Page 3
Seacourt Tower West Way Oxford OX2 0JJ	Yeomans Limited Worthing Honda/Office/Peugeot	
Date 21/09/2018 File Permeable Paving.srcx	Designed by NJ Checked by GT	
Micro Drainage		Source Control 2018.1

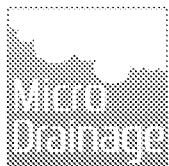
Rainfall Details

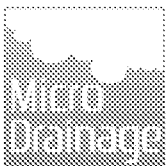
Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.200	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

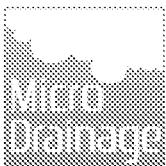
Time Area Diagram

Total Area (ha) 0.115

Time (mins)	Area
From:	To: (ha)
0	4 0.115

AKSWard Ltd		Page 4
Seacourt Tower West Way Oxford OX2 0JJ	Yeomans Limited Worthing Honda/Office/Peugeot	
Date 21/09/2018 File Permeable Paving.srcx	Designed by NJ Checked by GT	
Micro Drainage		

AKSWard Ltd				Page 1																																																																																																																																																																																																																			
Seacourt Tower West Way Oxford OX2 0JJ		Yeomans Limited Worthing Honda/Office/Peugeot																																																																																																																																																																																																																					
Date 21/09/2018 File Permeable Paving.srcx		Designed by NJ Checked by GT																																																																																																																																																																																																																					
Micro Drainage		Source Control 2018.1																																																																																																																																																																																																																					
<u>Summary of Results for 100 year Return Period</u> Half Drain Time : 994 minutes. <table><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr><tr><td>15 min Summer</td><td>49.689</td><td>0.169</td><td>0.3</td><td>14.1</td><td>O K</td></tr><tr><td>30 min Summer</td><td>49.724</td><td>0.204</td><td>0.3</td><td>20.6</td><td>Flood Risk</td></tr><tr><td>60 min Summer</td><td>49.756</td><td>0.236</td><td>0.4</td><td>27.5</td><td>Flood Risk</td></tr><tr><td>120 min Summer</td><td>49.784</td><td>0.264</td><td>0.4</td><td>34.4</td><td>Flood Risk</td></tr><tr><td>180 min Summer</td><td>49.798</td><td>0.278</td><td>0.5</td><td>38.1</td><td>Flood Risk</td></tr><tr><td>240 min Summer</td><td>49.806</td><td>0.286</td><td>0.5</td><td>40.3</td><td>Flood Risk</td></tr><tr><td>360 min Summer</td><td>49.815</td><td>0.295</td><td>0.5</td><td>43.1</td><td>Flood Risk</td></tr><tr><td>480 min Summer</td><td>49.820</td><td>0.300</td><td>0.5</td><td>44.5</td><td>Flood Risk</td></tr><tr><td>600 min Summer</td><td>49.823</td><td>0.303</td><td>0.5</td><td>45.2</td><td>Flood Risk</td></tr><tr><td>720 min Summer</td><td>49.824</td><td>0.304</td><td>0.5</td><td>45.5</td><td>Flood Risk</td></tr><tr><td>960 min Summer</td><td>49.825</td><td>0.305</td><td>0.5</td><td>45.8</td><td>Flood Risk</td></tr><tr><td>1440 min Summer</td><td>49.825</td><td>0.305</td><td>0.5</td><td>45.8</td><td>Flood Risk</td></tr><tr><td>2160 min Summer</td><td>49.821</td><td>0.301</td><td>0.5</td><td>44.6</td><td>Flood Risk</td></tr><tr><td>2880 min Summer</td><td>49.815</td><td>0.295</td><td>0.5</td><td>42.8</td><td>Flood Risk</td></tr><tr><td>4320 min Summer</td><td>49.801</td><td>0.281</td><td>0.5</td><td>38.9</td><td>Flood Risk</td></tr><tr><td>5760 min Summer</td><td>49.787</td><td>0.267</td><td>0.4</td><td>35.1</td><td>Flood Risk</td></tr><tr><td>7200 min Summer</td><td>49.773</td><td>0.253</td><td>0.4</td><td>31.7</td><td>Flood Risk</td></tr><tr><td>8640 min Summer</td><td>49.762</td><td>0.242</td><td>0.4</td><td>28.8</td><td>Flood Risk</td></tr><tr><td>10080 min Summer</td><td>49.751</td><td>0.231</td><td>0.4</td><td>26.3</td><td>Flood Risk</td></tr><tr><td>15 min Winter</td><td>49.702</td><td>0.182</td><td>0.3</td><td>16.4</td><td>Flood Risk</td></tr></table> <table><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Time-Peak (mins)</th></tr><tr><td>15 min Summer</td><td>90.053</td><td>0.0</td><td>19</td></tr><tr><td>30 min Summer</td><td>60.532</td><td>0.0</td><td>34</td></tr><tr><td>60 min Summer</td><td>38.834</td><td>0.0</td><td>64</td></tr><tr><td>120 min Summer</td><td>24.053</td><td>0.0</td><td>124</td></tr><tr><td>180 min Summer</td><td>17.903</td><td>0.0</td><td>182</td></tr><tr><td>240 min Summer</td><td>14.414</td><td>0.0</td><td>242</td></tr><tr><td>360 min Summer</td><td>10.599</td><td>0.0</td><td>362</td></tr><tr><td>480 min Summer</td><td>8.517</td><td>0.0</td><td>480</td></tr><tr><td>600 min Summer</td><td>7.181</td><td>0.0</td><td>600</td></tr><tr><td>720 min Summer</td><td>6.244</td><td>0.0</td><td>670</td></tr><tr><td>960 min Summer</td><td>5.002</td><td>0.0</td><td>778</td></tr><tr><td>1440 min Summer</td><td>3.653</td><td>0.0</td><td>1026</td></tr><tr><td>2160 min Summer</td><td>2.662</td><td>0.0</td><td>1448</td></tr><tr><td>2880 min Summer</td><td>2.124</td><td>0.0</td><td>1848</td></tr><tr><td>4320 min Summer</td><td>1.542</td><td>0.0</td><td>2676</td></tr><tr><td>5760 min Summer</td><td>1.227</td><td>0.0</td><td>3456</td></tr><tr><td>7200 min Summer</td><td>1.027</td><td>0.0</td><td>4248</td></tr><tr><td>8640 min Summer</td><td>0.889</td><td>0.0</td><td>5008</td></tr><tr><td>10080 min Summer</td><td>0.787</td><td>0.0</td><td>5744</td></tr><tr><td>15 min Winter</td><td>90.053</td><td>0.0</td><td>19</td></tr></table>						Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	15 min Summer	49.689	0.169	0.3	14.1	O K	30 min Summer	49.724	0.204	0.3	20.6	Flood Risk	60 min Summer	49.756	0.236	0.4	27.5	Flood Risk	120 min Summer	49.784	0.264	0.4	34.4	Flood Risk	180 min Summer	49.798	0.278	0.5	38.1	Flood Risk	240 min Summer	49.806	0.286	0.5	40.3	Flood Risk	360 min Summer	49.815	0.295	0.5	43.1	Flood Risk	480 min Summer	49.820	0.300	0.5	44.5	Flood Risk	600 min Summer	49.823	0.303	0.5	45.2	Flood Risk	720 min Summer	49.824	0.304	0.5	45.5	Flood Risk	960 min Summer	49.825	0.305	0.5	45.8	Flood Risk	1440 min Summer	49.825	0.305	0.5	45.8	Flood Risk	2160 min Summer	49.821	0.301	0.5	44.6	Flood Risk	2880 min Summer	49.815	0.295	0.5	42.8	Flood Risk	4320 min Summer	49.801	0.281	0.5	38.9	Flood Risk	5760 min Summer	49.787	0.267	0.4	35.1	Flood Risk	7200 min Summer	49.773	0.253	0.4	31.7	Flood Risk	8640 min Summer	49.762	0.242	0.4	28.8	Flood Risk	10080 min Summer	49.751	0.231	0.4	26.3	Flood Risk	15 min Winter	49.702	0.182	0.3	16.4	Flood Risk	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	15 min Summer	90.053	0.0	19	30 min Summer	60.532	0.0	34	60 min Summer	38.834	0.0	64	120 min Summer	24.053	0.0	124	180 min Summer	17.903	0.0	182	240 min Summer	14.414	0.0	242	360 min Summer	10.599	0.0	362	480 min Summer	8.517	0.0	480	600 min Summer	7.181	0.0	600	720 min Summer	6.244	0.0	670	960 min Summer	5.002	0.0	778	1440 min Summer	3.653	0.0	1026	2160 min Summer	2.662	0.0	1448	2880 min Summer	2.124	0.0	1848	4320 min Summer	1.542	0.0	2676	5760 min Summer	1.227	0.0	3456	7200 min Summer	1.027	0.0	4248	8640 min Summer	0.889	0.0	5008	10080 min Summer	0.787	0.0	5744	15 min Winter	90.053	0.0	19
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status																																																																																																																																																																																																																		
15 min Summer	49.689	0.169	0.3	14.1	O K																																																																																																																																																																																																																		
30 min Summer	49.724	0.204	0.3	20.6	Flood Risk																																																																																																																																																																																																																		
60 min Summer	49.756	0.236	0.4	27.5	Flood Risk																																																																																																																																																																																																																		
120 min Summer	49.784	0.264	0.4	34.4	Flood Risk																																																																																																																																																																																																																		
180 min Summer	49.798	0.278	0.5	38.1	Flood Risk																																																																																																																																																																																																																		
240 min Summer	49.806	0.286	0.5	40.3	Flood Risk																																																																																																																																																																																																																		
360 min Summer	49.815	0.295	0.5	43.1	Flood Risk																																																																																																																																																																																																																		
480 min Summer	49.820	0.300	0.5	44.5	Flood Risk																																																																																																																																																																																																																		
600 min Summer	49.823	0.303	0.5	45.2	Flood Risk																																																																																																																																																																																																																		
720 min Summer	49.824	0.304	0.5	45.5	Flood Risk																																																																																																																																																																																																																		
960 min Summer	49.825	0.305	0.5	45.8	Flood Risk																																																																																																																																																																																																																		
1440 min Summer	49.825	0.305	0.5	45.8	Flood Risk																																																																																																																																																																																																																		
2160 min Summer	49.821	0.301	0.5	44.6	Flood Risk																																																																																																																																																																																																																		
2880 min Summer	49.815	0.295	0.5	42.8	Flood Risk																																																																																																																																																																																																																		
4320 min Summer	49.801	0.281	0.5	38.9	Flood Risk																																																																																																																																																																																																																		
5760 min Summer	49.787	0.267	0.4	35.1	Flood Risk																																																																																																																																																																																																																		
7200 min Summer	49.773	0.253	0.4	31.7	Flood Risk																																																																																																																																																																																																																		
8640 min Summer	49.762	0.242	0.4	28.8	Flood Risk																																																																																																																																																																																																																		
10080 min Summer	49.751	0.231	0.4	26.3	Flood Risk																																																																																																																																																																																																																		
15 min Winter	49.702	0.182	0.3	16.4	Flood Risk																																																																																																																																																																																																																		
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)																																																																																																																																																																																																																				
15 min Summer	90.053	0.0	19																																																																																																																																																																																																																				
30 min Summer	60.532	0.0	34																																																																																																																																																																																																																				
60 min Summer	38.834	0.0	64																																																																																																																																																																																																																				
120 min Summer	24.053	0.0	124																																																																																																																																																																																																																				
180 min Summer	17.903	0.0	182																																																																																																																																																																																																																				
240 min Summer	14.414	0.0	242																																																																																																																																																																																																																				
360 min Summer	10.599	0.0	362																																																																																																																																																																																																																				
480 min Summer	8.517	0.0	480																																																																																																																																																																																																																				
600 min Summer	7.181	0.0	600																																																																																																																																																																																																																				
720 min Summer	6.244	0.0	670																																																																																																																																																																																																																				
960 min Summer	5.002	0.0	778																																																																																																																																																																																																																				
1440 min Summer	3.653	0.0	1026																																																																																																																																																																																																																				
2160 min Summer	2.662	0.0	1448																																																																																																																																																																																																																				
2880 min Summer	2.124	0.0	1848																																																																																																																																																																																																																				
4320 min Summer	1.542	0.0	2676																																																																																																																																																																																																																				
5760 min Summer	1.227	0.0	3456																																																																																																																																																																																																																				
7200 min Summer	1.027	0.0	4248																																																																																																																																																																																																																				
8640 min Summer	0.889	0.0	5008																																																																																																																																																																																																																				
10080 min Summer	0.787	0.0	5744																																																																																																																																																																																																																				
15 min Winter	90.053	0.0	19																																																																																																																																																																																																																				
©1982-2018 Innovyze																																																																																																																																																																																																																							

AKSWard Ltd				Page 2	
Seacourt Tower West Way Oxford OX2 0JJ		Yeomans Limited Worthing Honda/Office/Peugeot			
Date 21/09/2018 File Permeable Paving.srcx		Designed by NJ Checked by GT			
Micro Drainage		Source Control 2018.1			
<u>Summary of Results for 100 year Return Period</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	49.739	0.219	0.4	23.7	Flood Risk
60 min Winter	49.772	0.252	0.4	31.4	Flood Risk
120 min Winter	49.802	0.282	0.5	39.2	Flood Risk
180 min Winter	49.817	0.297	0.5	43.5	Flood Risk
240 min Winter	49.825	0.305	0.5	46.0	Flood Risk
360 min Winter	49.836	0.316	0.5	49.3	Flood Risk
480 min Winter	49.843	0.323	0.5	51.2	Flood Risk
600 min Winter	49.847	0.327	0.5	52.2	Flood Risk
720 min Winter	49.849	0.329	0.5	52.8	Flood Risk
860 min Winter	49.849	0.329	0.5	52.9	Flood Risk
1440 min Winter	49.847	0.327	0.5	52.3	Flood Risk
2160 min Winter	49.839	0.319	0.5	50.1	Flood Risk
2880 min Winter	49.829	0.309	0.5	47.1	Flood Risk
4320 min Winter	49.809	0.289	0.5	41.2	Flood Risk
5760 min Winter	49.789	0.269	0.4	35.8	Flood Risk
7200 min Winter	49.771	0.251	0.4	31.1	Flood Risk
8640 min Winter	49.755	0.235	0.4	27.3	Flood Risk
10080 min Winter	49.740	0.220	0.4	24.0	Flood Risk
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	60.532	0.0	33		
60 min Winter	38.834	0.0	62		
120 min Winter	24.053	0.0	122		
180 min Winter	17.903	0.0	180		
240 min Winter	14.414	0.0	238		
360 min Winter	10.599	0.0	354		
480 min Winter	8.517	0.0	468		
600 min Winter	7.181	0.0	578		
720 min Winter	6.244	0.0	688		
860 min Winter	5.602	0.0	894		
1440 min Winter	3.653	0.0	1110		
2160 min Winter	2.662	0.0	1560		
2880 min Winter	2.124	0.0	1992		
4320 min Winter	1.542	0.0	2856		
5760 min Winter	1.227	0.0	3688		
7200 min Winter	1.027	0.0	4472		
8640 min Winter	0.889	0.0	5264		
10080 min Winter	0.787	0.0	5960		
©1982-2018 Innovyze					

AKSWard Ltd		Page 3
Seacourt Tower West Way Oxford OX2 0JJ	Yeomans Limited Worthing Honda/Office/Peugeot	
Date 21/09/2018 File Permeable Paving.srcx	Designed by NJ Checked by GT	
Micro Drainage		Source Control 2018.1

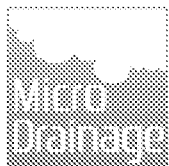
Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.200	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

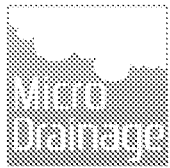
Time Area Diagram

Total Area (ha) 0.115

Time (mins)	Area
From:	To: (ha)
0	4 0.115

AKSWard Ltd		Page 4
Seacourt Tower West Way Oxford OX2 0JJ	Yeomans Limited Worthing Honda/Office/Peugeot	
Date 21/09/2018 File Permeable Paving.srcx	Designed by NJ Checked by GT	
Micro Drainage		

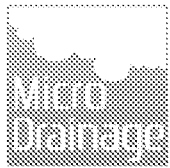
AKSWard Ltd				Page 1																																																																																																																																																																																																																			
Seacourt Tower West Way Oxford OX2 0JJ		Yeomans Limited Worthing Honda/Office/Peugeot																																																																																																																																																																																																																					
Date 21/09/2018 File Permeable Paving.srcx		Designed by NJ Checked by GT																																																																																																																																																																																																																					
Micro Drainage		Source Control 2018.1																																																																																																																																																																																																																					
<u>Summary of Results for 100 year Return Period (+40%)</u> Half Drain Time : 1383 minutes. <table><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr><tr><td>15 min Summer</td><td>49.730</td><td>0.210</td><td></td><td>0.3</td><td>21.8 Flood Risk</td></tr><tr><td>30 min Summer</td><td>49.770</td><td>0.250</td><td></td><td>0.4</td><td>30.9 Flood Risk</td></tr><tr><td>60 min Summer</td><td>49.807</td><td>0.287</td><td></td><td>0.5</td><td>40.7 Flood Risk</td></tr><tr><td>120 min Summer</td><td>49.841</td><td>0.321</td><td></td><td>0.5</td><td>50.5 Flood Risk</td></tr><tr><td>180 min Summer</td><td>49.860</td><td>0.340</td><td></td><td>0.5</td><td>56.0 Flood Risk</td></tr><tr><td>240 min Summer</td><td>49.874</td><td>0.354</td><td></td><td>0.5</td><td>59.5 Flood Risk</td></tr><tr><td>360 min Summer</td><td>49.892</td><td>0.372</td><td></td><td>0.5</td><td>64.0 Flood Risk</td></tr><tr><td>480 min Summer</td><td>49.904</td><td>0.384</td><td></td><td>0.5</td><td>66.8 Flood Risk</td></tr><tr><td>600 min Summer</td><td>49.912</td><td>0.392</td><td></td><td>0.5</td><td>68.6 Flood Risk</td></tr><tr><td>720 min Summer</td><td>49.917</td><td>0.397</td><td></td><td>0.5</td><td>69.7 Flood Risk</td></tr><tr><td>960 min Summer</td><td>49.921</td><td>0.401</td><td></td><td>0.5</td><td>70.4 Flood Risk</td></tr><tr><td>1440 min Summer</td><td>49.920</td><td>0.400</td><td></td><td>0.5</td><td>70.4 Flood Risk</td></tr><tr><td>2160 min Summer</td><td>49.914</td><td>0.394</td><td></td><td>0.5</td><td>69.1 Flood Risk</td></tr><tr><td>2880 min Summer</td><td>49.905</td><td>0.385</td><td></td><td>0.5</td><td>67.0 Flood Risk</td></tr><tr><td>4320 min Summer</td><td>49.882</td><td>0.362</td><td></td><td>0.5</td><td>61.7 Flood Risk</td></tr><tr><td>5760 min Summer</td><td>49.861</td><td>0.341</td><td></td><td>0.5</td><td>56.3 Flood Risk</td></tr><tr><td>7200 min Summer</td><td>49.843</td><td>0.323</td><td></td><td>0.5</td><td>51.2 Flood Risk</td></tr><tr><td>8640 min Summer</td><td>49.829</td><td>0.309</td><td></td><td>0.5</td><td>47.0 Flood Risk</td></tr><tr><td>10080 min Summer</td><td>49.817</td><td>0.297</td><td></td><td>0.5</td><td>43.5 Flood Risk</td></tr><tr><td>15 min Winter</td><td>49.745</td><td>0.225</td><td></td><td>0.4</td><td>25.1 Flood Risk</td></tr></table> <table><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Time-Peak (mins)</th></tr><tr><td>15 min Summer</td><td>126.074</td><td>0.0</td><td>19</td></tr><tr><td>30 min Summer</td><td>84.745</td><td>0.0</td><td>34</td></tr><tr><td>60 min Summer</td><td>54.368</td><td>0.0</td><td>64</td></tr><tr><td>120 min Summer</td><td>33.674</td><td>0.0</td><td>124</td></tr><tr><td>180 min Summer</td><td>25.065</td><td>0.0</td><td>182</td></tr><tr><td>240 min Summer</td><td>20.180</td><td>0.0</td><td>242</td></tr><tr><td>360 min Summer</td><td>14.839</td><td>0.0</td><td>362</td></tr><tr><td>480 min Summer</td><td>11.923</td><td>0.0</td><td>482</td></tr><tr><td>600 min Summer</td><td>10.054</td><td>0.0</td><td>602</td></tr><tr><td>720 min Summer</td><td>8.741</td><td>0.0</td><td>720</td></tr><tr><td>960 min Summer</td><td>7.003</td><td>0.0</td><td>952</td></tr><tr><td>1440 min Summer</td><td>5.114</td><td>0.0</td><td>1168</td></tr><tr><td>2160 min Summer</td><td>3.727</td><td>0.0</td><td>1540</td></tr><tr><td>2880 min Summer</td><td>2.973</td><td>0.0</td><td>1956</td></tr><tr><td>4320 min Summer</td><td>2.159</td><td>0.0</td><td>2764</td></tr><tr><td>5760 min Summer</td><td>1.718</td><td>0.0</td><td>3568</td></tr><tr><td>7200 min Summer</td><td>1.438</td><td>0.0</td><td>4328</td></tr><tr><td>8640 min Summer</td><td>1.245</td><td>0.0</td><td>5096</td></tr><tr><td>10080 min Summer</td><td>1.102</td><td>0.0</td><td>5848</td></tr><tr><td>15 min Winter</td><td>126.074</td><td>0.0</td><td>19</td></tr></table>						Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	15 min Summer	49.730	0.210		0.3	21.8 Flood Risk	30 min Summer	49.770	0.250		0.4	30.9 Flood Risk	60 min Summer	49.807	0.287		0.5	40.7 Flood Risk	120 min Summer	49.841	0.321		0.5	50.5 Flood Risk	180 min Summer	49.860	0.340		0.5	56.0 Flood Risk	240 min Summer	49.874	0.354		0.5	59.5 Flood Risk	360 min Summer	49.892	0.372		0.5	64.0 Flood Risk	480 min Summer	49.904	0.384		0.5	66.8 Flood Risk	600 min Summer	49.912	0.392		0.5	68.6 Flood Risk	720 min Summer	49.917	0.397		0.5	69.7 Flood Risk	960 min Summer	49.921	0.401		0.5	70.4 Flood Risk	1440 min Summer	49.920	0.400		0.5	70.4 Flood Risk	2160 min Summer	49.914	0.394		0.5	69.1 Flood Risk	2880 min Summer	49.905	0.385		0.5	67.0 Flood Risk	4320 min Summer	49.882	0.362		0.5	61.7 Flood Risk	5760 min Summer	49.861	0.341		0.5	56.3 Flood Risk	7200 min Summer	49.843	0.323		0.5	51.2 Flood Risk	8640 min Summer	49.829	0.309		0.5	47.0 Flood Risk	10080 min Summer	49.817	0.297		0.5	43.5 Flood Risk	15 min Winter	49.745	0.225		0.4	25.1 Flood Risk	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	15 min Summer	126.074	0.0	19	30 min Summer	84.745	0.0	34	60 min Summer	54.368	0.0	64	120 min Summer	33.674	0.0	124	180 min Summer	25.065	0.0	182	240 min Summer	20.180	0.0	242	360 min Summer	14.839	0.0	362	480 min Summer	11.923	0.0	482	600 min Summer	10.054	0.0	602	720 min Summer	8.741	0.0	720	960 min Summer	7.003	0.0	952	1440 min Summer	5.114	0.0	1168	2160 min Summer	3.727	0.0	1540	2880 min Summer	2.973	0.0	1956	4320 min Summer	2.159	0.0	2764	5760 min Summer	1.718	0.0	3568	7200 min Summer	1.438	0.0	4328	8640 min Summer	1.245	0.0	5096	10080 min Summer	1.102	0.0	5848	15 min Winter	126.074	0.0	19
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status																																																																																																																																																																																																																		
15 min Summer	49.730	0.210		0.3	21.8 Flood Risk																																																																																																																																																																																																																		
30 min Summer	49.770	0.250		0.4	30.9 Flood Risk																																																																																																																																																																																																																		
60 min Summer	49.807	0.287		0.5	40.7 Flood Risk																																																																																																																																																																																																																		
120 min Summer	49.841	0.321		0.5	50.5 Flood Risk																																																																																																																																																																																																																		
180 min Summer	49.860	0.340		0.5	56.0 Flood Risk																																																																																																																																																																																																																		
240 min Summer	49.874	0.354		0.5	59.5 Flood Risk																																																																																																																																																																																																																		
360 min Summer	49.892	0.372		0.5	64.0 Flood Risk																																																																																																																																																																																																																		
480 min Summer	49.904	0.384		0.5	66.8 Flood Risk																																																																																																																																																																																																																		
600 min Summer	49.912	0.392		0.5	68.6 Flood Risk																																																																																																																																																																																																																		
720 min Summer	49.917	0.397		0.5	69.7 Flood Risk																																																																																																																																																																																																																		
960 min Summer	49.921	0.401		0.5	70.4 Flood Risk																																																																																																																																																																																																																		
1440 min Summer	49.920	0.400		0.5	70.4 Flood Risk																																																																																																																																																																																																																		
2160 min Summer	49.914	0.394		0.5	69.1 Flood Risk																																																																																																																																																																																																																		
2880 min Summer	49.905	0.385		0.5	67.0 Flood Risk																																																																																																																																																																																																																		
4320 min Summer	49.882	0.362		0.5	61.7 Flood Risk																																																																																																																																																																																																																		
5760 min Summer	49.861	0.341		0.5	56.3 Flood Risk																																																																																																																																																																																																																		
7200 min Summer	49.843	0.323		0.5	51.2 Flood Risk																																																																																																																																																																																																																		
8640 min Summer	49.829	0.309		0.5	47.0 Flood Risk																																																																																																																																																																																																																		
10080 min Summer	49.817	0.297		0.5	43.5 Flood Risk																																																																																																																																																																																																																		
15 min Winter	49.745	0.225		0.4	25.1 Flood Risk																																																																																																																																																																																																																		
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)																																																																																																																																																																																																																				
15 min Summer	126.074	0.0	19																																																																																																																																																																																																																				
30 min Summer	84.745	0.0	34																																																																																																																																																																																																																				
60 min Summer	54.368	0.0	64																																																																																																																																																																																																																				
120 min Summer	33.674	0.0	124																																																																																																																																																																																																																				
180 min Summer	25.065	0.0	182																																																																																																																																																																																																																				
240 min Summer	20.180	0.0	242																																																																																																																																																																																																																				
360 min Summer	14.839	0.0	362																																																																																																																																																																																																																				
480 min Summer	11.923	0.0	482																																																																																																																																																																																																																				
600 min Summer	10.054	0.0	602																																																																																																																																																																																																																				
720 min Summer	8.741	0.0	720																																																																																																																																																																																																																				
960 min Summer	7.003	0.0	952																																																																																																																																																																																																																				
1440 min Summer	5.114	0.0	1168																																																																																																																																																																																																																				
2160 min Summer	3.727	0.0	1540																																																																																																																																																																																																																				
2880 min Summer	2.973	0.0	1956																																																																																																																																																																																																																				
4320 min Summer	2.159	0.0	2764																																																																																																																																																																																																																				
5760 min Summer	1.718	0.0	3568																																																																																																																																																																																																																				
7200 min Summer	1.438	0.0	4328																																																																																																																																																																																																																				
8640 min Summer	1.245	0.0	5096																																																																																																																																																																																																																				
10080 min Summer	1.102	0.0	5848																																																																																																																																																																																																																				
15 min Winter	126.074	0.0	19																																																																																																																																																																																																																				
©1982-2018 Innovyze																																																																																																																																																																																																																							

AKSWard Ltd		Page 2
Seacourt Tower West Way Oxford OX2 0JJ	Yeomans Limited Worthing Honda/Office/Peugeot	
Date 21/09/2018 File Permeable Paving.srcx	Designed by NJ Checked by GT	
Micro Drainage		Source Control 2018.1

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	49.787	0.267	0.4	35.3	Flood Risk
60 min Winter	49.826	0.306	0.5	46.2	Flood Risk
120 min Winter	49.866	0.346	0.5	57.4	Flood Risk
180 min Winter	49.891	0.371	0.5	63.7	Flood Risk
240 min Winter	49.908	0.388	0.5	67.7	Flood Risk
360 min Winter	49.933	0.413	0.5	73.0	Flood Risk
480 min Winter	49.952	0.432	0.5	76.5	Flood Risk
600 min Winter	49.965	0.445	0.5	78.7	Flood Risk
720 min Winter	49.974	0.454	0.5	80.2	Flood Risk
860 min Winter	49.984	0.464	0.5	81.8	Flood Risk
1440 min Winter	49.983	0.463	0.5	81.6	Flood Risk
2160 min Winter	49.968	0.448	0.5	79.2	Flood Risk
2880 min Winter	49.949	0.429	0.5	76.0	Flood Risk
4320 min Winter	49.909	0.389	0.5	68.0	Flood Risk
5760 min Winter	49.875	0.355	0.5	59.8	Flood Risk
7200 min Winter	49.847	0.327	0.5	52.3	Flood Risk
8640 min Winter	49.827	0.307	0.5	46.4	Flood Risk
10080 min Winter	49.810	0.290	0.5	41.6	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	84.745	0.0	33
60 min Winter	54.368	0.0	62
120 min Winter	33.674	0.0	122
180 min Winter	25.065	0.0	180
240 min Winter	20.180	0.0	240
360 min Winter	14.839	0.0	356
480 min Winter	11.923	0.0	472
600 min Winter	10.054	0.0	588
720 min Winter	8.741	0.0	700
860 min Winter	7.903	0.0	824
1440 min Winter	5.114	0.0	1342
2160 min Winter	3.727	0.0	1664
2880 min Winter	2.973	0.0	2132
4320 min Winter	2.159	0.0	3024
5760 min Winter	1.718	0.0	3856
7200 min Winter	1.438	0.0	4616
8640 min Winter	1.245	0.0	5360
10080 min Winter	1.102	0.0	6152

AKSWard Ltd		Page 3
Seacourt Tower West Way Oxford OX2 0JJ	Yeomans Limited Worthing Honda/Office/Peugeot	
Date 21/09/2018 File Permeable Paving.srcx	Designed by NJ Checked by GT	
Micro Drainage		Source Control 2018.1

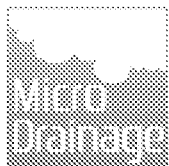
Rainfall Details

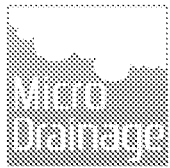
Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.200	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.115

Time (mins)	Area
From:	To: (ha)
0	4 0.115

AKSWard Ltd		Page 4
Seacourt Tower West Way Oxford OX2 0JJ	Yeomans Limited Worthing Honda/Office/Peugeot	
Date 21/09/2018 File Permeable Paving.srcx	Designed by NJ Checked by GT	
Micro Drainage		

AKSWard Ltd		Page 1
Seacourt Tower West Way Oxford OX2 0JJ	Yeomans Limited Worthing Honda/Office/Peugeot	
Date 09/12/2018 File SW_Proposed_P04_with no...	Designed by NJ Checked by GT	
Micro Drainage	Network 2018.1.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	19.200	Add Flow / Climate Change (%)	0
Ratio R	0.350	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)	0.800
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

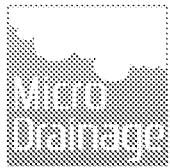
Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	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)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.200	Storm Duration (mins)	30
Ratio R	0.350		

AKSWard Ltd		Page 2
Seacourt Tower West Way Oxford OX2 0JJ	Yeomans Limited Worthing Honda/Office/Peugeot	
Date 09/12/2018 File SW_Proposed_P04_with no...	Designed by NJ Checked by GT	
Micro Drainage	Network 2018.1.1	

Online Controls for Storm

Pump Manhole: S08, DS/PN: S1.006, Volume (m³): 3.2

Invert Level (m) 48.300

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.0000	0.900	2.0000	1.700	2.0000	2.500	2.0000
0.200	2.0000	1.000	2.0000	1.800	2.0000	2.600	2.0000
0.300	2.0000	1.100	2.0000	1.900	2.0000	2.700	2.0000
0.400	2.0000	1.200	2.0000	2.000	2.0000	2.800	2.0000
0.500	2.0000	1.300	2.0000	2.100	2.0000	2.900	2.0000
0.600	2.0000	1.400	2.0000	2.200	2.0000	3.000	2.0000
0.700	2.0000	1.500	2.0000	2.300	2.0000		
0.800	2.0000	1.600	2.0000	2.400	2.0000		

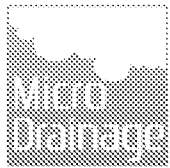
AKSWard Ltd		Page 3
Seacourt Tower West Way Oxford OX2 0JJ	Yeomans Limited Worthing Honda/Office/Peugeot	
Date 09/12/2018 File SW_Proposed_P04_with no...	Designed by NJ Checked by GT	
Micro Drainage	Network 2018.1.1	

Storage Structures for Storm

Cellular Storage Manhole: S08, DS/PN: S1.006

Invert Level (m) 48.300 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	176.0	176.0	0.401	0.0	200.0
0.400	176.0	200.0			

AKSWard Ltd		Page 4
Seacourt Tower West Way Oxford OX2 0JJ	Yeomans Limited Worthing Honda/Office/Peugeot	
Date 09/12/2018 File SW_Proposed_P04_with no...	Designed by NJ Checked by GT	
Micro Drainage	Network 2018.1.1	

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 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

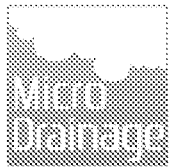
Rainfall Model FSR Ratio R 0.350
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 19.200 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
 Analysis Timestep Fine Inertia Status ON
 DTS Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600,
 720, 960, 1440, 2160, 2880, 4320, 5760,
 7200, 8640, 10080
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 40

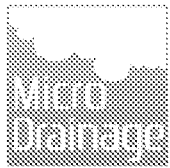
US/MH		Return Climate		First (X)	First (Y)	First (Z)	Overflow	Water
PN	Name	Storm	Period Change	Surcharge	Flood	Overflow	Act.	Level (m)
S1.000	S01	15 Winter	1	+0% 100/15 Summer				49.147
S1.001	S01A	15 Winter	1	+0% 30/15 Winter				49.082
S1.002	S02	15 Winter	1	+0% 30/15 Summer				48.951
S1.003	S03	15 Winter	1	+0% 100/15 Summer				48.763
S2.000	S04	15 Winter	1	+0%				49.080
S1.004	S_JT	15 Winter	1	+0% 100/15 Summer				48.730
S1.005	S05	15 Winter	1	+0% 100/15 Summer				48.614
S3.000	S06	15 Winter	1	+0%				49.083
S3.001	S07	15 Winter	1	+0%				48.984
S1.006	S08	1440 Winter	1	+0% 100/30 Summer				48.433

US/MH		Depth	Volume	Flow / Overflow	Pipe	Level
PN	Name	(m)	(m ³)	Cap. (l/s)	Flow (l/s) Status	Exceeded
S1.000	S01	-0.103	0.000	0.22	2.8 OK	
S1.001	S01A	-0.090	0.000	0.33	4.5 OK	
S1.002	S02	-0.079	0.000	0.45	7.3 OK	

AKSWard Ltd		Page 5
Seacourt Tower West Way Oxford OX2 0JJ	Yeomans Limited Worthing Honda/Office/Peugeot	
Date 09/12/2018 File SW_Proposed_P04_with no...	Designed by NJ Checked by GT	
Micro Drainage	Network 2018.1.1	

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

PN	US/MH Name	Surcharged		Flooded		Pipe		Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)	Status	
S1.003	S03	-0.147	0.000	0.26		7.9	OK	
S2.000	S04	-0.120	0.000	0.09		2.0	OK	
S1.004	S_JT	-0.146	0.000	0.26		11.2	OK*	
S1.005	S05	-0.149	0.000	0.25		11.0	OK	
S3.000	S06	-0.117	0.000	0.11		1.8	OK	
S3.001	S07	-0.113	0.000	0.14		3.5	OK	
S1.006	S08	-0.091	0.000	0.02		0.7	OK	

AKSWard Ltd		Page 6
Seacourt Tower West Way Oxford OX2 0JJ	Yeomans Limited Worthing Honda/Office/Peugeot	
Date 09/12/2018 File SW_Proposed_P04_with no...	Designed by NJ Checked by GT	
Micro Drainage	Network 2018.1.1	

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coefficient 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

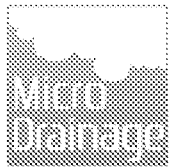
Rainfall Model FSR Ratio R 0.350
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.200 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600,
720, 960, 1440, 2160, 2880, 4320, 5760,
7200, 8640, 10080
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

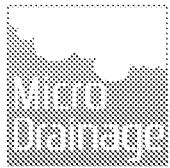
									Water
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)
S1.000	S01	15 Winter	30	+0%	100/15 Summer				49.200
S1.001	S01A	15 Winter	30	+0%	30/15 Winter				49.175
S1.002	S02	15 Winter	30	+0%	30/15 Summer				49.077
S1.003	S03	15 Winter	30	+0%	100/15 Summer				48.824
S2.000	S04	15 Winter	30	+0%					49.098
S1.004	S_JT	15 Winter	30	+0%	100/15 Summer				48.791
S1.005	S05	15 Winter	30	+0%	100/15 Summer				48.670
S3.000	S06	15 Winter	30	+0%					49.104
S3.001	S07	15 Winter	30	+0%					49.011
S1.006	S08	360 Winter	30	+0%	100/30 Summer				48.516

		Surcharged		Flooded	Pipe		Level	
PN	US/MH Name	Depth (m)	Volume (m ³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)	Status	Exceeded
S1.000	S01	-0.050	0.000	0.52		6.7	OK	
S1.001	S01A	0.002	0.000	0.82		11.2	SURCHARGED	
S1.002	S02	0.048	0.000	1.19		19.2	SURCHARGED	

AKSWard Ltd		Page 7
Seacourt Tower West Way Oxford OX2 0JJ	Yeomans Limited Worthing Honda/Office/Peugeot	
Date 09/12/2018 File SW_Proposed_P04_with no...	Designed by NJ Checked by GT	
Micro Drainage	Network 2018.1.1	

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

PN	US/MH Name	Surcharged Flooded		Flow / Overflow		Pipe Flow	Status	Level Exceeded
		Depth (m)	Volume (m³)	Cap.	(l/s)	(l/s)		
S1.003	S03	-0.086	0.000	0.69		20.7	OK	
S2.000	S04	-0.102	0.000	0.22		4.9	OK	
S1.004	S_JT	-0.085	0.000	0.69		29.3	OK*	
S1.005	S05	-0.092	0.000	0.64		28.8	OK	
S3.000	S06	-0.096	0.000	0.27		4.4	OK	
S3.001	S07	-0.086	0.000	0.38		9.8	OK	
S1.006	S08	-0.008	0.000	0.06		2.0	OK	

AKSWard Ltd		Page 1
Seacourt Tower West Way Oxford OX2 0JJ	Yeomans Limited Worthing Honda/Office/Peugeot	
Date 09/12/2018 File SW_Proposed_P04_with no...	Designed by NJ Checked by GT	
Micro Drainage	Network 2018.1.1	

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 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

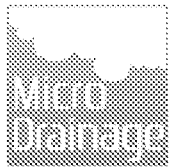
Rainfall Model FSR Ratio R 0.350
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 19.200 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
 Analysis Timestep Fine Inertia Status ON
 DTS Status OFF

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

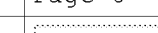
									Water
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)
S1.000	S01	15 Winter	100	+0%	100/15 Summer				49.374
S1.001	S01A	15 Winter	100	+0%	100/15 Summer				49.342
S1.002	S02	15 Winter	100	+0%	100/15 Summer				49.182
S1.003	S03	15 Winter	100	+0%					48.848
S2.000	S04	15 Winter	100	+0%					49.105
S1.004	S_JT	15 Winter	100	+0%					48.816
S1.005	S05	15 Winter	100	+0%					48.694
S3.000	S06	15 Winter	100	+0%					49.112
S3.001	S07	15 Winter	100	+0%					49.022
S1.006	S08	360 Winter	100	+0%	100/60 Winter				48.583

		Surcharged		Flooded	Pipe			
PN	US/MH Name	Depth (m)	Volume (m ³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S01	0.124	0.000	0.66		8.6	SURCHARGED	
S1.001	S01A	0.169	0.000	1.04		14.2	SURCHARGED	
S1.002	S02	0.192	0.000	1.50		24.2	SURCHARGED	

AKSWard Ltd		Page 2
Seacourt Tower West Way Oxford OX2 0JJ	Yeomans Limited Worthing Honda/Office/Peugeot	
Date 09/12/2018 File SW_Proposed_P04_with no...	Designed by NJ Checked by GT	
Micro Drainage	Network 2018.1.1	

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

PN	US/MH Name	Surcharged Flooded		Flow / Overflow		Pipe Flow	Status	Level Exceeded
		Depth (m)	Volume (m³)	Cap.	(l/s)	(l/s)		
S1.003	S03	-0.062	0.000	0.87		26.1	OK	
S2.000	S04	-0.095	0.000	0.29		6.4	OK	
S1.004	S_JT	-0.060	0.000	0.88		37.1	OK*	
S1.005	S05	-0.068	0.000	0.82		36.5	OK	
S3.000	S06	-0.088	0.000	0.36		5.6	OK	
S3.001	S07	-0.075	0.000	0.49		12.7	OK	
S1.006	S08	0.058	0.000	0.06		2.0	SURCHARGED	

AKSWard Ltd		Page 8
Seacourt Tower	Yeomans Limited	
West Way Oxford	Worthing	
OX2 0JJ	Honda/Office/Peugeot	
Date 09/12/2018	Designed by NJ	
File SW_Proposed_P04_with no...	Checked by GT	
Micro Drainage	Network 2018.1.1	

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

Simulation Criteria

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

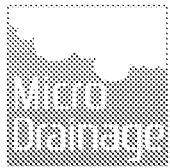
Synthetic Rainfall Details

```
Margin for Flood Risk Warning (mm) 300.0      DVD Status ON
      Analysis Timestep  Fine Inertia Status ON
      DTS Status      OFF
```

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

									Water
	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)
S1.000	S01	15 Winter	100	+40%	100/15 Summer				49.852
S1.001	S01A	15 Winter	100	+40%	30/15 Winter				48.792
S1.002	S02	15 Winter	100	+40%	30/15 Summer				49.505
S1.003	S03	15 Winter	100	+40%	100/15 Summer				49.022
S2.000	S04	15 Winter	100	+40%					49.116
S1.004	S_JT	480 Winter	100	+40%	100/15 Summer				48.991
S1.005	S05	480 Winter	100	+40%	100/15 Summer				48.988
S3.000	S06	15 Winter	100	+40%					49.125
S3.001	S07	15 Winter	100	+40%					49.039
S1.006	S08	480 Winter	100	+40%	100/30 Summer				48.984

PN	US/MH Name	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Pipe	Status	Level Exceeded
		Depth (m)	Volume (m³)			Flow		
S1.000	S01	0.602	0.000	0.92		12.0	FLOOD RISK	
S1.001	S01A	0.620	0.000	1.42		19.0	FLOOD RISK	
S1.002	S02	0.476	0.000	2.01		32.4	SURCHARGED	

AKSWard Ltd		Page 9
Seacourt Tower West Way Oxford OX2 0JJ	Yeomans Limited Worthing Honda/Office/Peugeot	
Date 09/12/2018 File SW_Proposed_P04_with no...	Designed by NJ Checked by GT	
Micro Drainage	Network 2018.1.1	

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

PN	US/MH Name	Surcharged		Flooded	Pipe		Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
S1.003	S03	0.112	0.000	1.17		25.0	SURCHARGED	
S2.000	S04	-0.084	0.000	0.40		8.9	OK	
S1.004	S_JT	0.114	0.000	0.16		6.8	SURCHARGED*	
S1.005	S05	0.225	0.000	0.15		6.8	SURCHARGED	
S3.000	S06	-0.075	0.000	0.50		7.9	OK	
S3.001	S07	-0.058	0.000	0.69		17.7	OK	
S1.006	S08	0.460	0.000	0.06		2.0	SURCHARGED	

Appendix E

Surface Water Drainage Pro-Forma

Surface Water Drainage Pro-forma for new developments

This pro-forma accompanies our “Surface Water Drainage; Local Guidance for Planning Applications” note. It is expected that applicants/developers should complete and submit the pro-forma to present a summary of the surface water drainage strategy for the site and demonstrate compliance with the National Planning Policy Guidance and Non-Statutory Technical Standards. The pro-forma will then be used to support the LPA in making a decision on the suitability of the proposal and, if the LPA is minded to find the completed pro-forma acceptable, then it may be used as an evidence base for a relevant surface water condition to be appended to the decision notice, stating that the developments drainage proposal will be constructed in accordance with the details set out in the relevant pro-forma.

It must however be noted that this pro-forma submitted alone, will not be considered a suitable surface water drainage strategy. It should be clearly referenced within the pro-forma where in the other submission documents the details provided are taken from.

The pro-forma is supported by the [Defra/EA guidance on Rainfall Runoff Management](#), and uses the storage calculator on www.UKsuds.com. The pro-forma should be considered alongside other supporting SuDS Guidance, but focuses on ensuring flood risk is not made worse elsewhere. This proforma is based upon current industry standard practice.

1. Site Details

Site	Yeomans Limited, Honda/Office/Peugeot. Worthing
Address & post code or LPA reference	Littlehampton Road, Ferring, Worthing BN12 6PB
Grid reference	TQ 08916 03457
Is the existing site developed or Greenfield?	Developed
Total Site Area	0.2668 Hectares
Total Site Area served by drainage system (excluding open space) (Ha)*	0.2466 Hectares
Pre-application sought? (Ref)	

* The Greenfield runoff off rate from the development which is to be used for assessing the requirements for limiting discharge flow rates and attenuation storage from a site should be calculated for the area that forms the drainage network for the site whatever size of site and type of drainage technique. Please refer to the Rainfall Runoff Management document or CIRIA manual for detail on this.

2. Impermeable Area

	Existing	Proposed	Difference (Proposed-Existing)	Notes for developers
Impermeable area (ha)	0.1084 Hectares	0.2466 Hectares	0.1382 Hectares	If proposed > existing, then runoff rates and volumes will be increasing. Section 6 must be filled in. If proposed ≤ existing, then section 6 can be skipped & section 7 filled in.
Drainage Method (infiltration/sewer/watercourse)	Infiltration (Assumed)	Infiltration	N/A	If different from the existing, please fill in section 3. If existing drainage is by infiltration and the proposed is not, discharge volumes may increase. Fill in section 6.

3. Proposing to Discharge Surface Water via

	Yes	No	Justification and Evidence that this is possible	Notes for developers
Infiltration	X		Soakage tests Infiltration rate: 1.542×10^{-6} m/s	Soakage tests will need to be provided and results included in drainage strategy. Section 7 (infiltration) must be filled in if infiltration is proposed.
To watercourse		X		If infiltration is not possible - is there a watercourse nearby? Have the EA or IDB provided input where necessary?
To surface water sewer	X			This should be a last resort. If required, has sewer provider confirmed that sufficient capacity exists for this connection? Has an appropriate connection detail been agreed?
Combination of above		X		e.g. part infiltration, part discharge to sewer or watercourse. Provide evidence as above.

4. Peak Discharge Rates – This is the maximum flow rate at which storm water runoff leaves the site during a particular storm event.

	Existing Rates (l/s)	Proposed Rates (l/s)	Difference (l/s) (Proposed-Existing)	Notes for developers
Greenfield QBAR	1 l/s	N/A	N/A	QBAR is approx. 1 in 2 storm event. Provide this if Section 7 (QBAR) is proposed.
1 in 1	0.9 l/s	0.7 l/s	-0.2 l/s	Proposed discharge rates (with mitigation) should be no greater than existing rates for all corresponding storm events. E.g. discharging all flow from site at
1 in 30	1.9 l/s	2 l/s	0.1 l/s	

1 in 100	2.4 l/s	2 l/s	-0.4 l/s	the existing 1 in 100 event increases flood risk during smaller events.
1 in 100 plus climate change	N/A	2 l/s	-0.4 l/s	To mitigate for climate change the proposed 1 in 100 +CC must be no greater than the existing 1 in 100 runoff rate. If not, flood risk increases under climate change. - Where lifetime of development is 100 years (residential) 30% should be added to the peak rainfall intensity. - Where lifetime of development is 60 years (residential) 20% should be added to the peak rainfall intensity.

5. Calculate additional volumes for storage –The total volume of water leaving the development site. New hard surfaces potentially restrict the amount of storm water that can go to the ground, so this needs to be controlled so not to make flood risk worse to properties downstream.

	Existing Volume (m³)	Proposed Volume (m³)	Difference (m³) (Proposed-Existing)	Notes for developers
1 in 1	18.474 m ³	6.934 m ³	-11.540 m ³	Proposed discharge volumes (without mitigation) should be no greater than existing volumes for all corresponding storm events. Any increase in volume increases flood risk elsewhere. Where volumes are increased section 6 must be filled in.
1 in 30	42.997 m ³	34.815 m ³	-8.182 m ³	
1 in 100	58.681 m ³	48.999 m ³	-9.682 m ³	
1 in 100 plus climate change	N/A	67.697 m ³	9.016 m ³	To mitigate for climate change the volume discharge from site must be no greater than the existing 1 in 100 storm event. If not, flood risk will increase under climate change.

6. Calculate attenuation storage – Attenuation storage is provided to enable the rate of runoff from the site into the receiving watercourse to be limited to an acceptable rate to protect against erosion and flooding downstream. The attenuation storage volume is a function of the degree of development relative to the greenfield discharge rate.

		Notes for developers
What Storage Attenuation volume (Flow rate control) is required to retain rates as existing (m³) Where is the storage to be accommodated on site?	New cellular attenuation tank will be installed under parking area to attenuate and store runoff volume from roof areas.	Volume of water to attenuate on site if discharging at existing rates. Can't be used where discharge volumes are increasing

	In addition, permeable sub-base in car park will drain and infiltrate runoff water from this area.	
--	--	--

7. How is Storm Water stored on site?

Storage is required for the additional volume from site but also for holding back water to slow down the rate from the site. This is known as attenuation storage and long term storage. The idea is that the additional volume does not get into the watercourses, or if it does it is at an exceptionally low rate. You can either infiltrate the stored water back to ground, or if this isn't possible hold it back with on site storage. Firstly, can infiltration work on site?

			Notes for developers
Infiltration	State the Site's Geology and known Source Protection Zones (SPZ)	Outside SPZ	- Infiltration rates are highly variable, soakage tests should be comprehensive. - Avoid infiltrating in made ground. - Refer to Environment Agency website to identify and source protection zones (SPZ)
	Infiltration Rate (m/s)?	1.542×10^{-6}	Infiltration rates should be no lower than 1×10^{-6} m/s.
	State the distance between a proposed infiltration device base and the ground water (GW) level	1m	Need 1m (min) between the base of the infiltration device & the water table to protect Groundwater quality & ensure GW doesn't enter infiltration devices. Avoid infiltration where this isn't possible.
	Were infiltration rates obtained by desk study or infiltration test?	Infiltration test	Infiltration rates can be estimated from desk studies at most stages of the planning system if a back up attenuation scheme is provided.
	Is the site contaminated? If yes, consider advice from others on whether infiltration can happen.	No	Water should not be infiltrated through land that is contaminated. The Environment Agency may provide bespoke advice in planning consultations for contaminated sites that should be considered.
In light of the above, is infiltration feasible?	Yes/No? If the answer is No, please identify how the storm water will be stored prior to release	Yes at high level only due to ground water level.	If infiltration is not feasible how will the additional volume be stored? The applicant should consider the following options in the next section.

Storage requirements

The developer must confirm one of the two methods for dealing with the amount of water that needs to be stored on site.

Option 1 Simple – Store both the additional volume and attenuation volume in order to make a final discharge from site at **QBAR** (Mean annual flow rate). This is preferred if no infiltration can be made on site. This very simply satisfies the runoff rates and volume criteria.

Option 2 Complex – If some of the additional volume of water can be infiltrated back into the ground, the remainder can be discharged at a very low rate of 2 l/sec/hectare. A combined storage calculation using the partial permissible rate of 2 l/sec/hectare and the attenuation rate used to slow the runoff from site.

		Notes for developers
Please confirm what option has been chosen and how much storage is required on site.	It is required a storage of 71.35 m ³ in cellular attenuation tank and 92m ³ in permeable sub-base in order to achieve an overflow of 2 l/s for all storms.	The developer at this stage should have an idea of the site characteristics and be able to explain what the storage requirements are on site and how it will be achieved.

8. Please confirm

		Notes for developers
1. Which Drainage Systems measures have been used? Provide an overview of the SuDS design scheme used? - Is the runoff managed at, or close to, the surface wherever possible. - Where the system serves more than one property, is public space used and integrated with the drainage system in an appropriate and beneficial way?	- Permeable paving - Cellular attenuation tank	SUDS can be adapted for most situations even where infiltration isn't feasible e.g. impermeable liners beneath some SUDS devices allows treatment but not infiltration. See CIRIA SUDS Manual C697.
2. Functionality Are the design features sufficiently durable to ensure structural integrity over the system design life (residential 100 years and commercial 60 years), with reasonable maintenance requirements?	Yes	
Are all parts of the SuDS system outside any areas of flood risk?	Yes	If not, provide justification and evidence that performance will not be adversely affected.

Has runoff and flooding from all sources (both on and off site) been considered and taken into account in the design?	Yes	
Has residual risk been addressed?	Yes refer Drainage strategy	- Does the drainage system contain the 1 in 30 storm event without any flooding (include description of how any exceedance of surface water systems will be routed exceptional rain fall away from property)? - Are 1 in 100 year flows contained or stored on-site within safe exceedance storage areas and flow paths? - Is any flooding between 1 in 30 and 100 +CC storm events safely contained on site, without causing property flooding or a hazard to site users? - Has it been ensured that there is no flooding from the system to downstream property or access routes for the 100 year + climate change event?
How are rates being restricted (hydro brakes etc.)?	Pumping chamber	- Hydrobrakes to be used where rates are between 2l/s to 5l/s. - Orifices not to be used below 5l/s as the pipes may block. - Pipes with flows < 2l/s are prone to blockage.
3. Please confirm the owners/adopters of the entire drainage systems throughout the development. Please list all the owners.	Yeomans Ltd.	If these are multiple owners then a drawing illustrating exactly what features will be within each owner's remit must be submitted with this Proforma.
How is the entire drainage system to be maintained? An acceptable maintenance plan, clearly defining the operating and maintenance requirements of the drainage system will need to be submitted and approved.	The drainage drawings and schedules will form part of the O&M manual along with a post completion CCTV survey to ensure the system is fully operational at handover.	If the features are to be maintained directly by the owners as stated in answer to the above question please answer yes to this question and submit the relevant maintenance schedule for each feature. If it is to be maintained by others than those above, please give details of each feature and the maintenance schedule. Clear details of the maintenance proposals of all element of the proposed drainage system must be provided. Poorly maintained drainage can lead to increased flooding problems in the future.

9. Evidence Please identify where the details quoted in the sections above were taken from. i.e. Plans, reports etc. Please also provide relevant drawings that need to accompany your pro-forma, in particular exceedance routes, ownership and location of SuDS (maintenance access strips etc.)

Pro-forma Section	Document reference where details quoted above are taken from	Page Number
Section 2	Drainage Strategy	1, Appendix A & C
Section 3	Drainage Strategy	Appendix C
Section 4	Drainage Strategy	Appendix B & D
Section 5	Drainage Strategy	Appendix B & D
Section 6	Drainage Strategy	Appendix C
Section 7	Drainage Strategy	Appendix A & C

The above form is completed using factual information and evidence from the Surface Water Drainage Strategy, Flood Risk Assessment and site plans and can be used as a summary of the surface water drainage strategy on this site, clearly showing that the proposed surface water rate and volume will not be increasing as a result of the development. Where an increase in rate or volume is shown the appropriate sections of the pro-forma have been completed setting out how the additional rate/volume is being dealt with, to ensure no increased flood risk on or off site.

Where the pro-forma is found to be acceptable to the Local Planning Authority then the surface water drainage system design must be built in accordance with the details provided here.

Form completed by: Graham Taylor

Qualification of person responsible for signing of this pro-forma: IEng MICE

Company: AKS Ward

On behalf of (Client's details): Yeomans Ltd.

Date 12.03.19

Appendix F

SuDS Maintenance Schedule

Cellular Tanks Operation & Maintenance Requirements

Regular inspection and maintenance is required to ensure the effective long-term operation of below ground modular storage systems.

Specific maintenance needs of the system should be monitored, and maintenance schedules adjusted to suit requirements.

Modular systems – operation and maintenance requirements

Maintenance schedule	Required action	Recommended Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for three months then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae, or other matter; remove and replace surface infiltration medium as necessary	Annually
	Remove sediment from pretreatment structures and/or internal forebays	Annually, or as required
Remedial actions	Repair/rehabilitate inlets, outlets, overflows, and vents	As required
Monitoring	Inspect/check all inlets, outlets, overflows, and vents to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment buildup and remove if necessary	Every five years or as required

Maintenance activities should be detailed in the health and safety plan and a risk assessment should be undertaken.

Permeable Paving Operation & Maintenance Requirements

Regular inspection and maintenance is important for the effective operation of pervious pavements. The facility should be inspected regularly, preferably during and after heavy rainfall to check effective operation and to identify any areas of ponding.

Pervious surfaces need to be regularly cleaned of silt and other sediments to preserve their infiltration capability. Manufacturers' recommendations should always be followed.

A brush cleaner, which can be a lorry-mounted device or a smaller precinct sweeper, should be used and the sweeping regime should be as follows:

1. End of winter (April) – to collect winter debris.
2. Mid-summer (July/August) – to collect dust, flower and grass-type deposits.
3. After autumn leaf fall (November).

Care should be taken in using vacuuming equipment to avoid removal of jointing material. Any lost material should be replaced.

If reconstruction is necessary, the following procedure should be followed:

1. Lift surface layer and laying course.
2. Remove any geo-textile filter layer.
3. Inspect sub-base and remove, and replace if required.
4. Renew any geo-textile layers.
5. Renew laying course, jointing material and concrete block paving.

The reconstruction of failed areas of concrete block pavement should be less costly and disruptive than the rehabilitation of continuous concrete or asphalt porous surfaces due to the reduced area that is likely to be affected. Materials removed from the voids or the layers below the surface may contain heavy metals and hydrocarbons and may need to be disposed of as controlled waste. Sediment testing should be carried out before disposal to confirm its classification and appropriate disposal methods.

Pervious pavement operation and maintenance requirements

Maintenance schedule	Required action	Frequency
Regular maintenance	Brushing	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilize and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosphate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements

Maintenance schedule	Required action	Frequency
Remedial actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving	As required
	Remedial work to any depressions, rutting, and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every ten to fifteen years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48hrs after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Maintenance activities should be detailed in the Health and Safety Plan and a risk assessment should be undertaken.