

NOLTA STREET ALCADE

Date
09/19

Job No.
18/3139

Page
01

SURFACE WATER

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Engineer
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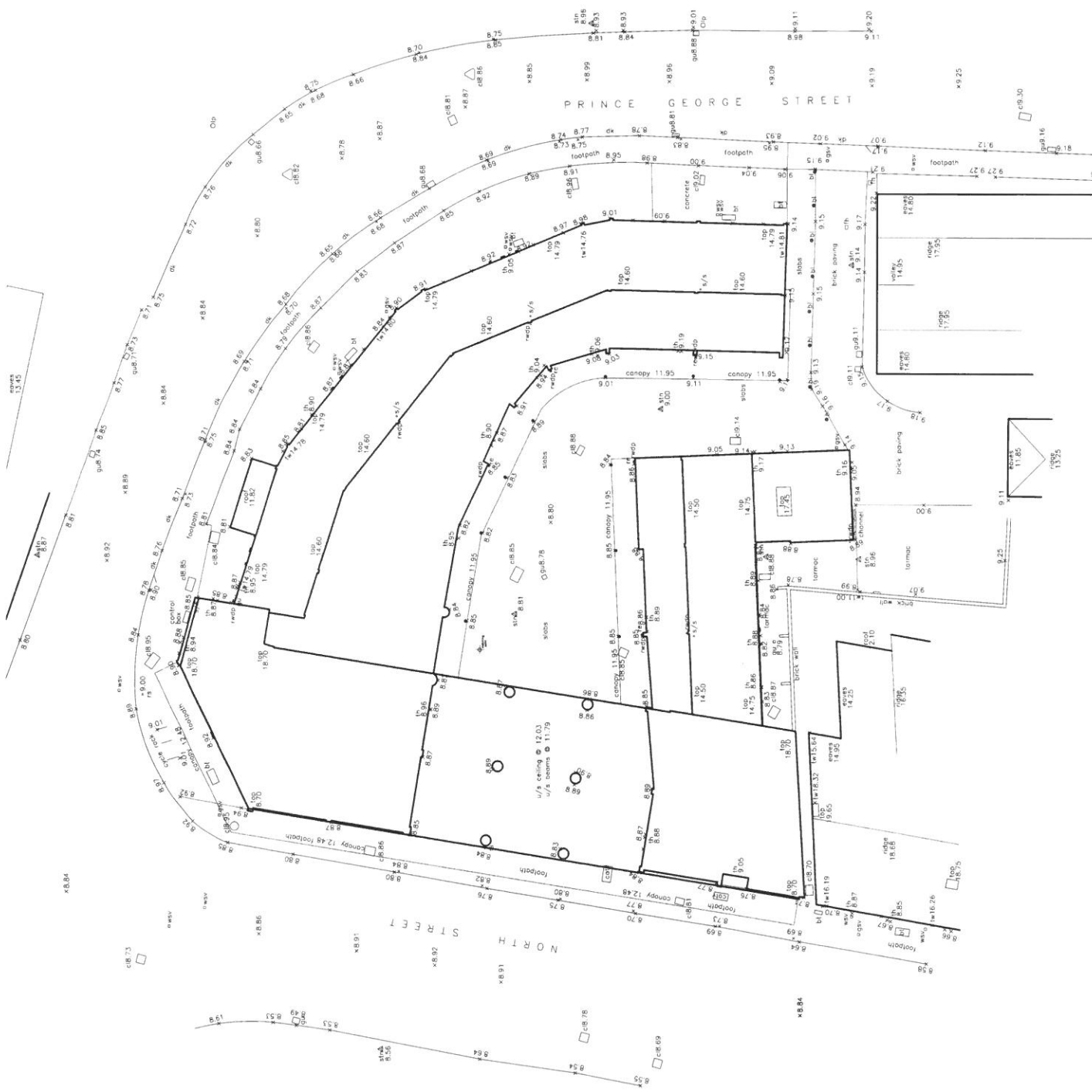
SURFACE WATER

SEASONAL CALCULATIONS



NOTES

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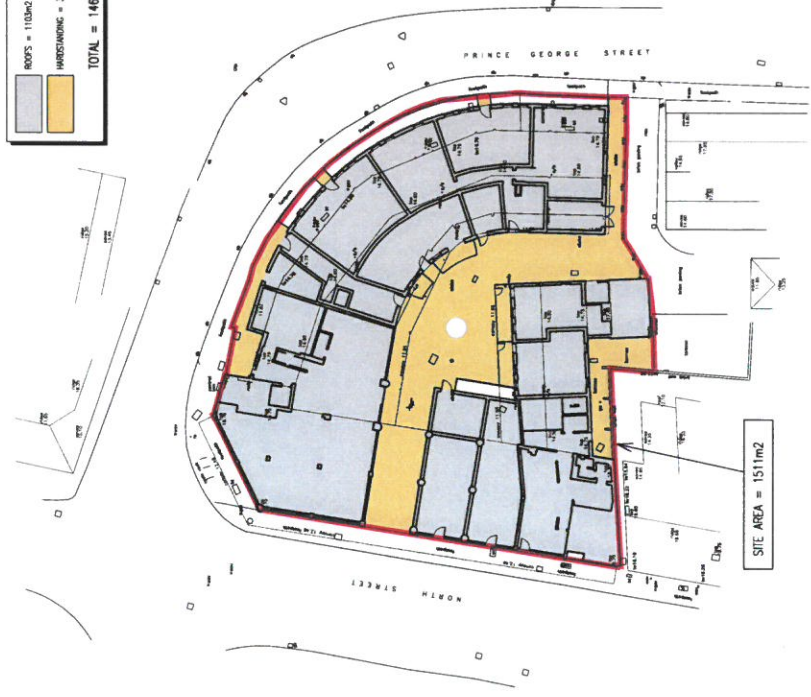
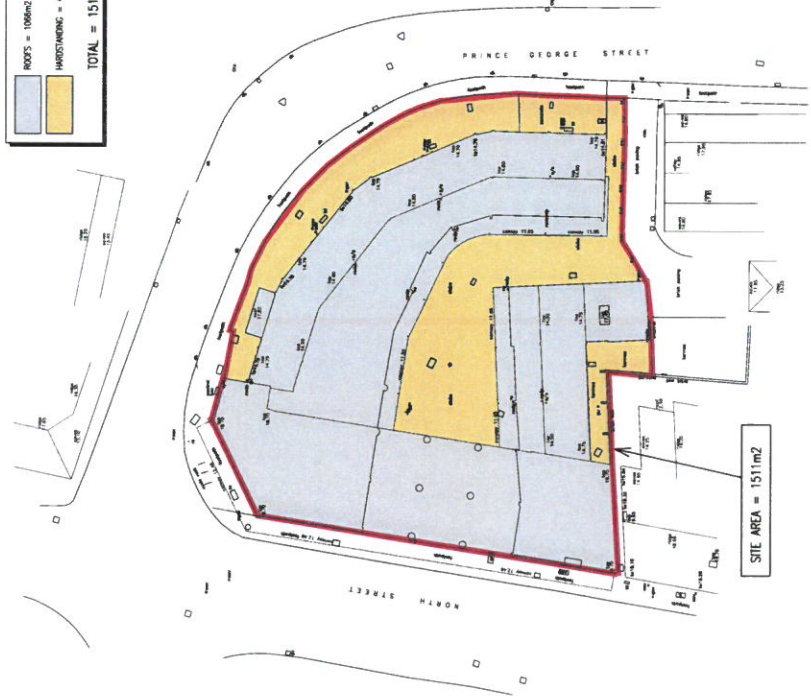
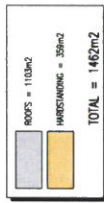
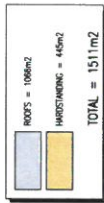
PRELIMINARY

P1 PRELIMINARY		REV/05/18	REV/05/18	REV/05/18			
Author	Drawn	Checked	Reviewed	Approved			
ORIGINAL DRAWING SIZE - A1		X-REFS					
DATE REV.							
FIRM: TRESTMIRE LIMITED							
PROJECT: NORTH STREET ARCADE, HAWAII							
DRAWING: EXISTING TOPOGRAPHICAL SURVEY							
DRAWN: H.D.							
CHECKED: H.D.							
DATE: 11/25/18							
DRAWING: PRELIMINARY							
DRAWING: CONSULTING CIVIL							
DRAWING: STANDARD							
DRAWING: 01489 803 596							
P1							



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PRELIMINARY

NO.	REV.	DATE	BY	CHKD.	APP'D.
P1	PRELIMINARY	18/05/18	18/05/18	18/05/18	
ORIGINAL DRAWING SIZE - A1					
A1-REYS					
CDS REF.					
PROJECT NAME: NORTH STREET ARCADE, INMAN					
DRAWING NO.: IMPERMEABLE AREAS					
PROJECT NO.: PRELIMINARY					
SCALE: 1:250 @ A1					
DRAWN BY: SHANMARE					
CHECKED BY: SHANMARE					
DATE: 18-05-2018					
PROJECT NO.: 18-3139-901					
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PROJECT					

NORTH STREET ARCADE

Date
09/19

Job No.
10/3139

Page
04

Office
RV

Engineer
BH

Checked

STORM WATER

ATTENUATION STORAGE

1 IN 100 YEAR STORM
(4 HOUR DURATION)

40% CLIMATE CHANGE

Given Field Run off RATE
0.47 L/s

STORAGE PROVIDED USING
AQUACELL STORAGE UNITS
BELOW SURFACE OF
PEDESTRIAN PAVING AS
PER ATTACHED HDL DRAWING
NOS. 10/3139/511 P2 & 511 P1
TO PROVIDE ATTENUATION
STORAGE OF 500mm DEPTH AQUACEUS



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Job No.	18-3139		
Sheet no.	105		
Date	25/09/19		
By	Checked	Reviewed	
B.H.			

MasterDrain
HY 10.07

Project **North Street Arcade, Havant**
Title **BREEAM SUR1 calculations for HAVANT**

Data:-

Hydrology (FSR):-
Location = HAVANT
Long reference = 471106
M5-60 (mm) = 19
r = 0.35
Hyd. area = 7
Hydrograph = Summer
WRAP = 3
Grid reference = SU7106
SAAR (mm/yr) = 750
Soil = 0.37
Hyd. zone = 7
Area = England & Wales

Site values used in design:-

Total site area = 0.1511 ha
Pre-dev area drained = 0.1511 ha
Imperm runoff factor = 98%
Climate change factor = 40%
Post-dev area drained = 0.1462 ha
Perm runoff factor = 20%
Pre-development
Area to soakaways = 0.0000 ha
Perv. area to SUDS = 0.0000 ha
Post-development
Area to soakaways = 0.0000 ha
Perv. area to SUDS = 0.0000 ha
Area to other SUDS = 0.0000 ha
Pre-dev flow to drain = 1.00 l/s
Area to other SUDS = 0.0000 ha
Post-dev flow to drain = 1.00 l/s

Calculations:-

Revised Post-dev Imperm. area = 0.146 ha
Equiv. Post-dev Imperm. area = 0.143 ha
Equiv. Post-dev Perm. area = 0.001 ha
Total Pre-dev equiv. area ha = 0.148 ha
Total Post-dev equiv. area ha = 0.144 ha
100 yr 6 hour mean intensity = 10.50mm/hr

Results:-

Pre-dev peakflow runoff (l/s) (m³/s)											
R.P.	15	30	60	120	240	360	480	600	Max	CCF	R.P.
1	45.8	31.0	19.6	12.5	7.9	6.1	4.9	4.2	45.8	N/A	1
30	111.0	73.9	47.1	29.2	17.7	13.1	10.6	8.9	111.0	N/A	30
100	143.5	96.5	61.9	38.4	23.0	16.9	13.6	11.5	143.5	N/A	100

Post-dev peakflow runoff (l/s)											
R.P.	15	30	60	120	240	360	480	600	Max	CCF	R.P.
1	44.7	30.2	19.1	12.2	7.7	5.9	4.8	4.1	44.7	40	1
30	108.1	72.0	45.9	28.5	17.2	12.7	10.3	8.7	108.1	40	30
100	139.8	94.0	60.3	37.4	22.4	16.5	13.3	11.2	139.8	40	100

100 year 6 hour (x Climate Change Factor) storm gives:-

Pre-dev runoff volume m³ = 93.3m³
Post-dev rainfall volume = 127.3m³
Post-dev volume m³ (excess above SUDS) = 127.3m³
100 yr 6 hour mean intensity = 10.50mm/hr
Pre-dev volume to drain at 1 l/s = 22.0 m³
Post-dev volume to drain at 1 l/s = 22.0 m³
Post-dev storage volume = 105.3m³
Post-dev 5mm imperm volume = 7.3 m³
Post-dev 5mm perm volume = 0.2 m³

$Q_{BAR(rural)} = 0.471 \text{ l/s}$ or 3.114 l/s/ha or 0.000 cumecs - from IoH 124.

The rainfall rates are calculated using the location specific values above in accordance with the Wallingford procedure.

• ADAPT AQUACON ATTENUATION STORAGE
(95% voids)

• AREA OF AQUACON STORAGE, Ref H2C
DRAWING 18-3139-511 P2 of 551 P1, is 246 m^2

• VOLUME OF STORAGE REQ'D is 105.3 m^3

• DEPTH OF AQUACON

$$= 105.3 / 246 \times 0.95 = 0.4 \text{ m DEPTH}$$

• PROVIDE 246 m^2 STORAGE AT 0.4 m DEPTH



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Job No.	18-3139	
Sheet no.	2	06
Date	25/09/19	
By	B.H.	Checked
		Reviewed

Project North Street Arcade, Havant
Title BREEAM SUR1 calculations for HAVANT

Data summary.

Use the data below for the SUR1 form

Site areas:-

Total site area	=	0.1511 ha ; 1511.0 m ² [3A]
Pre-development impermeable area	=	0.1511 ha [3B]
Pre-development permeable area	=	0.0000 ha
Post-development impermeable area	=	0.1462 ha [3C]
Post-development permeable area	=	0.0049 ha

Peak runoff:-

Pre-development 1 year storm (15min)	=	45.8 l/s [6A]
Pre-development 100 year storm (15min)	=	143.5 l/s [6C]
Post-development 1 year storm (15min)	=	44.7 l/s [6B]
Post-development 100 year storm (15min)	=	139.84 l/s [6D]

Greenfield runoff:-

$Q_{BAR(rural)}$ = 0.471 l/s or 3.114 l/s/ha or 0.000 cumecs - from IoH 124.

Climate change factor:-

CCF = 40%

Volumes:-

Pre-development 100 yr/6hr storm [12A]	=	130.7m ³
Post-development 100 yr/6hr storm (add. volume with no SUDS) [12B]	=	127.3m ³
Post-development 100 yr/6hr storm (add. volume with SUDS)	=	127.3m ³
Post-development add. predicted volume (No SUDS) [12C]	=	-3.4m ³

You may also require

Data relating to the infiltration test calculations (if applicable)
Evidence to show runoff reduction (if applicable)
Information on calculation methods (if applicable see next sheet)

Note

Numbers in square brackets relate to the
Nov. 2010 v1.1 / issued 11/02/10 copy of SUR1



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Job No.	18-3139	
Sheet no.	3	07
Date	25/09/19	
By	B.H.	Checked
		Reviewed

Project **North Street Arcade, Havant**

Title **BREEAM SUR1 calculations for HAVANT**

Definitions and methods

Hydrology

The hydrological constants are derived from the Wallingford maps. They are used to calculate location specific rainfall figures.

Site values and factors

Areas of the site should be entered in hectares (10000 m²). If the Pre-development site is a green field, this box is blank.

Climate Change Factor is initially set at 20% - this may be changed as required.

Greenfield runoff is calculated using the method described in IoH 124.

Runoff factors

The impermeable runoff factor is initially set at 98%

The permeable runoff factor is initially set at 20%

Note: the CCF and the runoff factors may be changed by the user to suit the development

The areas draining to soakaways and other SUDS are entered in the appropriate box (in hectares)

Calculations

The post-development area is reduced by subtracting the areas that drain to soakaways or other SUDS, to give a revised figure.

All areas are then multiplied by the appropriate runoff factor to give an equivalent area with 100% runoff.

These are then summated.

This gives a total pre-development equivalent area, and a similar figure for the post-development area.

The 'Post-dev volume to drain (no SUDS)' gives the total runoff to drain if no SUDS were used.

Results

The pre- and post-development areas are subjected to 1,30 and 100 year return period storms with a duration of 15 to 600 minutes.

The Revised Post-dev Imperm. area is the area (in ha) that is not going to SUDS x impervious runoff factor.

The runoff rates are calculated for the chosen hydrograph (Summer or Winter) as l/s. Figures in red indicate m³/s

The peak value is measured, multiplied by the CCF and the total maximum rate is shown.

The pre- and post-development volumes for a 100 year / 6 hour storm are calculated from the area under the hydrograph curve.

Post-dev volume (i.e. excess above SUDS) is that volume produced by the drained area that does not go to SUDS.

Qbar(rural) is calculated in accordance with the procedure laid down in IoH 124