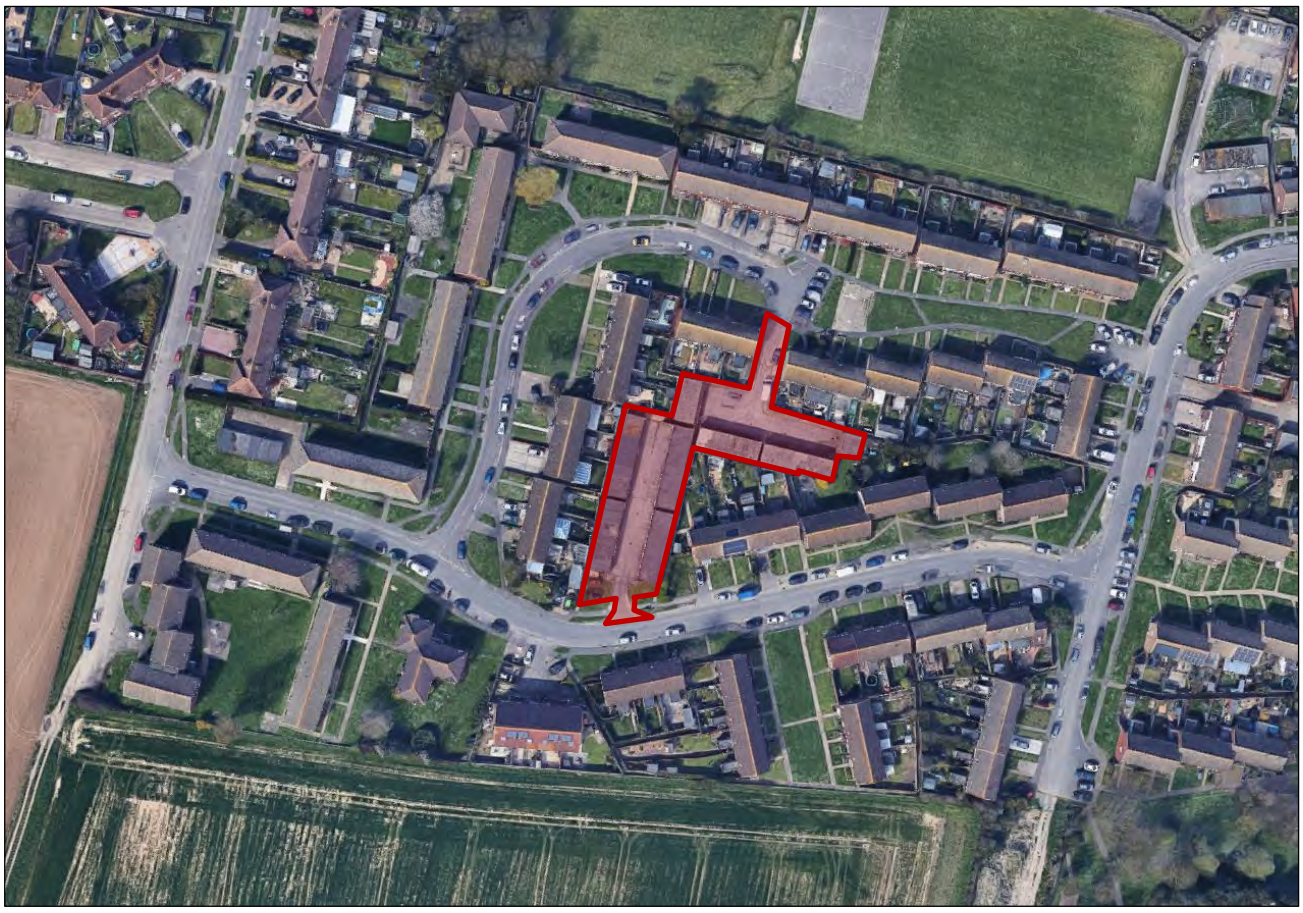
HOP
CONSULTING CIVIL AND STRUCTURAL ENGINEERS

SYLVAN ROAD EAST, LANCING

SUSTAINABLE DRAINAGE ASSESSMENT

FEBRUARY 2021



Ref: 15945/06/HOP/SUDS

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Client: Adur District Council

Prepared by	Checked by	Approved by	Revision
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Tom Butler	**Andrew Keen**	**Andrew Keen**	**V1.1 - 16/02/2021**
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1.0 INTRODUCTION

1.1 HOP Consulting Ltd (HOP) has been instructed to undertake a Sustainable Drainage (SuDS) and Flood Risk Assessment (FRA) on behalf of Adur District Council for the proposed redevelopment of the existing garages at Sylvan Road, Lancing.

1.2 This report is intended to demonstrate compliance with the National Planning Policy Framework (NPPF) and its associated Planning Practice Guidance for the assessment of development and flood risk; and West Sussex County Council's (WSCC) SuDS policies including reference to the SuDS Manual (CIRIA C753) and the Non-statutory Technical Standards for the Design, Maintenance and Operation of SuDS.

1.3 A topographical survey conducted by Maltby Surveys in June 2020 has been forwarded to HOP by the Client, and a walkover was undertaken by HOP on the 26th January 2021. In addition, the content of this report and associated calculations are based on information provided by the Client; the British Geological Survey (BGS); and the Adur and Worthing District Council Strategic Flood Risk Assessment (SFRA). HOP does not accept liability for the accuracy of information provided by others. Any deviation from the development proposals assessed in this report should be highlighted to the report's author.

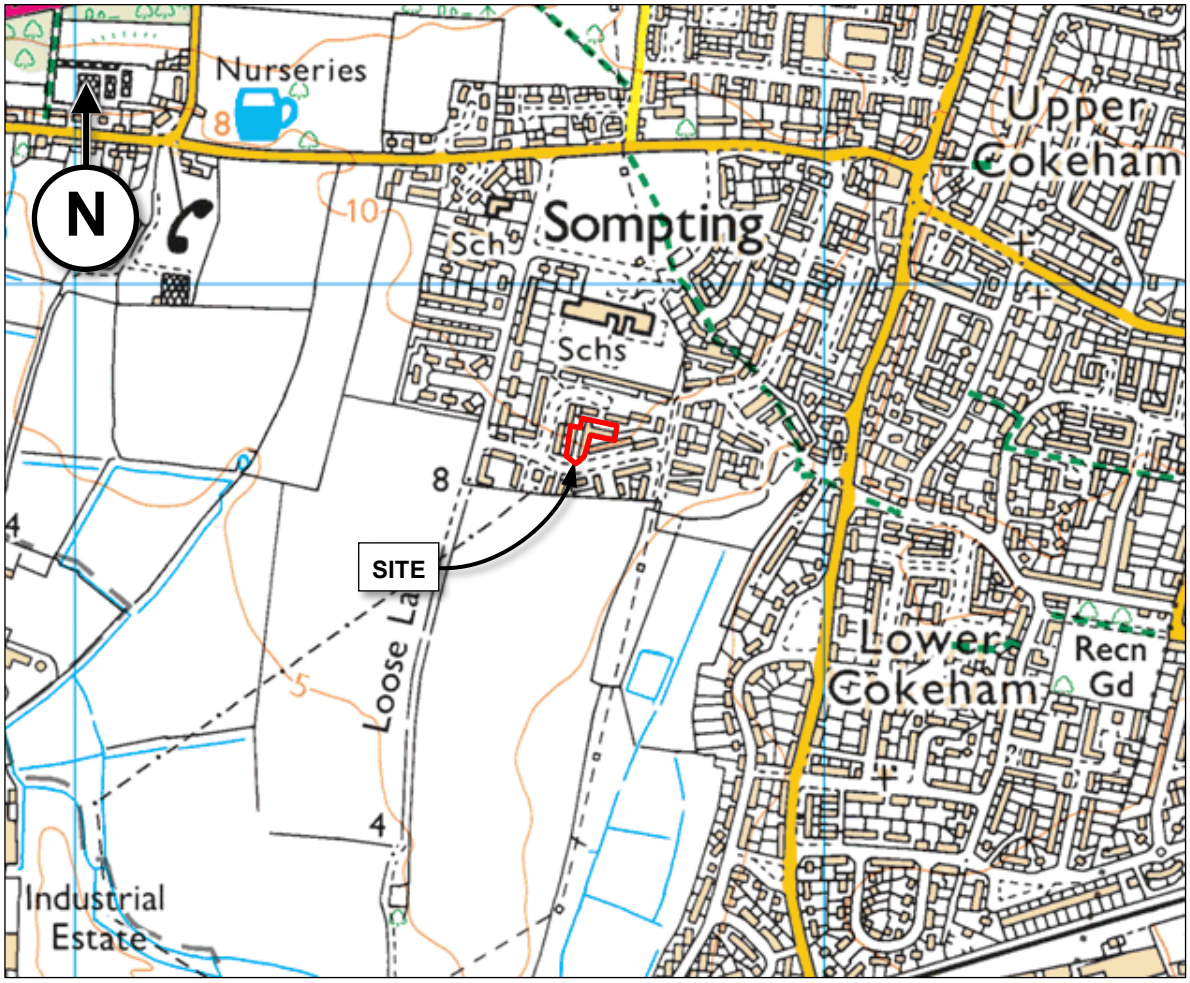


Figure 1.1 Location map.

2.0 SITE DESCRIPTION AND LOCATION

2.1 The site occupies an area of approximately 1,800m² to the rear of the properties between Sylvan Road and Avon Close. The site is currently occupied by council owned garages with part of the site accessed via Sylvan Road and the remainder accessed via Avon Close. Additionally, pedestrian access paths connect the site to Sylvan Road, Avon Close and Test Road. The site is bordered on all sides by private gardens, bounded by brick walls and wooden panelled fencing.

2.2 The wider area is generally characterised by residential development and farmland. Local features include the Sompting Village Primary School and Sompting Recreation Ground located 100m and 200m north of the site respectively. A site location map is shown in Figure 1.1.

2.3 The site comprises 100% impermeable hardstanding, consisting of garage roof area and asphalt concrete surfacing. The surfacing is in poor condition and is drained by 10No. gullies and a length of channel drain which appear to be in good structural condition but are heavily silted.

2.4 A topographical survey, undertaken by Maltby Surveys (Drawing ref: 20/069/109), is included in Appendix A. This survey has been reconciled to Ordnance Survey datum and shows the site to be generally flat at a level of approximately 9.70mAOD with localised falls to gullies. The levels of the northern and southern access roads to the existing garages fall by approximately 0.3m and 0.6m respectively, falling towards the south. The maximum difference in elevation between the north and south extents of the site is approximately 0.8m.

2.5 Data from the BGS online map service shows the site to be located over thew Tarrant Chalk Member, interbedded, with superficial Head deposits of clay, silt, sand and gravel recorded.

2.6 With regard to the protection of groundwater abstracted for potable supply, the site does not lie within an Environment Agency designated Source Protection Zone (SPZ)

3.0 DEVELOPMENT PROPOSALS

3.1 The development proposals involve the construction of 6No. new houses in two blocks, with associated parking, gardens and access. The architectural site plan is included in Appendix B, an extract of which is presented in Figure 3.1.

3.2 As shown in the site plan, 15No. formal parking spaces will be provided within the site.

3.3 Finished floor levels of the proposed buildings are yet to be confirmed, though based on existing ground levels, there is unlikely to be a significant difference in levels between the two blocks.

3.4 To the rear of each plot a soft landscaped garden is provided, with patio areas and a shed for each plot. Small areas of soft landscaping are proposed to the front of each of the plots. 3No. parking spaces are provided to the front of the southern plots with a further 19No. spaces provide to the northwest. The plots to are enclosed by footpaths which border the site.

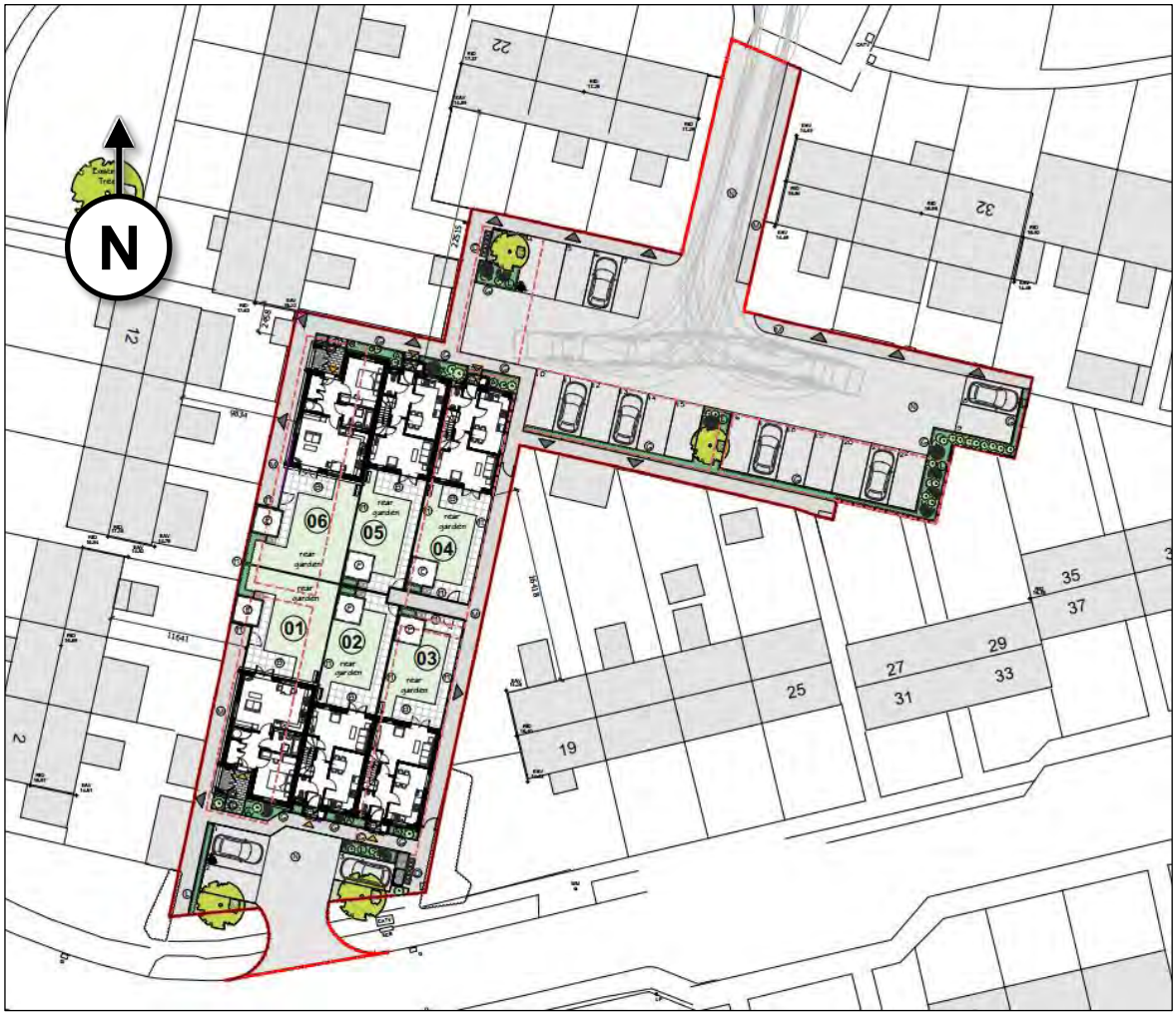


Figure 3.1 Proposed site plan extract.

4.0 DRAINAGE STRATEGY

FOUL WATER

Existing

4.1 Southern Water sewer records have been obtained, which show an existing 225mm diameter public foul water sewer to the southwest of the site from the northwest to the southeast at approximately 4.5m deep. Adur and Worthing District Council records show a network of private foul water sewers in the vicinity of the site including sewers crossing the northern and southern entrances to the site at 0.94m and 2.41m deep respectively. Following consultations resulting from this development proposal, Southern Water and AWDC have agreed that these sewers are part of the Southern Water public foul sewer network. The Council sewer records can be found in Appendix C with private sewers shown in yellow and an extract is shown below in Figure 4.1. The Southern Water sewer records can be found in Appendix C.

4.2 The private foul sewer to the southeast of the proposed residential units runs adjacent to the site boundary and at its closest point lies 1.34m from the southeastern unit (Unit 03). This property will be within the standard Southern Water public sewer easement, however, Southern Water have agreed that this is acceptable in principle as sufficient unrestricted access is available on the western side of the sewer. This approval is subject to the submission of details of the interaction with adjacent foundations which is currently under review by Southern Water This detail can be found on the drainage proposals in Appendix D and the Southern Water correspondence can be found in Appendix G.

4.3 There is not understood to be a current connection to the foul sewer on-site.

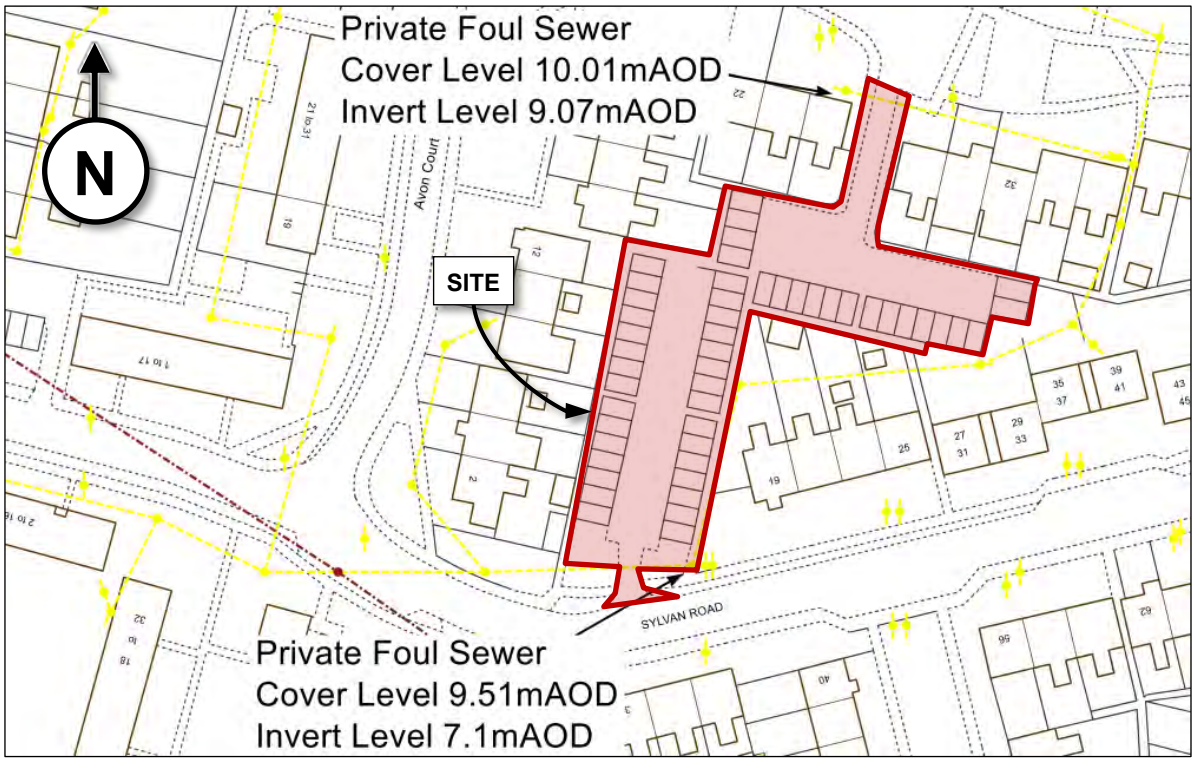


Figure 4.1 AWDC Private Sewer Map extract.

Proposed

4.4 Utilising Southern Water's Design Guidance, for the proposed 6No. residential units, a peak foul water flow rate to the public sewer of 0.061 litres/second would be generated. This calculation is shown in Table 4.2.

Table 4.2 Proposed peak foul flows.

General housing peak foul flow		
Number of properties, N	6	Units
Occupancy, O	3.33	Persons / unit
Per capita flow, G (L/D)	125	litres / head / day
Population, P (NxO)	20	People
Storm duration, SD	300	Minutes
Peaking Factor, PF	2	
Peak Flow	**0.061**	**l/s**

4.5 It is considered feasible that a gravity foul water drainage system can serve the development as the existing private foul manhole to the south of the site, is at an invert level of 7.10m. This is around 2.60m below the lowest expected proposed ground levels adjacent to the new houses.

4.6 In accordance with Building Regulations, new drainage at the site should be installed as separate foul and surface water networks. A Connection to a Public Sewer Section 106 application will be required in due course to discharge the foul water to the public sewer as is the expected final discharge point.

SURFACE WATER

Existing

4.7 Southern Water sewer records show there to be no public surface water sewers in the vicinity of the site.

4.8 The site is at present 100% impermeable consisting roof area and hard surfacing, with an area of 1,800m² shown to be impermeable. The topographic survey and site visit identified existing surface water gullies and a channel drain on the site. The discharge point of this drainage is currently unknown. Highways gullies are present adjacent to the site in Sylvan Road and the on-site drainage may be connected as the site is council-owned. If this is not the case, it is likely that the site discharges to a soakaway via infiltration due to the underlying chalk geology.

4.9 The proposals indicate that the hardstanding area of the site is to decrease from 1579m^2 to 1396m^2, a reduction of 11%. As such, proposed surface water flows are expected to decrease by the same amount.

4.10 The lack of storm water sewers in the area and underlying chalk geology suggests that infiltration SuDS may well be suitable and already utilised in this area. However, the existing drainage should be CCTV surveyed to inform the detailed design and confirm if any off-site drainage connections are present.

Proposed

4.11 The proposed surface water scheme is designed to improve on the existing flow of surface water. The principle of the storm water drainage system is to manage all rainwater falling on the developed area of the site at source by discharge to the ground via infiltration.

4.12 In line with Building Regulations Part H3, the consideration of the hierarchy of surface water disposal for the site is listed below;

a) **Discharge to soakaway** – The underlying geology in the area is conducive to infiltration, and there are no public storm water sewers indicating that infiltration may be a viable method of surface water disposal. The use of soakaways at the site is considered to be a feasible option for surface water management. This should be confirmed by soakage testing to the Building Research Establishment Digest 365 (BRE 365) prior to detailed design.

b) **Discharge to a watercourse** – There are no rivers or streams in the vicinity of the site that would facilitate a practical surface water connection.

c) **Discharge to surface water sewer** – There are no public surface water sewers within the area.

d) **Discharge to combined sewer** – There are no public combined water sewers in the vicinity of the site that would facilitate a practical surface water connection from the site.

4.13 Based on a consideration of the SuDS hierarchy, discharge to the ground is proposed via a soakaway in the parking area and permeable paving for the parking areas and access road.

4.14 Post-development, the total impermeable area of the site will be reduced to approximately 1396m^2, a reduction of around 183m^2, comprising the roof areas, access road and parking areas. Post-development peak surface water runoff flows for the 100-year return periods have been calculated using an additional 40% increase in rainfall intensity to allow for climate change, in accordance with the NPPF.

4.15 An infiltration system has been designed to drain the 100-year storm event plus a 40% allowance for climate change. A 500mm deep permeable sub base soakaway is proposed to fill the entire 645m^2 northern car park and access road, taking runoff from the roof areas, and permeable paving is to be used for the access road and parking areas. The soakaway has been based on an assumed infiltration rate of $5x10^{-5}$ m/s which is to be confirmed by in-situ infiltration testing. These calculations can be found in Appendix F and the proposed drainage scheme can be found on drawing 15945-HOP-06-XX-DR-C-09100 which is presented in Appendix D.

4.16 Through the application of infiltration SuDS for the proposed development, surface water can be managed at source by using positive drainage through permeable paving, rainwater downpipes and conventional pipework directed to the soakaway.

4.17 There is a possibility of high groundwater, with the site straddling an area of 'no risk' and an area of high groundwater as identified in the SFRA. Site Investigation works should be undertaken to ascertain the level of any groundwater at site. If groundwater is present near the surface then an alternative attenuation SuDS scheme may be required, with a discharge to off-site drainage.

4.18 In accordance with the Non-Statutory Technical Standards for SuDS, the surface water drainage system should be designed so that flooding does not occur on any part of the site for a 1 in 30 year rainfall event; and so that flooding does not occur during a 1 in 100 year event in any part of a building or in any utility plant susceptible to water.

4.19 Through utilising infiltration SuDS to accommodate the 1 in 100 year rainfall event (+40% allowance for climate change), it can be shown that no part of the site is vulnerable to surface water flooding from the managed on-site runoff.

4.20 Should infiltration testing and groundwater monitoring show the proposed infiltration scheme to not be feasible, an alternative attenuated discharge to the private foul sewer at a reduced rate is also feasible as shown on Drawing 15945-HOP-06-XX-DR-C-09110 which can be found in Appendix D.

4.21 To prevent surface water runoff leaving the site in an uncontrolled manner, raised kerbs are proposed to be installed along boundaries to manage runoff within the site and on the site boundary. This will positively intercept surface water flows and direct them to the SuDS features and water quality control elements of the proposed drainage scheme.

WATER QUALITY

4.22 Both the SuDS Manual (CIRIA C753) and guidance from the EA, as outlined in the recently withdrawn Pollution Prevention Guidance 3 (PPG3), state that rainwater runoff from roof areas is considered to be at very low risk of containing contaminants and does not require any pollution control to be implemented prior to discharge, outside of the removal of gross solids and sediments only.

4.23 Further reference to Table 26.2 of the SuDS Manual shows that the whilst the proposed land use also comprises residential car parks and low traffic roads, these represent a low risk of pollution hazard level. The guidance for this level of risk is to use the simple index approach to pollution control requirements for discharging to surface water sewers.

4.24 The notes to Table 26.2 state that extra measures may be required for discharges to protected resources, the guidance clarifies that in England and Wales, protected groundwater resources are represented by the catchment of a SPZ 1 classification. As discussed in Paragraph 2.6, the development site does not lie within an SPZ and therefore no additional pollution control measures are required in this regard.

4.25 The simple index approach is outlined in the SuDS Manual and provides pollution hazard indices for different land use classifications. An extract applicable to the development site is provided in Table 4.3. This shows pollution hazard indices for; total suspended solids (TSS) 0.5; Metals 0.4; and Hydrocarbons 0.4.

Table 4.3 Extract of table 26.2 from the SuDS Manual.

Pollution hazard indices for different land use classifications				
Land use	**Pollution hazard level**	**Total suspended solids (TSS)**	**Metals**	**Hydro-carbons**
Residential roofs	Very low	0.2	0.2	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

4.26 These are to be compared against mitigation indices for individual SuDS components, as provided in Table 26.3 of the SuDS Manual. An extract showing the mitigation indices for SuDS components is provided in Table 4.4.

Table 4.4 Extract of table 26.3 from the SuDS Manual.

Indicative SuDS mitigation indices for discharges to surface waters			
	Mitigation indices[1]		
Type of SuDS component	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4[2]	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond[4]	0.7[3]	0.7	0.5
Wetland	0.8[3]	0.8	0.8
Proprietary treatment systems[5,6]	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

4.27 The SuDS Manual also allows for proprietary systems such as oil interceptors, smart filters, membranes and silt/debris traps to be utilised to minimise the risk of watercourse pollution. These products must demonstrate that they can address each of the contaminant types as described in Table 4.3. Permeable paving would provide an adequate level of treatment with respect to each contaminant type, therefore, it is proposed that it is incorporated within the design. However, the specification of proprietary water quality control systems will be confirmed at the detailed design stage.

SuDS Maintenance

4.28 Details of SuDS operation and maintenance activities are provided within Chapter 32 of the SuDS Manual. A summary of typical key SuDS components is given in Table 4.5.

4.29 As can be seen, all SuDS components require regular inspection and for the first year the guidance states that monthly inspections are carried out and documented to inform the ongoing maintenance regime of the site drainage. SuDS components at the site are not to be adopted and will be maintained for their lifetime by the owner of the property.

4.30 The key maintenance procedure for the soakaway and permeable paving is the management of sediment. The risk of sedimentation to these features can be mitigated through the use of silt traps prior to rainwater discharging to the system and regular sediment removal, and regular cleaning of the permeable paving.

4.31 Further operational activities for the SuDS components described for the site include regular litter and debris removal to reduce the risk of the drainage systems becoming blocked.

4.32 Contractors should protect SuDS components from adverse sediment runoff during the construction phase and an initial pre-handover inspection as required to ensure that the drainage system has been constructed as designed.

4.33 A SuDS Maintenance and Management Plan has been included as Appendix E.

Table 4.5 Extract of Table 32.1 of the SuDS Manual.

Typical key SuDS components operation and maintenance activities (for full specifications, see Chapters 11–23)

Operation and maintenance activity	SuDS component												
	Pond	Wetland	Detention basin	Infiltration basin	Soakaway	Infiltration trench	Filter drain	Modular storage	Pervious pavement	Swale/bioretention/ trees	Filter strip	Green roofs	Proprietary treatment systems
Regular maintenance													
Inspection	■	■	■	■	■	■	■	■	■	■	■	■	■
Litter and debris removal	■	■	■	■	□	■	■	□	■	■	■		□
Grass cutting	■	■	■	■	□	■	■	□	□	■	■		
Weed and invasive plant control	□	□	□	□		□	□		□		□	■	
Shrub management (including pruning)	□	□	□	□					□	□	□		
Shoreline vegetation management	■	■	□										
Aquatic vegetation management	■	■	□										
Occasional maintenance													
Sediment management[1]	■	■	■	■	■	■	■	■	■	■	■		■
Vegetation replacement	□	□	□	□						□	□	■	
Vacuum sweeping and brushing									■				
Remedial maintenance													
Structure rehabilitation /repair	□	□	□	□	□	□	□	□	□	□	□	□	
Infiltration surface reconditioning				□	□	□	□		□	□	□		

Key

■ will be required

□ may be required

Notes

1 Sediment should be collected and managed in pre-treatment systems, upstream of the main device.

5.0 CONCLUSIONS

5.1 Initial investigations show that surface water from the existing site may discharge to the local highway drainage or to infiltration, given the lack of public surface water sewers and potentially favourable ground conditions. No existing foul drainage connection is present at the site, however, a public foul sewer has been identified to the south west of the site and further currently identified public foul sewers are expected in the sites vicinity. The existing drainage should be CCTV surveyed to inform the detailed design and confirm if any off-site drainage connections are present.

5.2 Surface water from the new impermeable areas is proposed to discharge to infiltration SuDS, consisting of a permeable sub base and has been sized for the 100 year plus 40% event. If groundwater is shown to be present at site following a Site Investigation, then an attenuated SuDS scheme with an off-site discharge may be required.

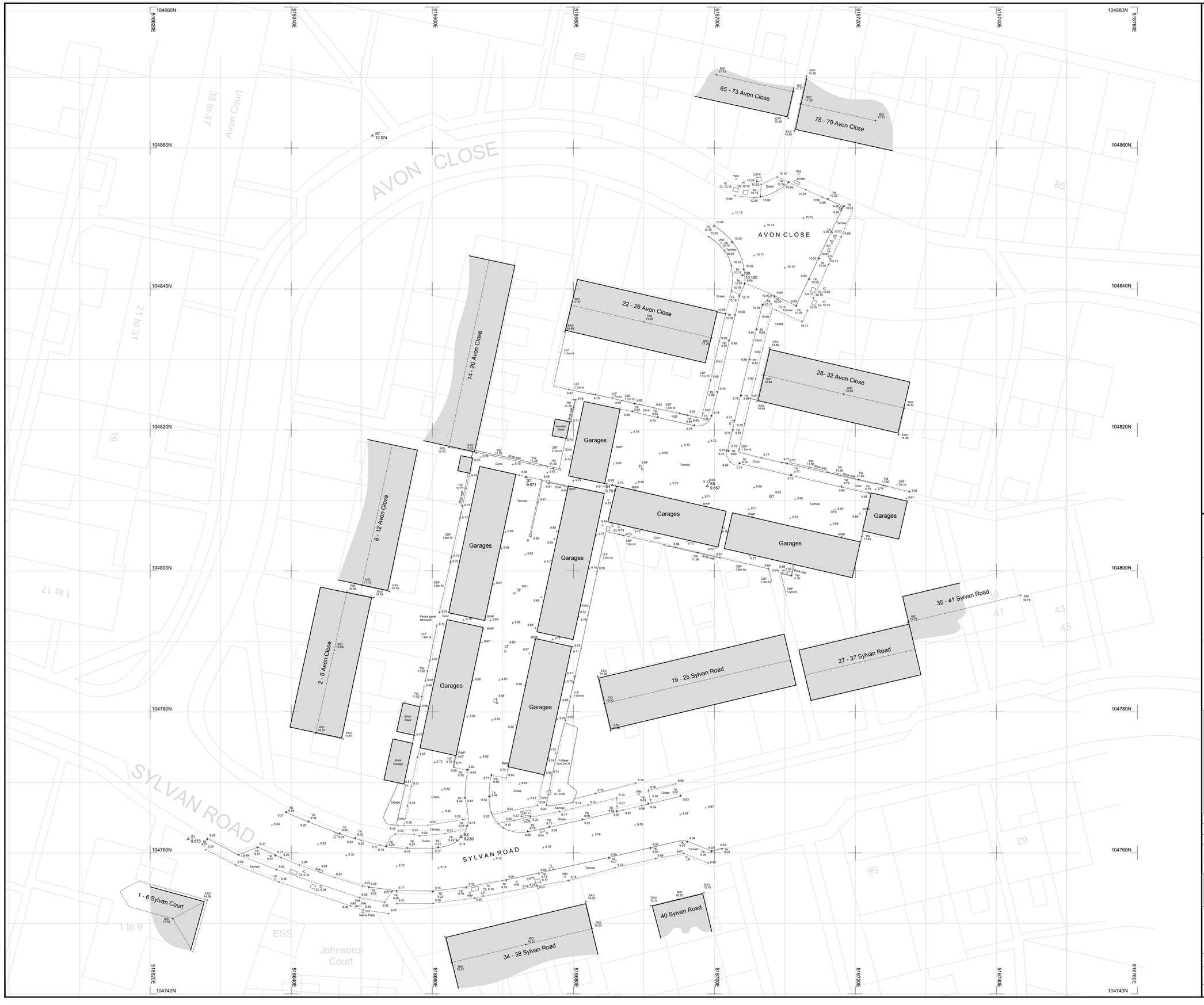
5.3 The use of permeable paving is considered appropriate to manage potential pollutants from trafficked areas, based on EA guidance and the SuDS manual in terms of water quantity and quality. The site is located outside of SPZ1, therefore no further pollution control measures are required in this regard.

5.4 Should surface water management via infiltration not be feasible, an alternate attenuated scheme, discharging to the private foul sewer a reduced rate, is feasible.

5.5 Maintenance requirements of SuDS elements during construction and operation phases have been identified in this report and should be developed in line with the detailed design to be included in the Operation and Maintenance and Health and Safety Manuals provided to the Client upon completion of the project.

5.6 In light of the above, it is considered that the proposed development is safe and does not increase the flood risk at the site or to neighbouring or downstream properties. It has been shown that the proposals for new houses at the Sylvan Road site can be successfully implemented and managed to provide comfort and safety to residents in regard to flood risk for the lifetime of the development.

APPENDIX A - TOPOGRAPHICAL SURVEY



Grid

N

W E

S

LEGEND

BANKING — Top / Bottom

BUSHES & HEDGES

TREES — MT / 3T / 0.2 / 6 (Multiple Trunks No of Trunks / Dia of Trunk Bole / Height of Tree)

NOTE:- SPREADS AND HEIGHTS ARE INDICATIVE ONLY

GATES — Single / Double

WALL — Width drawn to scale 0.23m

BUILDING

OPEN SIDED BUILDING

GLASS ROOFED

CONTOURS 25.50

ABBREVIATIONS (WHERE APPLICABLE)

ARCH HEAD HEIGHT	AHH	MARKER	MKR
ARCH HEAD LEVEL	AHL	MONITORING WELL	MW
ARCH SPRINGER HEIGHT	ASH	NOTICE BOARD	NB
ARCH SPRINGER LEVEL	ASL	NAME PLATE	NP
AIR VALVE	AV	OVERHEAD WIRES	OHW
BED LEVEL	BL	PARKING METER	PM
BELISHA BEACON	BB	RIDGE LEVEL	RID
BOLLARD	B	ROOF LEVEL	RL
BRITISH TELECOM BOX	BTB	ROAD SIGN	RS
BRITISH TELECOM MANHOLE	BTMH	RODDING EYE	RE
BRICKWORK	BKWK	RETAINING WALL	RTW
BUS STOP	BS	RAIN WATER PIPE	RWP
CABLE TV	CATV	SLUICE VALVE	SV
COVER LEVEL	CL	STOP COCK	SC
CABLE MARKER	CM	SOFFIT LEVEL	SOF
COLUMN	Col	STRUCTURAL SLAB LEVEL	SSL
CONCRETE POST	CP	TREE STUMP	ST
EAVES LEVEL	EAV	SOIL AND VENT PIPE	SVP
ELECTRICAL COVER	ELEC	THRESHOLD LEVEL	THL
ELECTRICITY CONTROL BOX	ECB	TELEGRAPH POLE	TP
ELECTRICITY POLE	EP	TELEPHONE CALL BOX	TCB
EARTH ROD	ER	TOP OF KERB	TK
FLOWER BED	FB	TURNSTILE	TS
FINISHED FLOOR LEVEL	FFL	TRAFFIC LIGHT	TL
FIRE HYDRANT	FH	TOP OF WALL	TW
FLOOR LEVEL	FL	UNABLE TO LIFT	UTL
FLAG STAFF	FS	UNABLE TO SURVEY	UTS
GAS PIPE	GP	VENT PIPE	VP
GAS VALVE	GV	WATER METER	WM
GULLY	G	WATER LEVEL	WL
GATE STOP	GS	WASH OUT	WO
INSPECTION COVER	IC	WASTE PIPE	WP
INVERT LEVEL	IL	WATER TANK	WT
LAMP POST	LP	WATER VALVE	WV

FENCES

BARBED WIRE FENCE	BWF	LARCH LAP FENCE	LLF
CORRUGATED IRON FENCE	CIF	METAL RAILING FENCE	MRF
CLOSE BOARD FENCE	CBF	POST AND CHAIN FENCE	PCF
CHAIN LINK FENCE	CLF	PICKET FENCE	PIF
CHESTNUT PALING FENCE	CPF	POST AND RAIL FENCE	PRF
FENCE POST	FPO	POST AND WIRE FENCE	PWF
INTERWOVEN FENCE	IWF	STEEL PALISADE SECURITY FENCE	SPSF
IRON RAILING FENCE	IRF	TUBULAR STEEL RAIL FENCE	TSRF

REV.	NOTES	DWN	DATE
A	---	---	--/----

QMS ISO 9001 REGISTERED

A MEMBER OF THE THE SURVEY ASSOCIATION

QMS ISO 14001 REGISTERED

Notes:

Grid and levels relate to OS GPS Active Network.
Survey Scale 1:200 Presentation Scale 1:250

Maltby Surveys Ltd

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SURVEYED	WM	CLIENT
DRAWN	WM	Calford Seaden
CHECKED	SJM	SCALE
RICS		1/250 (A1 Sheet)

Sylvan Rd, Sompting, BN15 0BT

TOPOGRAPHICAL SURVEY

Job No	Rev	Drawing Number
200/069		20/069/109

Date : June 2020

APPENDIX B – ARCHITECTURAL PROPOSALS



Schedule of Accommodation

4 x 2b 4p Houses @ 79.20 sqm
2 x 1b 2p Houses @ 50.72 sqm

Total 6 homes
Site Area = 0.18 ha
Density = 33.3 dwellings per hectare

22 on site parking spaces
Bins and cycles in individual stores

Notes

1. This drawing is the copyright of MH Architects Ltd
2. Do not scale this drawing except for Local Authority planning purposes
3. All dimensions must be checked on site by the contractor prior to commencement of the works.

Client Approval

X	A - Approved
X	B - Approved with comments
X	C - Do not use

Rev.	Revision Note/Purpose of Issue	Drw By	Date	Chk By	Date
P02	Amendments: -unit changed to a bungalow wheelchair compliant unit	YM	31/07/20	NKS	31/07/20
P03	Amendments: -schedule of accommodation re-added and amended -minimum distance check key and info added -existing services added	YM	27/08/20	NKS	27/08/20
P04	Amendments: -measurements amended	YM	01/09/20	NKS	01/09/20
P05	Amendments: -minimum distance dims amended	YM	04/09/20	NKS	04/09/20
P06	Amendments: -Plots 1-3 moved south -2 parking spaces removed (south)	YM	11/11/20	NKS	11/11/20
P07	Amendments: -Plots 5-7 moved north -Bin storage provided to the front of the units -Associated landscaping amended -Replacement parking added to Avon Close with associated landscape	YM	20/11/20	NKS	20/11/20
P08	Amendments: -Replacement parking amended to Avon Close with associated landscape	YM	27/11/20	NKS	27/11/20
P09	Amendments: -Wheelchair unit amended to 1B2P standard unit -Rear gardens amended appropriately -Unit 7 removed	YM	22/01/21	NKS	22/01/21
P10	Amendments: -ASHP added -Bin storage points reconfigured -Security gate added to alley -Material to public footpath amended -Rear garden access points to neighbouring properties visually identified -Schedule of accommodation up-dated -Material "K" omitted	YM	02/02/21	NKS	02/02/21

Ⓐ A: Private planting including shrubs, native species to encourage biodiversity.

Ⓑ B: Private paths, terraces & patios in light patio slabs 450x450mm.

Ⓒ C: Paving of varying lengths to main pathways and private entrances

Ⓓ D: External timber and brick clad bin stores for houses.

Ⓔ E: Secure outdoor timber and metal cycle storage.

Ⓕ F: External timber and brick clad bin stores for houses

Ⓖ G: Timber knee rails 450mm high to protect frontages and planting areas

Ⓗ H: Timber close boarded fence 1800mm high

Ⓛ L: Public planting including shrubs, native species to encourage biodiversity.

Ⓜ M: Tarmac to public pathways

Ⓝ N: Tarmac road surface

Q: Security gate to access alley to rear gardens

Garages to be demolished

Rear access to existing neighbouring properties retained

ADUR & WORTHING COUNCILS

Client
Adur District Council

Job title
Sylvan Road E Residential Development

Drawing title
Proposed Site Plan

Drawn	Date	Checked	Date	Scale at A1
YM	Jul 20	NKS	Jul 20	1:200

Job No.	Pro.	Org.	Zone	Level	Type	Role	No.	Rev.
19-210	HDH	MHA	ZZ	XX	DR	A	720	P10

Purpose of Issue
PRELIMINARY

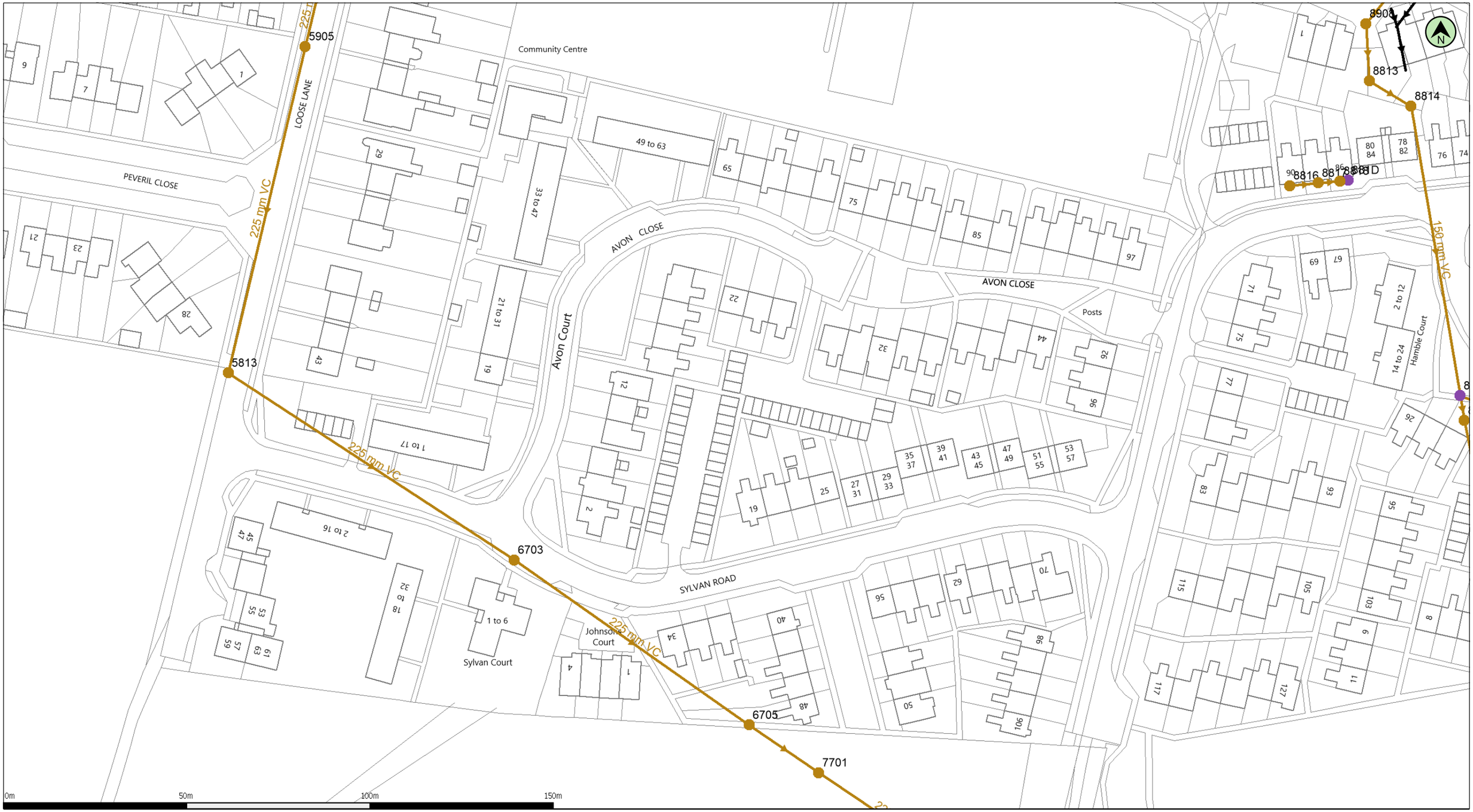
Ground Floor I Bicentennial Building
Southern Gate I Chichester
West Sussex I PO19 8EZ

t. 01243 774748
e. admin@mharchitects.co.uk
www.mharchitects.co.uk

Limited Company
Registered in England No.1994233

mh ARCHITECTS

APPENDIX C – SOUTHERN WATER SEWER RECORDS



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The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2020 Ordnance Survey 100031673 .This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.

Foul Gravity Sewer
Combined Gravity Sewer
Culverted Water Course or Treated Effluent
Surface Water Gravity Sewer
Rising Main, Vacuum or Syphon
Combined Outfall
Surface Water Outfall
Foul Outfall
Surface Water Inlet
Combined Pumping Station
Surface Water Pumping Station
Foul Pumping Station
WWTW Water Treatment Works
Section 104 Area
Building Over Agreement Area
Foul Manhole
Combined Manhole
Surface Water Manhole
Side Entry Manhole, Decarcation Chamber, Dummy Manhole or Surface Water Soakaway

vbrigginshaw@calfordseaden.co.uk

Nick - Sylvan Rd

WATER for LIFE from Southern Water

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
5813	F	9.12	5.53	
5905	F	10.09	6.58	
6703	F	9.49	5.04	
6705	F	8.81	4.66	
7701	F	0.00	0.00	
8805	F	7.68	6.09	
880D	F	0.00	0.00	
8813	F	10.58	9.29	
8814	F	10.33	6.10	
8816	F	0.00	0.00	
8817	F	0.00	0.00	
8818	F	0.00	0.00	
881D	F	0.00	0.00	
8908	F	10.68	9.60	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

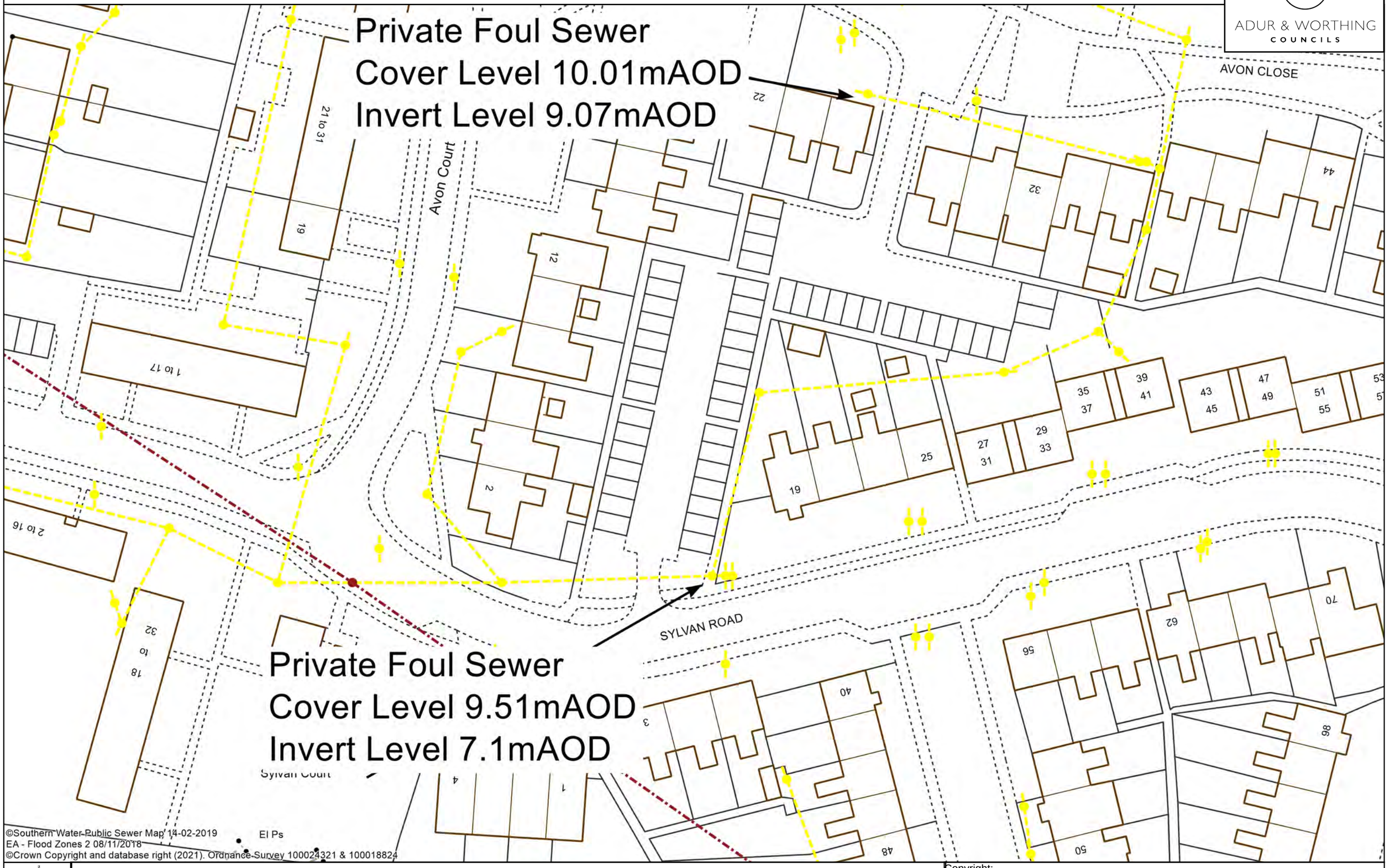
Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Sylvan Road

ADUR & WORTHING COUNCILS

Private Foul Sewer
Cover Level 10.01mAOD
Invert Level 9.07mAOD

Private Foul Sewer
Cover Level 9.51mAOD
Invert Level 7.1mAOD



©Southern Water-Public Sewer Map 14-02-2019
EA - Flood Zones 2 08/11/2018
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Private Foul Sewer Shown in Yellow

LG

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APPENDIX D – PROPOSED DRAINAGE STRATEGY



N

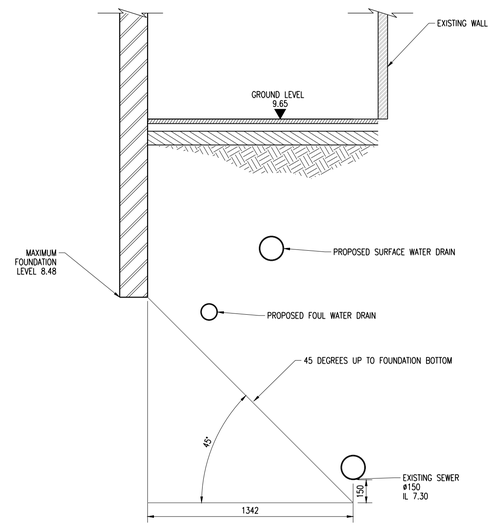
INDICATIVE ONLY

NOTES

FOUL DISCHARGE CONNECTIONS SUBJECT TO SOUTHERN WATER APPROVAL.

SOAKAWAY DESIGN TO BE CONFIRMED PENDING RESULTS OF INFILTRATION TESTING TO BRE 365 AND SITE INVESTIGATION INCLUDING GROUNDWATER INVESTIGATION.

DRAWING TO BE READ IN CONJUNCTION WITH SuDS REPORT 15945/06/HOP/SUDS BY HOP CONSULTING.



SECTION A–A
(1:20)

Project/Task No. 15945-06 Scale: 1:200 ORIGINAL DRAWING SIZE A1

1. GENERAL

(i) This drawing is not to be scaled, work to figured dimensions only, confirmed on site.

(ii) This drawing is to be read in conjunction with all relevant architectural drawings, detailed specifications where applicable and all associated drawings in this series.

(iii) Any discrepancy on this drawing is to be reported immediately to the partnership for clarification.

(iv) The contractor is responsible for all temporary works and for the stability of the works in progress.

2. DRAINAGE GENERAL

(i) All foul and storm water drains which are not to be adopted as public sewers under a section 104 Agreement must be constructed in accordance with the Building Regulations, BS EN 752 and where appropriate the relevant agreement certificates.

(ii) Manholes, gullies, gully connections, sewers and other sewerage structures intended to convey surface water are to be constructed in accordance with the Water Authorities Association Specification 'Sewers for Adoption' 7th Edition and relevant Council Design Guide.

(iii) All concrete used in drainage works to comply with BRE Digest 363 for Class DS-2 sulphate conditions.

3. BELOW GROUND DRAINAGE

(i) Pipework to be UPVC-U pipes to BS 4660 : 2000 and Inspection Chambers to BS EN 13598.

(ii) All adoptable drainage to be constructed in accordance with 'Sewers for Adoption' 7th Edition and the relevant Council Design Guide.

(iii) All private surface water sewers to be laid at 1 in 80 unless otherwise stated on the drawing.

(iv) All private foul water sewers to be laid at 1 in 40 at the head of pipe runs and 1 in 80 elsewhere unless otherwise stated.

(v) All private foul sewer pipes to be 100mm diameter unless otherwise stated on the drawing. All private surface water sewer pipes to be 100mm diameter from downpipes and 150mm diameter elsewhere unless otherwise stated on the drawing.

(vi) Allow for rodding access above ground where rainwater downpipes do not have a direct connection to an inspection chamber.

(vii) Existing sewer pipe to be re-used to be surveyed and levelled prior to commencement of the drainage works and refurbished if necessary.

(viii) Connections to an adopted sewer only to be made following approval from the relevant adopting Authority.

(ix) All drains, sewer pipes and manholes to be cleaned and tested for water tightness on completion of construction.

4. MANHOLE COVERS & FRAMES

(i) Manhole covers to be class D400 in highways, class B125 in footways and verges, class C250 in external maintenance vehicle access areas and verges, and class A15 in non-trafficked areas.

(ii) Manhole covers and frames to be bedded and surrounded in 1:3 mortar.

5. PIPES

(i) Plastic pipes shall be of unplasticised polyvinyl chloride (UPVC) complying with the requirements of BS EN 1401-1:2009.

(ii) Concrete pipes shall be spun by a centrifugal process or be vertically pressed. They shall possess self inverting sockets and shall comply with the requirements of and be tested in accordance with BS 5911:2010.

LEGEND

FOUL WATER	SURFACE WATER	
FW	SW	PROPOSED DRAINAGE
		EXISTING SEWER
		EXISTING SEWER TO BE REMOVED
FW		PROPOSED FOUL WATER DIVERSION
		PROPOSED CONCRETE MANHOLE
		PROPOSED TYPE 3 INSPECTION CHAMBER 450mmø / 600mmø
		SITE BOUNDARY
		PERMEABLE PAVING
		PROPOSED BUILDING FOOTPRINT

1:200
0 2m 4m 6m 8m 10m

Description	By	Aprvd.	Date	Rev.
SECTION A–A ADDED. DRAINAGE AMENDED	BAK	TRB	06.10.21	P4
ISSUED TO SOUTHERN WATER	TRB	AK	20.07.21	P3
PRIVATE FOUL SEWER NETWORK ADDED	BAK	TRB	21.06.21	P2
FIRST ISSUE	BAK	TRB	08.02.21	P1

PRELIMINARY DRAWING
NOT FOR CONSTRUCTION

Title: DRAINAGE STRATEGY

Project: SYLVAN ROAD EAST

Client: ADUR DISTRICT COUNCIL

HOP
CONSULTING CIVIL AND STRUCTURAL ENGINEERS
HOP House, 41 Church Road
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+44 (0)1273 223900

Drawing No. 15945-HOP-06-XX-DR-C-09100 Status: S0 Rev: P4

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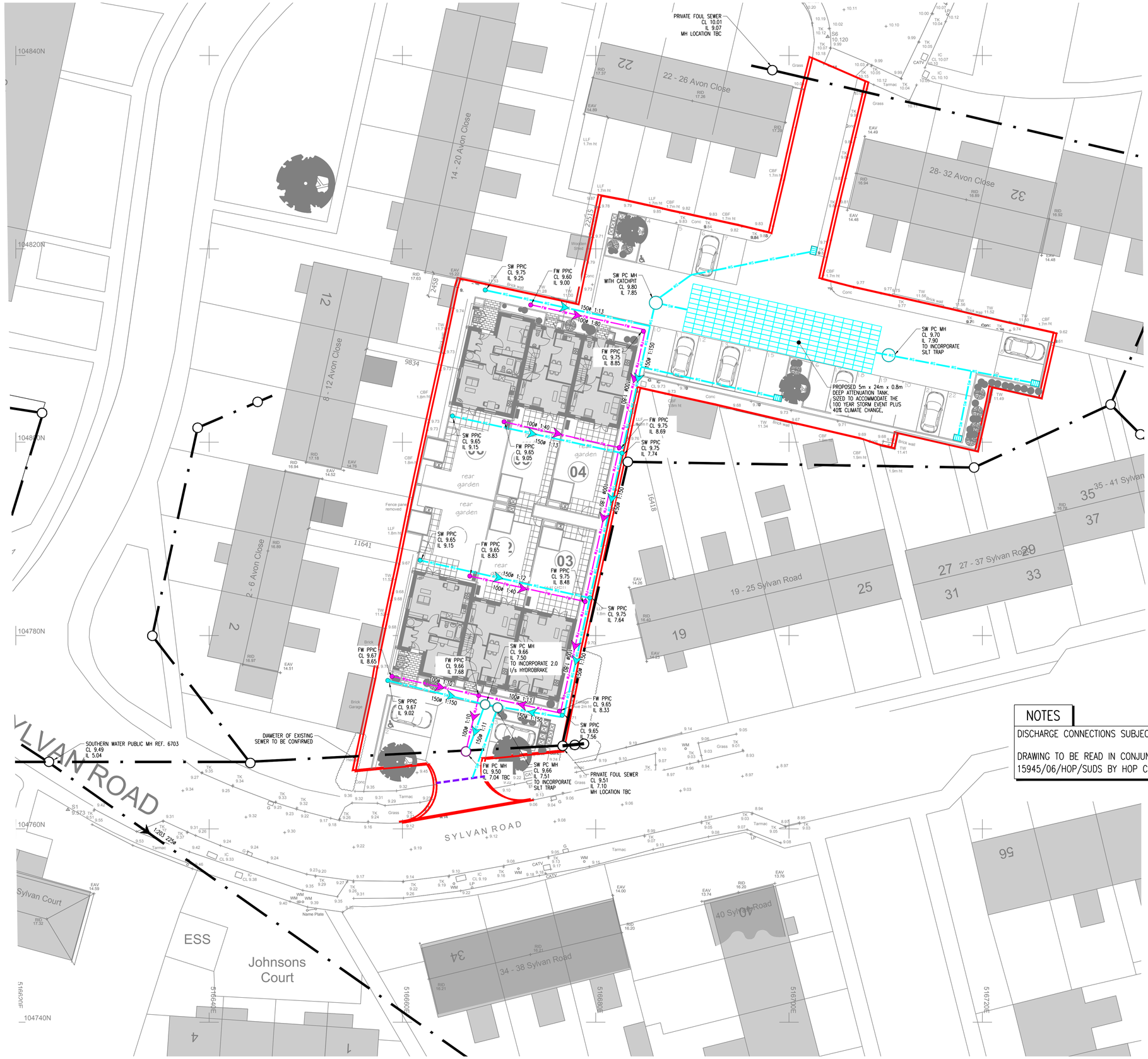
1:50 0 0.5m 1m 1.5m 2m 2.5m
1:100 0 1m 2m 3m 4m 5m

\\hop-data-20\Jobs\Jobs\PROJECTS\15945 AMDC Infill Sites, Shoreham & Lancing\Drawings\HOP\15945-HOP-06-XX-DR-C-09100 Sylvan Road East Drainage Strategy Beata Kozicka





Project/Task No. 15945-06 Scale: 1:200 ORIGINAL DRAWING SIZE A1

1. GENERAL

(i) This drawing is not to be scaled, work to figured dimensions only, confirmed on site.

(ii) This drawing is to be read in conjunction with all relevant architectural drawings, detailed specifications where applicable and all associated drawings in this series.

(iii) Any discrepancy on this drawing is to be reported immediately to the partnership for clarification.

(iv) The contractor is responsible for all temporary works and for the stability of the works in progress.

2. DRAINAGE GENERAL

(i) All foul and storm water drains which are not to be adopted as public sewers under a section 104 Agreement must be constructed in accordance with the Building Regulations, BS EN 752 and where appropriate the relevant agreement certificates.

(ii) Manholes, gullies, gully connections, sewers and other sewerage structures intended to convey surface water are to be constructed in accordance with the Water Authorities Association Specification 'Sewers for Adoption' 7th Edition and relevant Council Design Guide.

(iii) All concrete used in drainage works to comply with BRE Digest 363 for Class DS-2 sulphate conditions.

3. BELOW GROUND DRAINAGE

(i) Pipework to be UPVC-U pipes to BS 4660 : 2000 and Inspection Chambers to BS EN 13598.

(ii) All adoptable drainage to be constructed in accordance with 'Sewers for Adoption' 7th Edition and the relevant Council Design Guide.

(iii) All private surface water sewers to be laid at 1 in 80 unless otherwise stated on the drawing.

(iv) All private foul water sewers to be laid at 1 in 40 at the head of pipe runs and 1 in 80 elsewhere unless otherwise stated.

(v) All private foul sewer pipes to be 100mm diameter unless otherwise stated on the drawing. All private surface water sewer pipes to be 100mm diameter from downpipes and 150mm diameter elsewhere unless otherwise stated on the drawing.

(vi) Allow for rodding access above ground where rainwater downpipes do not have a direct connection to an inspection chamber.

(vii) Existing sewer pipe to be re-used to be surveyed and levelled prior to commencement of the drainage works and refurbished if necessary.

(viii) Connections to an adopted sewer only to be made following approval from the relevant adopting Authority.

(ix) All drains, sewer pipes and manholes to be cleaned and tested for water tightness on completion of construction.

4. MANHOLE COVERS & FRAMES

(i) Manhole covers to be class D400 in highways, class B125 in footways and verges, class C250 in external maintenance vehicle access areas and verges, and class A15 in non-trafficked areas.

(ii) Manhole covers and frames to be bedded and surrounded in 1:3 mortar.

5. PIPES

(i) Plastic pipes shall be of unplasticised polyvinyl chloride (UPVC) complying with the requirements of BS EN 1401-1:2009.

(ii) Concrete pipes shall be spun by a centrifugal process or be vertically pressed. They shall possess self inverting sockets and shall comply with the requirements of and be tested in accordance with BS 5911:2010.

LEGEND

FOUL WATER	SURFACE WATER	
FW	SW	PROPOSED DRAINAGE
		EXISTING SEWER
		PROPOSED CONCRETE MANHOLE
		PROPOSED TYPE 3 INSPECTION CHAMBER 450mmø / 600mmø
		HIGHWAY GULLY
		PROPOSED CHANNEL DRAIN
		SITE BOUNDARY
		PROPOSED BUILDING FOOTPRINT

NOTES

DISCHARGE CONNECTIONS SUBJECT TO SOUTHERN WATER APPROVAL.

DRAWING TO BE READ IN CONJUNCTION WITH SuDS REPORT 15945/06/HOP/SUDS BY HOP CONSULTING.

1:200
0 2m 4m 6m 8m 10m

FIRST ISSUE	TRB	BAK	29.07.21	P2
FIRST ISSUE	BAK	TRB	21.06.21	P1
Description	By	Aprvd.	Date	Rev.

PRELIMINARY DRAWING
NOT FOR CONSTRUCTION

Title
DRAINAGE STRATEGY
ALTERNATE ATTENUATED OPTION

Project
SYLVAN ROAD EAST

Client
ADUR DISTRICT COUNCIL

HOP
CONSULTING CIVIL AND STRUCTURAL ENGINEERS
HOP House, 41 Church Road
Hove, East Sussex BN3 2BE
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+44 (0)1273 223900

Drawing No. 15945-HOP-06-XX-DR-C-09110 Status S0 Rev. P2

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1:50 0 0.5m 1m 1.5m 2m 2.5m
1:100 0 1m 2m 3m 4m 5m

P:\PROJECTS\15945 AMDC Infill Sites, Shoreham & Lancing\Drawings\HOP\15945-HOP-06-XX-DR-C-09110 Sylvan Road East Drainage Strategy - Attenuated backup Tom Butler

APPENDIX E – SuDS MAINTENANCE SCHEDULE

SYLVAN ROAD SITE, LANCING

PROPOSED MAINTENANCE & INSPECTION SCHEDULE FOR BELOW GROUND DRAINAGE (FOUL WATER AND SURFACE WATER) INCLUDING SUSTAINABLE DRAINAGE SYSTEMS (SuDS)

Item	Required Maintenance/Monitoring	Suggested Frequency	Responsibility
Foul Water Drainage	Check inspection chambers and manholes for damage, condition and function.	Every six months	Facilities Management
	Undertake a CCTV drainage survey of the drainage network to establish condition.	Every ten years	Specialist
	Replace or repair malfunctioning parts or structures	As required	Specialist
Surface Water Drainage	Check inspection chambers and manholes for damage, condition and function.	Every six months	Facilities Management
	Undertake a CCTV drainage survey of the drainage network to establish condition.	Every ten years	Specialist
	Replace or repair malfunctioning parts or structures.	As required	Specialist
Surface Water Catch Pits	Check silt traps and inspection chambers and note the rate of sediment accumulation. Remove sediment if present.	Every month for the first year and then annually, or as conditions require	Facilities Management
Soakaways	Inspect for damage, blockages or erosion	Every six months and after periods of heavy rainfall	Facilities Management
	Littler, sediment and debris removal	As necessary	Specialist
Permeable Paving	Sweep clean of debris.	Every six months	Facilities Management
	Remove fines from paving using a suction road sweeper.	Every 5 years or as required	Specialist
	As manufacturers guidance	As required	As required
General	Remove sediment, litter, debris and vegetation from the surface of pathways areas	As necessary and after heavy rainfall	Facilities Management
Flood Flow Routes	Ensure flood flow routes are not obstructed (i.e. lower lying portions of the land that will direct surface water runoff away from vulnerable assets in the event of drainage failure).	Every year and during periods of heavy rainfall	Facilities Management

NOTES

The facilities management team will be responsible for the implementation of the maintenance schedule for below ground drainage, by appointing appropriate persons and/or sub-consultants that are qualified to undertake these operations.

Maintenance is to be carried out by the facilities management team or by a specialist contractor, as noted in Responsibility column above.

This maintenance schedule has been produced with reference to the guidelines outlined in 'The SuDS Manual' (CIRIA C753: 2015). The suggested frequency of maintenance is considered a guide, and should not replace the guidance from manufacturers of proprietary systems.

Refer to Engineering drawings for location and details of below ground drainage assets and SuDS features.

APPENDIX F – MICRODRAINGE CALCULATIONS

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

Half Drain Time : 1088 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	8.542	0.192	0.7	37.2	O K
30 min Summer	8.607	0.257	0.7	49.7	O K
60 min Summer	8.676	0.326	0.7	63.0	O K
120 min Summer	8.735	0.385	0.7	74.5	O K
180 min Summer	8.767	0.417	0.7	80.8	O K
240 min Summer	8.788	0.438	0.7	84.7	O K
360 min Summer	8.809	0.459	0.7	88.8	O K
480 min Summer	8.817	0.467	0.7	90.4	O K
600 min Summer	8.818	0.468	0.7	90.6	O K
720 min Summer	8.816	0.466	0.7	90.1	O K
960 min Summer	8.804	0.454	0.7	87.8	O K
1440 min Summer	8.779	0.429	0.7	83.0	O K
2160 min Summer	8.750	0.400	0.7	77.3	O K
2880 min Summer	8.725	0.375	0.7	72.5	O K
4320 min Summer	8.683	0.333	0.7	64.4	O K
5760 min Summer	8.647	0.297	0.7	57.5	O K
7200 min Summer	8.350	0.000	0.0	0.0	O K
8640 min Summer	8.350	0.000	0.0	0.0	O K
10080 min Summer	8.350	0.000	0.0	0.0	O K
15 min Winter	8.542	0.192	0.7	37.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	152.544	0.0	20
30 min Summer	102.536	0.0	35
60 min Summer	65.758	0.0	64
120 min Summer	39.746	0.0	124
180 min Summer	29.325	0.0	184
240 min Summer	23.520	0.0	244
360 min Summer	17.099	0.0	362
480 min Summer	13.559	0.0	482
600 min Summer	11.302	0.0	602
720 min Summer	9.729	0.0	720
960 min Summer	7.671	0.0	932
1440 min Summer	5.492	0.0	1140
2160 min Summer	3.952	0.0	1516
2880 min Summer	3.144	0.0	1932
4320 min Summer	2.296	0.0	2732
5760 min Summer	1.851	0.0	3568
7200 min Summer	-0.012	0.0	0
8640 min Summer	-0.010	0.0	0
10080 min Summer	-0.008	0.0	0
15 min Winter	152.544	0.0	20

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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	8.607	0.257	0.7	49.7	O K
60 min Winter	8.676	0.326	0.7	63.0	O K
120 min Winter	8.735	0.385	0.7	74.6	O K
180 min Winter	8.768	0.418	0.7	80.9	O K
240 min Winter	8.788	0.438	0.7	84.8	O K
360 min Winter	8.810	0.460	0.7	89.1	O K
480 min Winter	8.819	0.469	0.7	90.7	O K
600 min Winter	8.821	0.471	0.7	91.1	O K
720 min Winter	8.819	0.469	0.7	90.7	O K
960 min Winter	8.808	0.458	0.7	88.7	O K
1440 min Winter	8.779	0.429	0.7	82.9	O K
2160 min Winter	8.742	0.392	0.7	75.9	O K
2880 min Winter	8.707	0.357	0.7	69.1	O K
4320 min Winter	8.644	0.294	0.7	56.9	O K
5760 min Winter	8.589	0.239	0.7	46.3	O K
7200 min Winter	8.350	0.000	0.0	0.0	O K
8640 min Winter	8.350	0.000	0.0	0.0	O K
10080 min Winter	8.350	0.000	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	102.536	0.0	34
60 min Winter	65.758	0.0	64
120 min Winter	39.746	0.0	122
180 min Winter	29.325	0.0	180
240 min Winter	23.520	0.0	240
360 min Winter	17.099	0.0	356
480 min Winter	13.559	0.0	472
600 min Winter	11.302	0.0	586
720 min Winter	9.729	0.0	698
960 min Winter	7.671	0.0	916
1440 min Winter	5.492	0.0	1168
2160 min Winter	3.952	0.0	1620
2880 min Winter	3.144	0.0	2072
4320 min Winter	2.296	0.0	2940
5760 min Winter	1.851	0.0	3752
7200 min Winter	-0.012	0.0	0
8640 min Winter	-0.010	0.0	0
10080 min Winter	-0.008	0.0	0

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 516660 104791 TQ 16660 04791
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.099

Time (mins) From:	To:	Area (ha)
0	5	0.099

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Model Details

Storage is Online Cover Level (m) 9.700

Cellular Storage Structure

Invert Level (m) 8.350 Safety Factor 5.0
Infiltration Coefficient Base (m/hr) 0.01800 Porosity 0.30
Infiltration Coefficient Side (m/hr) 0.01800

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	645.0	645.0	0.501	0.0	719.5
0.500	645.0	719.5			

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

Half Drain Time : 478 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	8.249	0.399	0.0	1.6	1.6	45.5	O K
30 min Summer	8.379	0.529	0.0	1.6	1.6	60.3	O K
60 min Summer	8.510	0.660	0.0	1.8	1.8	75.2	O K
120 min Summer	8.607	0.757	0.0	1.8	1.8	86.3	O K
180 min Summer	8.646	0.796	0.0	1.9	1.9	90.8	O K
240 min Summer	8.660	0.810	0.0	1.9	1.9	92.2	O K
360 min Summer	8.646	0.796	0.0	1.9	1.9	90.7	O K
480 min Summer	8.611	0.761	0.0	1.8	1.8	86.8	O K
600 min Summer	8.582	0.732	0.0	1.8	1.8	83.4	O K
720 min Summer	8.557	0.707	0.0	1.8	1.8	80.5	O K
960 min Summer	8.514	0.664	0.0	1.8	1.8	75.7	O K
1440 min Summer	8.441	0.591	0.0	1.7	1.7	67.4	O K
2160 min Summer	8.351	0.501	0.0	1.6	1.6	57.1	O K
2880 min Summer	8.273	0.423	0.0	1.6	1.6	48.3	O K
4320 min Summer	8.144	0.294	0.0	1.6	1.6	33.5	O K
5760 min Summer	8.018	0.168	0.0	1.6	1.6	19.2	O K
7200 min Summer	7.850	0.000	0.0	0.0	0.0	0.0	O K
8640 min Summer	7.850	0.000	0.0	0.0	0.0	0.0	O K
10080 min Summer	7.850	0.000	0.0	0.0	0.0	0.0	O K
15 min Winter	8.249	0.399	0.0	1.6	1.6	45.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	152.544	0.0	47.2	20
30 min Summer	102.536	0.0	63.5	34
60 min Summer	65.758	0.0	81.3	64
120 min Summer	39.746	0.0	98.5	122
180 min Summer	29.325	0.0	109.1	182
240 min Summer	23.520	0.0	116.5	242
360 min Summer	17.099	0.0	127.2	360
480 min Summer	13.559	0.0	134.4	418
600 min Summer	11.302	0.0	140.2	478
720 min Summer	9.729	0.0	144.7	542
960 min Summer	7.671	0.0	152.1	674
1440 min Summer	5.492	0.0	163.3	952
2160 min Summer	3.952	0.0	176.4	1360
2880 min Summer	3.144	0.0	187.2	1760
4320 min Summer	2.296	0.0	205.1	2552
5760 min Summer	1.851	0.0	220.2	3280
7200 min Summer	-0.012	0.0	-1.7	0
8640 min Summer	-0.010	0.0	-1.7	0
10080 min Summer	-0.008	0.0	-1.7	0
15 min Winter	152.544	0.0	47.2	19

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	8.380	0.530	0.0	1.6	1.6	60.4	O K
60 min Winter	8.512	0.662	0.0	1.8	1.8	75.4	O K
120 min Winter	8.611	0.761	0.0	1.8	1.8	86.7	O K
180 min Winter	8.652	0.802	0.0	1.9	1.9	91.4	O K
240 min Winter	8.671	0.821	0.0	1.9	1.9	93.1	O K
360 min Winter	8.661	0.811	0.0	1.9	1.9	92.3	O K
480 min Winter	8.628	0.778	0.0	1.8	1.8	88.7	O K
600 min Winter	8.590	0.740	0.0	1.8	1.8	84.3	O K
720 min Winter	8.560	0.710	0.0	1.8	1.8	80.9	O K
960 min Winter	8.508	0.658	0.0	1.7	1.7	75.0	O K
1440 min Winter	8.408	0.558	0.0	1.7	1.7	63.6	O K
2160 min Winter	8.278	0.428	0.0	1.6	1.6	48.7	O K
2880 min Winter	8.164	0.314	0.0	1.6	1.6	35.7	O K
4320 min Winter	7.936	0.086	0.0	1.6	1.6	9.8	O K
5760 min Winter	7.850	0.000	0.0	1.6	1.6	0.0	O K
7200 min Winter	7.850	0.000	0.0	0.0	0.0	0.0	O K
8640 min Winter	7.850	0.000	0.0	0.0	0.0	0.0	O K
10080 min Winter	7.850	0.000	0.0	0.0	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	102.536	0.0	63.5	34
60 min Winter	65.758	0.0	81.4	62
120 min Winter	39.746	0.0	98.5	120
180 min Winter	29.325	0.0	109.0	178
240 min Winter	23.520	0.0	116.5	236
360 min Winter	17.099	0.0	127.2	346
480 min Winter	13.559	0.0	134.4	450
600 min Winter	11.302	0.0	140.0	488
720 min Winter	9.729	0.0	144.6	562
960 min Winter	7.671	0.0	152.2	714
1440 min Winter	5.492	0.0	163.4	1014
2160 min Winter	3.952	0.0	176.5	1452
2880 min Winter	3.144	0.0	187.2	1876
4320 min Winter	2.296	0.0	204.9	2512
5760 min Winter	1.851	0.0	220.3	0
7200 min Winter	-0.012	0.0	-1.7	0
8640 min Winter	-0.010	0.0	-1.7	0
10080 min Winter	-0.008	0.0	-1.7	0

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 516660 104791 TQ 16660 04791
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.124

Time (mins) From:	To:	Area (ha)
0	5	0.124

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Model Details

Storage is Online Cover Level (m) 9.700

Cellular Storage Structure

Invert Level (m) 7.850 Safety Factor 5.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	120.0	120.0	0.900	0.0	166.4
0.800	120.0	166.4			

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0062-2000-1350-2000
Design Head (m)	1.350
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	62
Invert Level (m)	7.500
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.350	2.0
Flush-Flo™	0.274	1.6
Kick-Flo®	0.557	1.3
Mean Flow over Head Range	-	1.6

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.4	1.200	1.9	3.000	2.9	7.000	4.3
0.200	1.6	1.400	2.0	3.500	3.1	7.500	4.4
0.300	1.6	1.600	2.2	4.000	3.3	8.000	4.6
0.400	1.6	1.800	2.3	4.500	3.5	8.500	4.7
0.500	1.5	2.000	2.4	5.000	3.7	9.000	4.8
0.600	1.4	2.200	2.5	5.500	3.8	9.500	4.9
0.800	1.6	2.400	2.6	6.000	4.0		
1.000	1.7	2.600	2.7	6.500	4.1		

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APPENDIX G – SOUTHERN WATER CORRESPONDANCE

Tom Butler

From: Murad, Majed <Majed.Murad@southernwater.co.uk>
Sent: 20 August 2021 13:36
To: Tom Butler; Developer Services
Cc: Bower, Steven
Subject: FW: Sylvan Road East - Sewer Easement [Filed 20 Aug 2021 14:18]
Attachments: 15945-HOP-06-XX-DR-C-09100 Sylvan Road East Drainage Strategy.pdf; Sylvan Rd - Drainage.pdf; Sylvan Road Sewer Mapping 1 to 500@A3.pdf

Tom,
Further to our valuable discussed today, I think the private sewer which is now confirmed to be a public sewer on drawing 15945-HOP-06-XX-DR-C-09100 drainage strategy (from MH at the back garden of house Nr4 to MH SWS-CL9.51/IL7.10) is apparently 1.5m from one side of the house wall. The 1.5m distance will be fine if the foundation footing will be below the pipe level to avoid the pressure of the house wall on the existing sewer.
The approval subject to:

- Care should be taken during construction of the property;
- Cross section of the pipe and the house wall should be provided to confirm that the house foundation footing is below the pipe level.

Should you require further clarification, please do not hesitate to contact us.

Many thanks

Majed.

Majed Murad
Technical Coordinator
BSc, MSc, CEng, C.WEM, FCIWEM, CEnv.

T. 07542 3963 16
southernwater.co.uk

From: Tom Butler [mailto:tomb@hop.uk.com]
Sent: 20 August 2021 12:15
To: Developer Services <Developer.Services@southernwater.co.uk>
Cc: Murad, Majed <Majed.Murad@southernwater.co.uk>; Bower, Steven <Steven.Bower2@southernwater.co.uk>; Gyanchandani, Nitin <Nitin.Gyanchandani@southernwater.co.uk>; Andy Keen <AndyK@hop.uk.com>
Subject: RE: Sylvan Road East - Sewer Easement

Hi,

We have submitted drainage proposals to support the Sylvan Road East development planning application and have been in consultation with yourselves from the early stages of design. When the scheme was developed, the sewer records showed a public foul sewer outside the site boundary and council records showed a number of private sewers connecting to this main public foul sewer.

During consultations with yourselves, Southern Water has claimed responsibility/ownership over the private sewers within and adjacent to the development site. This has created an issue where one of the proposed houses is now within the standard 3m easement of a public sewer which was previously considered to be private.

I have set out the details of this in the email sent to Majed on 20th July but have not received any response. In summary, the proposed house is 1.5m from the sewer on one side with unfettered access via the council owned land on the other. We do not believe that the development would restrict access to the public sewer and are hoping

for you the review whether the easement can be locally reduced to accommodate this dwelling. I have reattached the drawings originally sent to Majed and look forward to hearing from you.

Kind regards,

TOM BUTLER
Civil Engineer

HOP House
41 Church Road
Hove, BN3 2BE
T: +44 (0)1273 223900
W: www.hop.uk.com

HOP are pleased to announce two recent enhancements to our Senior Leadership Team. Tristan Banks will join the HOP Board as a Director and Carlo Sabia has been promoted to Associate. Click here to find out more about Tristan and Carlo's HOP journey.

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Please note that I am working remotely until further notice and am best contacted via email.

From: Tom Butler
Sent: 30 July 2021 16:19
To: 'Majed.Murad@southernwater.co.uk' <Majed.Murad@southernwater.co.uk>
Cc: Andy Keen (AndyK@hop.uk.com) <AndyK@hop.uk.com>
Subject: RE: Sylvan Road East - Sewer Easement [Filed 30 Jul 2021 16:19]

Hi Majed,

Have you been able to look into the Sylvan Road Easement query below?

Kind regards,

TOM BUTLER
Civil Engineer

HOP House
41 Church Road
Hove, BN3 2BE
T: +44 (0)1273 223900
W: www.hop.uk.com

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Please note that I am working remotely until further notice and am best contacted via email.

From: Tom Butler
Sent: 26 July 2021 18:05
To: 'Majed.Murad@southernwater.co.uk' <Majed.Murad@southernwater.co.uk>
Cc: Andy Keen (AndyK@hop.uk.com) <AndyK@hop.uk.com>
Subject: RE: Sylvan Road East - Sewer Easement [Filed 26 Jul 2021 18:05]

Hi Majed,

Thank you for the S185 approval letter. I notice the email subject was the same as this email chain and wanted to check that the two enquiries haven't been confused. Are you able to provide comment on the Sylvan Road easement query?

As always, please don't hesitate to call me on 07789 824334 if you have any questions.

Kind regards,

TOM BUTLER
Civil Engineer

HOP
CONSULTING CIVIL AND STRUCTURAL ENGINEERS

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Please note that I am working remotely until further notice and am best contacted via email.

From: Tom Butler
Sent: 20 July 2021 17:48
To: 'Majed.Murad@southernwater.co.uk' <Majed.Murad@southernwater.co.uk>
Cc: Andy Keen (AndyK@hop.uk.com) <AndyK@hop.uk.com>
Subject: Sylvan Road East - Sewer Easement [Filed 20 Jul 2021 17:47]

Hi Majed,

The Sylvan Road East site is part of the AWDC development in Lancing which includes the sites with the sewer diversions we have been discussing recently. As you can see on the attached Southern Water sewer map, only a single sewer is shown, with the attached council records showing a network of private sewers. In the recent planning consultations Southern Water is now claiming that all the sewers are public which presents us with a problem as one of the proposed houses is now 1.5m from a public sewer.

Can you confirm if this is an acceptable easement for the western side of the sewer with unrestricted access and full easement from the eastern side of the sewer?

If you are unable to comment on this, could you provide a contact that we can direct this enquiry to?

Kind regards,

TOM BUTLER
Civil Engineer

HOP
CONSULTING CIVIL AND STRUCTURAL ENGINEERS

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