HYDROLOGICAL STUDY REPORT AND SUSTAINABLE SURFACE WATER DRAINAGE PROPOSALS

PHASE 5 DEVELOPMENT TO REAR OF 38 AND 40 GLADYS AVENUE COWPLAIN HAMPSHIRE

EG/331184/EG

22 JUL 2011
RECEIVED

20 July 2011

INTRODUCTION

In 2006 phase 1 of our clients Gladys Avenue development was completed with three units to the rear of Nos. 42 and 44 Gladys Avenue; phases 2 and 3 followed shortly afterwards with developments to the rear of Nos. 40 and 46 Gladys Avenue. In 2009 Phase 4 of the development proposed to develop the land to the rear of Nos. 26 and 30 Gladys Avenue with a pair of semi-detached properties.

For each of these developments a Hydrological Study and surface water drainage scheme was produced.

The following hydrological report considers the requirements of the Phase 5 development which consists of 2 detached dwellings and gives proposals for the storm water drainage requirements in a similar vein to the previous phases of this development. A proposed site layout plan can be seen in Appendix A.

As in the previous phases of this development the sub soil is likely to be of slowly permeable clayey substrates. This will be confirmed during the intrusive site investigation to be undertaken on the site in the future. This clayey soil means that traditional soakways are not suitable for this site. Therefore as was utilised in the previous phases large scale soakaway tanks are proposed which use highly voided cellular tanks to store storm water whilst it soaks away. A permeable paving solution will also be utilised for the access road and parking areas in this phase of the development. This type of drainage solution means that all storm water which falls on the site is stored until it can slowly infiltrate into the surrounding soil. Coarse-grained permeable substrata do not appear to occur on this site and so, in the absence of laterally flowing groundwater, the proposals will not interfere with the wider hydrogeology system.

SITE DESCRIPTION

The proposed site of the new development covers the land to the rear of 38 and 40 Gladys Avenue, which is currently used as domestic rear gardens. The development consist of 2 new detached dwellings designated plots 1 and 2. The grid reference for the site is SU6920 1175. This is approximately 30m to the South of the phase 1 development, to the rear of 42 Gladys Avenue, of which a detailed soil investigation was undertaken in December 2003 and January 2004. The site is to be found to the East of Gladys Avenue and the site generally slopes from northwest to southeast.

The site lies within the drainage catchment of the Wallington Brook. This watercourse flows south and west and finally outfalls into Fareham Harbour.

22 JUL 2011
RECEIVED

GEOLOGY

A study was made of the local British Geological Survey map and it was found that the site is overlain by Reading Formation which consists of mottled clay with possibly some sand content. The Reading formation overlies Upper Chalk with London Clay formation found to the south of the site. The findings of the map are confirmed by the site investigation carried out on phase 1 of the development.

SOAKAWAY TESTS AND STORM CONDITION

Detailed soakaway testing was undertaken during phase 1 to the rear of No. 42 Gladys Avenue. Even though the new site is approximately 30m to the South of this site the geological map shows that the underlying soil is the same Reading formation and it is very unlikely that any significant difference in subsoil will occur over such a small distance. This engineering assumption will also be checked during an intrusive site investigation when the phase 5 works are to begin. We have therefore utilised the results from the previous soakaway testing to produce a storm water drainage scheme for the proposed development. The soakaway tests were undertaken for Meon Valley Developments using standard methodology. The soakaway test results show that the soil infiltration rate is likely to be at the low end for the underlying deposits encountered of 0.03m/day.

The previous hydrological assessments showed that this relatively low soil infiltration value when combined with the Flood Estimation Handbook rainfall meant that a long duration storm would produce the worst case scenario for the site. This is opposed to a short duration high intensity storm. Therefore the long duration storm with a 1 in 100 year return period +20% allowance for climate change has also been used to produce a drainage solution in accordance with PPS25 for the storm drainage solution on the new development.

DRAINAGE

It is understood that the majority of the local surface water drainage in the area is disposed of via soakaways. It is also understood from local anecdotal evidence that some local properties have previously experienced some kind of flooding which can occur every 3 to 5 years. Our scheme proposes to use a 1/100 year storm event + 20%. This means that the proposed development will have no effect on other properties in the local area for storm return periods less than 100 years. We have undertaken drainage design calculations, which can be found in Appendix B, utilising BRE Digest 365 recommendations combined with PPS25 and FEH criteria.

The proposed development to the rear of No. 38 & 40 Gladys Avenue does represent an increase in impermeable area over that which is already present. However the proposed drainage scheme, which considers all new areas of

22 JUL 2011
RECEIVED

hardstanding including roofs, roads, driveways and pavements, would allow the collection and temporary storage of all rapid runoff storm water. This collected storm water would then be stored whilst slowly soaking into the subsoil as currently occurs on the site.

CONCLUSIONS

From the previous developments investigations the soil infiltration rate of the subsoil has been determined as 0.032m/day. It has also been determined that a long duration storm will provide the worst case for any storage system. This long period storm has been considered for a 1 in 100 year return period + 20% as suggested by PPG25. The proposed storm drainage solution has been produced in-line with that already installed for the previous phases of this development.

The storm drainage scheme for each of the proposed dwellings making up the proposed development will consist of two large combined storage / soakaway tanks with water from all impermeable areas being piped into them. These underground storage/soakway units will be constructed using cellular units which have much higher void ratios than traditional rubble filled soakaways. These cellular units can also be installed in load bearing applications (i.e. under driveways) if required.

Appendix B contains design calculations for these storage/soakaway tanks along with a proposed tank layout plan for each plot. Plot 1 would require one tank of 6.0x2.50m on plan and 1.5m in depth and one tank of 7.0x2.50m on plan and 1.5m in depth. Due to the tree protection areas Plot 2 would require one tank of 7.5x2.50m on plan and 1.5m in depth and one tank of 5.0x3.00m on plan and 1.5m in depth. It is of note that the amount of rain falling on the site will not increase only the speed at which this water runs-off the impermeable areas of the site. The proposed underground storage tanks and permeable access road and parking areas allow this rapid run-off to be stored whilst it slowly soaks away. Therefore as a 1/100 year storm event + 20% has been assumed for this study, adopting the measures proposed above will significantly reduce the flood risk to the area of the phase 5 proposed development.

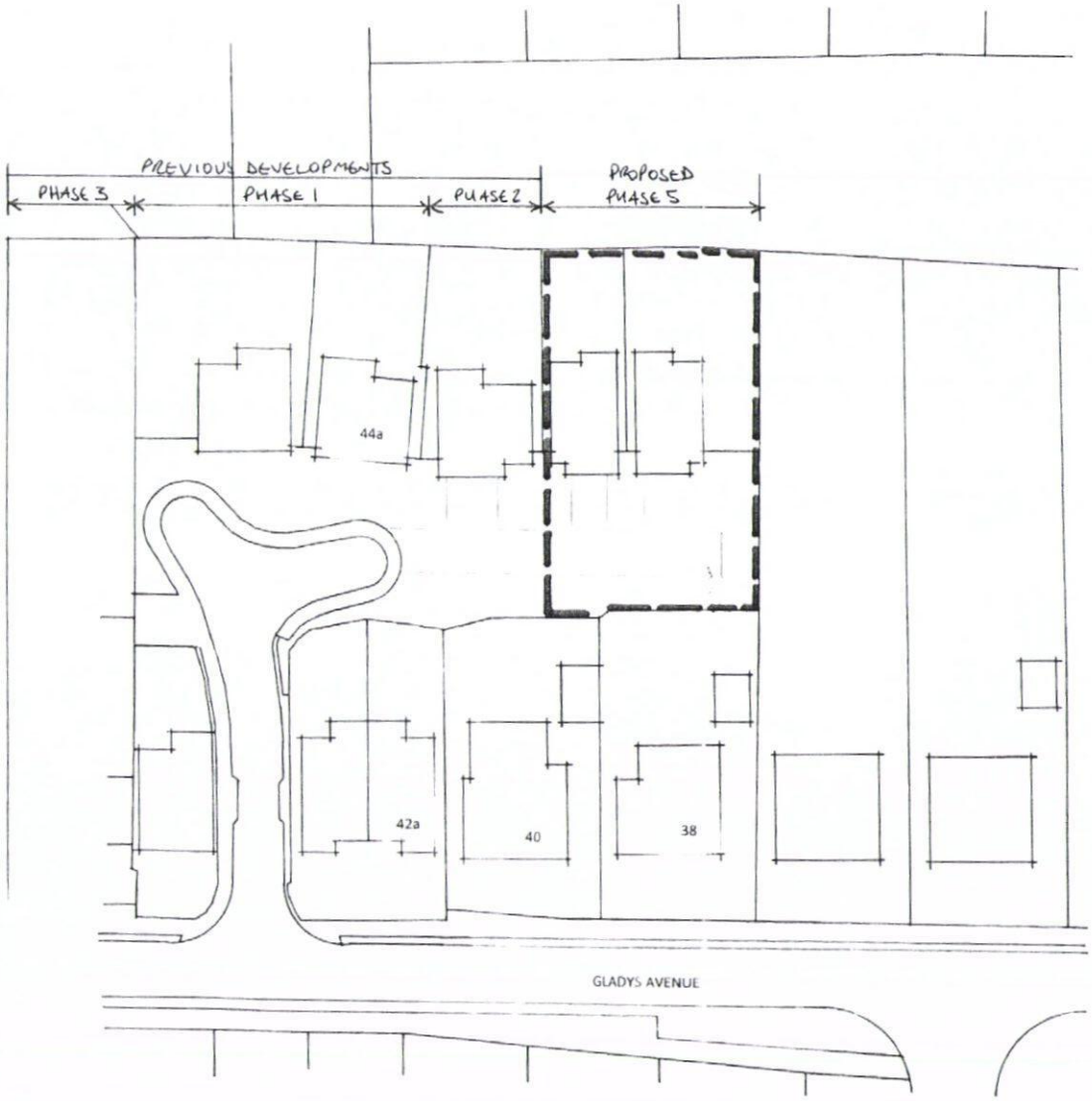
ELVIN GOMERY B. Eng.
For and on behalf of Cowan Consultancy

DAVID BUTTON
B.Sc., (Eng), C.Eng., M.I.C.E.
For and on behalf of Cowan Consultancy

22 JUL 2011
RECEIVED

APPENDIX A

27 JUL 2011
RECEIVED



PROPOSED PHASE 5 DEVELOPMENTS

RECEIVED
27 JUL 2011

Project :		Land to rear of 38 & 40 Gladys Avenue, Cowplain
Title :		Block Plan
Scale	-	1 : 500
Drawing No.	-	GA010/05
Date	-	May 2011

Mean Valley Developments Limited

APPENDIX B

22 JUL 2011
RECEIVED

Cowan Consultancy
STRUCTURAL, CIVIL AND BUILDING CONSULTANTS

Cowan Consultancy Limited
3 Turnberry House
4400 Parkway
Whiteley
Fareham
Hampshire
PO15 7FJ

Tel: 01489 577488
Fax: 01489 579873

www.cowanconsult.co.uk
consultants@cowanconsult.co.uk

Also at:

The Old Post Office
73 High Street
Cowes
Isle of Wight
PO31 7AJ

Tel: 01983 280033
Fax: 01983 280154

Job No 33184	Sheet 1	Date 07/11
Job 38 HOGARTH AVE	By EG	Checked

DRAINAGE ASSESSMENT

SITE PLAN MAY 2011 (DRG. No. GA010/01)

AREA OF IMPERMEABLE SURFACES

PLOT 1 (NORTH)

ROOF	72.0	m²
PATHS/DRIVES	31.0	"
FOOTPATHS	16.0	"
ROADS	32.0	"
	151.0	m²

PLOT 2 (SOUTH)

ROOF	72.0	m²
PATHS/DRIVES	31.0	"
FOOTPATHS	16.0	"
ROADS	36.0	"
	155.0	m²

SEE SPREADSHEETS BASED UPON THE PREVIOUS DEVELOPMENTS STORM WATER DRAINAGE SOLUTION =>

IN ORDER TO FACILITATE THE INSTALLATION OF THE SOAKAWAYS THE PROPERTIES ARE TO USE PILED TYPE FOUNDATIONS.

FROM SPREADSHEET :

PLOT 1 (NORTH)

TANK 1 - PROVIDE 6.0 x 2.5 x 1.5m DEEP

TANK 2 - PROVIDE 7.0 x 2.5 x 1.5m DEEP

PLOT 2

TANK 1 - PROVIDE 7.5 x 2.5 x 1.5m DEEP

TANK 2 - PROVIDE 5.0 x 3.0 x 1.5m DEEP

22 JUL 2011
RECEIVED

PLOT 1

Soakaway & Storage Design

Following on from Environmental Project Consulting Group calculations
(Substituting Storm cell units instead of granular fill for all soakaways)

Storm: 1/100 year return + 20% event of 16 days duration in accordance with PPG25

depth rainfall	230.23	(+20%)
Area	151.0	m2
Storage req.	34.76	m3
Area Soakaway Tank 1		
B	6	
D	2.5	
Void ratio	0.95	%
soil infiltration rate	**0.032**	
depth req. Blanket	2.440	m
Rate soakaway Tank 1	**0.664**	m3/day
Time to soakaway (Both tanks)	31.05	days
Extra rainfall (Ave.2.6mm day)	5.91	m3
Total volume to store	40.67	m3
Depth storage req.	1.10	m
Tank 1 B	**6.00**	m
D	**2.50**	m
Min.Depth	**1.50**	m

Area Soakaway Tank 2		
B	**7**	
D	**2.5**	
Depth	**1.5**	
Rate soakaway Tank 2	**0.456**	m3/day
Storage provided	24.9375	m3

Double Check Solution		
Rate soakaway Tank 1	0.41	m3/day
Time to soakaway	40.24	days
Additional rain	9.52	m3/day
Total volume	44.28	m3
Actual storage Tank 1	21.38	m3
Actual storage Tank 2	24.94	m3
Total Storage	**46.31**	m3
Ok Solution is satisfactory		

RECEIVED
27 JUL 2011

PLOT 2

Soakaway & Storage Design

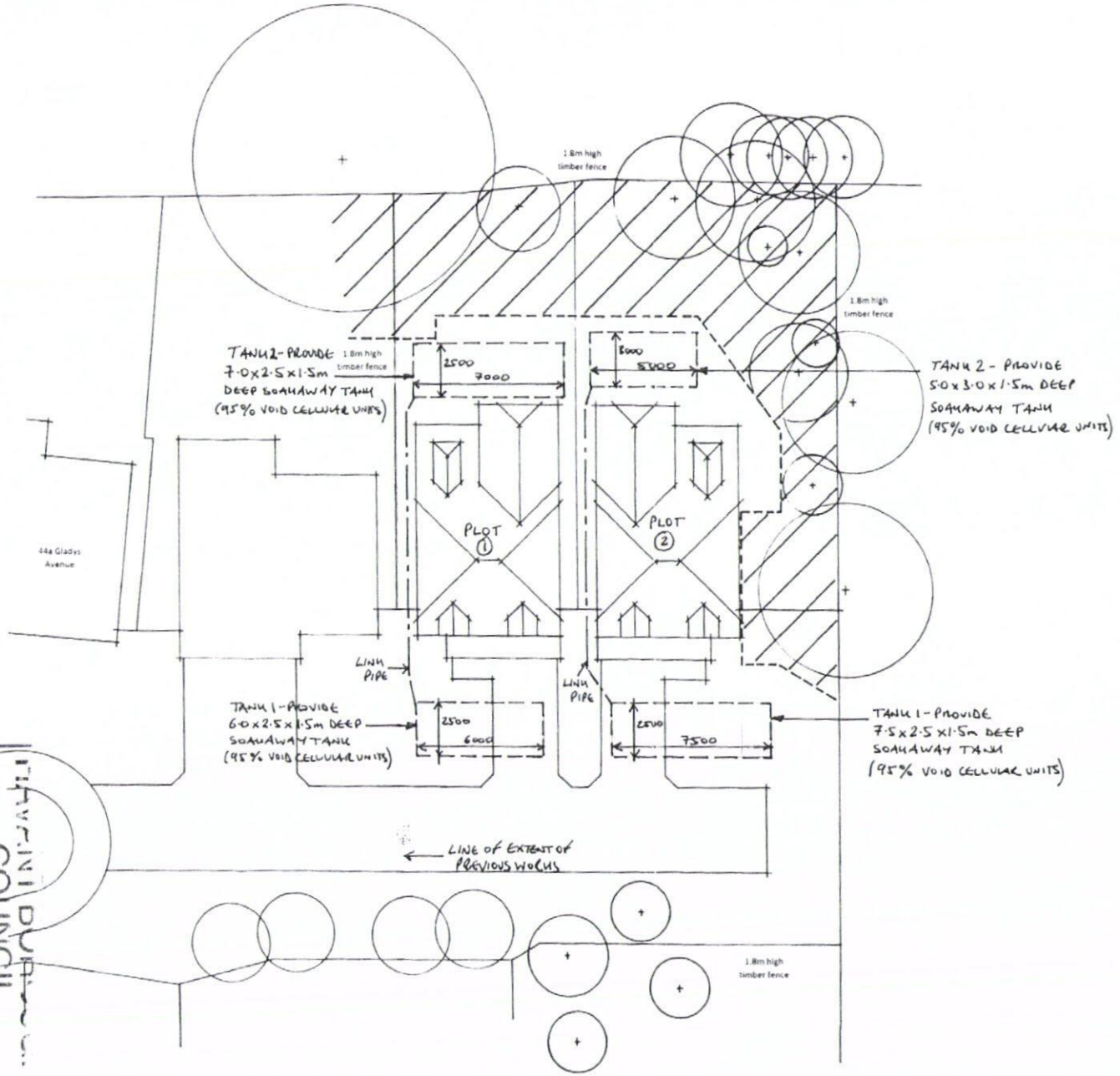
Following on from Environmental Project Consulting Group calculations
(Substituting Storm cell units instead of granular fill for all soakaways)

Storm: 1/100 year return + 20% event of 16 days duration in accordance with PPG25

depth rainfall	230.23	(+20%)			
Area	155.0	m2	Area Soakaway Tank 2		
Storage req.	35.69	m3	B	**5**	
			D	**3**	
Area Soakaway Tank 1			Depth	**1.5**	
B	7.5				
D	2.5		Rate soakaway Tank 2	**0.384**	m3/day
Void ratio	0.95	%	Storage provided	21.375	m3
soil infiltration rate	**0.032**				
depth req. Blanket	2.003	m			
Rate soakaway Tank 1	**0.641**	m3/day			
Time to soakaway (Both tanks)	34.81	days			
Extra rainfall (Ave.2.6mm day)	7.58	m3			
Total volume to store	43.27	m3			
Depth storage req.	1.23	m			
Tank 1 B	**7.50**	m			
D	**2.50**	m			
Min.Depth	**1.50**	m			

Double Check Solution		
Rate soakaway Tank 1	0.48	m3/day
Time to soakaway	41.30	days
Additional rain	10.20	m3/day
Total volume	45.88	m3
Actual storage Tank 1	26.72	m3
Actual storage Tank 2	21.38	m3
Total Storage	**48.09**	m3
Ok Solution is satisfactory		

RECEIVED
COUNCIL
27 JUL 2011



RECEIVED
27 JUL 2011
COUNCIL

Project :		Land to rear of 38 & 40 Gladys Avenue, Cowplain
Title :		Site Layout
Scale	-	1 : 200
Drawing No.	-	GA010/01
Date	-	May 2011

Meon Valley Developments Limited