	Nimbus Engineering			24 Elm Court, Bridge of Earn,				Job No. C1203				
	Consultants Ltd			Perthshire, PH2 9RU Tel:01738 813645 Mob:0772 339 3155				Sheet no. 1				
	www.r	nimbusengineering.co.uk	em	email: info@nimbusengineering.co.uk				Date	09/12/13	}		
MasterDrain	Project 17 Goldington Crescent							By	Checked	Reviewe		
HY 8.66	Title SUR1 calcu	Title SUR1 calculations for 17 Goldington Crescent						S.L				
ata:-												
Hydrology	$\sim -$			<b>D</b>	_							
Location	= LONDON (NO)	KTH) 190	WRA Gri	r d refere	= nce = '	4 104090						
M5-60 (mm	(1) = 20	190	SAA	R (mm/vr	) = (	510						
r	= 0.43		Soi	1	=0	.47						
Hyd. area	= 6		Hyd	. zone	= 8	3						
Hydrograp	oh = Summ	er	Are	a = Engla	and and	d Wales	ł					
ite values	used in des	ign:-										
Total site area = 0.0384 ha				Climate change factor = 30%								
Pre-dev a	rea drained	= 0.0384 ha	Pos	t-dev ar	ea drai	ined =	0.038	84 ha				
Imperm ru	noff factor	= 98%	Per	m runoff	factor	= 2	: 20%					
Pre-devel Area to s	opment oakawavs	= 0.0000 ha	Are	a to oth	er SUDS	5 =	0.000	)0 ha				
Perv. area to SUDS = $0.0000$ ha				-dev flo	w to di	cain =	0.00	1/s				
Post-deve	lopment											
Area to s	oakaways	= 0.0000 ha	Are	Area to other SUDS = 0.0000 ha								
Perv. are	a to SUDS	= 0.0000 ha	Pos	t-dev fl	ow to a	drain =	0.00	1/s				
alculation	is:-											
Revised P	ost-dev Impe	rm. area = 0.0	038 ha									
Revised P Equiv. Po	ost-dev Impe st-dev Imper	rm. area = 0.( m. area = 0.(	038 ha 038 ha									
Revised P Equiv. Po Equiv. Po	ost-dev Imper ost-dev Imper ost-dev Perm.	rm. area = 0.( m. area = 0.( area = 0.(	038 ha 038 ha 000 ha									
alculation Revised P Equiv. Po Equiv. Po Total Pre	ost-dev Imper ost-dev Imper ost-dev Perm. e-dev equiv.	rm. area = 0.( m. area = 0.( area = 0.( area ha = 0.(	038 ha 038 ha 000 ha 038 ha									
alculation Revised P Equiv. Po Equiv. Po Total Pre Total Pos	ost-dev Imper ost-dev Imper ost-dev Perm. e-dev equiv.	rm. area = $0.0$ m. area = $0.0$ area = $0.0$ area ha = $0.0$ area ha = $0.0$	038 ha 038 ha 000 ha 038 ha 038 ha									
Revised P Equiv. Po Equiv. Po Total Pre Total Pos 100 yr 6	ost-dev Imper ost-dev Imper ost-dev Perm. e-dev equiv. t-dev equiv. hour mean in	rm. area = 0.0 m. area = 0.0 area = 0.0 area ha = 0.0 area ha = 0.0 tensity = 10.1	038 ha 038 ha 000 ha 038 ha 038 ha 13mm/hr									
alculation Revised P Equiv. Po Equiv. Po Total Pre Total Pos 100 yr 6	ost-dev Imper ost-dev Imper ost-dev Perm. e-dev equiv. hour mean in	rm. area = 0.0 m. area = 0.0 area = 0.0 area ha = 0.0 area ha = 0.0 tensity = 10.1	038 ha 038 ha 000 ha 038 ha 038 ha 13mm/hr									
Revised P Equiv. Po Equiv. Po Total Pre Total Pos 100 yr 6 esults:- Pre-dev p	est-dev Imper ost-dev Imper ost-dev Perm. e-dev equiv. t-dev equiv. hour mean in peakflow runo	rm. area = 0.0 m. area = 0.0 area = 0.0 area ha = 0.0 area ha = 0.0 tensity = 10.1 ff $(1/s) (m^3/s)$	038 ha 038 ha 000 ha 038 ha 038 ha 13mm/hr	0 400	600	Masa	005	R-ac-		P		
alculation Revised P Equiv. Po Equiv. Po Total Pre Total Pos 100 yr 6 esults:- Pre-dev p R.P. 1	est-dev Imper ost-dev Imper ost-dev Perm. e-dev equiv. hour mean in bour mean in 15 30	rm. area = 0.0 m. area = 0.0 area = 0.0 area ha = 0.0 area ha = 0.0 tensity = 10.1 ff $(1/s) (m^3/s)$ 60 120 5 2 3 2	038 ha 038 ha 000 ha 038 ha 038 ha 13mm/hr 240 36	0 480	600 1 0	Max	CCF 30	Final	LR	P. 1		
Revised P Equiv. Po Equiv. Po Total Pre Total Pos 100 yr 6 esults:- Pre-dev p R.P. 1 30	ost-dev Imper ost-dev Imper ost-dev Perm. e-dev equiv. t-dev equiv. hour mean in 15 30 13.1 8.6 31.9 20.5	<pre>rm. area = 0.0 m. area = 0.0 area = 0.0 area ha = 0.0 tensity = 10.1 ff (1/s) (m<sup>3</sup>/s) 60 120 5.2 3.2 12.6 7.5</pre>	038 ha 038 ha 000 ha 038 ha 13mm/hr 240 36 2.0 1.5 4.4 3.2	0 480 1.2 2.5	600 1.0 2.1	Max 13.1 31.9	CCF 30 30	Fina: 17.0 41.5	L R	P. 1 0		
Revised P Equiv. Po Equiv. Po Total Pre Total Pos 100 yr 6 esults:- Pre-dev p R.P. 1 30 100	ost-dev Imper ost-dev Imper ost-dev Perm. e-dev equiv. t-dev equiv. hour mean in 15 30 13.1 8.6 31.9 20.5 41.5 26.9	rm. area = 0.0 m. area = 0.0 area = 0.0 area ha = 0.0 tensity = 10.1 ff $(1/s) (m^3/s)$ 60 120 5.2 3.2 12.6 7.5 16.6 9.9	038 ha 038 ha 000 ha 038 ha 13mm/hr 240 36 2.0 1.5 4.4 3.2 5.8 4.2	0 480 1.2 2.5 3.3	600 1.0 2.1 2.8	Max 13.1 31.9 41.5	CCF 30 30 30	Fina: 17.0 41.5 53.9	L R 3 10	P. 1 0 0		
alculation Revised P Equiv. Po Equiv. Po Total Pre Total Pos 100 yr 6 esults:- Pre-dev p R.P. 1 30 100 Post-dev	<pre>cost-dev Imper ost-dev Imper ost-dev Perm. e-dev equiv. hour mean in 15 30 13.1 8.6 31.9 20.5 41.5 26.9 peakflow run</pre>	rm. area = 0.0 m. area = 0.0 area = 0.0 area ha = 0.0 tensity = 10.1 ff $(1/s) (m^3/s)$ 60 120 5.2 3.2 12.6 7.5 16.6 9.9 off $(1/s)$	038 ha 038 ha 000 ha 038 ha 038 ha 13mm/hr 240 36 2.0 1.5 4.4 3.2 5.8 4.2	0 480 1.2 2.5 3.3	600 1.0 2.1 2.8	Max 13.1 31.9 41.5	CCF 30 30 30	Fina: 17.0 41.5 53.9	L R 3 10	₽. 1 0 0		
alculation Revised P Equiv. Po Equiv. Po Total Pre Total Pos 100 yr 6 esults:- Pre-dev p R.P. 1 30 100 Post-dev R.P.	<pre>cost-dev Imper ost-dev Imper ost-dev Perm. e-dev equiv. hour mean in peakflow runo 15 30 13.1 8.6 31.9 20.5 41.5 26.9 peakflow runo 15 30</pre>	<pre>rm. area = 0.0 m. area = 0.0 area = 0.0 area ha = 0.0 tensity = 10.1 ff (1/s) (m<sup>3</sup>/s) 60 120 5.2 3.2 12.6 7.5 16.6 9.9 off (1/s) 60 120</pre>	038 ha 038 ha 000 ha 038 ha 038 ha 13mm/hr 240 36 2.0 1.5 4.4 3.2 5.8 4.2	0 480 1.2 2.5 3.3 0 480	600 1.0 2.1 2.8 600	Max 13.1 31.9 41.5 Max	CCF 30 30 30 CCF	Fina: 17.0 41.5 53.9 Fina:	L R 3 10 L R	P. 1 0 0		
alculation Revised P Equiv. Po Equiv. Po Total Pre Total Pos 100 yr 6 esults:- Pre-dev p R.P. 1 30 100 Post-dev R.P. 1 30	ost-dev Imper ost-dev Imper ost-dev Perm. e-dev equiv. hour mean in peakflow runo 15 30 13.1 8.6 31.9 20.5 41.5 26.9 peakflow runo 15 30 13.1 8.6 31.9 20 5	rm. area = 0.0 m. area = 0.0 area = 0.0 area ha = 0.0 tensity = 10.1 ff $(1/s) (m^3/s)$ 60 120 5.2 3.2 12.6 7.5 16.6 9.9 off $(1/s)$ 60 120 5.2 3.2 12.6 7.5 16.6 9.9	038 ha 038 ha 000 ha 038 ha 038 ha 13mm/hr 240 36 2.0 1.5 4.4 3.2 5.8 4.2 240 36 2.0 1.5	0 480 1.2 2.5 3.3 0 480 1.2 2 5	600 1.0 2.1 2.8 600 1.0 2.1	Max 13.1 31.9 41.5 Max 13.1 31 9	CCF 30 30 30 CCF 30	Fina: 17.0 41.5 53.9 Fina: 17.0 41.5	L R 3 10 L R	P. 1 0 0		
Calculation Revised P Equiv. Po Equiv. Po Total Pre Total Pos 100 yr 6 Cesults:- Pre-dev p R.P. 1 30 100 Post-dev R.P. 1 30 100	<pre>cost-dev Imper pst-dev Imper pst-dev Perm. e-dev equiv. hour mean in 15 30 13.1 8.6 31.9 20.5 41.5 26.9 peakflow run 15 30 13.1 8.6 31.9 20.5 41.5 26.9</pre>	<pre>rm. area = 0.0 m. area = 0.0 area = 0.0 area ha = 0.0 area ha = 0.0 tensity = 10.1 ff (1/s) (m<sup>3</sup>/s) 60 120 5.2 3.2 12.6 7.5 16.6 9.9 off (1/s) 60 120 5.2 3.2 12.6 7.5 16.6 9.9</pre>	038 ha 038 ha 000 ha 038 ha 038 ha 13mm/hr 240 36 2.0 1.5 4.4 3.2 5.8 4.2 240 36 2.0 1.5 4.4 3.2 5.8 4.2	0 480 1.2 2.5 3.3 0 480 1.2 2.5 3.3	600 1.0 2.1 2.8 600 1.0 2.1 2.8	Max 13.1 31.9 41.5 Max 13.1 31.9 41.5	CCF 30 30 30 20 CCF 30 30 30	Fina: 17.0 41.5 53.9 Fina: 17.0 41.5 53.9	L R 3 10 L R 3 10	P. 1 0 0 0		
Revised P Equiv. Po Equiv. Po Total Pre Total Pos 100 yr 6 esults:- Pre-dev p R.P. 1 30 100 Post-dev R.P. 1 30 100 100	<pre>cost-dev Imper pst-dev Imper pst-dev Perm. e-dev equiv. hour mean in peakflow runo 15 30 13.1 8.6 31.9 20.5 41.5 26.9 peakflow runo 15 30 13.1 8.6 31.9 20.5 41.5 26.9 6 hour (x Cl. Pr</pre>	<pre>rm. area = 0.0 m. area = 0.0 area = 0.0 area ha = 0.0 area ha = 0.0 tensity = 10.1 ff (1/s) (m<sup>3</sup>/s) 60 120 5.2 3.2 12.6 7.5 16.6 9.9 off (1/s) 60 120 5.2 3.2 12.6 7.5 16.6 9.9 imate Change Fre-dev runoff</pre>	038 ha 038 ha 000 ha 038 ha 038 ha 13mm/hr 240 36 2.0 1.5 4.4 3.2 5.8 4.2 240 36 2.0 1.5 4.4 3.2 5.8 4.2 5.8 4.2 Factor) st	$\begin{array}{cccc} 0 & 480 \\ 1.2 \\ 2.5 \\ 3.3 \\ 0 & 480 \\ 1.2 \\ 2.5 \\ 3.3 \\ \hline \text{corm give} \\ = 29.7 \\ \end{array}$	600 1.0 2.1 2.8 600 1.0 2.1 2.8 600 1.0 2.1 2.8 600 1.0 2.1 2.1 2.8	Max 13.1 31.9 41.5 Max 13.1 31.9 41.5	CCF 30 30 30 30 CCF 30 30 30	Fina: 17.0 41.5 53.9 Fina: 17.0 41.5 53.9	L R 3 10 L R 3 10	P. 1 0 0 P. 1 0 0		
Revised P Equiv. Po Equiv. Po Total Pre Total Pos 100 yr 6 Results:- Pre-dev p R.P. 1 30 100 Post-dev R.P. 1 30 100 100	<pre>cost-dev Imper pst-dev Imper pst-dev Perm. e-dev equiv. hour mean in peakflow runo 15 30 13.1 8.6 31.9 20.5 41.5 26.9 peakflow runo 15 30 13.1 8.6 31.9 20.5 41.5 26.9 6 hour (x Cl. Pr Pr Pr Pr Pr Pr Pr Pr Pr Pr Pr Pr Pr</pre>	<pre>rm. area = 0.0 m. area = 0.0 area = 0.0 area ha = 0.0 area ha = 0.0 tensity = 10.1 ff (1/s) (m<sup>3</sup>/s) 60 120 5.2 3.2 12.6 7.5 16.6 9.9 off (1/s) 60 120 5.2 3.2 12.6 7.5 16.6 9.9 imate Change F re-dev runoff ost-dev rainfa</pre>	038 ha         038 ha         030 ha         038 ha         13mm/hr         240 36         2.0 1.5         4.4 3.2         5.8 4.2         Factor) st         volume m <sup>3</sup>	$\begin{array}{cccc} 0 & 480 \\ 1.2 \\ 2.5 \\ 3.3 \\ 0 & 480 \\ 1.2 \\ 2.5 \\ 3.3 \\ \hline 0 & 1.2 \\ 3.3 \\ \hline 0 & 1.2 \\ 2.5 \\ 3.3 \\ \hline 0 & 1.2 \\ 2.5 \\ 3.3 \\ \hline 0 & 1.2 \\ 2.5 \\ 3.3 \\ \hline 0 & 1.2 \\ 2.5 \\ 3.3 \\ \hline 0 & 1.2 \\ 2.5 \\ 3.3 \\ \hline 0 & 1.2 \\ 2.5 \\ 3.3 \\ \hline 0 & 1.2 \\ 2.5 \\ 1.2 \\ $	600 1.0 2.1 2.8 600 1.0 2.1 2.8 s:- 1 <sup>3</sup> 7m <sup>3</sup>	Max 13.1 31.9 41.5 Max 13.1 31.9 41.5	CCF 30 30 30 CCF 30 30 30	Fina: 17.0 41.5 53.9 Fina: 17.0 41.5 53.9	L R 3 10 L R 30	P. 1 0 0 0		
Revised P Equiv. Po Equiv. Po Total Pre Total Pos 100 yr 6 esults:- Pre-dev p R.P. 1 30 100 Post-dev R.P. 1 30 100 Post-dev R.P. 1 30 100	<pre>cost-dev Imper pst-dev Imper pst-dev Perm. e-dev equiv. hour mean in peakflow runo 15 30 13.1 8.6 31.9 20.5 41.5 26.9 peakflow runo 15 30 13.1 8.6 31.9 20.5 41.5 26.9 6 hour (x CL Pr Pr Pr 15 10 10 10 10 10 10 10 10 10 10 10 10 10</pre>	<pre>rm. area = 0.0 m. area = 0.0 area = 0.0 area ha = 0.0 tensity = 10.1 ff (1/s) (m<sup>3</sup>/s) 60 120 5.2 3.2 12.6 7.5 16.6 9.9 off (1/s) 60 120 5.2 3.2 12.6 7.5 16.6 9.9 imate Change H re-dev runoff ost-dev rainfa ost-dev volume 00 w 6 barron 1000</pre>	038 ha         13mm/hr         240       36         2.0       1.5         4.4       3.2         5.8       4.2         Factor)       st         volume m <sup>3</sup> (exce         m <sup>3</sup> (exce	$\begin{array}{cccc} 0 & 480 \\ 1.2 \\ 2.5 \\ 3.3 \\ 0 & 480 \\ 1.2 \\ 2.5 \\ 3.3 \\ 0 & 1.2 \\ 3.3 \\ 0 & 1.2 \\ 0 & 1.2 \\ 0 & 1.2 \\ 0 & 1.2 \\ 0 & 1.2 \\ 0 & 1.2 \\ 0 & 1.2 \\ 0 & 1.$	600 1.0 2.1 2.8 600 1.0 2.1 2.8 600 1.0 2.1 2.8 600 1.0 2.1 2.8 600 1.0 2.1 2.8 600 1.0 2.1 2.8 600 1.0 2.1 2.8 600 1.0 2.1 2.8 600 1.0 2.1 2.8 600 1.0 2.1 2.8 600 1.0 2.1 2.8 600 1.0 2.1 2.8 600 1.0 2.1 2.8 600 1.0 2.1 2.8 600 1.0 2.1 2.8 600 1.0 2.1 2.8 600 1.0 2.1 2.8 600 1.0 2.1 2.8 7 7 7 7 7 7 7 7 7 7 7 7 7	Max 13.1 31.9 41.5 Max 13.1 31.9 41.5 = 29.'	CCF 30 30 30 CCF 30 30 30	Fina: 17.0 41.5 53.9 Fina: 17.0 41.5 53.9	L R 3 10 L R 3 10	P. 1 0 0 P. 1 0 0		
Revised P Equiv. Po Equiv. Po Total Pre Total Pos 100 yr 6 esults:- Pre-dev p R.P. 1 30 100 Post-dev R.P. 1 30 100 100 100	<pre>cost-dev Imper pst-dev Imper pst-dev Perm. e-dev equiv. hour mean in peakflow runo 15 30 13.1 8.6 31.9 20.5 41.5 26.9 peakflow runo 15 30 13.1 8.6 31.9 20.5 41.5 26.9 6 hour (x Cl. pr pr pr 1 pr 1 pr 1 pr 1 pr 1 pr 1 pr</pre>	<pre>rm. area = 0.0 m. area = 0.0 area = 0.0 area ha = 0.0 area ha = 0.0 tensity = 10.1 ff (1/s) (m<sup>3</sup>/s) 60 120 5.2 3.2 1 12.6 7.5 16.6 9.9 off (1/s) 60 120 5.2 3.2 1 12.6 7.5 16.6 9.9 imate Change F re-dev runoff ost-dev rainfa ost-dev volume 00 yr 6 hour r ost-dev volume</pre>	038 ha 038 ha 038 ha 038 ha 038 ha 13mm/hr 240 36 2.0 1.5 4.4 3.2 5.8 4.2 240 36 2.0 1.5 4.4 3.2 5.8 4.2 5.8 4.2 Factor) st volume m <sup>3</sup> all volume e m <sup>3</sup> (excent nean inter a to drain	0 480 1.2 2.5 3.3 0 480 1.2 2.5 3.3 corm give = 29.7m = 29.7m = 29.7m = 29.1m = 20.1m =	$ \begin{array}{c} 600\\ 1.0\\ 2.1\\ 2.8\\ 600\\ 1.0\\ 2.1\\ 2.8\\ s:-\\ 7m^{3}\\ subs)\\ 0.13mm\\ s=0\\ \end{array} $	Max 13.1 31.9 41.5 Max 13.1 31.9 41.5 = 29.' /hr 0 m <sup>3</sup>	CCF 30 30 30 CCF 30 30 30	Fina: 17.0 41.5 53.9 Fina: 17.0 41.5 53.9	L R 3 10 L R 3 10	P. 1 0 0 P. 1 0 0		

 $Q_{BAR(rural)} = 0.158$  l/s or 4.110 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.

MasterDrain HY 8.66	Nimbus Engineering	24 Elm Court, Bridge of Earn,	Job No. C1203 Sheet no. 2 Date 09/12/13										
	Consultants Ltd	Pertnsnire, PH2 9R0 Tel:01738 813645 Mob:0772 339 3155 email: info@nimbusengineering.co.uk											
	Project 17 Goldington Crescent		Ву	Checked	Reviewed								
	Title SUR1 calculations for 17 Goldington C	- S.L											
Data summary.													
Use the data	below for the SUR1 form	·											
Site areas:- Total sir Pre-dev Pre-dev Post-de Post-de	te area $= 0.0384$ ha ;384.1 m velopment impermeable area $= 0.0384$ ha velopment permeable area $= 0.0000$ ha evelopment impermeable area $= 0.0384$ ha evelopment permeable area $= 0.0000$ ha	<sup>2</sup> [3A] [3B] [3C]											
Peak runoff:- Pre-dev Pre-dev Post-de Post-de	velopment 1 year storm (15min) = 13.1 l/s velopment 100 year storm (15min) = 41.5 l/s evelopment 1 year storm (15min) = 13.1 l/s evelopment 100 year storm (15min)= 41.5 l	s [6A] /s [6C] s [6B] /s [6D]											
Greenfield ru Q <sub>ваR(rural</sub>	noff:- <sub>)</sub> = 0.158 l/s or 4.110 l/s/ha c	or 0.000 cumecs - from IoH 124	ł.										
Climate ch C	ange factor:- CF = 30%												
Volumes:- F F F F	Pre-development 100 yr/6hr stor Post-development 100 yr/6hr stor Post-development 100 yr/6hr stor Post-development add. predicted	cm [12A]= 29.7m <sup>3</sup> cm ( add. volume with no SUDS) cm ( add. volume with SUDS) volume (No SUDS) [12C]	[12B]	= 29.7r = 29.7r = 0.0m <sup>3</sup>	n <sup>3</sup> n <sup>3</sup> 3								
You may al E F I	so require Data relating to the infiltratio Ovidence to show runoff reductio Information on calculation metho	on test calculations (if appli on (if applicable) ods (if applicable see next sh	.cable) neet)										
Note													

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



MasterDrain HY 8.66

# Nimbus Engineering Consultants Ltd

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## Title SUR1 calculations for 17 Goldington Crescent

### 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 m<sup>2</sup>). 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 I/s. Figures in red indicate m<sup>3</sup>/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