

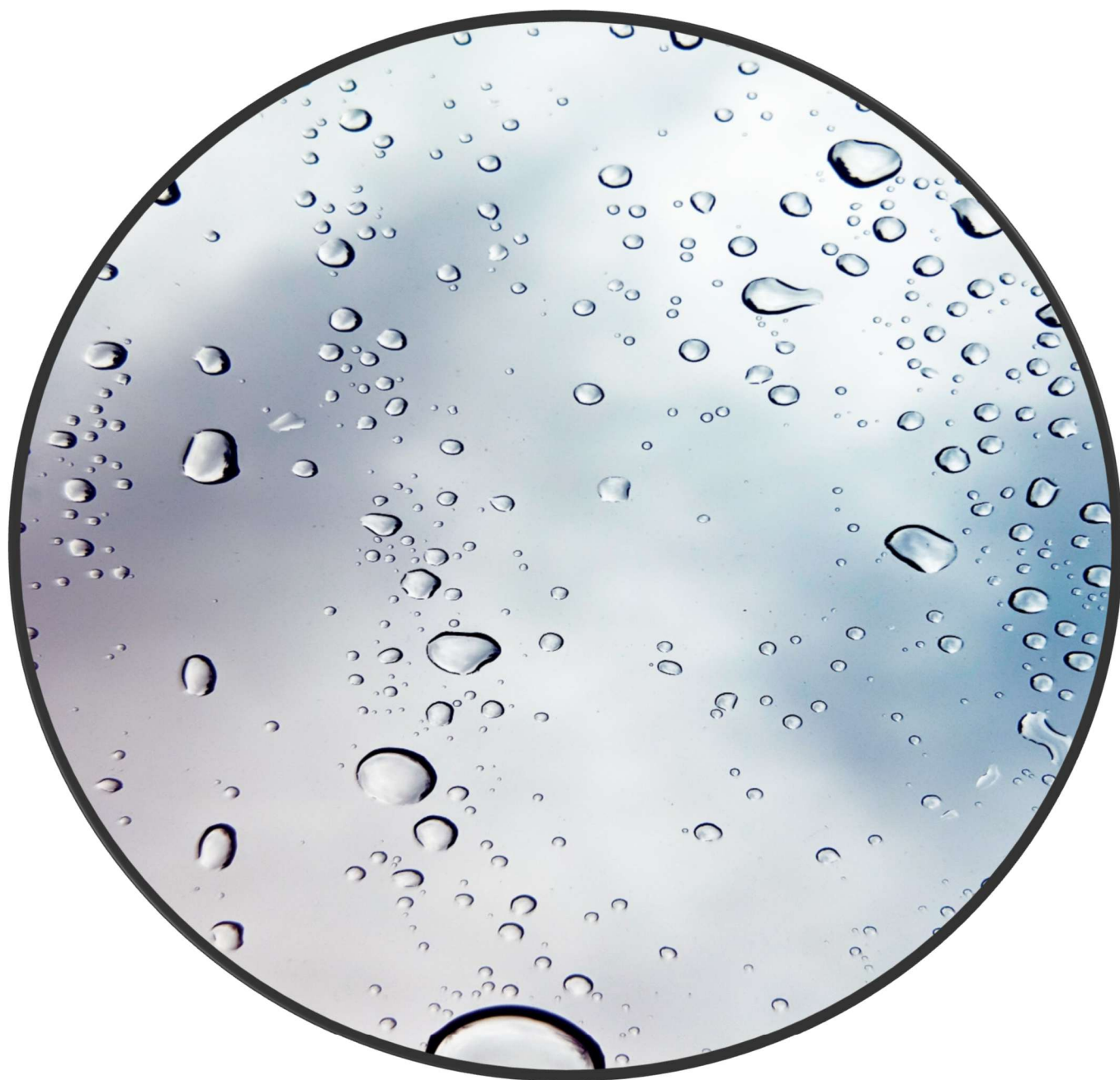


INFRASTRUCTURE DESIGN LTD
EST 2000

DRAINAGE STRATEGY REPORT, INCLUDING WASTEWATER STRATEGY

OLD CHARLTON ROAD, HITCHIN, HERTFORDSHIRE, SG5 2AJ
ON BEHALF OF MCCARTHY & STONE RETIREMENT LIFESTYLES LTD

MARCH 2025
IDL/1275/DS/001



INFRASTRUCTURE DESIGN LTD

Suite 44, Harborough Innovation Centre,
Airfield Business Park, Leicester Road,
Market Harborough,
Leicestershire,
LE16 7WB

+44 (0)1858 411570

www.infrades.co.uk

DRAINAGE STRATEGY REPORT, INCLUDING WASTEWATER STRATEGY
IDL/1275/DS/001

REPORT ISSUE

Revision	Date	Notes
P01	28/03/2025	Stage 3 Issue for Planning
P02	25/11/2025	Exceedance flood flow route added in the Proposed drainage plan

PREPARED BY

Brijesh Mistry
Infrastructure Engineer March 2025

REVIEWED BY

Phil Tomes
Director

March 2025

DISCLAIMER

This report has been prepared by Infrastructure Design Ltd for the sole use of the client. It may not be assigned to, relied upon or used by any third party in part or in whole without the written permission of Infrastructure Design Ltd.

CONTENTS

1	INTRODUCTION	1
2	SITE LOCATION	1
3	REFERENCE DOCUMENTS	2
4	TOPOGRAPHY	2
5	SITE DESCRIPTION AND PROPOSED DEVELOPMENT	2
6	EXISTING DRAINAGE	3
7	GEOLOGY	3
8	BROWNFIELD RUN-OFF RATE	3
9	SURFACE WATER DRAINAGE & SUDS	4
10	FOUL WATER DRAINAGE	6
11	CONCLUSION	7
12	ENCLOSURES	7
	APPENDIX A – SUDS HIERARCHY	
	APPENDIX B – ANGLIAN WATER ASSET SEARCH	
	APPENDIX C – TOPOGRAPHICAL SITE SURVEY	
	APPENDIX D– PROPOSED DRAINAGE STRATEGY LAYOUTS	
	APPENDIX E – SURFACE WATER DRAINAGE CALCULATIONS	
	APPENDIX F – MANAGEMENT & MAINTENANCE REGIME	

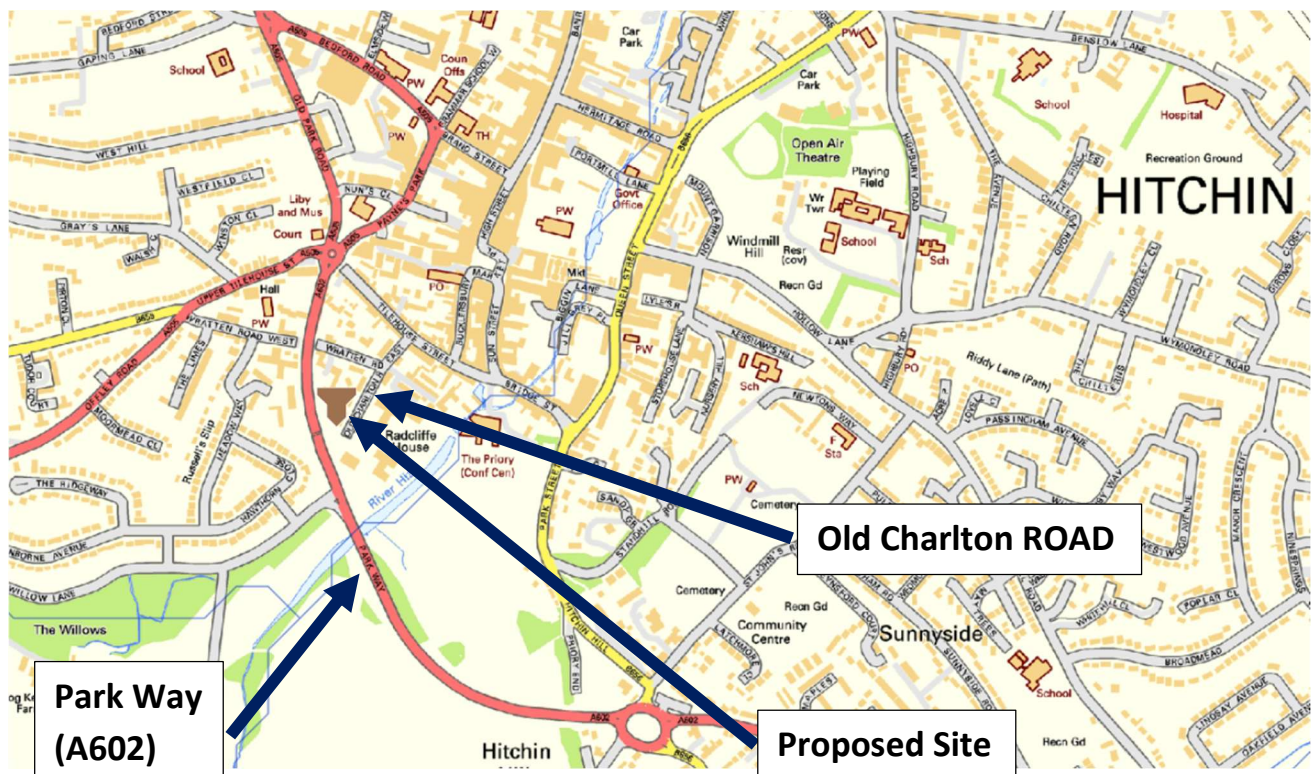
1 INTRODUCTION

- 1.1 McCarthy Stone Ltd has appointed Infrastructure Design Ltd (IDL) to prepare this Drainage Strategy Report in support of their planning application for their proposed retirement living accommodation development site.
- 1.2 This report has been prepared in accordance with both national and local planning policy and takes guidance from CIRIA SUDS Manual C753, Environment Agency Rainfall Run-off Management for Developments, Non-Statutory Technical Standard for SuDS (NSTS) and The Building Regulations, Approved Document Part H.
- 1.3 This drainage strategy report pertains only to the design of the drainage system for the developed site. It does not provide details on the surface water management plan or how the drainage will be protected during construction. This is considered to be temporary work and can only be prescribed separately in the surface water management plan.

2 SITE LOCATION

- 2.1 The site is off Old Charlton Road and lies east of Park Way (A602), to the southwest of Hitchin town centre. The nearest postcode is SG5 2AJ, and the grid reference is TL 1816 2882. The site location can be seen in Figure 1.

Figure 1 – Site Location Plan



3 REFERENCE DOCUMENTS

- Proscoplans Limited topographical survey drawing no: PP/4134/Hitchin/F1A
- Crossfield Consulting (Geotechnical Environmental) Site Investigation Report.
- Anglian Water sewer record map.
- NewLeaf studio Landscape and levels proposal LSE-2983-03-LA-MCS791-Drg 01 P3
- Keen Consults tree constraints Plan drawing 2282-KC-XX-YTREE-TreeConstraintsPlan01Rev0

4 TOPOGRAPHY

- 4.1 By reference to the topography survey, the site topography slopes gently up towards the west, approximately 1m high. The general surrounding topography appears to be sloping gently down towards the southeast.

5 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

- 5.1 The site is bounded by residential dwellings to the North, Old Charlton Road and offices to the east, a public footpath and offices to the south and Park Way (A602) and residential dwellings to the west. The brownfield site consists of four existing buildings, associated vehicle access and paved areas from Old Charlton Road, and a predominantly soft landscaped garden ground.
- 5.2 The proposed development comprises 35 retirement apartments (a four-storey building). The apartment block is associated with car parking areas, vehicular crossover to the car parking areas and external soft and hard landscape areas.
- 5.3 The dedicated vehicular crossovers currently associated with the existing 4 x bungalows are proposed to be stopped up. The proposed development will be accessed via a newly formed vehicle crossover onto Old Charlton Road, measuring 5.5m wide, leading into a 6m wide internal access road.
- 5.4 The proposed development's impermeable area is approximately 1957 m² (0.196ha), including roof and external paved areas.

6 EXISTING DRAINAGE

- 6.1 The Anglian Water Asset Location Search Sewer Map shows that the surface water sewer is located south of the site. A 150mm diameter surface water sewer crosses Park Way (A602) and changes the size to 300mm diameter once it crosses Park Way road. The 300mm diameter surface water sewer runs towards the south along the east of Park Way. Foul sewer manhole (1800) located outside the proposed site entrance. The foul sewer also heads towards the south and crosses Park Way (A602).
- 6.2 Refer to Appendix B for the Anglian Water sewer map.

7 GEOLOGY

- 7.1 The Crossfiled site investigation identified that the site is predominately fine-grained strata (i.e., low permeability material and including a high proportion of fines within sand and gravel horizons), suggesting that soakaway drainage will not be feasible at this site. There is also some indication of relatively shallow (3.5 m to 4.0 m depth) groundwater that may also constrain soakaways. A falling head test undertaken within one exploratory hole also confirms that low-permeability materials are present. Therefore, it is recommended that an alternative drainage strategy be identified at an early stage.
- 7.2 The site is located within a groundwater Source Protection Zone 3 (Total Catchment). Also, the site lies within Flood Zone 1.

8 BROWNFIELD RUN-OFF RATE

- 8.1 The site is brownfield, and the existing roof and paved area generate surface water run-off, which could be discharging to the foul sewer via an on-site combined drainage pipe. The existing impermeable areas are approximately 960m². Based on the Figure 2 rainfall data, the 100-year storm event generates an existing surface water run-off rate of 16.8 l/s.

Figure 2 below provides Rainfall data gathered from the flood estimation handbook web service.

Rainfall modelling FEH22

FEH22

FEH13

☒ Design Rainfall

Duration *

6

Hours

Sliding

☐ Event Rarity

Return period *

100

Years

Depth

63.27 mm

A design rainfall of 63.27 mm was calculated.

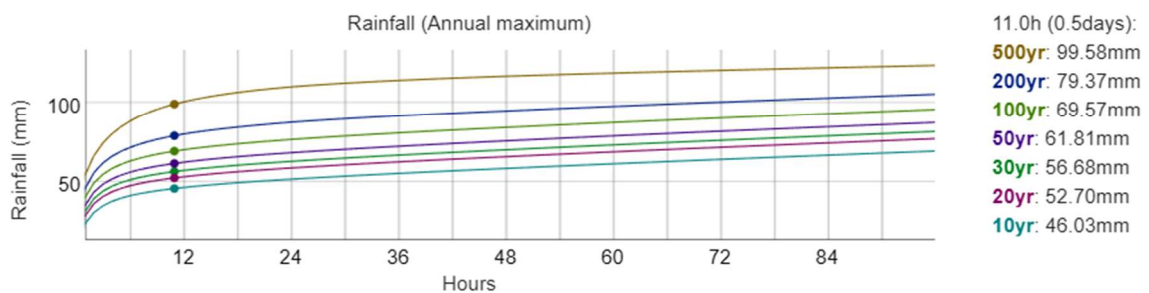
This design rainfall has been calculated for a return period on the annual maximum scale.

☒ Annual Max.☐ Peaks over threshold

Calculate



Export



Save graph as image

Close

9 SURFACE WATER DRAINAGE & SUDS

- 9.1 The total proposed impermeable area for the site is 1957 m²(0.196 ha). The proposed site's impermeable area serves the apartments' block roof and external paved areas. The impermeable area layout is included in Appendix D.
- 9.2 A hierarchal approach has been taken to consider the selection of SuDS for the surface water drainage system outfalls. In order of priority, the methods of surface water discharge considered are:
- via infiltration techniques
 - to the nearest watercourse
 - and to the nearest sewer.
- 9.3 As mentioned in section 7, infiltration techniques are not viable for discharging the proposed surface water run-off from the site. Discharging the proposed surface water run-off to the Anglian Water sewer is considered the most feasible option for the site. A proposed surface water sewer connection to Anglian Water manhole 1754 will be made.

- 9.4 Despite being a brownfield site and discharging surface water run-off to the sewer unrestricted, the proposed flow controls limit the flow off the site to as close as practicable to the greenfield run-off rates whilst ensuring that the system will endure minimal maintenance. Figure 3 below gives the greenfield discharge rates for the site;

Figure 3 Greenfield Run-off Rates – Using Proposed Site Impermeable Area

<u>Pre-development Discharge Rate</u>			
Site Makeup	Greenfield	Growth Factor 30 year	2.40
Greenfield Method	FEH	Growth Factor 100 year	3.19
Positively Drained Area (ha)	0.195	Betterment (%)	0
SAAR (mm)	744	QMed	1.2
Host	23	QBar	1.4
BFIHost	0.220	Q 1 year (l/s)	1.2
Region	6	Q 2 year (l/s)	1.2
QBar/QMed conversion factor	1.136	Q 30 year (l/s)	3.4
Growth Factor 1 year	0.85	Q 100 year (l/s)	4.5
Growth Factor 2 year	0.88		

- 9.5 The proposed restricted run-off rate is 1.4 l/s, which is a betterment of >91% compared to the existing 1 in 100-year run-off rate.
- 9.6 The proposed residential development will incorporate the use of SuDS techniques selected for their suitability given the site layout, topographical levels and geotechnical constraints. Refer to Appendix A to view the SuDS Hierarchy.
- 9.7 To summarise, the following SuDS devices will be applied to the scheme;

Permeable paving - To parking aisle and parking bays

Cellular Storage - To accommodate the run-off from all storm events, including peak 1 in 100 years, plus climate change storm events.

- 9.8 The new access roads and parking areas will be formed using permeable paving with a subbase lined in an impermeable membrane. This will delay run-off into the cellular storage and outfall via perforated pipes surrounded by granular material. Permeable paving also improves water quality prior to discharging to the wider SW network.
- 9.9 A minimum permeable stone layer of 375mm is required where the sub-base is laid level (<1:60).

9.10 All of the building's roof areas will be drained through conventional gravity drainage and cellular storage within the access road, providing attenuation during heavy or prolonged rainfall periods.

9.11 Appendix E provides the *Flow* software results summary for the 1 in 1, 1 in 30 (3.3%) (plus a 35% allowance for 'upper end' climate change) and 1 in 100 (1%) years (plus a 40% allowance for 'upper end' climate change) return period events for the crate storage. Refer to Appendix F for the surface water calculations and simulation.

9.12 The tables below summarise the greenfield run-off & post-development run-off rates and the storage volumes available within each SuDs feature.

Figure 4 Comparison of pre & post-development run-off rates

Location / Storm Event	Greenfield Rate (l/s)	Proposed Run-off Rate (l/s)
(QBar)	1.4	
1 in 1 year	1.2	0.9 l/s
1 in 2 year	1.2	0.9 l/s
1 in 30 year	3.4	1.1 l/s
1 in 100 year	4.5	1.2 l/s
1 in 100 year (+40%cc)	-	1.4 l/s

Figure 5 Storage volumes available within each SuDS feature

LOCATION	SuDS DEVICE	AVAILABLE STORAGE
Parking bays and Parking Aisle	Granular sub-base /Permeable Paving:670m ² x 0.375m subbase	Not storage structure
Cellular storage	Cellular system Area (100m ² x 1.5m)	150 m ³ Please note that a 95% void ratio has been used in the calculation.

10 FOUL WATER DRAINAGE

10.1 The proposed building's apartments-facing car park will be connected to the existing foul sewer manhole reference no:1800 located at Old Charlton Road via gravity-fed connection. Also, south of the building and apartments facing Old Charlton Road will be discharged downstream of the existing foul sewer located at Old Charlton Road via a gravity-fed connection.

10.2 The drainage strategy layout is included in Appendix D.

11 CONCLUSION

- 11.1 The site is in flood zone 1. Sources of flooding and their impacts have been assessed. There will be no increase in flood risk either on-site or offsite.
- 11.2 The foul water drainage for the proposed buildings will connect via a gravity drain to the existing Anglian Water foul sewer manhole located in Old Charlton Road.
- 11.3 A hierarchal approach has been considered to the selection of SuDS features for the surface water drainage system and their outfalls.
- 11.4 The ground conditions are not suitable for the infiltration techniques. Discharging the proposed surface water run-off to the Anglian Water sewer is considered the most appropriate option for the site.
- 11.5 SuDS features such as permeable paving and cellular storage tanks have been proposed to store/control the surface water run-off for development.
- 11.6 The proposed surface water run-off for up to 1 in 100 years of storm events plus 40% climate change has been controlled via a surface water package pumping station that is as close as possible to the greenfield run-off rate. Refer to Figure 3 for greenfield run-off and proposed run-off.
- 11.7 The proposed restricted run-off rate is 1.4 l/s, which is a betterment of >91% compared to the existing 1 in 100-year run-off rate.
- 11.8 A Management and Maintenance has been prepared regime has been set up for the drainage generally and all the SuDS features. The responsibility for maintaining all elements of the development remains with McCarthy Stone until it is handed over to the in-house management company. Refer to Appendix F for detailed information.

12 ENCLOSURES

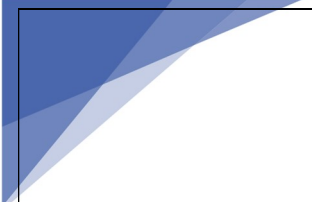
- 12.1 Appendix A includes the SuDS Hierarchy.
- 12.2 Appendix B includes a copy of the Anglian Water asset search.
- 12.3 Appendix C includes a copy of the Topographical Site Survey.
- 12.4 Appendix D includes a copy of the Drainage Strategy Layouts.

12.5 Appendix E includes the Surface Water / SuDS calculations and simulation result.

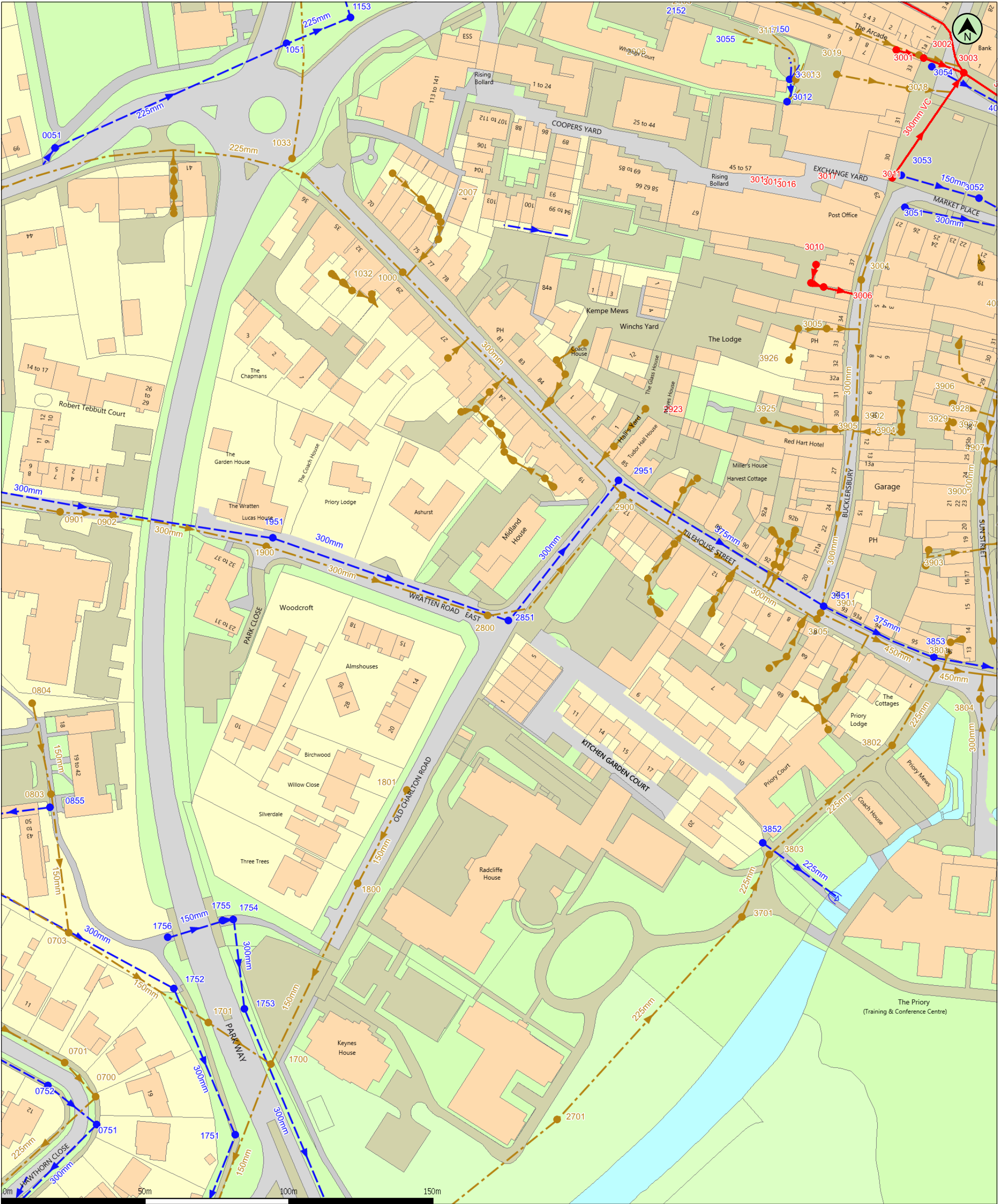
12.6 Appendix F includes the Draft Management & Maintenance Requirements report.

APPENDIX A – SUDS HIERARCHY

Most Sustainable	SUDS technique	Flood Reduction	Pollution Reduction	Landscape & Wildlife Benefit	Included in the scheme?	Comments
	Living roofs	✓	✓	✓		The proposed roof finishes preclude the use of green roofs
	Basins and ponds	✓	✓	✓		Given the proposed layout of this site, these SuDS features are not suitable.
	Filter strips and swales	✓	✓	✓		Given the site density and insufficient space that exists within site for these types of SuDS features.
	Infiltration devices	✓	✓	✓		The infiltration techniques are not viable due to impermeable soil strata. Alternative drainage outfall has been considered.
	Permeable surfaces and infiltration blanket	✓	✓		✓	Permeable paving is proposed to be used at the car park. This will assist in pollution reduction and the 'delay' of run-off.
Least Sustainable	Tanked systems-Over size Pipes	✓			✓	Cellular storage tanks are proposed to store extreme storm events and surface water run-off.



APPENDIX B – ANGLIAN WATER ASSET SEARCH



(c) Crown copyright and database rights 2024 Ordnance Survey 100022432
Data updated: 29/02/24

Scale: 1:1250
Map Centre: 518231,228904

Date: 28/03/24
Our Ref: 1433126 - 1

Wastewater Plan A3
Powered by digdat

Foul Sewer	---	Outfall*	⊕	Sewage Treatment Works	□
Surface Sewer	---	Inlet*	⊕	Public Pumping Station	●
Combined Sewer	---	Manhole*	●	Decommissioned Pumping Station	●
Final Effluent	---				
Rising Main*	---				
Private Sewer*	---				
Decommissioned Sewer*	---				

*(Colour denotes effluent type)

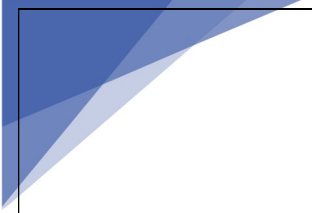
john.duncan@nrswa.net

Hitchin

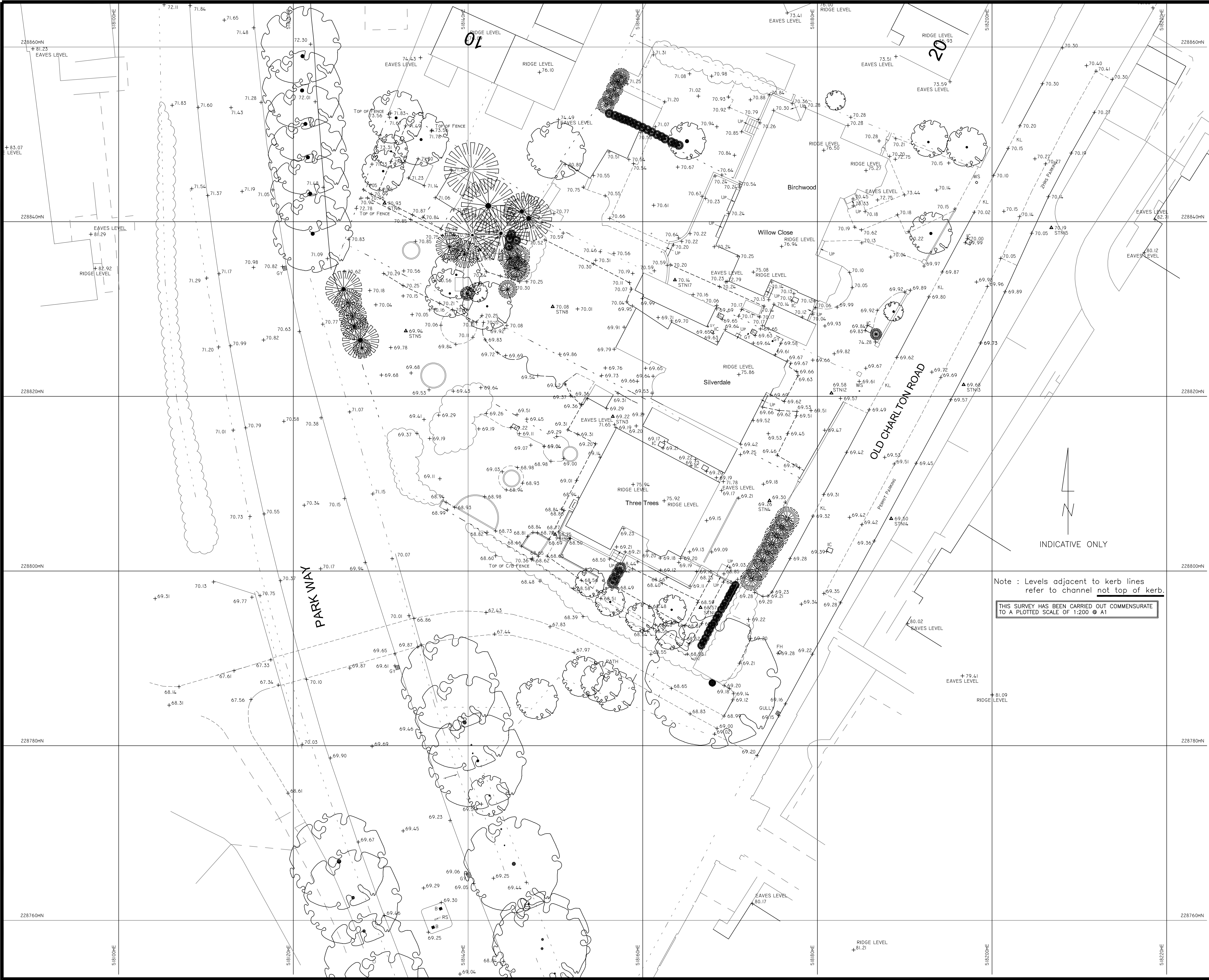


This plan is provided by Anglian Water pursuant its obligations under the Water Industry Act 1991 sections 198 or 199. It must be used in conjunction with any search results attached. The information on this plan is based on data currently recorded but position must be regarded as approximate. Service pipes, private sewers and drains are generally not shown. Users of this map are strongly advised to commission their own survey of the area shown on the plan before carrying out any works. The actual position of all apparatus MUST be established by trial holes. No liability whatsoever, including liability for negligence, is accepted by Anglian Water for any error or inaccuracy or omission, including the failure to accurately record, or record at all, the location of any water main, discharge pipe, sewer or disposal main or any item of apparatus. This information is valid for the date printed. This plan is produced by Anglian Water Services Limited (c) Crown copyright and database rights 2024 Ordnance Survey 100022432. This map is to be used for the purposes of viewing the location of Anglian Water plant only. Any other uses of the map data or further copies is not permitted. This notice is not intended to exclude or restrict liability for death or personal injury resulting from negligence.

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
3001	C	66.29	64.91	1.38
3002	C	66.23	64.49	1.74
3003	C	65.9	62.7	3.2
3006	C	66.43	65.53	0.9
3010	C	66.86	66.15	0.71
3011	C	-	-	-
0700	F	-	-	-
0701	F	-	-	-
0703	F	-	-	-
0803	F	-	-	-
0804	F	-	-	-
0901	F	-	-	-
0902	F	-	-	-
1000	F	71.895	69.28	2.615
1032	F	-	-	0.57
1033	F	73.213	-	-
1700	F	-	-	-
1701	F	-	-	-
1800	F	-	-	-
1801	F	-	-	-
1900	F	-	-	-
2701	F	64.492	63.132	1.36
2800	F	-	-	-
2900	F	-	-	-
3004	F	66.42	-	-
3005	F	-	-	-
3013	F	-	-	-
3018	F	-	-	-
3019	F	-	-	-
3701	F	64.558	62.468	2.09
3801	F	64.326	61.716	2.61
3802	F	64.482	62.062	2.42
3803	F	64.897	62.377	2.52
3804	F	64.166	61.776	2.39
3805	F	-	-	-
3900	F	-	-	-
3901	F	-	-	-
3902	F	-	-	-
3903	F	-	-	0.89
3904	F	-	-	0.44
3905	F	-	-	-
3906	F	-	-	-
3925	F	-	-	0.7
3926	F	-	-	0.44
3927	F	-	-	-
3928	F	-	-	-
3929	F	-	-	-
4807	F	-	-	-
4907	F	-	-	-
0051	S	-	-	-
0751	S	71.374	69.154	2.22
0752	S	72.053	69.243	2.81
0855	S	70.056	69.416	0.64
1051	S	-	-	-
1153	S	-	-	-
1751	S	68.874	67.654	1.22
1752	S	69.174	68.024	1.15
1753	S	-	-	-
1754	S	-	-	-
1755	S	-	-	-
1756	S	-	-	-
1951	S	73.168	71.348	1.82
2851	S	68.738	68.453	0.285
2951	S	66.904	65.444	1.46
3012	S	-	-	-
3051	S	-	-	-
3052	S	-	-	-
3053	S	-	-	-
3054	S	-	-	-
3056	S	-	-	-
3852	S	64.955	64.345	0.61



APPENDIX C – TOPOGRAPHICAL SITE SURVEY



DRG NO: PP/4134/HITCHIN/FI

LEGEND

- A AREA
- CATV CABLE TV SERVICE COVER
- CF CELLAR FLAP
- CP COAL PLATE
- E ELECTRICITY SUPPLY
- FH FIRE HYDRANT
- IC INSPECTION CHAMBER
- KL LOWERED KERB FOR ACCESS
- LP LAMP POST
- MH MANHOLE
- NP ROAD NAME PLATE
- PL PAVEMENT LIGHT
- RS ROAD SIGN
- STN SURVEY STATION
- T BT SERVICE BOX
- TCB TELEPHONE CALL BOX
- TL TRAFFIC LIGHTS
- TP TELEGRAPH POLE
- UP STEP ARROW
- DN RAMP ARROW
- (D) DEAD OR (P) POLLARDED TREE
- DECIDUOUS TREE (INDIVIDUALLY SHOWN)
- EVERGREEN TREE (INDIVIDUALLY SHOWN)
- TREES (DECIDUOUS) - PART OF A GROUP OF TREES

4134-Hitchin-F1.dwg

STATION CO-ORDINATES

STATION	TYPE	EASTING	NORTHING	LEVEL
STN13	NAIL	518196.744	228821.337	69.681
STN14	NAIL	518188.455	228806.008	69.500
STN15	NAIL	518206.788	228839.318	70.192

COORDINATE INFORMATION:
ALL LEVELS IN METRES TO ORDNANCE SURVEY
DATUM AND BASED ON NATIONAL GRID FROM RTK GPS
AND ADJUSTED INTO OS ACTIVE NETWORK

A	PARKWAY HIGHWAY DETAILS ADDED	RW	JAN 2025
REV	DRG. AMENDMENTS	BY	DATE

MCCARTHY & STONE

PROSPECT PLACE
HATFIELD
HERTS AL9 5DA

OLD CHARLTON ROAD

HITCHIN
SG5 2AJ

TOPOGRAPHICAL SURVEY

PROSPAPLANS
LIMITED

LAND & ENGINEERING SURVEYORS
O'HANA HOUSE
BEETLEY
NORFOLK
NR20 4FE

T: +44 (0) 1362 668504
E: INFO@PROSPAPLANS.COM
W: WWW.PROSPAPLANS.COM

Operating to ISO9001:2000

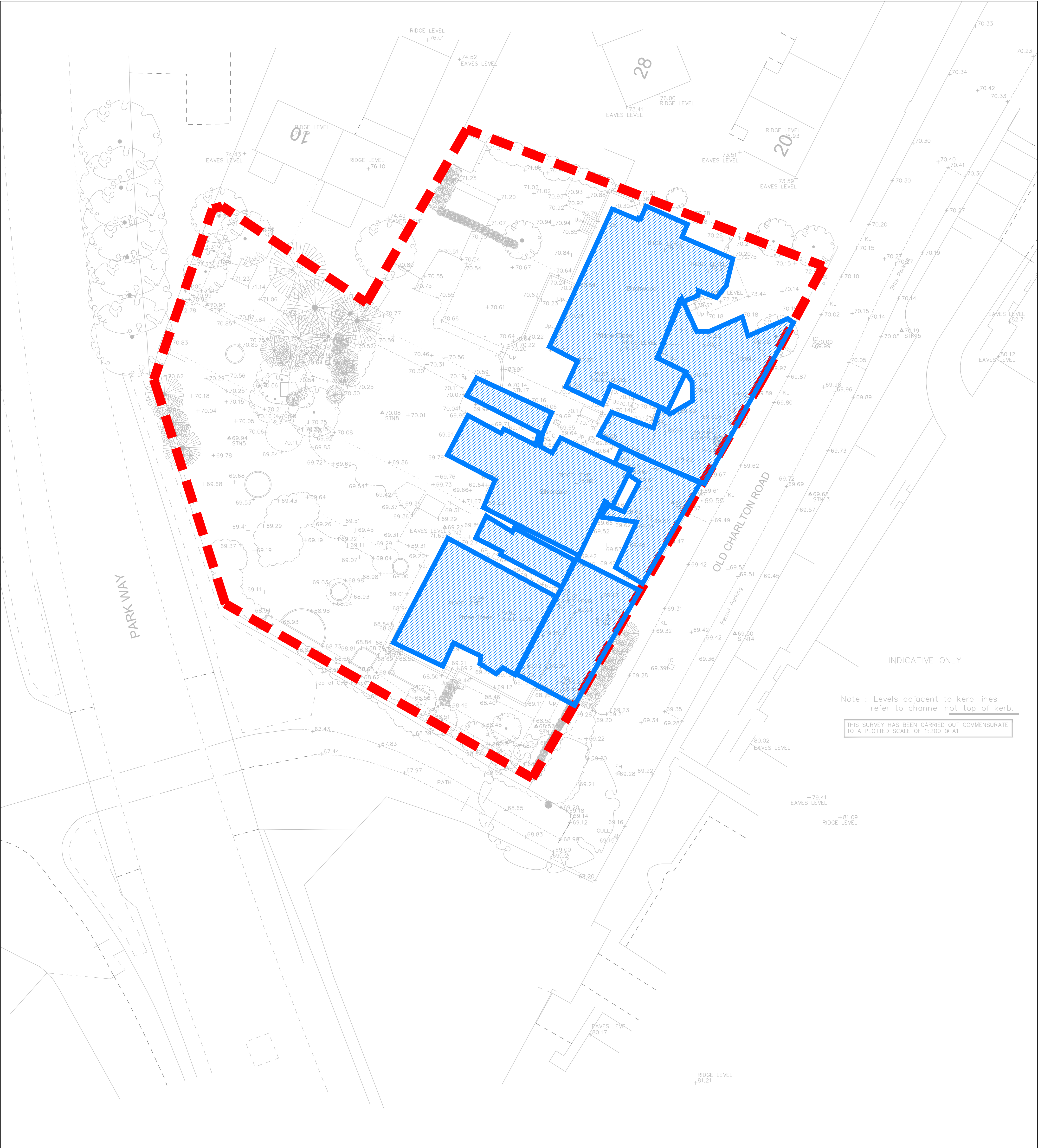
SCALE: 1:200@A1

DATE: MARCH 2024

DRAWN BY:	CHECKED BY:
R WELTON	G RUTHERFORD

DRG NO: PP/4134/HITCHIN/FI

APPENDIX D— PROPOSED DRAINAGE STRATEGY LAYOUTS



INDICATIVE ONLY

Note : Levels adjacent to kerb lines refer to channel not top of kerb.

THIS SURVEY HAS BEEN CARRIED OUT COMMENSURATE TO A PLOTTED SCALE OF 1:200 @ A1

Key (Existing drainage area)

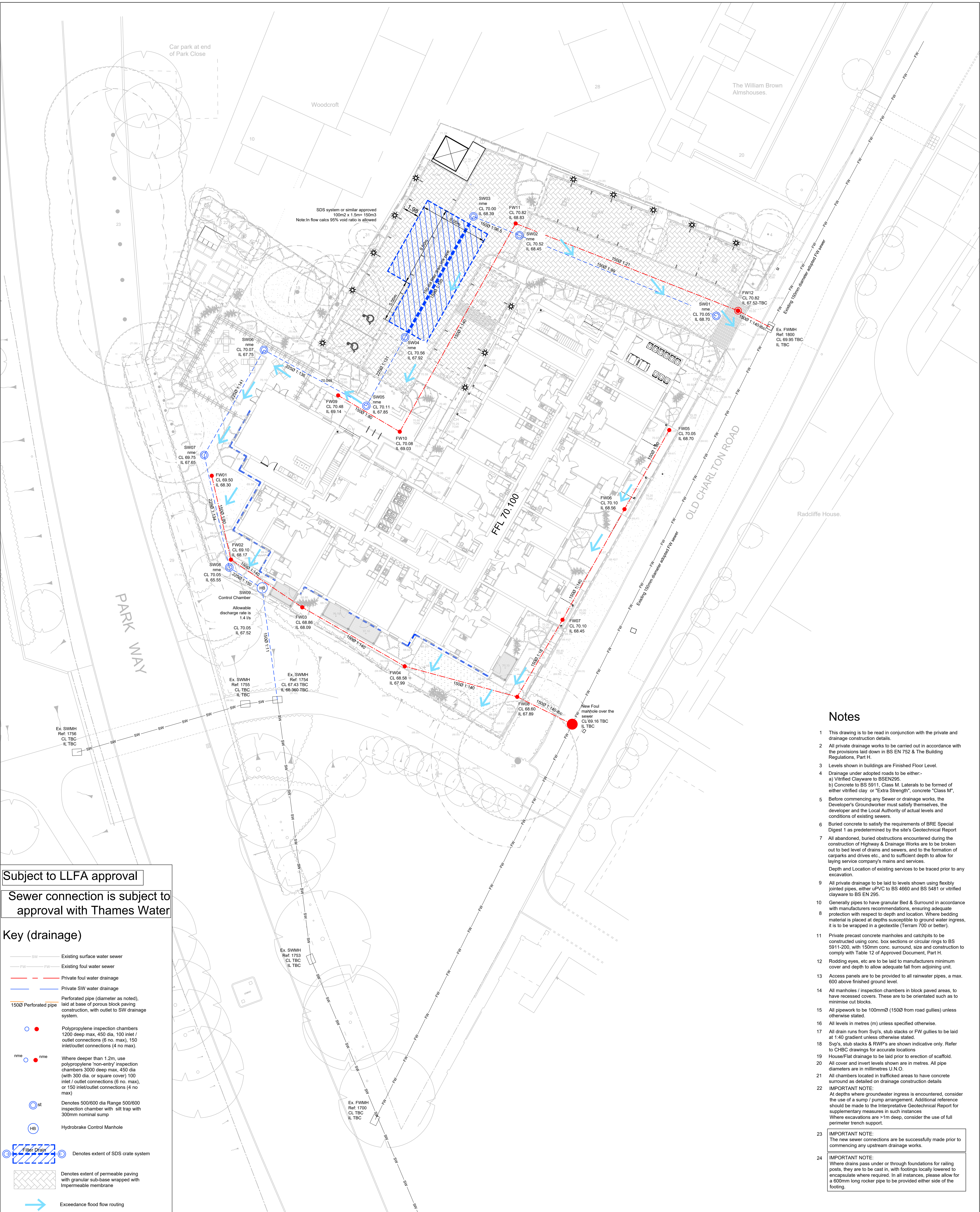
Existing Impermeable area
Approximately 960m2 (0.096 Ha)

Total Area
Approximately 960m2 (0.096 Ha)

Note

This drawing is to be read in conjunction with the private and drainage construction details.

PRELIMINARY ISSUE Status: Stage 3 Infrastructure Design Ltd Suite 44, Harborough Innovation Centre Airfield Business Park Leicester Road, Market Harborough Leicestershire LE16 7WB Tel: 01858 411570 Fax: 01858 411571 Email: info@infrades.co.uk URL: www.infrades.co.uk					 Scale : 1:200@A1 Date : March 2024 Checked: Approved: Drawn : IDL BM PT Title : Existing Drainage Area Layout Project : Old Charlton Road, Hitchin, Hertfordshire SG5 2AJ Drg. No: LSE-2983-03-DE-100 Rev: - File Ref: 1275-07-EDAP Plot Ref: LSE-2983-03-DE-100	 INFRASTRUCTURE DESIGN LTD EST 2000 working for McCARTHY STONE <i>Life, well lived</i>
	- Stage 3 Issue		28.03.25			
	Rev	Description	Date			



Subject to LLFA approval

Sewer connection is subject to approval with Thames Water

Key (drainage)

Legend for drainage symbols and notes:

- SW — Existing surface water sewer
- FW — Existing foul water sewer
- Private foul water drainage (red dashed line)
- Private SW water drainage (blue dashed line)
- 1500 Perforated pipe (diameter as noted), laid at base of porous block paving construction, with outlet to SW drainage system.
- Polypropylene inspection chambers 1200 deep max, 450 dia, 100 inlet / outlet connections (6 no. max), 150 inlet/outlet connections (4 no max).
- Where deeper than 1.2m, use polypropylene 'non-entry' inspection chambers 3000 deep max, 450 dia (with 300 dia. or square cover) 100 inlet / outlet connections (6 no. max), or 150 inlet/outlet connections (4 no max)
- st Denotes 500/600 dia Range 500/600 inspection chamber with silt trap with 300mm nominal sump
- HB Hydrobrake Control Manhole
- Filter Drain Denotes extent of SDS crate system
- Denotes extent of permeable paving with granular sub-base wrapped with Impermeable membrane
- Exceedance flood flow routing

- Notes
- This drawing is to be read in conjunction with the private and drainage construction details.
 - All private drainage works to be carried out in accordance with the provisions laid down in BS EN 752 & The Building Regulations, Part H.
 - Levels shown in buildings are Finished Floor Level.
 - Drainage under adopted roads to be either:
a) Vitrified Clayware to BS EN 295
b) Concrete to BS 5911, Class M. Laterals to be formed of either vitrified clay or "Extra Strength", concrete "Class M".
 - Before commencing any Sewer or drainage works, the Developer's Groundworker must satisfy themselves, the developer and the Local Authority of actual levels and conditions of existing sewers.
 - Buried concrete to satisfy the requirements of BRE Special Digest 1 as predetermined by the site's Geotechnical Report
 - All abandoned, buried obstructions encountered during the construction of Highway & Drainage Works are to be broken out to bed level of drains and sewers, and to the formation of carpark and drives etc., and to sufficient depth to allow for laying service company's mains and services.
Depth and Location of existing services to be traced prior to any excavation.
 - All private drainage to be laid to levels shown using flexibly jointed pipes, either uPVC to BS 4660 and BS 5481 or vitrified clayware to BS EN 295.
 - Generally pipes to have granular Bed & Surround in accordance with manufacturers recommendations, ensuring adequate protection with respect to depth and location. Where bedding material is placed at depths susceptible to ground water ingress, it is to be wrapped in a geotextile (Terram 700 or better).
 - Private precast concrete manholes and catchpits to be constructed using conc. box sections or circular rings to BS 5911-200, with 150mm conc. surround, size and construction to comply with Table 12 of Approved Document, Part H.
 - Rodding eyes, etc are to be laid to manufacturers minimum cover and depth to allow adequate fall from adjoining unit.
 - Access panels are to be provided to all rainwater pipes, a max. 600 above finished ground level.
 - All manholes / inspection chambers in block paved areas, to have recessed covers. These are to be orientated such as to minimise cut blocks.
 - All pipework to be 100mmØ (1500 from road gullies) unless otherwise stated.
 - All levels in metres (m) unless specified otherwise.
 - All drain runs from Svp's, stub stacks or FW gullies to be laid at 1:40 gradient unless otherwise stated.
 - Svp's, stub stacks & RWP's are shown indicative only. Refer to CHBC drawings for accurate locations.
 - House/Flat drainage to be laid prior to erection of scaffold.
 - All cover and invert levels shown are in metres. All pipe diameters are in millimetres U.N.O.
 - All chambers located in trafficked areas to have concrete surround as detailed on drainage construction details
 - IMPORTANT NOTE:
At depths where groundwater ingress is encountered, consider the use of a sump / pump arrangement. Additional reference should be made to the Interpretative Geotechnical Report for supplementary measures in such instances.
Where excavations are >1m deep, consider the use of full perimeter trench support.
 - IMPORTANT NOTE:
The new sewer connections are to be successfully made prior to commencing any upstream drainage works.
 - IMPORTANT NOTE:
Where drains pass under or through foundations for railing posts, they are to be cast in, with footings locally lowered to encapsulate where required. In all instances, please allow for a 600mm long rocker pipe to be provided either side of the footing.

PRELIMINARY
ISSUE

Status:

Stage 3

Infrastructure Design Ltd
Suite 44, Harborough Innovation Centre
Airfield Business Park
Leicester Road, Market Harborough
Leicestershire LE16 7WB
Tel: 01858 411570 Fax: 01858 411571
Email: info@infrades.co.uk URL: www.infrades.co.uk

Rev

Description

Date

A Exceedance flood flow route has been added

25.11.25

- Stage 3 Issue

28.03.25

Scale : 1:200@A1

Date : March 2024

Checked:

Approved:

Drawn : IDL

BM

PT

Title :

Proposed Drainage Layout

Project :

Old Charlton Road, Hitchin, Hertfordshire SG5 2AJ

Dwg. No:

Rev:

File Ref:

LSE-2983-03-DE-102

A

1275-07

Plot Ref:

LSE-2983-03-DE-102

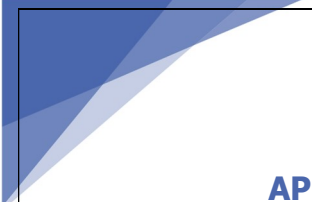
INFRASTRUCTURE DESIGN LTD

EST 2000

working for

McCarthy Stone

Life, well lived



APPENDIX E – SURFACE WATER DRAINAGE CALCULATIONS



Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	1.000
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	4.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	150.0		

Adoptable Manhole Type

Max Width (mm)	Diameter (mm)	Max Width (mm)	Diameter (mm)
374	1200	749	1500
499	1350	900	1800

>900 Link+900 mm

Max Depth (m)	Diameter (mm)	Max Depth (m)	Diameter (mm)
1.500	1050	99.999	1200

Circular Link Type

Shape	Circular	Auto Increment (mm)	75
Barrels	1	Follow Ground	x

Available Diameters (mm)

150	225	300	375
-----	-----	-----	-----

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
SW1	0.030	5.00	70.050	600	518191.074	228839.031	1.350
SW2	0.030	5.00	70.520	600	518168.154	228848.410	2.070
SW3	0.030	5.00	70.000	600	518162.795	228850.603	2.064
SW4	0.030	5.00	70.560	600	518154.842	228836.525	2.640
SW5	0.030	5.00	70.110	600	518150.339	228828.547	2.260
SW6	0.030	5.00	70.070	600	518138.407	228835.059	2.320
SW7	0.016	5.00	69.750	600	518131.460	228822.822	2.100
SW8			70.050	600	518134.375	228809.722	2.500
SW9			70.050	1200	518138.186	228807.320	2.530
SW10			67.430	1	518139.984	228794.334	1.070



Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
2.000	SW1	SW2	24.765	0.600	68.700	68.450	0.250	99.1	150	4.00	0.0
2.001	SW2	SW3	5.790	0.600	68.450	68.390	0.060	96.5	150	4.00	0.0
1.000	SW4	SW5	9.161	0.600	67.920	67.850	0.070	130.9	225	4.00	0.0
1.001	SW5	SW6	13.593	0.600	67.850	67.750	0.100	135.9	225	4.00	0.0
1.002	SW6	SW7	14.071	0.600	67.750	67.650	0.100	140.7	225	4.00	0.0
1.003	SW7	SW8	13.420	0.600	67.650	67.550	0.100	134.2	225	4.00	0.0
1.004	SW8	SW9	4.505	0.600	67.550	67.520	0.030	150.2	225	4.00	0.0
1.005	SW9	SW10	13.110	0.600	67.520	66.360	1.160	11.3	150	4.00	0.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
2.000	1.009	17.8	0.0	1.200	1.920	0.030	0.0
2.001	1.023	18.1	0.0	1.920	1.460	0.060	0.0
1.000	1.141	45.4	0.0	2.415	2.035	0.030	0.0
1.001	1.119	44.5	0.0	2.035	2.095	0.060	0.0
1.002	1.100	43.7	0.0	2.095	1.875	0.090	0.0
1.003	1.127	44.8	0.0	1.875	2.275	0.106	0.0
1.004	1.064	42.3	0.0	2.275	2.305	0.106	0.0
1.005	3.013	53.3	0.0	2.380	0.920	0.106	0.0

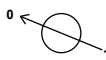
Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
2.000	24.765	99.1	150	Circular	70.050	68.700	1.200	70.520	68.450	1.920
2.001	5.790	96.5	150	Circular	70.520	68.450	1.920	70.000	68.390	1.460
1.000	9.161	130.9	225	Circular	70.560	67.920	2.415	70.110	67.850	2.035
1.001	13.593	135.9	225	Circular	70.110	67.850	2.035	70.070	67.750	2.095
1.002	14.071	140.7	225	Circular	70.070	67.750	2.095	69.750	67.650	1.875
1.003	13.420	134.2	225	Circular	69.750	67.650	1.875	70.050	67.550	2.275
1.004	4.505	150.2	225	Circular	70.050	67.550	2.275	70.050	67.520	2.305
1.005	13.110	11.3	150	Circular	70.050	67.520	2.380	67.430	66.360	0.920

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
2.000	SW1	600	Manhole	Adoptable	SW2	600	Manhole	Adoptable
2.001	SW2	600	Manhole	Adoptable	SW3	600	Manhole	Adoptable
1.000	SW4	600	Manhole	Adoptable	SW5	600	Manhole	Adoptable
1.001	SW5	600	Manhole	Adoptable	SW6	600	Manhole	Adoptable
1.002	SW6	600	Manhole	Adoptable	SW7	600	Manhole	Adoptable
1.003	SW7	600	Manhole	Adoptable	SW8	600	Manhole	Adoptable
1.004	SW8	600	Manhole	Adoptable	SW9	1200	Manhole	Adoptable
1.005	SW9	1200	Manhole	Adoptable	SW10	1	Manhole	Adoptable



Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
SW1	518191.074	228839.031	70.050	1.350	600	 0	2.000	68.700	150
SW2	518168.154	228848.410	70.520	2.070	600	 1	2.000	68.450	150
						0	2.001	68.450	150
SW3	518162.795	228850.603	70.000	2.064	600	 1	2.001	68.390	150
SW4	518154.842	228836.525	70.560	2.640	600	 0	1.000	67.920	225
SW5	518150.339	228828.547	70.110	2.260	600	 1	1.000	67.850	225
						0	1.001	67.850	225
SW6	518138.407	228835.059	70.070	2.320	600	 1	1.001	67.750	225
						0	1.002	67.750	225
SW7	518131.460	228822.822	69.750	2.100	600	 1	1.002	67.650	225
						0	1.003	67.650	225
SW8	518134.375	228809.722	70.050	2.500	600	 1	1.003	67.550	225
						0	1.004	67.550	225
SW9	518138.186	228807.320	70.050	2.530	1200	 1	1.004	67.520	225
						0	1.005	67.520	150
SW10	518139.984	228794.334	67.430	1.070	1	 1	1.005	66.360	150

Simulation Settings

Rainfall Methodology	FEH-22	Skip Steady State	✓	1 year (l/s)	1.2
Rainfall Events	Singular	Drain Down Time (mins)	10080	2 year (l/s)	1.2
Summer CV	1.000	Additional Storage (m³/ha)	20.0	30 year (l/s)	3.4
Winter CV	1.000	Starting Level (m)		100 year (l/s)	4.5
Analysis Speed	Detailed	Check Discharge Rate(s)	✓	Check Discharge Volume	x

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	



Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	0	0	0
30	35	0	0
100	0	0	0
100	40	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	2.40
Greenfield Method	FEH	Growth Factor 100 year	3.19
Positively Drained Area (ha)	0.195	Betterment (%)	0
SAAR (mm)	744	QMed	1.2
Host	23	QBar	1.4
BFIHost	0.220	Q 1 year (l/s)	1.2
Region	6	Q 2 year (l/s)	1.2
QBar/QMed conversion factor	1.136	Q 30 year (l/s)	3.4
Growth Factor 1 year	0.85	Q 100 year (l/s)	4.5
Growth Factor 2 year	0.88		

Node SW9 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	67.520	Product Number	CTL-SHE-0048-1400-1850-1400
Design Depth (m)	1.850	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.4	Min Node Diameter (mm)	1200

Node SW4 Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Main Channel Length (m)	16.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	67.920	Main Channel Slope (1:X)	1000.0
Safety Factor	2.0	Time to half empty (mins)	1020	Main Channel n	0.030

Inlets SW3

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	100.0	0.0	0.750	100.0	0.0	1.500	100.0	0.0	1.501	0.0	0.0



Results for 2 year Critical Storm Duration. Lowest mass balance: 95.22%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW1	10	68.754	0.054	5.1	0.0395	0.0000	OK
15 minute summer	SW2	10	68.538	0.088	10.1	0.0503	0.0000	OK
360 minute winter	SW3	336	68.217	0.281	2.7	0.1608	0.0000	OK
360 minute winter	SW4	336	68.217	0.297	2.4	0.1512	0.0000	SURCHARGED
360 minute winter	SW5	336	68.216	0.366	1.7	0.2008	0.0000	SURCHARGED
360 minute winter	SW6	336	68.216	0.466	1.9	0.2523	0.0000	SURCHARGED
360 minute winter	SW7	336	68.216	0.566	1.5	0.2464	0.0000	SURCHARGED
360 minute winter	SW8	336	68.216	0.666	1.2	0.1886	0.0000	SURCHARGED
360 minute winter	SW9	336	68.216	0.696	1.0	0.7876	0.0000	SURCHARGED
15 minute summer	SW10	1	66.360	0.000	0.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW1	2.000	SW2	5.0	0.611	0.281	0.2037	
15 minute summer	SW2	2.001	SW3	9.9	0.986	0.546	0.0581	
360 minute winter	SW3	Flow through pond	SW4	1.1	0.011	0.000	27.4190	
360 minute winter	SW4	1.000	SW5	1.3	0.431	0.029	0.3643	
360 minute winter	SW5	1.001	SW6	1.5	0.442	0.034	0.5406	
360 minute winter	SW6	1.002	SW7	1.4	0.461	0.032	0.5596	
360 minute winter	SW7	1.003	SW8	1.2	0.391	0.027	0.5337	
360 minute winter	SW8	1.004	SW9	1.0	0.165	0.024	0.1792	
360 minute winter	SW9	Hydro-Brake®	SW10	0.9				49.3



Results for 30 year Critical Storm Duration. Lowest mass balance: 95.22%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW1	11	68.872	0.172	13.8	0.1250	0.0000	SURCHARGED
15 minute summer	SW2	11	68.716	0.266	26.2	0.1526	0.0000	SURCHARGED
360 minute winter	SW3	352	68.691	0.755	5.4	0.4326	0.0000	OK
360 minute winter	SW4	352	68.691	0.771	5.2	0.3932	0.0000	SURCHARGED
360 minute winter	SW5	352	68.691	0.841	3.2	0.4609	0.0000	SURCHARGED
360 minute winter	SW6	352	68.691	0.941	1.8	0.5091	0.0000	SURCHARGED
360 minute winter	SW7	352	68.691	1.041	1.8	0.4528	0.0000	SURCHARGED
360 minute winter	SW8	352	68.691	1.141	1.6	0.3228	0.0000	SURCHARGED
360 minute winter	SW9	352	68.691	1.171	1.2	1.3241	0.0000	SURCHARGED
15 minute summer	SW10	1	66.360	0.000	0.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW1	2.000	SW2	13.1	0.753	0.737	0.4360	
15 minute summer	SW2	2.001	SW3	25.9	1.472	1.434	0.1005	
360 minute winter	SW3	Flow through pond	SW4	1.0	0.018	0.000	72.5018	
360 minute winter	SW4	1.000	SW5	-3.1	0.438	-0.068	0.3643	
360 minute winter	SW5	1.001	SW6	-1.4	0.462	-0.032	0.5406	
360 minute winter	SW6	1.002	SW7	1.6	0.489	0.035	0.5596	
360 minute winter	SW7	1.003	SW8	1.6	0.369	0.036	0.5337	
360 minute winter	SW8	1.004	SW9	1.2	0.200	0.027	0.1792	
360 minute winter	SW9	Hydro-Brake®	SW10	1.1				102.0



Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 95.22%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW1	11	69.170	0.470	18.6	0.3414	0.0000	SURCHARGED
480 minute winter	SW2	464	68.998	0.548	3.8	0.3143	0.0000	SURCHARGED
480 minute winter	SW3	464	68.998	1.062	5.7	0.6088	0.0000	OK
480 minute winter	SW4	464	68.998	1.078	5.4	0.5500	0.0000	SURCHARGED
480 minute winter	SW5	464	68.998	1.148	3.3	0.6293	0.0000	SURCHARGED
480 minute winter	SW6	464	68.998	1.248	1.9	0.6753	0.0000	SURCHARGED
480 minute winter	SW7	464	68.998	1.348	1.8	0.5865	0.0000	SURCHARGED
480 minute winter	SW8	464	68.998	1.448	1.5	0.4098	0.0000	SURCHARGED
480 minute winter	SW9	464	68.998	1.478	1.3	1.6717	0.0000	SURCHARGED
15 minute summer	SW10	1	66.360	0.000	1.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW1	2.000	SW2	17.7	1.007	0.993	0.4360	
480 minute winter	SW2	2.001	SW3	3.8	0.777	0.210	0.1019	
480 minute winter	SW3	Flow through pond	SW4	0.9	0.016	0.000	101.7088	
480 minute winter	SW4	1.000	SW5	-3.2	0.441	-0.071	0.3643	
480 minute winter	SW5	1.001	SW6	-1.4	0.464	-0.032	0.5406	
480 minute winter	SW6	1.002	SW7	1.6	0.479	0.037	0.5596	
480 minute winter	SW7	1.003	SW8	1.5	0.380	0.034	0.5337	
480 minute winter	SW8	1.004	SW9	1.3	0.200	0.030	0.1792	
480 minute winter	SW9	Hydro-Brake®	SW10	1.3				143.0



Results for 100 year Critical Storm Duration. Lowest mass balance: 95.22%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW1	11	69.088	0.388	17.3	0.2821	0.0000	SURCHARGED
360 minute winter	SW2	352	68.891	0.441	4.4	0.2528	0.0000	SURCHARGED
360 minute winter	SW3	352	68.891	0.955	6.7	0.5474	0.0000	OK
360 minute winter	SW4	352	68.891	0.971	6.4	0.4953	0.0000	SURCHARGED
360 minute winter	SW5	352	68.891	1.041	4.1	0.5706	0.0000	SURCHARGED
360 minute winter	SW6	352	68.891	1.141	2.2	0.6174	0.0000	SURCHARGED
360 minute winter	SW7	352	68.891	1.241	2.2	0.5399	0.0000	SURCHARGED
360 minute winter	SW8	352	68.891	1.341	2.0	0.3795	0.0000	SURCHARGED
360 minute winter	SW9	352	68.891	1.371	1.2	1.5505	0.0000	SURCHARGED
15 minute summer	SW10	1	66.360	0.000	1.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW1	2.000	SW2	16.6	0.941	0.928	0.4360	
360 minute winter	SW2	2.001	SW3	4.5	0.808	0.248	0.1019	
360 minute winter	SW3	Flow through pond	SW4	1.2	0.018	0.000	91.5248	
360 minute winter	SW4	1.000	SW5	-3.9	0.466	-0.087	0.3643	
360 minute winter	SW5	1.001	SW6	-1.9	0.492	-0.042	0.5406	
360 minute winter	SW6	1.002	SW7	2.0	0.480	0.046	0.5596	
360 minute winter	SW7	1.003	SW8	2.0	0.360	0.044	0.5337	
360 minute winter	SW8	1.004	SW9	1.2	0.200	0.029	0.1792	
360 minute winter	SW9	Hydro-Brake®	SW10	1.2				124.0



Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 95.22%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW1	11	69.579	0.879	24.2	0.6391	0.0000	SURCHARGED
600 minute winter	SW2	585	69.369	0.919	4.0	0.5264	0.0000	SURCHARGED
600 minute winter	SW3	585	69.369	1.433	5.8	0.8209	0.0000	OK
600 minute winter	SW4	585	69.369	1.449	5.6	0.7388	0.0000	SURCHARGED
600 minute winter	SW5	585	69.369	1.519	3.5	0.8321	0.0000	SURCHARGED
600 minute winter	SW6	585	69.368	1.618	2.0	0.8755	0.0000	SURCHARGED
600 minute winter	SW7	585	69.368	1.718	2.0	0.7474	0.0000	SURCHARGED
600 minute winter	SW8	585	69.368	1.818	1.5	0.5145	0.0000	SURCHARGED
600 minute winter	SW9	585	69.368	1.848	1.4	2.0902	0.0000	SURCHARGED
15 minute summer	SW10	1	66.360	0.000	1.1	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW1	2.000	SW2	22.6	1.285	1.268	0.4360	
600 minute winter	SW2	2.001	SW3	3.8	0.755	0.209	0.1019	
600 minute winter	SW3	Flow through pond	SW4	1.0	0.017	0.000	136.8335	
600 minute winter	SW4	1.000	SW5	-3.4	0.445	-0.075	0.3643	
600 minute winter	SW5	1.001	SW6	1.6	0.456	0.036	0.5406	
600 minute winter	SW6	1.002	SW7	1.8	0.454	0.041	0.5596	
600 minute winter	SW7	1.003	SW8	1.5	0.372	0.032	0.5337	
600 minute winter	SW8	1.004	SW9	1.4	0.163	0.033	0.1792	
600 minute winter	SW9	Hydro-Brake®	SW10	1.4				190.9

APPENDIX F – MANAGEMENT & MAINTENANCE REGIME

The Management Company

The responsibility for maintenance of all elements of the development remains with McCarthy and Stone Lifestyle Developments Ltd until handed over to the Management Company. Once handed over, the building will be managed by McCarthy & Stone Management Services (MSMS) who are the in-house management company for McCarthy & Stone. Following handover MSMS is responsible for all aspects of the maintenance. Handover of the building to the Management Company typically takes place prior to occupation. At handover the Management Company and Managing Agent receive as built information together with operating and maintenance manuals which detail all maintenance protocols.

Within the first two years from first occupations, there is a two year warranty on the communal parts of the building. There is also a two year warranty on the individual apartments which commences from the date of legal completion of the individual apartment. Defects should be reported to the Estates Manager who is an employee of MSMS and they will log the defect with McCarthy & Stone's Customer Services team.

On-site Surface Water Drainage System (generally)

The principle means of surface water disposal from the development is by way of direct connection to a wider SuDS network, with details supplied by PBA.

The Management Company will ensure that the following measures are undertaken to ensure the longevity of the surface water drainage system;

Every 6 months: Remove silt build up from **all** catchpits and road gullies.

Annually: elect approx. 20% of the development's surface water inspection chambers (situated in accessible non-private areas) and inspect for blockages / silt build up. Remove silt and debris. Rotate on a 5 yearly cycle to cover all such chambers over this period.

Every 2-5 years (depending on outcome of aforementioned inspections)

Commission a CCTV survey and report on condition of the surface water piped drainage system upstream of the soakaways to check for structural integrity and hydraulic fluidity. Carry out promptly any remedial work as advised by CCTV company.

Cellular storage tank

The principle means of surface water attenuation/disposal from the development is by way of cellular soakaways storage.

The Management Company will ensure that the following measures are undertaken to ensure the longevity of the surface water drainage system;

Inspections to identify any areas not operating correctly, pollution, blocked inlets or outlets, standing water etc.

Collect and remove from site all extraneous rubbish that is detrimental to the operation or detract from the appearance of the site, including paper, bottles, cans and similar debris.

Permeable Paving

External parking areas and access roads are to be constructed in permeable block paving in order to;

- a) Delay the surface water run-off from these areas, and
- b) Enhance the quality of the rainwater prior to discharge into the receiving sewer.

The Management Company will ensure that the following measures are undertaken to ensure the longevity of the pervious pavement;

Quarterly

- Inspect the pervious pavement for signs of ponding and ensure there is no migration of soils from adjacent landscaped areas or other deleterious material that may prematurely clog up the jointing stone situated in the gaps between the blocks. Ideally this type of inspection should be undertaken immediately following a heavy rainfall event.
- Commission vacuum sweeping and brushing of the pervious pavement to ensure joints are kept free of silt. Minimum 3 sweeping per year, thus;
 - a) End of Winter (April) – to collect winter debris
 - b) Mid-Summer (July/August) – to collect dust, flower and grass-type deposits.
 - c) After Autumn leaf fall (November)

The company commissioned to carry out this work should ensure that their vacuum equipment is adjusted accordingly to avoid the removal of jointing material.

Any lost material should be replaced promptly to avoid the blocks from being dislodged.

Last Resort Remedial Action

- i) Should a portion of the pervious pavement become substantially impervious due to excessive siltation, the following procedure should be followed;
 - a) Lift block paving and laying course
 - b) Break out underlying bitmac base layer and replace with similar compacted depth of course aggregate subbase material to BS EN 13242:2002 Type 4/20, wrapped in geotextile as Terram 1000 or similar.
 - c) Renew laying course, replace blocks and renew jointing material

NB. Material removed from the voids or the layers below the surface may contain heavy metals and hydrocarbons and as such may need to be disposed of as 'controlled waste'. Sediment testing should be carried out before disposal to confirm its classification and appropriate disposal methods.

Renew laying course, replace blocks and renew jointing material. NB. Material removed from the voids or the layers below the surface may contain heavy metals and hydrocarbons and as such may need to be disposed of as 'controlled waste'. Sediment testing should be carried out before disposal to confirm its classification and appropriate disposal methods.



Control Chamber

A system of regular inspections should be established, initially these inspections should be carried out in October and March, however, this may be modified to suit observations over time. Items to be observed and cleared are high levels of grit, leaves and other such detritus. The main aim of these inspections will be to prevent siltation of the system, which, if allowed to develop may reduce the effectiveness of the system by clogging the soakage medium.

All inlets into the chamber and the well head should be checked to ensure unimpeded flow, with the emphasis being on the removal of any silt/detritus build up within the chamber.