

74-76 CANADA ROAD, ARUNDEL

SUSTAINABLE DRAINAGE ASSESSMENT

FEBRUARY 2020



Ref: 15718/01/HOP/SDR/01

HOP Consulting Limited
HOP House, 41 Church Road
Hove, BN3 2BE
Registered 4402211 England



Gold
10/11/2020





CONTENTS

1.0	INTRODUCTION	2
2.0	SITE LOCATION AND DEVELOPMENT PROPOSALS	3
3.0	DRAINAGE STRATEGY	5
4.0	CONCLUSIONS	11

APPENDICES

APPENDIX A	TOPOGRAPHIC SURVEY
APPENDIX B	ARCHITECTURAL PROPOSALS
APPENDIX C	SOUTHERN WATER SEWER RECORDS
APPENDIX D	SURFACE WATER RUNOFF CALCULATIONS
APPENDIX E	DRAINAGE STRATEGY
APPENDIX F	MAINTENANCE SCHEDULE

Client : Miss L St Quinton

Prepared by	Checked by	Approved by	Revision
Tom Butler	Andrew Keen	Andrew Keen	V1.0 28-02-2020

SITE LOCATION

- ARUN DISTRICT COUNCIL: AB/63/20/DOG

Development proposals are detailed in the architectural layouts produced by Architectural Design Computer Services (ADCS) and Malcolm Westcott (see Appendix B), with extracts of the proposed site plan illustrated in Figure 2.1.

- [illegible]

2.10 Vehicular access is proposed via a new entrance from Canada Road to the south of the site which leads to the external parking area of the new residence and the proposed garages serving Numbers 74 and 76 Canada Road.

2.11 The proposed building is located over or adjacent to the surface water culvert which is expected to require a diversion to permit development.

3.0 DRAINAGE STRATEGY

SURFACE WATER

Existing

- 3.1 The topographic survey has indicated that the surface water runoff from the existing site is predominantly unmanaged. Based on a recent groundwater investigation conducted by RSK, which found window sample boreholes to fill up with rainwater and not drain away, RSK have concluded that there is very low infiltration potential on site. It is assumed that currently much of the rainwater incident on the site will eventually discharge overland onto Canada Road and into the highways drainage.
- 3.2 The CCTV drainage survey has confirmed the existence and condition of the 300mm diameter surface water culvert running under the site. Due to the changes in direction noted, its assumed route is an estimation. Two significant concerns were flagged regarding the pipe's condition, open joints in the pipe and no grill or screen on the headwall, however, these were both located outside the development area.
- 3.3 The Southern Water sewer records show a public surface water sewer running adjacent to the site at a depth of approximately 1.3m, however the surface water culvert under the site is not identified, as can be seen on the extract in Figure 3.1 below. This culvert is noted on the Arun District Council sewer records although this does not confirm the connection to the public surface water sewer. The Southern Water and Arun District Council sewer records can be found in Appendix C.

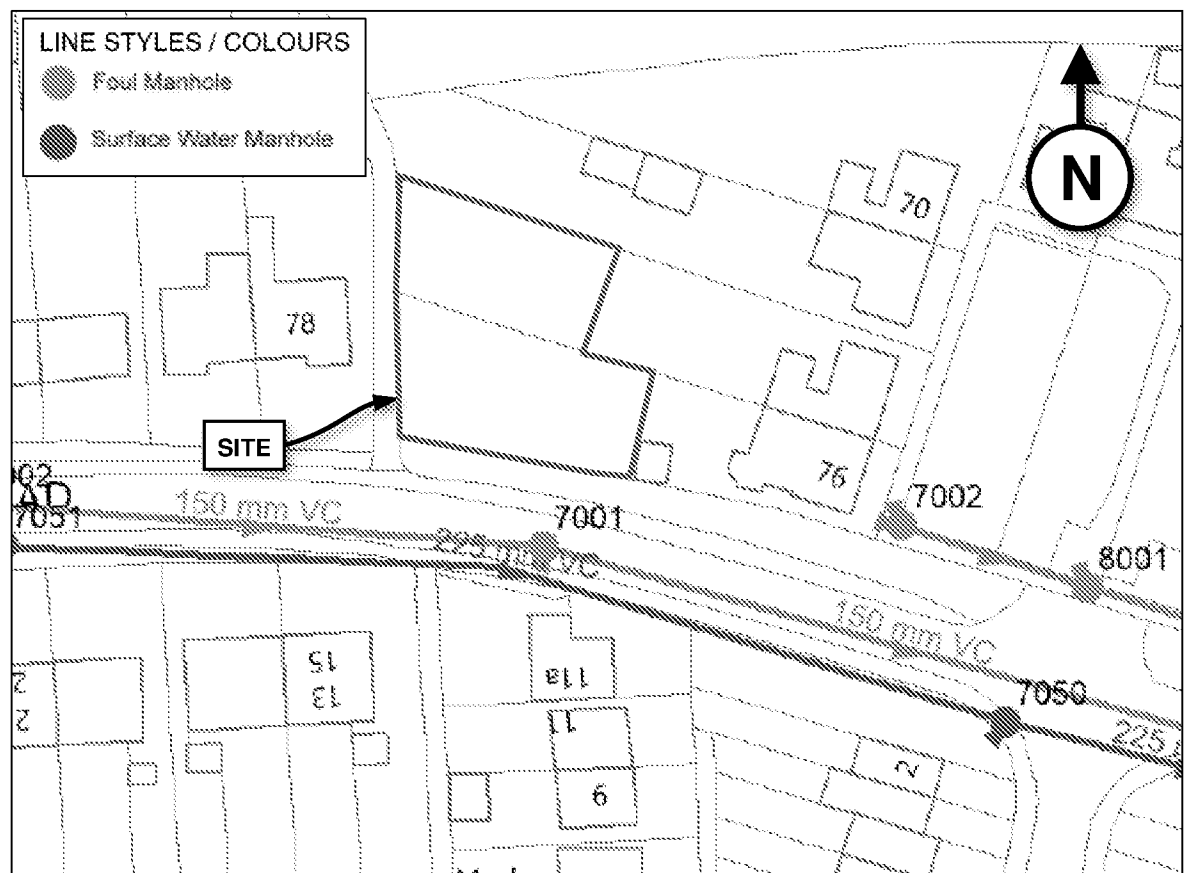


Fig. 3.1 Sewer record extract showing public sewers in the vicinity of the site.

- ## Proposed

- ARUN DISTRICT COUNCIL: AB/63/20/DOG

- ## Water quality

- Date: February 2020

Table 3.1 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	Hydrocarbons
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

These are to be compared against mitigation indices for individual SuDS components, as provided in Table 26.3 of the SuDS Manual. An extract of this showing the mitigation indices for SuDS components is provided in Table 3.2.

Table 3.2 Extract of table 26.3 from the SuDS Manual.

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters				
	Type of SuDS component	Mitigation indices ¹		
		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	0.6	0.6	0.6
	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			

- 3.17 As can be seen in Table 3.2 above, the permeable surface of the parking area has mitigation indices of; total suspended solids (TSS) 0.7; Metals 0.6; and Hydrocarbons 0.7 therefore the risk of pollution is considered to be mitigated in this regard.
- 3.18 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 3.2. The use of proprietary water quality control systems is not expected to be required.

SuDS maintenance

- 3.19 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 3.3 and Appendix F.
- 3.20 As can be seen, all SuDS components require regular inspection and for the first year the guidance states that monthly inspections should be 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 development.
- 3.21 The key maintenance procedure for the flow control is the management of sediment buildup. The risk of sedimentation to these features can be mitigated through the use of silt traps prior to discharge to the attenuation and flow control chamber.
- 3.22 Further operational activities for the SuDS component described for the site include regular litter and debris removal to ensure the drainage systems function without their design characteristics being compromised.
- 3.23 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.

Table 3.3 Extract of Table 32.1 of the SuDS Manual.

Typical key SuDS components operation and maintenance activities (for full specifications, see Chapters 31-33)												
Operation and maintenance activity	SuDS component											
	Pond	Wetland	Detention basin	Infiltration basin	Soak away	Infiltration trench	Filter drain	Modular storage	Pervious pavement	Swale/bioretention/ trees	Filter strip	Green roofs
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.

Existing

- Proposed**

- Table 3.4 Table of proposed peak foul flows.**

TOTAL PEAK FLOW	0.027 l/s
-----------------	-----------

- 3.27 An increase of 0.027 litres/second is therefore anticipated from the proposed development to be discharged to the foul water sewer located to the rear of 74-76 Canada Road as identified on the Arun District Council sewer map and confirmed by CCTV survey. The existing pipework is 100mm in diameter and is in generally good condition with the exception of debris noted in and adjacent to the manholes. Following the removal of the debris the sewer should comfortably accommodate the small increase in foul water flows.
- 3.28 It is proposed to discharge to the unused foul connection in the garden of 76 Canada Road. In the absence of the existing pipe invert level, it is assumed that a positive gravity connection to this pipe is available. An indirect connection to the public sewer will be subject to a Section 106 agreement with Southern Water, to be applied for in due course.

- 4.1 Onsite groundwater monitoring has indicated that the site geology is of dense clay with minimal infiltration potential. Surface water runoff from the existing site is therefore assumed to saturate the topsoil before discharging gradually via overland flows to the highway drainage to the south. No positive surface water or foul drainage exists on the site. Surface water management is proposed through the use of attenuation and controlled discharge. This report outlines a size and layout of the attenuation and flow control device that can manage the surface water, which is to be developed further during the detailed drainage design phase.
- 4.2 The anticipated additional foul water flows from the development are expected to be discharged to the public foul sewer via an existing unused private foul lateral drain within the garden of 76 Canada Road, subject to approval by Southern Water.
- 4.3 The use of attenuation to manage surface water runoff from the site is considered compliant with the SuDS Manual guidance in terms of water quantity and quality for the roof areas. Permeable paving is recommended for the trafficked areas to mitigate any pollution risk and will be confirmed at the detailed design stage. The site is not located within a SPZ and no additional pollution control measures are required in this regard.
- 4.4 This report has identified measures that reduce the level of flood risk to the development and ensures the surface water flood risk is mitigated through the use of attenuation SuDS. This report shows that the proposals for the redevelopment of the gardens of 76 and 74 Canada Road can be successfully implemented and managed sustainably and that there should be no increase in risk to future users and neighbouring properties with regard to foul or surface water flooding over the expected lifetime of the development.

APPENDIX A – EXISTING TOPOGRAPHY



Important Information:

We advise that an arborologist be appointed to correctly determine the species and condition of all trees surveyed prior to any design work.

All information contained in this drawing (including digital data) should be checked and verified prior to any fabrication or construction.



Tree Schedule

Pt No	Spread	Bole	Height	Feature
107	15.0	0.75	16.0	OAK
122	5.0	0.15	7.0	TREE UNKNOWN
123	6.0	0.15	7.0	TREE UNKNOWN
625	4.0	0.12	5.0	CHERRY
626	4.0	0.12	5.0	CHERRY
627	5.0	0.05	5.0	HAZEL
644	4.0	0.15	5.0	FRUIT
655		0.90		STUMP

Coordinate Table

Station	Easting	Northing	Level
1	1000.000	1000.000	50.000
2	1026.118	997.714	49.493
3	992.725	1011.097	50.783
4	980.917	1010.635	51.851
1A	1001.527	1004.532	50.402
1B	972.165	1004.187	51.480
1C	971.850	1029.917	53.029
A1	1025.883	1016.148	51.006
J1	1016.141	1019.323	51.185
J2	1015.202	1016.735	51.255
J3	1005.536	1019.041	51.461
J4	992.844	1021.940	51.340
J5	981.428	1025.393	51.988

Survey Grid: Based to a local arbitrary grid

Levelling: Arbitrary datum based on Station 1
Value - 50.00 metres

Drawing Title: Topographical Survey

Site Address: Nos 74 & 76
Canada Road
Arundel

Client: Mrs L.St Quintin

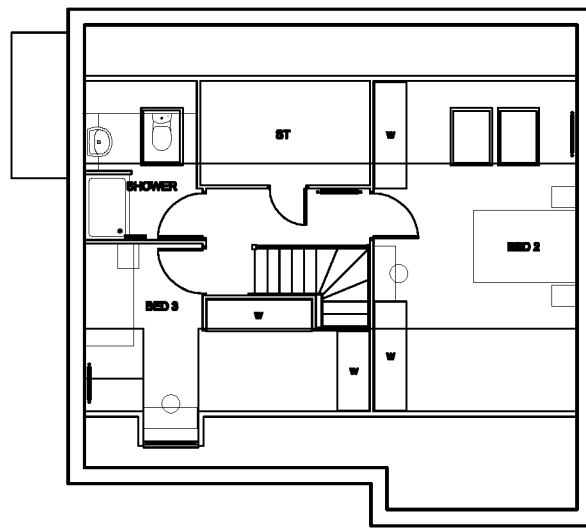
Surveyor	MPB	Drawn By	AMF	Verified By	MPB	Date	21.11.12
----------	-----	----------	-----	-------------	-----	------	----------

CM No:	CM/12382	Rev:	
Scale:	1:200m @ A2	Date:	November 2012

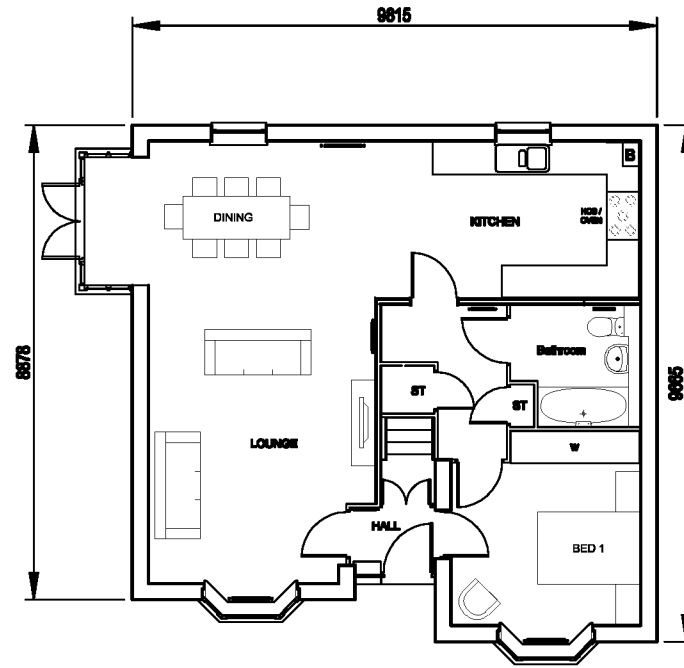


Cadmap Ltd
67 Meadowway Grove
Hornsea, Norfolk
Gumley, GU21 4TF
T: 01485 429346
E: info@cadmap.co.uk
W: www.cadmap.co.uk

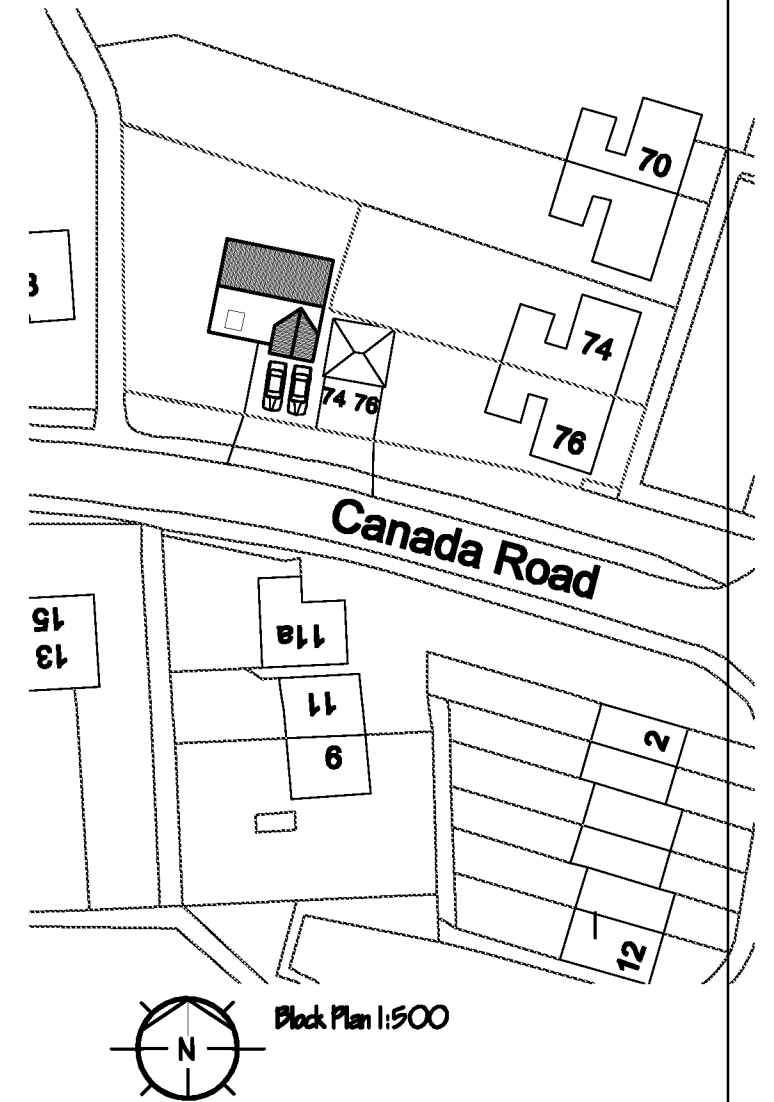
APPENDIX B – ARCHITECTURAL PLANS



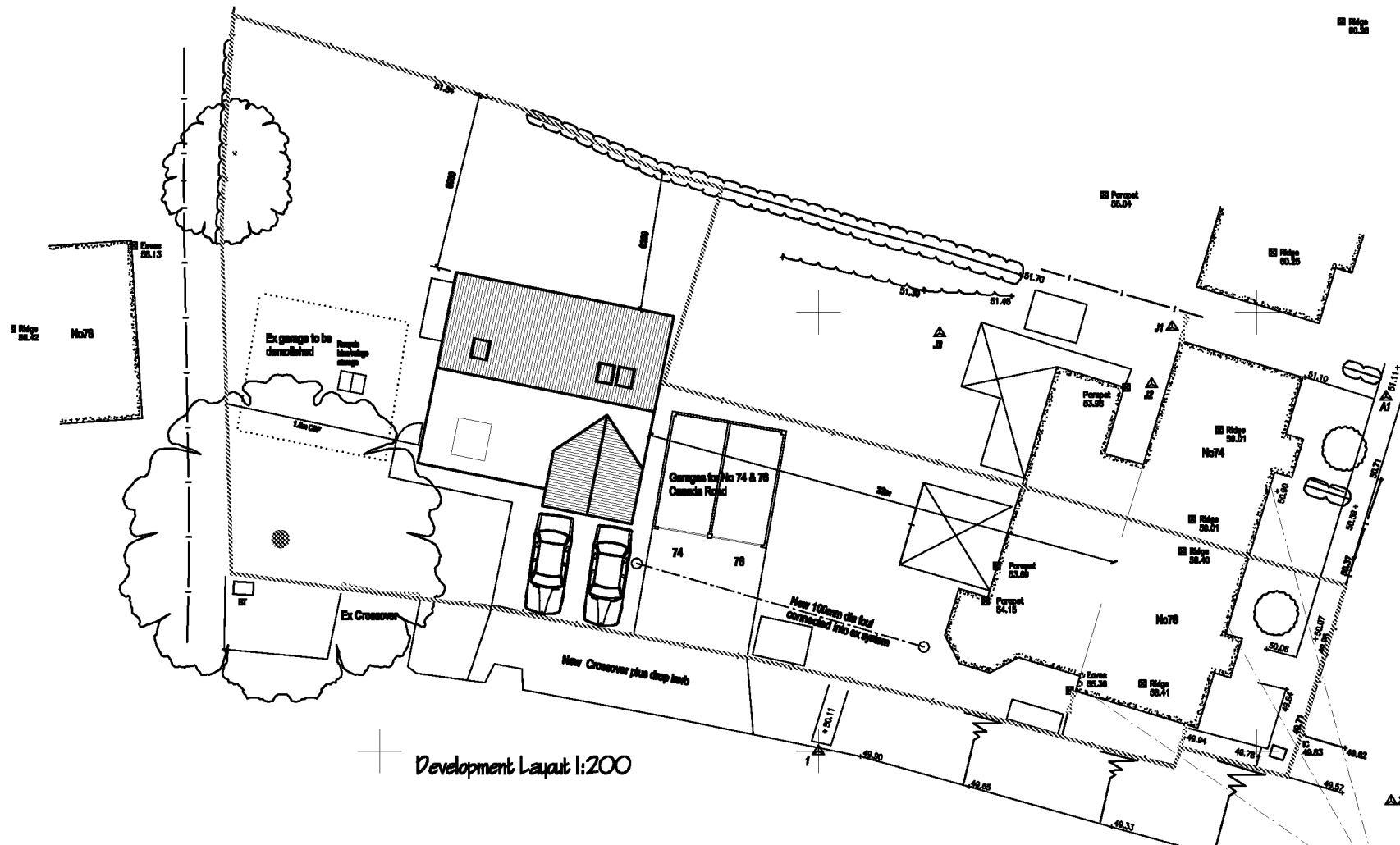
First Floor Plan 1:100



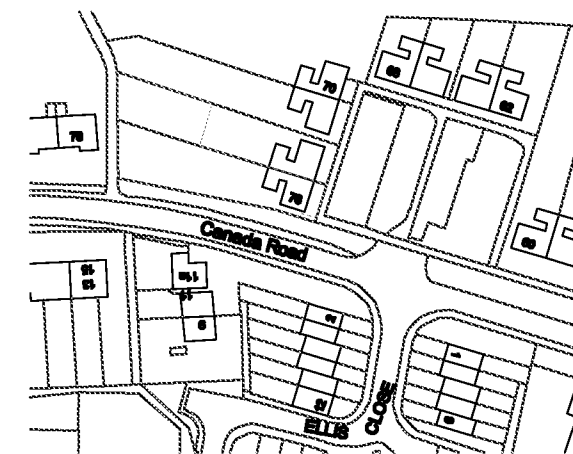
Ground Floor Plan 1:100



Block Plan 1:500



Development Layout 1:200



Location Plan 1:1250

A	Layout rev	MW	04/17
Rev	Description	By	Date
Project Land Rear of 74-76 Canada Road Arundel BN18 9HY			
Drawing Title Proposed 3 bed Detached bungalow plus associated off road parking.			
Drawing No. 101 A		Revision	
Scale	As Shown @A2	Date	April 17
Drawing Status Planning			
Drawn By		Checked By	
Client Miss L St Quinton			

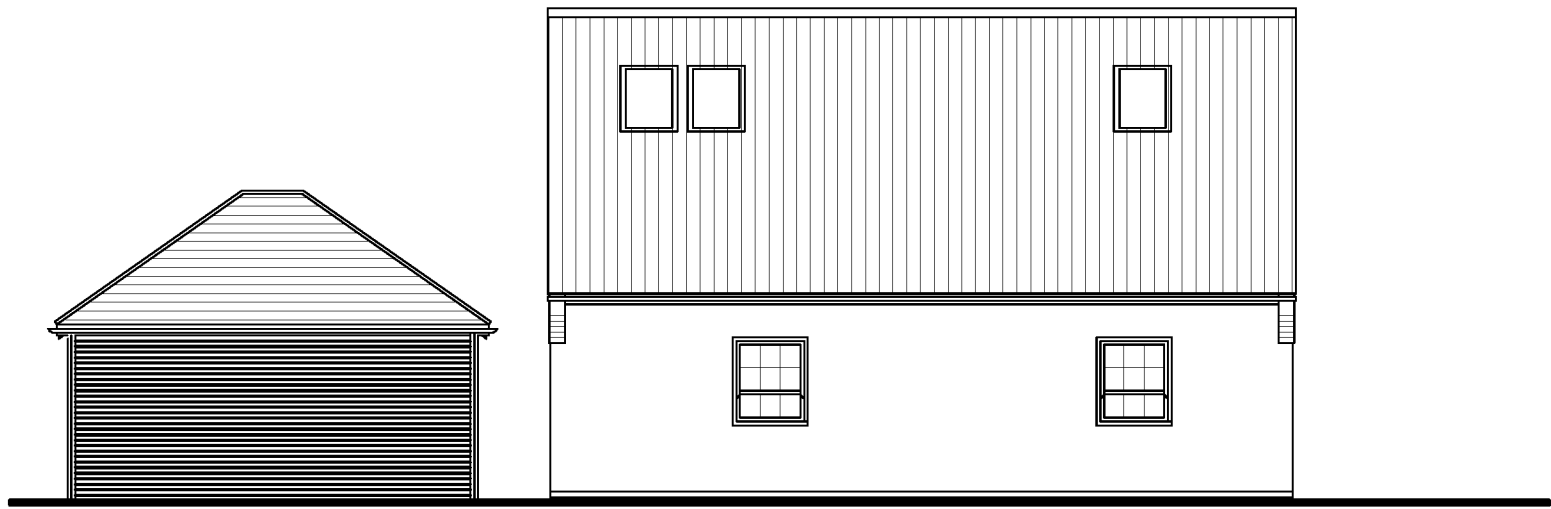


Front Elevation

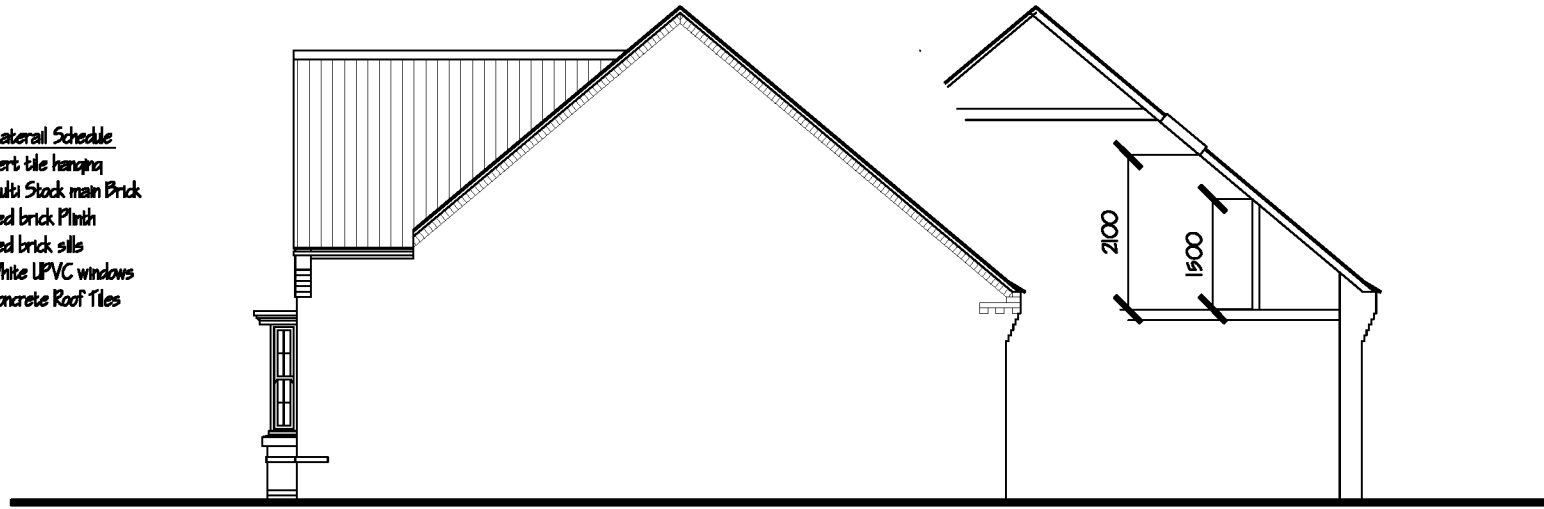


Side Elevation

Material Schedule
 Vert tile hanging
 Multi Stock main Brick
 Red brick Plinth
 Red brick sills
 White UPVC windows
 Concrete Roof Tiles



Rear Elevation

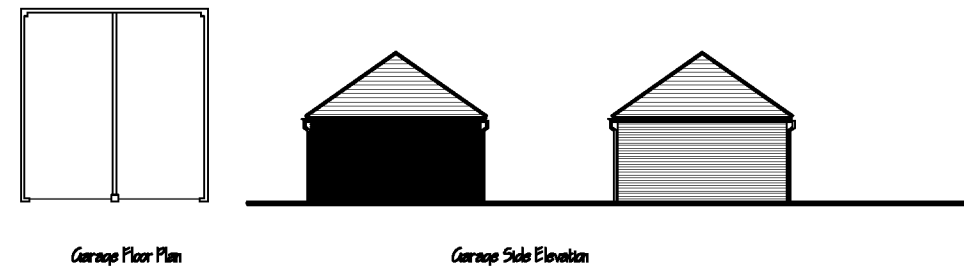
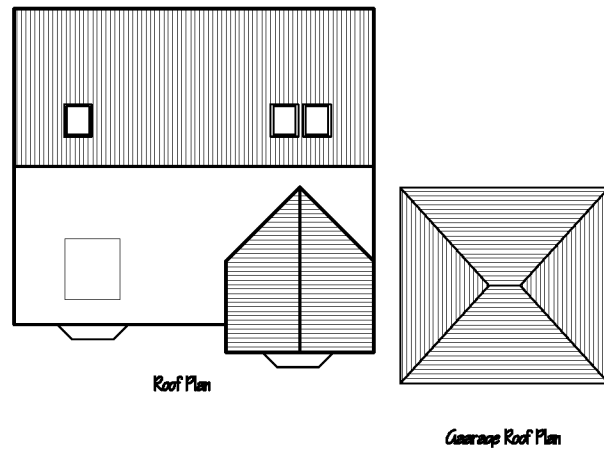


Side Elevation

Material Schedule
 Vert tile hanging
 Multi Stock main Brick
 Red brick Plinth
 Red brick sills
 White UPVC windows
 Concrete Roof Tiles

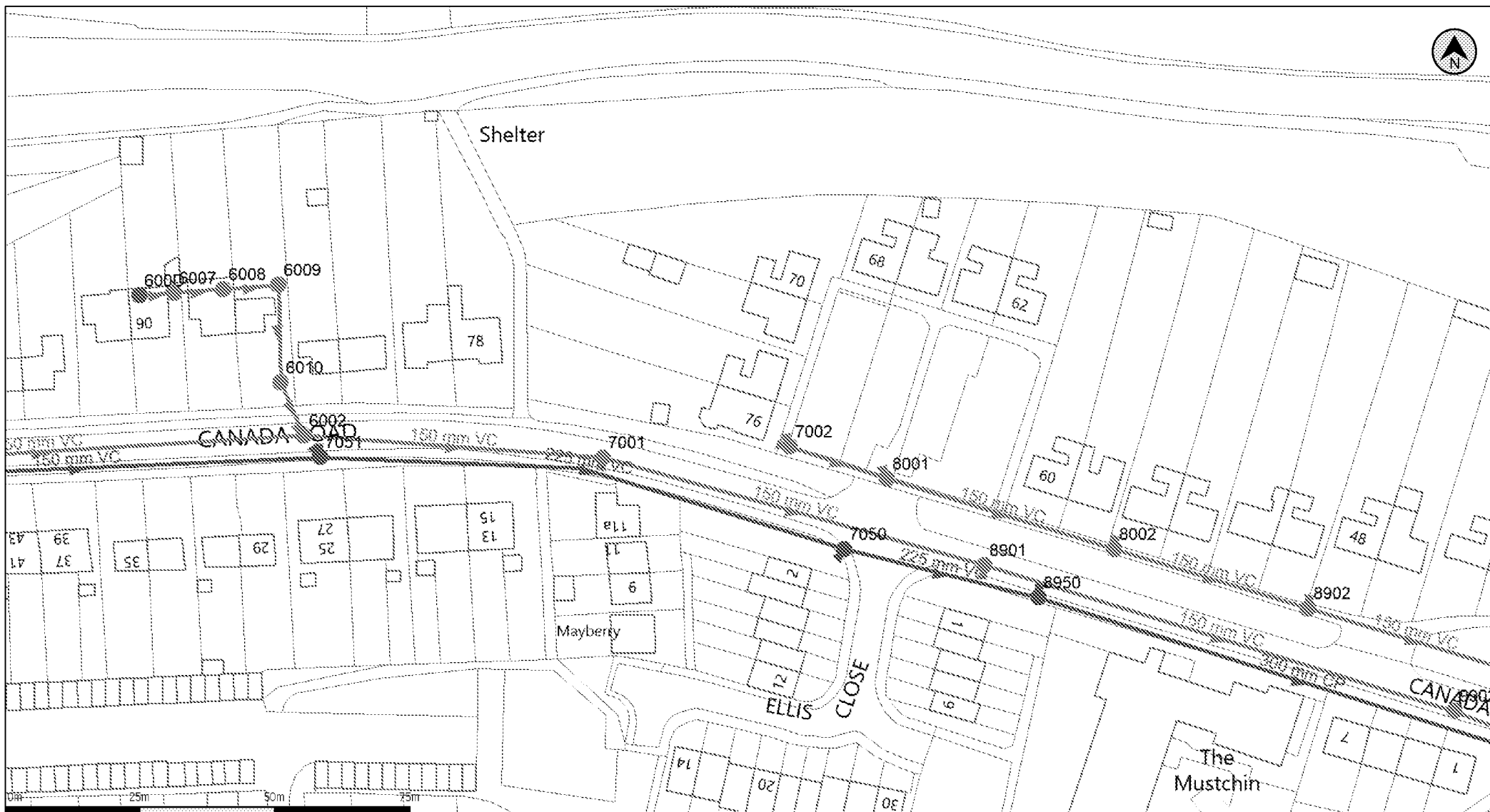
Typical Section thro rear elevation

	Layout revised	MW	04/17
Rev	Description	By	Date
Project			
Land Rear of 74-76 Canada Road Arundel BN18 9HY			
Drawing Title			
Proposed Elevation			
Drawing No.		Revision	
100 A			
Scale	1:100 @A2	Date	April 17
Drawing Status		Planning	
Drawn By		Checked By	
Client			
Miss L St Quinton			



Malcolm Westcott 07885977832	Project Land Rear of 74-76 Canada Road Arundel BN18 9HY	Drawing Title Proposed Street Scene, Roof Plans & Car Port Floor Plan	Drawing No. 102 A	Revision	Scale 1:200@A3	Date Sep 16	Rev A	Description Layout rev	By MW	Date 04/17	Client Miss L St Quinton
					Drawing Status Planning						
					Drawn By	Checked By					

APPENDIX C – SOUTHERN WATER RECORDS



(c) Crown copyright and database rights 2020 Ordnance Survey 100031673

Date: 17/02/20

Scale: 1:1000

Map Centre: 500782,107026

Data updated: 18/12/19

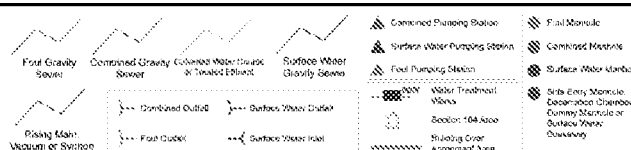
Our Ref: 370164 - 1

Wastewater Plan A4

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.

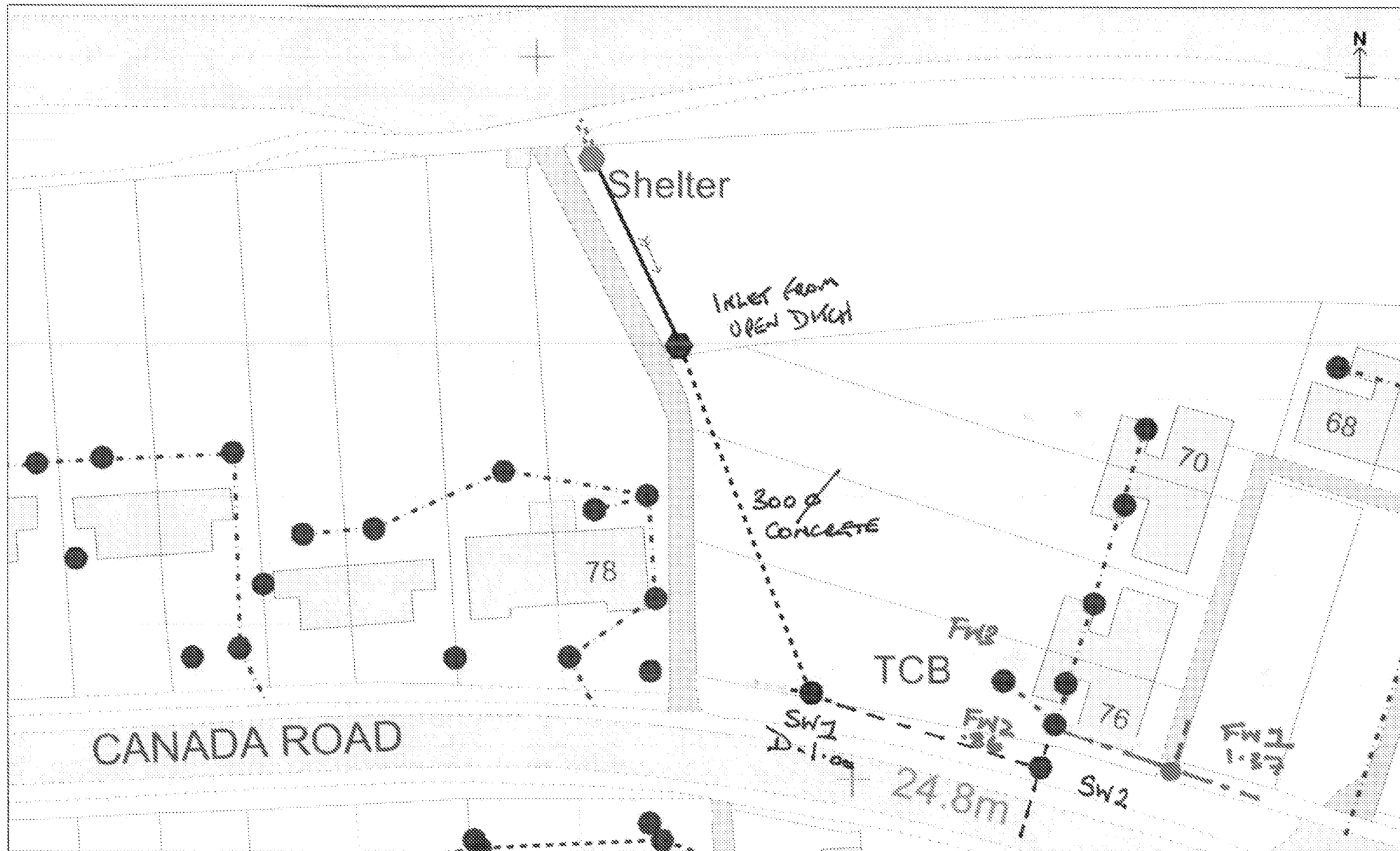


tomb@hop.uk.com

74-76 Canada Road



Arun District Council Maps



Mapping produced by Arun District Council

© Arun District Council and Crown Copyright. All rights reserved. Licence No: 100018487, 2018

Production Date: 11 May 2018

www.arun.gov.uk



APPENDIX D – SURFACE WATER RUNOFF CALCULATIONS

Calculated by:	Tom Butler
Site name:	74-76 Canada Road
Site location:	Arundel

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	50.85414° N
Longitude:	0.57013° W
Reference:	2477445493
Date:	Feb 17 2020 16:15

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):	0.8
-----------------------	-----

Methodology

Q _{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	1	1
HOST class:	N/A	N/A
SPR/SPRHOST:	0.1	0.1

Hydrological characteristics

	Default	Edited
SAAR (mm):	797	797
Hydrological region:	7	7
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q _{BAR} (l/s):	0.16	0.16
1 in 1 year (l/s):	0.13	0.13
1 in 30 years (l/s):	0.36	0.36
1 in 100 years (l/s):	0.5	0.5
1 in 200 years (l/s):	0.59	0.59

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Hemsley Orrell Partnership							Page 1
HOP House 41 Church Road Hove BN3 2BE			74-76 CANADA ROAD ARUNDEL ATTENUATION SCHEME				
Date 18/02/2020 17:10 File 15718-1 Sub-base 2ls.SRCX			Designed by MB Checked by TRB				
Micro Drainage			Source Control 2018.1.1				
<u>Summary of Results for 100 year Return Period (+40%)</u>							
Half Drain Time : 22 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	50.238	0.618	0.0	2.0	2.0	3.1	O K
30 min Summer	50.279	0.659	0.0	2.0	2.0	3.5	O K
60 min Summer	50.283	0.663	0.0	2.0	2.0	3.6	O K
120 min Summer	50.234	0.614	0.0	2.0	2.0	3.1	O K
180 min Summer	50.163	0.543	0.0	2.0	2.0	2.4	O K
240 min Summer	50.064	0.444	0.0	2.0	2.0	1.6	O K
360 min Summer	49.876	0.256	0.0	2.0	2.0	0.5	O K
480 min Summer	49.758	0.138	0.0	1.9	1.9	0.2	O K
600 min Summer	49.709	0.089	0.0	1.7	1.7	0.1	O K
720 min Summer	49.696	0.076	0.0	1.5	1.5	0.0	O K
960 min Summer	49.682	0.062	0.0	1.2	1.2	0.0	O K
1440 min Summer	49.670	0.050	0.0	0.9	0.9	0.0	O K
2160 min Summer	49.661	0.041	0.0	0.7	0.7	0.0	O K
2880 min Summer	49.656	0.036	0.0	0.5	0.5	0.0	O K
4320 min Summer	49.650	0.030	0.0	0.4	0.4	0.0	O K
5760 min Summer	49.647	0.027	0.0	0.3	0.3	0.0	O K
7200 min Summer	49.645	0.025	0.0	0.3	0.3	0.0	O K
8640 min Summer	49.643	0.023	0.0	0.2	0.2	0.0	O K
10080 min Summer	49.641	0.021	0.0	0.2	0.2	0.0	O K
15 min Winter	50.286	0.666	0.0	2.0	2.0	3.6	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)			
15 min Summer	127.442	0.0	4.5	15			
30 min Summer	86.359	0.0	6.2	25			
60 min Summer	55.837	0.0	8.2	42			
120 min Summer	34.792	0.0	10.2	76			
180 min Summer	25.944	0.0	11.4	110			
240 min Summer	20.920	0.0	12.3	140			
360 min Summer	15.465	0.0	13.6	194			
480 min Summer	12.459	0.0	14.6	248			
600 min Summer	10.526	0.0	15.5	306			
720 min Summer	9.166	0.0	16.2	366			
960 min Summer	7.361	0.0	17.3	478			
1440 min Summer	5.393	0.0	19.0	712			
2160 min Summer	3.941	0.0	20.8	1068			
2880 min Summer	3.151	0.0	22.1	1420			
4320 min Summer	2.293	0.0	24.0	2128			
5760 min Summer	1.830	0.0	25.5	2928			
7200 min Summer	1.537	0.0	26.6	3608			
8640 min Summer	1.333	0.0	27.6	4160			
10080 min Summer	1.182	0.0	28.4	4952			
15 min Winter	127.442	0.0	5.1	16			
©1982-2018 Innovyze							

Hemsley Orrell Partnership							Page 2
HOP House 41 Church Road Hove BN3 2BE			74-76 CANADA ROAD ARUNDEL ATTENUATION SCHEME				
Date 18/02/2020 17:10 File 15718-1 Sub-base 2ls.SRCX			Designed by MB Checked by TRB				
Micro Drainage			Source Control 2018.1.1				
<u>Summary of Results for 100 year Return Period (+40%)</u>							
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	50.335	0.716	0.0	2.0	2.0	4.2	Flood Risk
60 min Winter	50.332	0.712	0.0	2.0	2.0	4.1	Flood Risk
120 min Winter	50.246	0.626	0.0	2.0	2.0	3.2	O K
180 min Winter	50.126	0.506	0.0	2.0	2.0	2.1	O K
240 min Winter	49.933	0.313	0.0	2.0	2.0	0.8	O K
360 min Winter	49.719	0.099	0.0	1.8	1.8	0.1	O K
480 min Winter	49.695	0.075	0.0	1.5	1.5	0.0	O K
600 min Winter	49.684	0.064	0.0	1.2	1.2	0.0	O K
720 min Winter	49.677	0.057	0.0	1.1	1.1	0.0	O K
960 min Winter	49.669	0.049	0.0	0.9	0.9	0.0	O K
1440 min Winter	49.661	0.041	0.0	0.6	0.6	0.0	O K
2160 min Winter	49.654	0.034	0.0	0.5	0.5	0.0	O K
2880 min Winter	49.650	0.030	0.0	0.4	0.4	0.0	O K
4320 min Winter	49.646	0.026	0.0	0.3	0.3	0.0	O K
5760 min Winter	49.643	0.023	0.0	0.2	0.2	0.0	O K
7200 min Winter	49.641	0.021	0.0	0.2	0.2	0.0	O K
8640 min Winter	49.640	0.020	0.0	0.2	0.2	0.0	O K
10080 min Winter	49.638	0.018	0.0	0.1	0.1	0.0	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)			
30 min Winter	56.355	0.0	7.0	26			
60 min Winter	55.837	0.0	9.2	46			
120 min Winter	34.792	0.0	11.5	82			
180 min Winter	25.944	0.0	12.8	118			
240 min Winter	20.920	0.0	13.8	142			
360 min Winter	15.465	0.0	15.3	186			
480 min Winter	12.459	0.0	16.4	242			
600 min Winter	10.526	0.0	17.4	304			
720 min Winter	9.166	0.0	18.1	356			
960 min Winter	7.361	0.0	19.4	472			
1440 min Winter	5.393	0.0	21.3	708			
2160 min Winter	3.941	0.0	23.3	1064			
2880 min Winter	3.151	0.0	24.8	1480			
4320 min Winter	2.293	0.0	27.0	2208			
5760 min Winter	1.830	0.0	28.6	2688			
7200 min Winter	1.537	0.0	30.0	3744			
8640 min Winter	1.333	0.0	31.1	4368			
10080 min Winter	1.182	0.0	32.0	5168			
©1982-2018 Innovyze							

Hemsley Orrell Partnership		Page 3
HOP House 41 Church Road Hove BN3 2BE	74-76 CANADA ROAD ARUNDEL ATTENUATION SCHEME	
Date 18/02/2020 17:10 File 15718-1 Sub-base 2ls.SRCX	Designed by MB Checked by TRB	
Micro Drainage		Source Control 2018.1.1

Hemsley Orrell Partnership		Page 4
HOP House 41 Church Road Hove BN3 2BE	74-76 CANADA ROAD ARUNDEL ATTENUATION SCHEME	
Date 18/02/2020 17:10 File 15718-1 Sub-base 2ls.SRCX	Designed by MB Checked by TRB	
Micro Drainage Source Control 2018.1.1		

Model Details

Storage is Online Cover Level (m) 50.350

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.5
Membrane Percolation (mm/hr)	1000	Length (m)	11.5
Max Percolation (l/s)	14.4	Slope (1:X)	12.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	49.620	Cap Volume Depth (m)	0.600

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0071-2000-0730-2000
Design Head (m)	0.730
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	71
Invert Level (m)	49.620
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

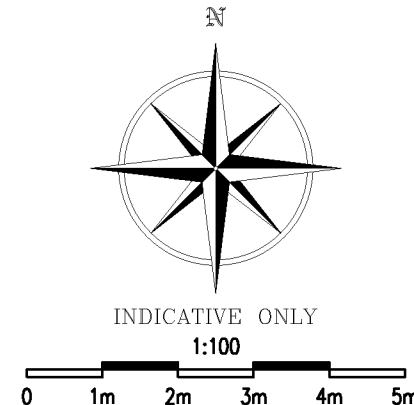
Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.730	2.0
Flush-Flo™	0.219	2.0
Kick-Flo®	0.469	1.6
Mean Flow over Head Range	-	1.7

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	1.8	1.200	2.5	3.000	3.8	7.000	5.7
0.200	2.0	1.400	2.7	3.500	4.1	7.500	5.9
0.300	2.0	1.600	2.9	4.000	4.4	8.000	6.1
0.400	1.9	1.800	3.0	4.500	4.6	8.500	6.3
0.500	1.7	2.000	3.2	5.000	4.9	9.000	6.4
0.600	1.8	2.200	3.3	5.500	5.1	9.500	6.6
0.800	2.1	2.400	3.5	6.000	5.3		
1.000	2.3	2.600	3.6	6.500	5.5		

©1982-2018 Innovyze

APPENDIX E – DRAINAGE STRATEGY



- 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 2 sulphate conditions.

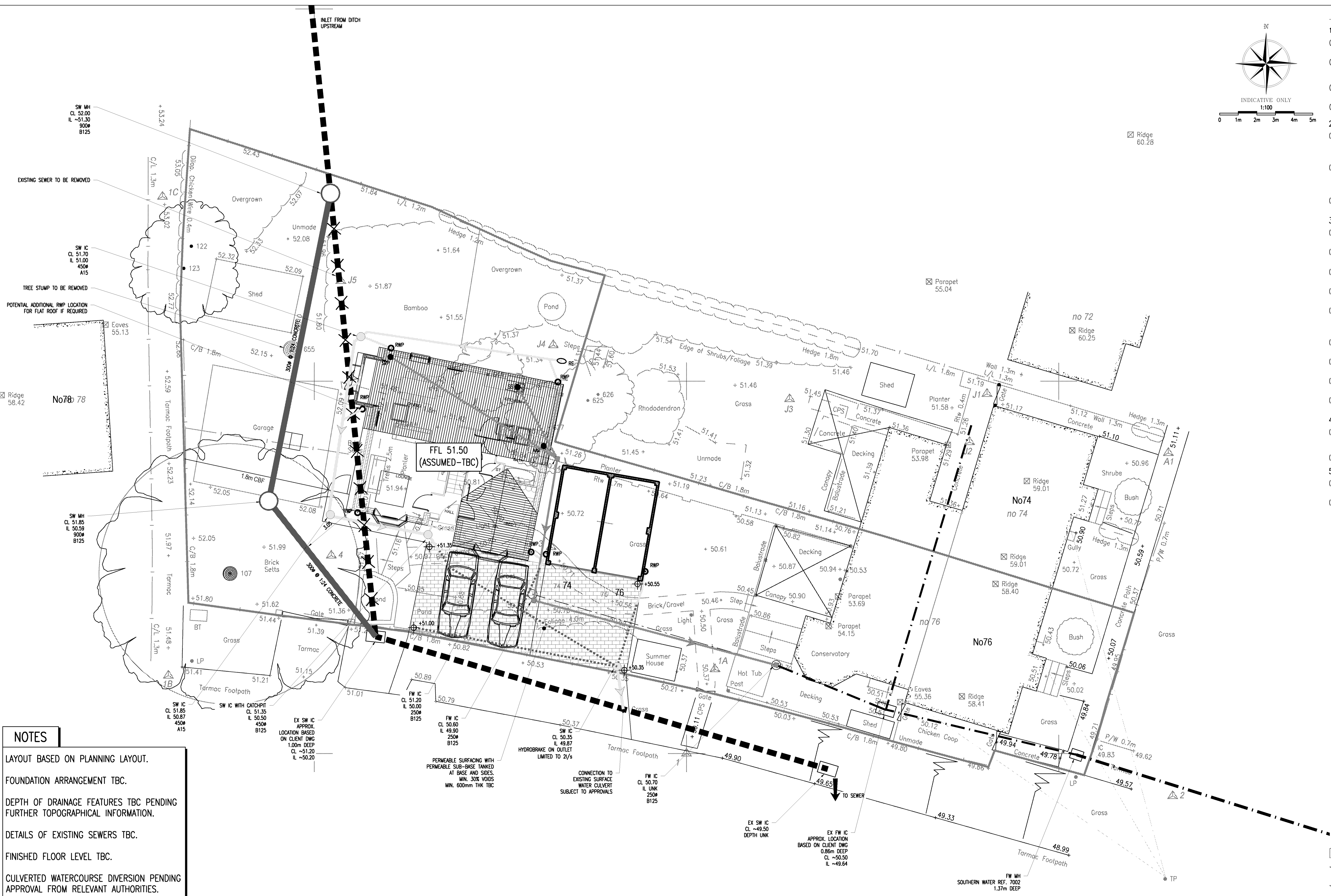
- 3 BELOW GROUND DRAINAGE**
- (i) Pipework to be UPVC-U pipes to BS 4660 : 2000 and Inspection Chambers to BS 7158 : 2001.
 - (ii) All adoptable drainage to be constructed in accordance with 'Sewers for Adoption' 7th Edition and the relevant Council Design Guide.
 - (iii) All private surface water sewers 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 5911:2002.

LEGEND		
FOUL WATER	SURFACE WATER	
		PROPOSED DRAIN
		PROPOSED CULVERT DIVERSION
		PROPOSED SLOTTED PIPE WRAPPED IN GEOTEXTILE
		EXISTING DRAIN
		EXISTING DRAIN TO BE REMOVED
		PROPOSED CONCRETE MANHOLE
		PROPOSED TYPE 3 INSPECTION CHAMBER 450mmø / 600mmø
		PROPOSED TYPE 4 INSPECTION CHAMBER 180mmø / 250mmø
		SOIL AND VENT PIPE
		RAIN WATER PIPE
		RODDING EYE
		PROPOSED THRESHOLD DRAIN
		SITE BOUNDARY
		PERMEABLE SURFACING

FIRST ISSUE		MB	TRB	20.02.20	P1
Description		By Approved Date Rec.			
PRELIMINARY DRAWING					
NOT FOR CONSTRUCTION					
Title					
PROPOSED DRAINAGE STRATEGY					
Project					
74-76 CANADA ROAD, ARUNDEL					
Client					
BARRATT HOMES					
HOP House, 41 Church Road Hove, East Sussex BN3 2BE www.hop.uk.com ask@hop.uk.com +44 (0)1273 223900					
Drawing No.					
15718-HOP-ZZ-XX-DR-C-10001					
Sheet					
S0					
Revision					
P1					



- NOTES**
- LAYOUT BASED ON PLANNING LAYOUT.
 - FOUNDATION ARRANGEMENT TBC.
 - DEPTH OF DRAINAGE FEATURES TBC PENDING FURTHER TOPOGRAPHICAL INFORMATION.
 - DETAILS OF EXISTING SEWERS TBC.
 - FINISHED FLOOR LEVEL TBC.
 - CULVERTED WATERCOURSE DIVERSION PENDING APPROVAL FROM RELEVANT AUTHORITIES.
 - FOUL WATER DISCHARGE CONNECTION SUBJECT TO SOUTHERN WATER SECTION 106 CONNECTION APPROVAL.
 - SURFACE WATER DISCHARGE CONNECTION SUBJECT TO APPROVAL FROM RELEVANT AUTHORITIES.
 - SUB-BASE DEPTH TBC PENDING SITE INVESTIGATION.
 - SITE LEVELS TO ARBITRARY DATUM.

APPENDIX F – MAINTENANCE SCHEDULE

74-76 CANADA ROAD DEVELOPMENT, ARUNDEL

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	Property owner
	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	Property owner
	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
Gullies and Channel Drains	Check gullies and channel drains for damage, condition and function.	Every six months	Property owner
	Remove sediment, oil/grease, litter and debris.	As necessary	Property owner
	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	Property owner
Attenuation flow control device	Inspect for damage, blockages	Every six months and after periods of heavy rainfall	Property owner
	Litter, sediment and debris removal	As necessary	Specialist
Permeable paving	Removal / treatment of weeds	Every six months	Property owner
General	Remove sediment, litter, debris and vegetation from the surface of pathways areas	As necessary and after heavy rainfall	Property owner
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	Property owner

NOTES

The property owner 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 owner 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.