

Our ref: VLC/DP/28476

13 March 2017

Havant Borough Council
Public Service Plaza
Civic Centre Road
Havant
Hampshire
PO9 2AX

Dear Sirs

11 Bound Lane, Hayling Island, PO11 9HU
Planning Reference: APP/16/00327
Validating Surface Water Drainage Design

We write to confirm that the proposed drainage design attached is consistent with the drainage strategy proposed by Robert Clark Associates in August 2015. The majority of site waters will be managed on site by a plate soakaway beneath the proposed access road, with roof waters served by discrete soakaways.

Archibald Shaw adopted a design infiltration coefficient of 4.5×10^{-6} m/s which is an approximate mean of three infiltration tests undertaken in autumn 2016. An extract of the relevant page from the geotechnical report refers. The design infiltration coefficient lies comfortably within the infiltration test results obtained by Robert Clark Associates.

The division of two detached properties into four semi-detached properties maintains the original roof areas which are catered by the design summarised on drawing 28476/201/A.

Discrete soakaways have a designed depth of 1.4m below ground level which offers a clear distance of 0.8m above the highest reported groundwater level on site.

Yours faithfully



Vincent Carpenter
for ARCHIBALD SHAW

Enc: Extract of Ground Investigation PS8
Drawing 28476/201/A

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Archibald Shaw LLP uses the word 'Partner' to refer to a Member of the LLP

Also at Newbury

Archibald Shaw Limited		Page 1
One Little London Chichester Sussex PO19 1PP	BOUND LANE HAYLING ISLAND S.AWAY 80 SQ M 1.4m deep	
Date 08-03-2017	Designed By PF	
File 80 sq m CONTRIBUTING 1.4M ...	Checked By	
Micro Drainage	Source Control W.11.2	

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 1189 minutes

Storm Duration (mins)	Maximum Filtration (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Maximum Volume (m³)	Status
15 Summer	0.0	0.0	100.2288	0.2287	1.7	O K
30 Summer	0.0	0.0	100.3137	0.3137	2.4	O K
60 Summer	0.0	0.0	100.4082	0.4082	3.1	O K
120 Summer	0.0	0.0	100.5057	0.5057	3.8	O K
180 Summer	0.0	0.0	100.5573	0.5572	4.2	O K
240 Summer	0.0	0.0	100.5923	0.5923	4.4	O K
360 Summer	0.0	0.0	100.6373	0.6373	4.8	O K
480 Summer	0.0	0.0	100.6638	0.6638	5.0	O K
600 Summer	0.0	0.0	100.6788	0.6788	5.1	O K
720 Summer	0.0	0.0	100.6873	0.6873	5.2	O K
960 Summer	0.0	0.0	100.6918	0.6918	5.2	O K
1440 Summer	0.0	0.0	100.6898	0.6898	5.2	O K
2160 Summer	0.0	0.0	100.6733	0.6733	5.0	O K
2880 Summer	0.0	0.0	100.6498	0.6498	4.9	O K
4320 Summer	0.0	0.0	100.6023	0.6023	4.5	O K
5760 Summer	0.0	0.0	100.5587	0.5587	4.2	O K
7200 Summer	0.0	0.0	100.5177	0.5177	3.9	O K
8640 Summer	0.0	0.0	100.4802	0.4802	3.6	O K
10080 Summer	0.0	0.0	100.4457	0.4457	3.3	O K
15 Winter	0.0	0.0	100.2568	0.2567	1.9	O K
30 Winter	0.0	0.0	100.3522	0.3522	2.6	O K
60 Winter	0.0	0.0	100.4582	0.4582	3.4	O K
120 Winter	0.0	0.0	100.5687	0.5687	4.3	O K
180 Winter	0.0	0.0	100.6283	0.6283	4.7	O K
240 Winter	0.0	0.0	100.6688	0.6688	5.0	O K
360 Winter	0.0	0.0	100.7223	0.7223	5.4	O K
480 Winter	0.0	0.0	100.7548	0.7548	5.7	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
15 Summer	116.00	23
30 Summer	80.00	38
60 Summer	52.66	68
120 Summer	33.32	128
180 Summer	25.00	186
240 Summer	20.31	246
360 Summer	15.14	366
480 Summer	12.27	486
600 Summer	10.41	604
720 Summer	9.10	724
960 Summer	7.35	864
1440 Summer	5.42	1114
2160 Summer	3.99	1516
2880 Summer	3.20	1932
4320 Summer	2.35	2768
5760 Summer	1.89	3576
7200 Summer	1.59	4392
8640 Summer	1.39	5184
10080 Summer	1.24	5952
15 Winter	116.00	23
30 Winter	80.00	37
60 Winter	52.66	66
120 Winter	33.32	126
180 Winter	25.00	184
240 Winter	20.31	242
360 Winter	15.14	358
480 Winter	12.27	474

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Summary of Results for 100 year Return Period (+30%)

Storm Duration (mins)	Maximum Filtration (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Maximum Volume (m ³)	Status
600 Winter	0.0	0.0	100.7748	0.7748	5.8	O K
720 Winter	0.0	0.0	100.7873	0.7873	5.9	O K
960 Winter	0.0	0.0	100.7973	0.7973	6.0	O K
1440 Winter	0.0	0.0	100.7913	0.7913	5.9	O K
2160 Winter	0.0	0.0	100.7698	0.7698	5.8	O K
2880 Winter	0.0	0.0	100.7358	0.7358	5.5	O K
4320 Winter	0.0	0.0	100.6643	0.6643	5.0	O K
5760 Winter	0.0	0.0	100.5978	0.5978	4.5	O K
7200 Winter	0.0	0.0	100.5368	0.5368	4.0	O K
8640 Winter	0.0	0.0	100.4817	0.4817	3.6	O K
10080 Winter	0.0	0.0	100.4322	0.4322	3.2	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
600 Winter	10.41	588
720 Winter	9.10	698
960 Winter	7.35	916
1440 Winter	5.42	1158
2160 Winter	3.99	1624
2880 Winter	3.20	2080
4320 Winter	2.35	2984
5760 Winter	1.89	3856
7200 Winter	1.59	4680
8640 Winter	1.39	5528
10080 Winter	1.24	6256

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Rainfall Details

Region	ENG+WAL	Cv (Summer)	0.750	Summer Storms	Yes
Return Period (years)	100	Cv (Winter)	0.840	Winter Storms	Yes
M5-60 (mm)	20.000	Shortest Storm (mins)	15	Climate Change %	+30
Ratio-R	0.300	Longest Storm (mins)	10080		

Time / Area Diagram

Total Area (ha) = 0.008

Time (mins)	Area (ha)	Time (mins)	Area (ha)
from:	to:	from:	to:
0	4	0.000	
		4	8
		0.008	

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Infiltration Trench Details

Infil Coef - Base (m/hr)	0.016200	Length (m)	3.0
Infil Coef - Sides (m/hr)	0.016200	Invert Level (m)	100.000
Safety Factor	1.5	Cover Level (m)	101.400
Porosity	1.00	Slope (1:x)	0.0
Width (m)	2.5		

- 7.4 Soakage tests were conducted within pits TP1, TP4 and TP6 in accordance with an abridged version of BRE 365. A summary of the soakage test results is presented in the table below:

Trial Pit	Pit Dimensions LxWxD (metres)	Water Level at start of test (mm below ground level)	Duration of test (mins)	Fall of water level during test (mm)
TP1	0.3 x 2.0 x 2.6	1050	215	970
TP4	0.3 x 1.2 x 1.0	200	142	145
TP6	0.3 x 2.0 x 2.6	560	158	895

Based on these tests, infiltration coefficients of 7.1×10^{-6} , 1.5×10^{-6} and 4.7×10^{-6} m/s have been calculated for pit TP1, TP4 and TP6 respectively

- 7.5 Laboratory testing recorded plasticity index for the three clay samples taken from depths between 0.8m and 1.3m in each of the pits TP2, TP3 and TP6 ranged 17% to 27%. It is noted that the modified plasticity index, adjusted to take account of the percentage of particles greater than 0.425mm is determined to range 14% to 27%. Moisture content results ranged from 16.7% to 17.8%.

- 7.6 The chemical tests carried out on soil samples from TP2 and TP6 recorded:

- pH range 7.4 to 7.6
- Water Soluble (2:1 extract) Sulphate (as SO₄) 0.03 – 0.07 g/l



FOUL MANHOLE SCHEDULE						
M.H. REF.	INVERT LEVEL (LODEST PIPE)	COVER LEVEL	CHAMBER SIZE	COVER SIZE	COVER TYPE	COMMENT / DRG.
F1	4.128	4.730	EXISTING	EXISTING	-	NEW BACKDROP
F2	3.275	4.930	Ø1050	600 x 600	D400	P3 STD.01.23
F3	3.395	4.870	Ø1050	600 x 600	D400	P3 STD.01.23
F4	3.565	4.915	750 x 675	750 x 600	D400	P2 STD.01.22
F5	3.800	4.930	750 x 675	750 x 600	D400	P2 STD.01.22

SURFACE WATER MANHOLE SCHEDULE						
M.H. REF.	INVERT LEVEL (LODEST PIPE)	COVER LEVEL	CHAMBER SIZE	COVER SIZE	COVER TYPE	COMMENT / DRG.
S1	4.150	4.870	750 x 675	750 x 600	D400*	P2 STD.01.22
S2	4.150	4.870	750 x 675	750 x 600	D400*	P2 STD.01.22
S3	4.150	4.890	750 x 675	750 x 600	D400*	P2 STD.01.22
S3A	4.150	4.850	750 x 675	750 x 600	D400*	P2 STD.01.22
S4	4.150	4.890	750 x 675	750 x 600	D400*	P2 STD.01.22
S4A	4.150	4.860	750 x 675	750 x 600	D400*	P2 STD.01.22
S5	4.150	4.830	750 x 675	750 x 600	D400*	P2 STD.01.22
S6	4.150	5.040	750 x 675	750 x 600	D400*	P2 STD.01.22

SOAKAWAY SCHEDULE						
TYPE	LODEST INCOMING INVERT LEVEL	EFFECTIVE DEPTH (m)	TOTAL DEPTH (m)	RING DIA. (m)	PIT DIMENSIONS (L x W) (m)	COVER SIZE (CLEAR OPENING) (mm)
SA1	as shown	0.60	1.40	-	3.00 x 2.50	Ø225 (2 No.)
SA2	as shown	0.60	1.40	-	3.00 x 2.50	Ø225 (2 No.)
SA3	as shown	0.60	1.40	-	3.00 x 2.50	Ø225 (2 No.)
SA4	as shown	0.60	1.40	-	3.00 x 2.50	Ø225 (2 No.)
SA5	as shown	0.60	1.40	-	3.00 x 2.50	Ø225 (2 No.)

WARNING:

- Surface water drainage design is subject to further on site ground-water level monitoring.

OUTSTANDING DESIGN ISSUES:

- Predict RWP Locations
- Predict Foul Outlet Locations
- Foundation Details

KEY

- TOPOGRAPHICAL SURVEY
- PROPOSALS
- PROPOSED SURFACE WATER DRAINS Ø 100 UNLESS NOTED OTHERWISE
- SURFACE WATER MANHOLE Ø 450 INSPECTION CHAMBER, ROOFING EYE
- FULLY PERFORATED DISTRIBUTION PIPE TYPE 'S' BED SEE DETAIL
- PROPOSED Foul Water Drains Ø 100 UNLESS NOTED OTHERWISE
- FOUL WATER MANHOLE Ø 450 INSPECTION CHAMBER, ROOFING EYE
- GRADIENT
- ESD TYPE (SEE STD.01.25)
- PIPE DIA. (mm)
- DISTANCE CHAMBER CENTRE TO CHAMBER CENTRE
- CHANNEL DRAIN
- SOAKAWAY SEE SCHEDULE
- HYDRAULIC BREAK SEE DETAILED DRAWING

NOTES

- This drawing to be read in conjunction with all relevant Architects and Engineers drawings and specifications.
- Dimensions are in millimetres unless noted otherwise.
- Original topographic survey undertaken by Goodwin Limited. For full topographic survey information see Goodwin drawings. All levels based on O.S. Datum by GPS.
- Existing levels shown thus: +5.77
- Before excavation commences, the Contractor shall ascertain the depths, sizes and locations of all services to be crossed. Any conflicts in levels between new works and existing services shall be notified to the Engineer.
- All drainage shall be in accordance with Building Regulations 2002: Part H & W.S.A. Sewers for Adoption 2nd edition.
- Details of existing sewers & drains shall be confirmed by the contractor on site prior to the commencement of works.
- Sewers of different diameters shall be laid side by side in manholes, unless backdrops are detailed.
- Private drains passing through walls and footings are to be sleeved and a 600mm length of rocker pipe shall be laid on each side of the wall or footing. Run under building shall have a type 'S' bed and surround, unless depth below underside of slab is less than 300mm where a 150mm bed and surround of concrete is to be used. Where pipes pass beneath foundations 600mm length rocker pipes shall be laid on each side. Below is shown a typical detail of a pipe sleeved through a foundation.
- Manhole (M.H.) covers and inspection chamber (I.C.) shall be adjusted to suit final surface levels.
- Where trench foundation levels lie above original levels, levels shall be made up with either well compacted layers of D.O.T. type 1 or m/s S12 concrete.
- For positions of SVP's stub stacks and rainwater pipes see detailed Architects layouts.
- Minimum gradients for pipes where no gradient is shown shall be 1:80.
- Dimensions of M.H. on private drains and sewers to be in accordance with requirements of the Building Regulations.
- Drainage trenches lower than foundations: Where drainage is not in a trench, the trench is to be filled with concrete m/s S12 up to the level of the foundation. In accordance with Building Regulations 2002: Part H, diagram B.
- Where drainage trench is distance 'A' from footing and the depth of trench below foundation level is greater than 'A' the lower trench shall be filled with concrete m/s S12 such that the top level of concrete fill is no less than (A - 150mm) below foundation level. Notes a) and b) are represented diagrammatically below:

TRENCH WITH 150mm COVER OF CONCRETE

NOTE a) (A - 150mm)

NOTE b) (A - 150mm)

- Pipe materials shall be:
- a) For external private drain runs:
- i) Clay pipes, extra strength or super strength in accordance with BS EN 2526: 1991
- ii) UPVC pipes in accordance with BS 4533 & BS 5454: 1991 (flexible pipes)
- iii) Ductile iron pipe work in accordance with BS EN 558, as Stanton Integral with high performance joints or equivalent.
- iv) For foul sewer F2-F3-F4-F5: Manley Quantum Sewer Pipes or equivalent.
- Definition of 'Rigid' and 'Flexible' pipes shall be as Building Regulations Part H, table 7.
- Flexible pipes - Where private flexible pipes have less than 500mm cover under vehicular areas and more than 600mm cover under gardens, bedding and backfill shall be Type S as shown on drawing STD.01.65.
- For special protection where pipes are laid with less cover see notes below:
- a) Where private flexible pipes have less than 500mm cover under vehicular areas, a reinforced concrete bedding shall be used (as Type 'Y' drawing STD.01.65) Reference Building Regulations 2002: Part H.
- b) Where private flexible pipes have less than 600mm cover under gardens, concrete bedding shall be used (as Type 'X' drawing STD.01.65) Reference Building Regulations 2002: Part H.
- Rigid pipes - Bedding and backfill shall be Type 'S' as shown on drawing STD.01.65, except on lengths where special protection is required (see notes below):
- a) Where Ø 100mm private rigid pipes have less than 400mm cover under vehicular areas, a Type 'Z' concrete surround shall be used (see drawing STD.01.65) Reference Building Regulations 2002: Part H.
- b) Where Ø 100mm private rigid pipes have less than 300mm cover under gardens areas, a Type 'Z' concrete surround shall be used (see drawing STD.01.65) Reference Building Regulations 2002: Part H.
- c) Where Ø 150mm private rigid pipes have less than 600mm cover under any areas, a Type 'Z' concrete surround shall be used (see drawing STD.01.65) Reference Building Regulations 2002: Part H.
- Private storm and foul drainage connections shall be detailed by the Architect.
- All external rainwater down pipes shall discharge through a proprietary bottle gully as shown on drawing STD.01.12.
- Trenches below existing carriageways and parking areas shall be reinstated with D.O.E. Type 1 material in accordance with standard detail STD.02.05.
- Road gullies shall be trapped in accordance with standard detail STD.01.05 Type 1T.
- All utility covers & frames within the extent of the works shall be adjusted as necessary. The Contractor shall ensure that all services within vehicular areas have appropriate grade covers & frames as shown below:

Vehicular areas:	D400	Pedestrian areas:	B125
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- Where drains are to be abandoned they shall be removed or filled by grouting in accordance with the CEA Engineering Specification for the Water Industry - 6th Edition, clause 5.23. Drainage runs shall be CCTV Surveyed prior to being abandoned to ascertain whether any 'blind' junctions exist.
- Redundant / abandoned gullies, soakways and manholes shall be broken out to a depth of 600mm then filled with well compacted Type BFA 6/8 bedding material.
- Channel drains shall be Aco Multigrain MD150 with 0.5% in bulk gradient, or equivalent. They shall discharge via a sump by Aco or equivalent. Grating shall be Heavyduty Class D400. To be installed in accordance with manufacturers instructions.

Archibald Shaw

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CLIENT
Kingham Homes

PROJECT
Housing Development
Bound Lane, Hayling Island
General Arrangement - Drainage - 10 Unit Development

DRAWN BY PF	CHECKED BY VC	DESIGNED BY PF
SCALE @ A1 1:200	DATE Oct. 2016	STATUS Construction
JOB NO. 28476	DRAWING NO. 201	REVISION C3

REV **DESCRIPTION** **CHECKED** **DATE**

C3	SOAKAWAY S1, S2 & S3 TOTAL DEPTH REDUCED TO 1.40m.	-	FF-28-03-17
C2	FOUL CONNECTIONS TO PLOTS 4 & 5B 15 UPDATED	-	FF-01-03-17
C1	ON HIGHWAY WORKS UPDATED TO ACCORD WITH HWY'S CC COMMENTS	-	FF-24-03-17