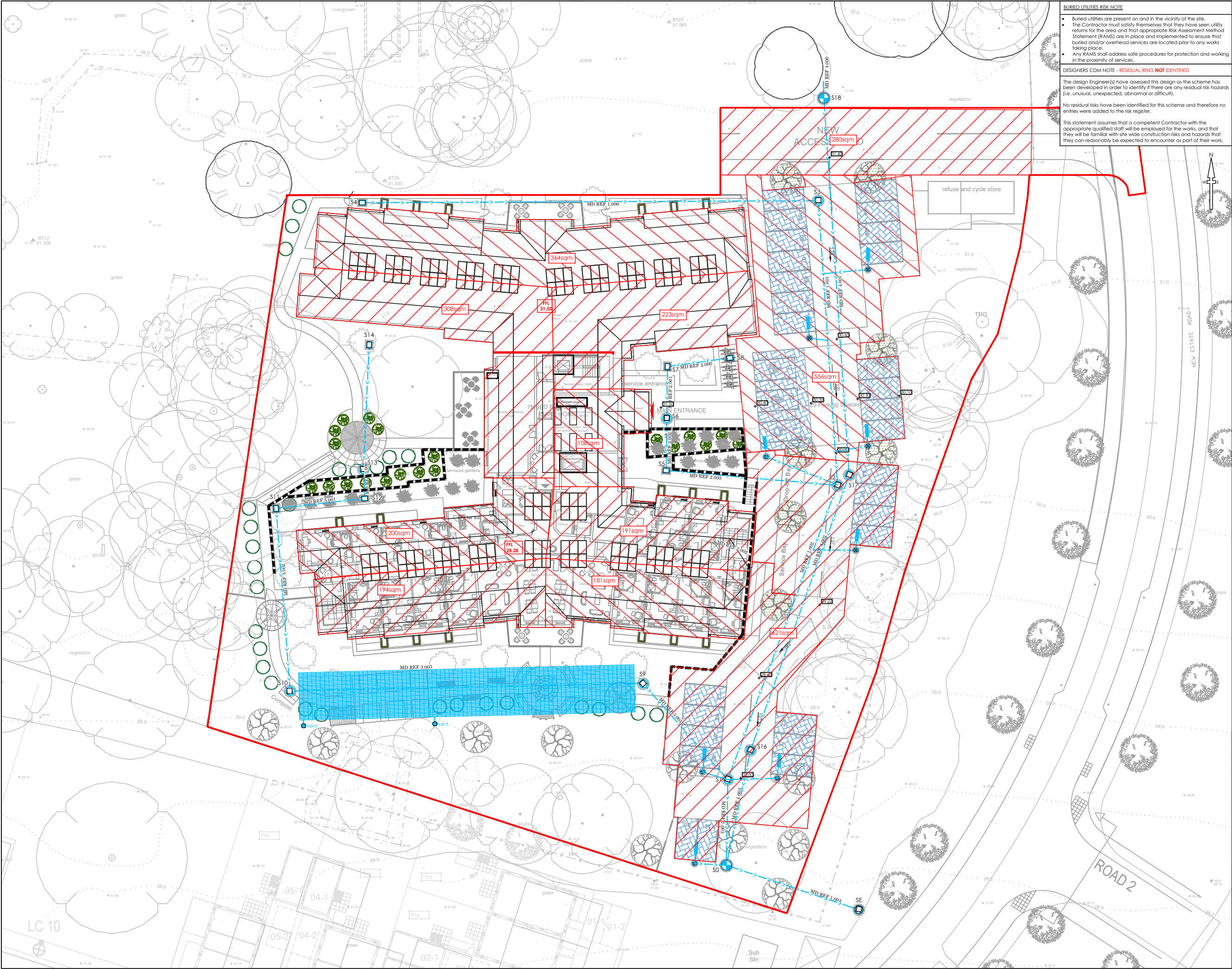




BURIED UTILITIES RISK NOTE

- Buried utilities are present on and in the vicinity of the site.
- The Contractor must satisfy themselves that they have seen utility returns for the area and that appropriate Risk Assessment Method Statement (RAMS) are in place and implemented to ensure that buried and/or overhead services are located prior to any works taking place.
- Any RAMS shall address safe procedures for protection and working in the proximity of services.

DESIGNERS CDM NOTE - RESIDUAL RISKS NOT IDENTIFIED

The design Engineer(s) have assessed this design as the scheme has been developed in order to identify if there are any residual risk hazards (i.e. unusual, unexpected, abnormal or difficult).

No residual risks have been identified for this scheme and therefore no entries were added to the risk register.

This statement assumes that a competent Contractor with the appropriate qualified staff will be employed for the works, and that they will be familiar with site wide construction risks and hazards that they can reasonably be expected to encounter as part of their work.

NOTES

- All dimensions and levels are in metres unless otherwise noted
- This drawing is to be read in conjunction with the relevant Architect's/Engineer's drawings, specifications and CDM documentation
- This drawings has been produced electronically and may have been photo reduced or enlarged when copied. Work to figured dimensions only (DO NOT SCALE). All dimensions to be checked on site. Any errors or omissions to be reported to the engineer immediately.
- This drawing contains coloured lines / information that may not be clear if reproduced in black and white.
- Digital copies of this plan can only be considered accurate if supplied directly by Infrastruct CS Ltd.

Construction Note

It is essential that new drainage associated with the development is laid from the outfall(s) into the site. This is essential to avoid unforeseen obstructions where encountered (such as services). If the drainage is laid from the site out to the outfall it can result in significant abortive works to relay and overcome such obstructions.

Location of Public Sewers have been taken from record drawings which should be fully substantiated by the contractor prior to commencing works on site

All manholes covers located within carriageways shall have no slip covers to prevent motorcycles/cycles losing control

P03	NJ	TST	Amended in line with updated site layout	04/05/23
P02	NJ	TST	Amended in line with updated site layout	14/08/20
P01	NJ	TST	Initial issue	16/04/20
REV	DRAWN	CHECK	REVISION COMMENTS	ISSUE DATE
DRAWING TITLE				SHEET NO.
Proposed Drainage Areas				1/1
PROJECT				
Helmsley House Bartons Road				
CLIENT		 Infrastruct CS Ltd		
Brackley Investments Ltd				
SCALE @ A1				
1:200				
PROJECT NUMBER		STATUS		ENGINEER
2709		S2		TST
PROJECT		INFORMATION		
ORIGIN		PHASE		DR-41
HELM		ICS		AC
LEVEL		TYPE		APPROVED
01		XX		DJ
ROLE		NO.		REVISION
DR		C		0201 P03



Appendix F - Microdrainage Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	19.800	Add Flow / Climate Change (%)	0
Ratio R	0.345	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Inverts

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.350	4-8	0.194

Total Area Contributing (ha) = 0.544

Total Pipe Volume (m³) = 13.954

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	53.000	0.883	60.0	0.036	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	33.000	2.200	15.0	0.083	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	7.500	0.125	60.0	0.022	5.00	0.0	0.600	o	150	Pipe/Conduit	
2.001	6.000	0.100	60.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.002	6.000	0.060	100.0	0.010	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.003	20.000	0.200	100.0	0.019	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	36.500	0.243	150.2	0.062	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.000	3.500	0.044	80.0	0.030	5.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.68	30.532	0.036	0.0	0.0	0.0	1.30	23.0	4.9
1.001	50.00	5.84	29.574	0.119	0.0	0.0	0.0	3.40	135.0	16.1
2.000	50.00	5.10	30.634	0.022	0.0	0.0	0.0	1.30	23.0	3.0
2.001	50.00	5.17	30.509	0.022	0.0	0.0	0.0	1.30	23.0	3.0
2.002	50.00	5.27	27.709	0.032	0.0	0.0	0.0	1.00	17.8	4.3
2.003	50.00	5.53	27.649	0.051	0.0	0.0	0.0	1.31	52.0	6.9
1.002	50.00	6.32	27.365	0.232	0.0	0.0	0.0	1.28	90.5	31.4
3.000	50.00	5.05	27.656	0.030	0.0	0.0	0.0	1.12	19.9	4.1

Infrastruct CS Ltd		Page 2
The Stables High Cogges, Witney Oxfordshire, OX29 6UN		
Date 04/05/2023 13:25	Designed by Tim.Trotman	
File Site SW.MDX	Checked by	
Innovyze	Network 2020.1.3	

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
3.001	10.500	0.131	80.0	0.020	0.00	0.0	0.600	o	150	Pipe/Conduit	
3.002	21.500	0.269	79.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
3.003	41.000	0.082	500.0	0.019	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.004	15.000	0.075	200.0	0.018	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	10.000	0.050	200.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
4.000	1.000	0.040	25.0	0.225	5.00	0.0	0.600	o	225	Pipe/Conduit	
4.001	44.000	1.760	25.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
4.002	34.000	1.360	25.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
4.003	13.500	0.166	81.3	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.004	16.000	0.356	44.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
3.001	50.00	5.21	27.612	0.050	0.0	0.0	0.0	1.12	19.9	6.8
3.002	50.00	5.53	27.481	0.050	0.0	0.0	0.0	1.13	19.9	6.8
3.003	50.00	6.71	27.212	0.069	0.0	0.0	0.0	0.58	23.0	9.3
3.004	50.00	6.93	27.130	0.087	0.0	0.0	0.0	1.11	78.3	11.8
1.003	50.00	7.08	27.055	0.319	0.0	0.0	0.0	1.11	78.3	43.2
4.000	50.00	5.01	30.256	0.225	0.0	0.0	0.0	2.63	104.5	30.5
4.001	50.00	5.29	30.216	0.225	0.0	0.0	0.0	2.63	104.5	30.5
4.002	50.00	5.50	28.456	0.225	0.0	0.0	0.0	2.63	104.5	30.5
4.003	50.00	5.66	27.096	0.225	0.0	0.0	0.0	1.45	57.7	30.5
1.004	50.00	7.26	27.006	0.544	0.0	0.0	0.0	1.50	26.6«	73.7

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	150	1	31.400	30.532	0.718	Open Manhole	1200
1.001	o	225	2	31.200	29.574	1.401	Open Manhole	1200
2.000	o	150	4	31.400	30.634	0.616	Open Manhole	1200
2.001	o	150	5	31.400	30.509	0.741	Open Manhole	1200
2.002	o	150	6	31.500	27.709	3.641	Open Manhole	1200
2.003	o	225	6	28.280	27.649	0.406	Open Manhole	1200
1.002	o	300	7	29.850	27.365	2.185	Open Manhole	1200
3.000	o	150	8	30.500	27.656	2.694	Open Manhole	1200
3.001	o	150	9	28.250	27.612	0.488	Open Manhole	1200
3.002	o	150	10	28.250	27.481	0.619	Open Manhole	1200
3.003	o	225	11	28.250	27.212	0.813	Open Manhole	1200
3.004	o	300	12	28.250	27.130	0.820	Open Manhole	1200
1.003	o	300	13	28.000	27.055	0.645	Open Manhole	1200
4.000	o	225	14	31.500	30.256	1.019	Open Manhole	1200
4.001	o	225	15	31.500	30.216	1.059	Open Manhole	1200
4.002	o	225	16	29.850	28.456	1.169	Open Manhole	1200
4.003	o	225	17	28.150	27.096	0.829	Open Manhole	1200
1.004	o	150	18	28.200	27.006	1.044	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	53.000	60.0	2	31.200	29.649	1.401	Open Manhole	1200
1.001	33.000	15.0	7	29.850	27.374	2.251	Open Manhole	1200
2.000	7.500	60.0	5	31.400	30.509	0.741	Open Manhole	1200
2.001	6.000	60.0	6	31.500	30.409	0.941	Open Manhole	1200
2.002	6.000	100.0	6	28.280	27.649	0.481	Open Manhole	1200
2.003	20.000	100.0	7	29.850	27.449	2.176	Open Manhole	1200
1.002	36.500	150.2	13	28.000	27.122	0.578	Open Manhole	1200
3.000	3.500	80.0	9	28.250	27.612	0.488	Open Manhole	1200
3.001	10.500	80.0	10	28.250	27.481	0.619	Open Manhole	1200
3.002	21.500	79.9	11	28.250	27.212	0.888	Open Manhole	1200
3.003	41.000	500.0	12	28.250	27.130	0.895	Open Manhole	1200
3.004	15.000	200.0	13	28.000	27.055	0.645	Open Manhole	1200
1.003	10.000	200.0	18	28.200	27.005	0.895	Open Manhole	1200
4.000	1.000	25.0	15	31.500	30.216	1.059	Open Manhole	1200
4.001	44.000	25.0	16	29.850	28.456	1.169	Open Manhole	1200
4.002	34.000	25.0	17	28.150	27.096	0.829	Open Manhole	1200
4.003	13.500	81.3	18	28.200	26.930	1.045	Open Manhole	1200
1.004	16.000	44.9		28.200	26.650	1.400	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
------------------------	-----------------	-----------------	-----------------	------------------------	-------------	-----------

1.004		28.200	26.650	0.000	0	0
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Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 2 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.800	Storm Duration (mins)	30
Ratio R	0.345		

Online Controls for Storm

Hydro-Brake® Optimum Manhole: 15, DS/PN: 4.001, Volume (m³): 1.4

Unit Reference	MD-SHE-0072-2500-1200-2500
Design Head (m)	1.200
Design Flow (l/s)	2.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	72
Invert Level (m)	30.216
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	2.5	Kick-Flo®	0.644	1.9
Flush-Flo™	0.318	2.3	Mean Flow over Head Range	-	2.1

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)	Depth (m)	Flow (l/s)
0.100	1.9	0.800	2.1	2.000	3.2	4.000	4.4	7.000	5.7
0.200	2.2	1.000	2.3	2.200	3.3	4.500	4.6	7.500	5.9
0.300	2.3	1.200	2.5	2.400	3.4	5.000	4.8	8.000	6.0
0.400	2.3	1.400	2.7	2.600	3.6	5.500	5.1	8.500	6.2
0.500	2.2	1.600	2.8	3.000	3.8	6.000	5.3	9.000	6.4
0.600	2.0	1.800	3.0	3.500	4.1	6.500	5.5	9.500	6.5

Hydro-Brake® Optimum Manhole: 18, DS/PN: 1.004, Volume (m³): 2.5

Unit Reference	MD-SHE-0105-5000-1000-5000
Design Head (m)	1.000
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	105
Invert Level (m)	27.006
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	5.0	Kick-Flo®	0.637	4.1
Flush-Flo™	0.296	5.0	Mean Flow over Head Range	-	4.3

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)	Depth (m)	Flow (l/s)
0.100	3.6	0.800	4.5	2.000	6.9	4.000	9.6	7.000	12.5
0.200	4.8	1.000	5.0	2.200	7.2	4.500	10.1	7.500	12.9
0.300	5.0	1.200	5.4	2.400	7.5	5.000	10.6	8.000	13.3
0.400	4.9	1.400	5.8	2.600	7.8	5.500	11.1	8.500	13.7
0.500	4.7	1.600	6.2	3.000	8.4	6.000	11.6	9.000	14.1
0.600	4.3	1.800	6.6	3.500	9.0	6.500	12.1	9.500	14.5

Storage Structures for Storm

Cellular Storage Manhole: 12, DS/PN: 3.004

Invert Level (m) 27.130 Safety Factor 2.0
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)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	234.0	234.0	0.800	234.0	306.0	0.900	0.0	306.0

Cellular Storage Manhole: 14, DS/PN: 4.000

Invert Level (m) 30.256 Safety Factor 2.0
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)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	250.0	250.0	1.200	250.0	334.0	1.300	0.0	334.0

Summary of Critical Results by Maximum Level (Rank 1) for Storm

		Half Drain		Pipe			
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
2.003	6	0.72			34.0	FLOOD RISK	
1.002	7	1.50			125.3	SURCHARGED	
3.000	8	1.15			15.0	SURCHARGED	
3.001	9	1.32			23.5	FLOOD RISK	
3.002	10	0.19			3.6	SURCHARGED	
3.003	11	0.22			4.7	SURCHARGED	
3.004	12	0.05			3.6	SURCHARGED	
1.003	13	0.05			3.3	FLOOD RISK	
4.000	14	0.10			2.9	SURCHARGED	
4.001	15	0.02			2.3	SURCHARGED	
4.002	16	0.02			2.3	OK	
4.003	17	0.07			3.4	FLOOD RISK	
1.004	18	0.20			4.8	FLOOD RISK	



Appendix G - SuDS Maintenance Manual



Infrastruct CS Ltd
The Stables
High Cogges Farm
High Cogges
Nr Witney
Oxon
OX29 6UN

SuDS MAINTENANCE GUIDE

OWNERS MANUAL

Scheme name: Helmsley House

Document reference 2709-HELM-ICS-RP-C-07.002 Rev A

Report Prepared By:

Tim Trotman

MEng (Hons), CEng, CWem, FIHE, MCIWEM

On behalf of Infrastruct CS Ltd

May 2023

Project Number: 2709

CONTENTS

PAGE NO.

1.0	Introduction	3
1.1	Who is responsible for maintenance of the suds features used for this scheme	3
1.2	Owner's manual.....	3
1.3	Location of SuDS techniques used on the scheme.....	3
1.4	SUDS techniques used on this scheme:	3
1.5	Summary of how the techniques work for the scheme	3
1.6	Maintenance requirements	3
1.7	Areas where activities are prohibited	4
1.8	Accidental spillages	4
1.9	Alterations	4
1.10	Health and safety.....	4
2.0	Operation and maintenance activity categories.....	4
2.1	Regular maintenance activities	6
2.2	Irregular maintenance activities.....	8
2.3	Remedial maintenance	8
3.0	Applications of the principles of landscape maintenance	9
4.0	Frequency of maintenance tasks.....	10
5.0	References.....	11
	Green roofs	12
	PERVIOUS PAVEMENTS	13
	Silt traps and catchpits	15
	Attenuation Storage Tanks	16
	Flow control chambers and devices	17
	Appendix A - Monitoring and maintenance record	18
	Appendix B - Accident and incident record	19
	Appendix C - Key site and emergency contacts.....	20

1.0 Introduction

This guidance provides best practice guidance on the maintenance of Sustainable Drainage Systems (SuDS) to facilitate their effective implementation within the Helmsley House development.

Unlike conventional drainage systems, SuDS features are often visible and their function should be easily understood by those responsible for maintenance. When problems occur, they are generally obvious and can be remedied simply, using standard landscaping practice. If systems are properly monitored and maintained, any deterioration in performance can often be managed out.

Like any drainage system maintenance is a necessary and important consideration of SuDS design and sufficient thought should be given to long-term maintenance and its funding during feasibility and planning stages. In particular, the following requirements should be given full consideration:

1.1 Who is responsible for maintenance of the suds features used for this scheme

The cellular storage and green roof are owned and maintained by the care provider or their representative if they have appointed a management company.

1.2 Owner's manual

SuDS are different from conventional drainage and require different maintenance regimes. This manual details the following:

- location of all SuDS techniques in a site
- brief summary of how the techniques work, their purpose and how they can be damaged
- maintenance requirements (a maintenance plan) and a maintenance record
- explanation of the consequences of not carrying out the maintenance that is specified
- identification of areas where certain activities are prohibited (for example stockpiling materials on pervious surfaces)
- an action plan for dealing with accidental spillages
- advice on what to do if alterations are to be made to a development, if service companies undertake excavations or other similar works carried out that could affect the SuDS.

1.3 LOCATION OF SUDS TECHNIQUES USED ON THE SCHEME

The location of the SuDS features are shown on drawing 2709-HELM-ICS-01-XX-DR-C-200

1.4 SUDS techniques used on this scheme:

- Green Roofs
- Geocellular/Modular Systems
- Silt traps and catchpits
- Flow control devices
- Permeable Pavements

1.5 Summary of how the techniques work for the scheme

The roof runoff from the proposed building discharges via a piped system into a tanked cellular storage system with an attenuated discharge into the drainage laterals along the southern boundary of the site.

Parking spaces are to be constructed in tanked permeable paving which will collect and then discharge surface water back into the piped system. The use of the permeable paving will provide an element of surface water treatment.

Discharge from the tanked cellular storage is controlled by a Hydrobrake or similar flow control device with the discharge limited to the agreed rate of 5l/s. The storage is sized to accommodate a 1 in 100 year storm with an allowance of 40% for climate change and is robustly designed to assume that there is free discharge into the system for all impermeable areas associated with the development including the access roads.

1.6 Maintenance requirements

These are detailed in the appropriate section of this document.

1.7 Areas where activities are prohibited

Heavy loads should not be allowed in areas where cellular soakaways are located. Failure to do so may cause structural damage and collapse of the cellular limits.

Storage of materials should not be placed on the permeable paving.

1.8 Accidental spillages

Health and safety consideration are a priority and addressing accidental spillages should only be attempted if the nature of the spillage is known and its potential hazardous properties understood. The source of the spillage should be stopped and excess surface spillage removed by suction tank or absorption mats. Silt traps and sumps should be emptied by suction tanker. Areas of affected permeable paving should have the surface and laying course removed. The surfacing blocks should be cleaned and re-laid on new bedding material. Heavy pollution of the sub-base will require removal and replacement of the sub-base.

1.9 Alterations

If any alterations are proposed to the development, the design Engineer must be notified so that the impact/implications of the work can be assessed. Utilities should be restricted in the designated service zone areas.

1.10 Health and safety

To comply with the Construction (Design and Management) Regulations (CDM) 2015, designers must assess all foreseeable risks during construction and maintenance and the design must minimise them by the following (in order of preference):

1. **Avoid.**
2. **Reduce.**
3. **Identify and mitigate residual risks.**

CDM 2015 requires designers to ensure that all maintenance risks have been identified, eliminated, reduced and/or controlled where appropriate. This information will be required as part of the health and safety file.

2.0 Operation and maintenance activity categories

There are likely to be three categories of maintenance activities:

1. **Regular maintenance** (including inspections and monitoring).
2. **Occasional maintenance.**
3. **Remedial maintenance.**

Regular maintenance consists of basic tasks done on a frequent and predictable schedule, including vegetation management, litter and debris removal, and inspections.

Occasional maintenance comprises tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the regular tasks (e.g. sediment removal or filter replacement). Table 2 summarises the likely maintenance activities required for each SuDS component and guidance on specific maintenance activities is given in the following sections.

Remedial maintenance describes the intermittent tasks that may be required to rectify faults associated with the system, although the likelihood of faults can be minimised by good design, construction and regular maintenance activities. Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and so timings are difficult to predict. Remedial maintenance can comprise activities such as:

- inlet/outlet repairs
- erosion repairs
- reinstatement or realignment of edgings, barriers, rip-rap or other erosion control

- infiltration surface rehabilitation
- replacement of blocked filter fabrics
- construction stage sediment removal (although this activity should have been undertaken before the start of the maintenance contract)
- system rehabilitation immediately following a pollution event.

It is important to note that these remedial activities will not be required for all systems, but for the purpose of estimating whole life maintenance costs, a contingency sum of 15-20% should be added to the annual regular and occasional maintenance costs to cover the risk of these activities being required.

Table 2 - Typical key SuDS components operation and maintenance activities
For full specifications, see individual chapters.

O & M activity	SuDS component																	
	Pond/wetland	Detention basin	Infiltration basin	Silt traps and catchpits	Soakaway	Infiltration trench	Filter trench	Modular storage	Pervious pavement	Swale/bioretention/green roofs	Filter strip	Sand filter	Pre-treatment systems	Perforated ring soakaways	Bio retention areas	Rain gardens	Oil interceptors	Flow control devices
Regular maintenance																		
Inspection				■				■	■	■								■
Litter/debris removal				□				□	■	■								□
Grass cutting				□				□	□	■								□
Weed/invasive plant control									□	□								
Shrub management									□	□								
Shoreline vegetation management																		
Aquatic vegetation management																		
Irregular maintenance																		
Sediment management (*)				■				■	■	■								
Vegetation/plant replacement										□								
Vacumn sweeping and brushing									■									
Remedial maintenance																		
Structure rehabilitation/repair				□				□	□	□							□	□
Infiltration surface reconditioning									□	□								

- Will be required
□ May be required

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

The maintenance regime of a site also needs to consider the response to extreme pollution events. A response action plan should be developed and communicated to all those involved in the operation of a site, so that if a spillage occurs it can be prevented from causing pollution to receiving waters.

2.1 Regular maintenance activities

Inspections and reporting

Regular SuDS scheme inspections will:

- help determine optimum future maintenance activities
- confirm hydraulic, water quality, amenity and ecological performance
- allow identification of potential system failures, e.g. blockage, poor infiltration, poor water quality etc.

Inspections can generally be required at monthly site visits (e.g. for grass cutting) for little additional cost, and should, therefore, be subsumed into regular maintenance requirements. During the first year of operation, inspections should ideally be carried out after every significant storm event to ensure proper functioning, but in practice this may be difficult or impractical to arrange.

Typical routine inspection questions that will indicate when occasional or remedial maintenance activities are required, and/or when water quality requires investigation include:

- are inlets or outlets blocked?
- does any part of the system appear to be leaking (especially ponds and wetlands)?
- is the vegetation healthy?
- is there evidence of poor water quality (e.g. algae, oils, milky froth, odour, unusual colourings)?
- is there evidence of sediment build-up?
- is there evidence of ponding above an infiltration surface?
- is there any evidence of structural damage that requires repair?
- are there areas of erosion or channelling over vegetated surfaces?

Litter/debris removal

This is an integral part of SuDS maintenance and reduces the risks of inlet and outlet blockages, retains amenity value and minimises pollution risks. High litter removal frequencies may be required at high profile commercial/retail parks where aesthetics are a major driver.

Grass cutting

It is recommended that grass cutting be minimised around SuDS facilities, apart from swales and filter strips and structural embankments where a height of 100–150 mm is recommended to prevent the plants falling over, or “lodging”, when water flows across the surface. In general, allowing grass to grow tends to enhance water quality performance. Short grass around a wet system such as pond or wetland provides an ideal habitat for nuisance species such as geese; allowing the grass to grow is an effective means of discouraging them. Grass around wet pond or wetland systems should not be cut to the edge of the permanent water.

Grass cutting is an activity undertaken primarily to enhance the perceived aesthetics of the facility. The frequency of cutting will tend to depend on surrounding land uses, and public requirements. Therefore, grass cutting should be done as infrequently as possible, recognising the aesthetic concerns of local residents. However, grass around inlet and outlet infrastructure should be trimmed closely to reduce risks to system performance. If a manicured, parkland effect is required, then cutting will need to be undertaken more regularly than for meadow type grass areas, which aim to maximise habitat and biodiversity potential.

Weed/invasive plant control

Weeds are generally defined as vegetation types that are unwanted in a particular area.

For SuDS, weeds are often alien or invasive species, which do not enhance the technical performance or aesthetic value of the system, or non-native species and the spread of which is undesirable.

In some places, weeding has to be done by hand to prevent the destruction of surrounding vegetation (hand weeding should generally be required only during the first year, i.e. during plant establishment). However, over grassed surfaces, mowing can be an effective management measure. The use of herbicides and pesticides should be prohibited since they cause water quality

deterioration. The use of fertilisers should also be limited or prohibited to minimise nutrient loadings which are damaging to water bodies.

Shrub management

Shrubs tend to be densely planted and are likely to require weeding at the base, especially during the first year to ensure that they get enough water. Shrubs should be selected so they can grow to their maximum natural height without pruning.

Management of green waste

Appropriate methods should be implemented to dispose of green waste, including:

1 The development of wildlife piles

These provide refuges, hibernation shelter, food and egg laying sites for a large number of animals. When rotted down at the end of 3–5 years they provide compost that can be used as fertiliser for planting areas outside of the SuDS system.

In general:

- wildlife piles should be located in sunny or semi-shaded areas away from direct access by people
- their bases should be constructed using substantial prunings or other branch material laid in a criss-cross pattern
- seasonal shrub and other woody prunings should be added through the winter
- non-woody and grass cuttings should be added through the summer
- wildlife piles should comprise tidy piles up to 1.2 m high
- new wildlife piles should be constructed each year and old wildlife piles should be used as compost to plant beds after 3–5 years
- wildlife piles should be located above normal flood level of watercourses and be protected by hedges or similar features.

A schematic of a typical wildlife pile structure is shown in Figure 1.1.

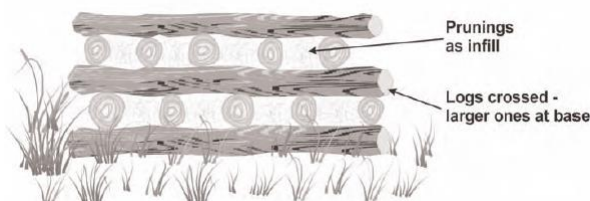


Figure 1.1 Schematic of a wildlife pile (courtesy of Steve Wilson and Robert Bray of Sustainable Drainage Associates)

2 On- or off-site composting

A compost facility allows all green waste, particularly grass cuttings and prunings to be recycled and provide compost for mulching ornamental plant beds. The following process should be followed for composting:

- shred all arisings from site
- combine all arisings in active compost bin with grass cuttings not exceeding 70%
- turn and mix active compost when bin is >50% full, at weekly intervals for at least four weeks
- turn and mix full bin every 28 days until used
- combine adjacent compost bins/bays when contents are settled to 50% volume reduction
- Use compost after 3–4 months.

A schematic/photo of a typical composting structure is given in Figure 1.2.

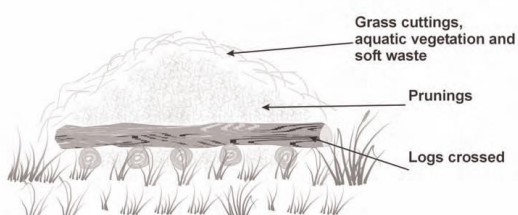


Figure 1.2 Schematic of a composting structure (courtesy Steve Wilson and Robert Bray of Sustainable Drainage Associates)

3 Disposal to landfill

As a last resort, green waste can be disposed of to some approved tips or landfill sites, although it is only accepted at certain locations.

2.2 Irregular maintenance activities

Sediment removal

To ensure long-term effectiveness, the sediment that accumulates in SuDS should be removed periodically. The required frequency of sediment removal is dependent on many factors including:

- design of upstream drainage system
- type of system
- design storage volume
- characteristics of upstream catchment area (eg land use, level of imperviousness, upstream construction activities, erosion control management and effectiveness of upstream pre-treatment).

Sediment accumulation will typically be rapid for the entire construction period (including time required for the building, turfing and landscaping of all upstream development plots). Once a catchment is completely developed and all vegetation is well-established, sediment mobility and accumulation is likely to drop significantly.

Vegetation/plant replacement

Some replacement of plants may be required in the first 12 months after installation, especially after storm events. Dead or damaged plants should be removed and replaced to restore the prescribed number of living plants per hectare.

Inspection programmes should identify areas of filtration, or infiltration surfaces where vegetation growth is poor and likely to cause a reduced level of system performance. Such areas can then be rehabilitated and plant growth repaired.

Vacuum sweeping and brushing

Pervious surfaces need to be regularly cleaned of silt and other sediments to preserve their infiltration capacity. Advice issued with permeable pre-cast concrete paving suggests a minimum of three sweepings per year. Chapter 12 should be referred to for details of this process.

2.3 Remedial maintenance

Structure rehabilitation/repair

There will come a time with most SuDS techniques when a major overhaul of the system is required to remove clogged filters, geotextiles, gravel etc. This will typically be between 10 and 25 years, depending on the technique and factors such as the type of catchment and sediment load. The SuDS design allows for vehicle access to undertake this work and consider the need for the overhaul without causing major disruption. For example, the use of geotextiles close to the surface in pervious surfaces traps the majority of sediment in a relatively easily accessible location. Reconstruction of the surface layer and bedding layer is all that is required, rather than reconstruction of the whole pavement depth.

Major overhaul is most likely to be required on techniques that rely on filtration through soils or aggregates, such as sand filters and infiltration devices. Other SuDS techniques are unlikely to need major overhaul if routine maintenance is undertaken as required (for example ponds and wetlands). Rehabilitation activities for each SuDS component are described in the individual component chapters. The requirements should be identified in the owner's manual.

Infiltration surface rehabilitation

In the event that grassed surface permeability has reduced, there are a number of landscape techniques that can be used to open the surface to encourage infiltration.

Such activities are not commonplace and are likely to be required only in circumstances where silt has not been effectively managed upstream.

1. Scarifying to remove "thatch". Thatch is a tightly intermingled organic layer of dead and living shoots, stems and roots, developing between the zone of green vegetation and the soil surface.

Scarifying with tractor-drawn or self-propelled equipment to a depth of at least 50 mm breaks up silt deposits, removes dead grass and other organic matter and relieves compaction of the soil surface.

2. Spiking or tining the soil, using aerating equipment to encourage water percolation. This is particularly effective if followed by top dressing with a medium to fine sand and is best undertaken when the soil is moist. Spiking or tining with tractor drawn or self-propelled equipment penetrates and perforates soil layers to a depth of at least 100 mm (at 100 mm centres) and allows the entry of air, water, nutrients and top-dressing materials.
3. As a last resort, it may be necessary to remove and replace the grass and topsoil by:
 - removing accumulated silt and (subject to a toxicity test) applying to land or dispose of to landfill
 - removing damaged turf which should be composted
 - cultivating remaining topsoil to required levels
 - re-turfing (using turf of a quality and appearance to match existing) or reseeded (to BS 7370: Part 3, Clause 12.6 (BSI, 1991) using seed to match existing turf) area to required levels. It may be necessary to supply and fix fully biodegradable coir blanket to protect seeded soil. Turf and seeded areas should be top dressed with fine sieved topsoil to BS 3882 (BSI, 1994) to achieve final design levels. Watering will be required to promote successful germination and/or establishment.

3.0 Applications of the principles of landscape maintenance

In contrast to conventional drainage, which comprises mainly sub-surface pipework and associated infrastructure, SuDS are predominantly surface systems. A key feature of SuDS is their integration within the local landscape and their amenity contribution, and it is appropriate therefore that landscape maintenance practice is applied to their management.

Landscape maintenance documentation

Typical landscape maintenance documentation and its potential relevance to SuDS systems is summarised below:

(A) Management plan – describing the management objectives for a site over time, and the management strategies that should be employed to realise these objectives and reconcile any potential conflicts that may arise.

Management plans are most appropriate for application in major parks and open spaces, wherever there are alternative choices for future action, and potential conflicts of purpose and priorities that need to be resolved. The following extract from *A guide to management plans for parks and open spaces* (Barber, 1991) sets out the types of management plans that can be prepared:

(i) Management plan

This predicts a degree of physical change, and therefore should present design proposals in its recommendations. It puts the emphasis on the presentation of anticipated physical change with much of the documentation being in support.

(ii) Outline plan

This is generally accepted as a more appropriate title for a management plan that wishes to establish the guiding principles, without providing detailed proposals which might constrain future options for achieving the outline objectives.

(iii) Maintenance plan

This is appropriate if the principal interest is in establishing the best way of maintaining an area, or where there is a need to match maintenance aspirations to a secure financial base. Planned maintenance programmes over longer timescales can be made more secure by the more public exposure of the need and the commitment that the Maintenance Plan should be able to guarantee. A Maintenance Plan can also establish changes in maintenance regimes that may be required to match a change in objectives e.g. the need to adapt operation and maintenance practices to accommodate specific wildlife habitats that may develop.

For a SuDS scheme, the maintenance plan will generally be the most appropriate type of management plan to use. The document should include an explanation of the function of the SuDS scheme and why it is being used on the site.

Where the drainage system has an impact on the wildlife value or public use of a site, it would be prudent to develop this simple explanation further to explain habitat enhancement goals, health and safety issues and long-term management implications.

Sites with special wildlife or amenity interest may require detailed management plans, which monitor habitat development, infrastructure changes or damage to sites and ensure rapid responses to such changes, should they occur.

It is common for smaller commercial, industrial and housing sites to have a simple maintenance statement. In this case, a single page explaining the site management (including the sustainable drainage system) would be useful for all parties involved in the care of the development.

(B) Conditions of contract – appropriate conditions will be required. Advice can be sought from the Landscape Institute. Guidance is also provided in CIRIA publication C625 (Shaffer *et al*, 2004).

(C) Specification – detailing the materials to be used and the standard of work required. A specification, usually preceded by preliminaries, details how work shall be carried out and contains clauses that give general instructions to the contractor. Specific SuDS maintenance clauses may be included in a general specification or as a separate "Sustainable drainage maintenance specification" section.

(D) Schedule of work – itemising the tasks to be undertaken and the frequency at which they will be performed.

The tasks required to maintain the site and the frequency necessary to achieve an acceptable standard should be set out in the schedule of work.

Smaller sites will usually have simple specification notes given to a contractor as a basis for maintenance on a performance basis. Examples of performance criteria are items such as:

- length of grass
- tidiness
- extent of weed growth, etc.

This document will often form the basis of a pricing mechanism and can also act as a checklist to ensure the work has been carried out satisfactorily.

For additional information on the development of appropriate schedules, reference should be made to *the operation and maintenance of sustainable drainage systems* (HR Wallingford, 2004).

4.0 Frequency of maintenance tasks

Landscape maintenance contract periods are usually of one to three years' duration. The three-year period is increasingly common to ensure continuity and commitment to long-term landscape care. The frequency of regular landscape maintenance tasks in a contract period can range from daily to once in the contract period. In practice most site tasks are based on monthly or fortnightly site visits, except where grass or weed growth requires a higher frequency of work. In many cases a performance specification is used with terms such as "beds shall be maintained weed-free" or "grass shall be cut to a height of 50 mm with a minimum height of 25 mm and a maximum height of 100 mm" to obtain the required standards.

Frequency can be specified within the schedule to include irregular items such as "'meadow grass' cut two times annually in July and September to a height of 50 mm, all arisings raked off and removed to wildlife features, compost facility or to tip", which provides flexibility for work that is not critical to the management of the site.

Maintenance tasks which suit a performance approach commonly include plant growth, grass cutting, pruning and tree maintenance. However, work tasks such as sweeping paths, regular litter collection and cleaning road surfaces will require work at an agreed frequency with more specific timings such as weekly, monthly or annually.

Where the frequency and timing of tasks is critical, a mixture of performance and frequency specification is necessary to provide effective maintenance.

SuDS maintenance generally tends towards a frequency requirement to ensure a predicable standard of care which can be recorded on site and which provides a reasonable basis for pricing work. A convenient frequency for many tasks is at a monthly inspection as this is the usual minimum site attendance required in a landscape specification. The monthly frequency should provide for an inspection of all SuDS features and checking all inlets and outlets.

Certain SuDS maintenance tasks however fall outside this monthly cycle and need to be accommodated in the contract. The two most obvious are:

- wetland vegetation maintenance
- silt management.

There are other tasks associated with ensuring the long-term performance of the systems that may be more difficult to predict and could even fall outside any contract period. It may therefore be more appropriate to review requirements for system rehabilitation at interim periods, when contracts are falling due for renewal.

5.0 References

- CIRIA C753 (2015) – The SuDS Manual
- Wildfowl & Wetlands Trust guidance (2012) – Maximising the potential for people and wildlife
- HR WALLINGFORD (2004). Whole Life Costing for Sustainable Drainage. Report SR 627.
- DEFRA (2010). Surface Water Management Plan Technical Guidance.
- Environment Agency (2015) - Cost estimation for SUDS. Summary of evidence.

GREEN ROOFS

DESCRIPTION

Green roofs are areas of living vegetation, installed on the top of buildings, for a range of reasons including visual benefit, ecological value, enhanced building performance and the reduction of surface water runoff.

OPERATION AND MAINTENANCE REQUIREMENTS

The most maintenance is generally required during the establishment stage (12 to 15 months), and this should usually be made the responsibility of the green roof provider. Maintenance contractors with specialist training in green roof care should be used, where possible.

Table below provides guidance on the type of operational and maintenance requirements that may be appropriate. The list of actions is not exhaustive and some actions may not always be required. Actual requirements will depend on the planting, the desired aesthetic and visual effect and the biodiversity objectives for the system. Maintenance specifications and schedules should therefore be specified for any individual green roof. If mechanical systems are located on the roof, then spill prevention measures should be exercised to ensure that roof runoff is not contaminated. The mechanical system area should be bunded and provided with separate drainage.

All maintenance actions carried out at roof level must be in full compliance with the appropriate health and safety regulations, and particularly those specifically dealing with working at height. Training and guidance information on operating and maintaining the roof should be provided to all property owners and tenants. Safety fastenings will be required for personnel working on the roof. Access routes to the roof should be designed and maintained to be safe and efficient, and walkways should always be kept clear of obstructions. Secure points for harness attachments should be provided when access near to the roof edges is required. Specific maintenance needs of the green roof should be monitored, and maintenance schedules adjusted to suit requirements.

Maintenance schedule	Required action	Frequency
Regular inspections	Inspect all components including soil substrate, vegetation, drains, irrigation systems (if applicable), membranes and roof structure for proper operation, integrity of waterproofing and structural stability	Annually and after severe storms
	Inspect soil substrate for evidence of erosion channels and identify any sediment sources	Annually and after severe storms
	Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drain system	Annually and after severe storms
	Inspect underside of roof for evidence of leakage	Annually and after severe storms
Regular maintenance	Remove debris and litter to prevent clogging of inlet drains and interference with plant growth	Six monthly and annually or as required
	During establishment (i.e. year one), replace dead plants as required	Monthly (but usually responsibility of manufacturer)
	Post establishment replace dead plants as required (where > 5% of coverage)	Annually (in autumn)
	Remove fallen leave and debris from deciduous plant foliage	Six monthly or as required
	Remove nuisance and invasive vegetation, including weeds	Six monthly or as required
	Mow grasses, prune shrubs and manage other planting as required – clippings should be removed and not allowed to accumulate	Six monthly or as required
Remedial actions	If erosion channels are evident, these should be stabilised with extra soil substrate similar to the original material, and sources of erosion damage should be identified and controlled.	As required
	If drain inlet has settled, cracked or moved, investigate and repair as appropriate	As required

PERVIOUS PAVEMENTS

DESCRIPTION

Pervious pavements provide a pavement suitable for pedestrian and/or vehicular traffic, while allowing rainwater to infiltrate through the surface and into the underlying layers. The water is temporarily stored before infiltration to the ground, reuse, or discharge to a watercourse or other drainage system. Pavements with aggregate sub-bases can provide good water quality treatment.

OPERATION AND MAINTENANCE REQUIREMENTS

Regular inspection and maintenance is important for the effective operation of pervious pavements. Maintenance responsibility for a pervious pavement and its surrounding area should be placed with an appropriate responsible organisation. Before handing over the facility to the client, it should be inspected for clogging, litter, weeds and water ponding and all failures should be rectified. After handover, the facility should be inspected regularly, preferably during and after heavy rainfall to check effective operation and to identify any areas of ponding.

Pervious surfaces need to be regularly cleaned of silt and other sediments to preserve their infiltration capability. Experience in the UK is limited, but advice issued with permeable precast concrete paving has suggested a minimum of three surface sweepings per year. Manufacturers' recommendations should always be followed.

A brush and suction cleaner, which can be a lorry-mounted device or a smaller precinct sweeper, should be used and the sweeping regime should be as follows:

1. End of winter (April) – to collect winter debris.
2. Mid-summer (July/August) – to collect dust, flower and grass-type deposits.
3. After autumn leaf fall (November).

Care should be taken in adjusting vacuuming equipment to avoid removal of jointing material. Any lost material should be replaced.

The likely design life (or period before pavement rehabilitation is required) has yet to be established for the UK. However, it should be no different from standard paving assuming that an effective maintenance regime is in place to minimise risks of infiltration clogging.

If reconstruction is necessary, the following procedure should be followed:

1. Lift surface layer and laying course.
2. Remove any geotextile filter layer.
3. Inspect sub-base and remove, wash and replace if required.
4. Renew any geotextile layer.
5. Renew laying course, jointing material and concrete block paving.

The reconstruction of failed areas of concrete block pavement should be less costly and disruptive than the rehabilitation of continuous concrete or asphalt porous surfaces due to the reduced area that is likely to be affected. Materials removed from the voids or the layers below the surface may contain heavy metals and hydrocarbons and 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. Guidance on waste management is provided in Chapter 33 of CIRIA C753.

Pervious pavement operation and maintenance requirements

Maintenance schedule	Required action	Frequency
Regular maintenance	Brushing and vacuuming.	Three times/year at end of winter, mid-summer, after autumn leaf fall, or as required based on site-specific observations of clogging or manufacturers' recommendations.
Occasional maintenance	Stabilise and mow contributing and adjacent areas.	As required.
	Removal of weed.	As required.
	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving.	As required.
Remedial actions	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users.	As required.
	Rehabilitation of surface and upper sub-structure.	As required (if infiltration performance is reduced as a result of significant clogging).
	Initial inspection.	Monthly for 3 months after installation
Monitoring	Inspect for evidence of poor operation and/or weed growth. If required, take remedial action.	3-monthly, 48 h after large storms.
	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually.
	Monitor inspection chambers.	Annually.

Implementation of the CDM Regulations (DETR, 1994) and generic health and safety criteria are presented in Sections 2.5.10 and 3.4.2 of CIRIA C697 respectively. Maintenance activities should be detailed in the Health and Safety Plan and a risk assessment should be undertaken.

SILT TRAPS AND CATCHPITS

DESCRIPTION

Silt traps and catch pits are circular or rectangular manholes and /or chambers with a sump in them to collect suspended solids. Some chambers have removeable silt buckets to assist with the removal of accumulated silt deposits. Catch pits are usually concrete ring or segment structures and silt traps preformed plastic chambers.

OPERATION AND MAINTENANCE REQUIREMENTS

Regular inspection and maintenance is required to ensure the effective long-term operation of below ground silt traps and catch pits systems. Maintenance responsibility for systems should be placed with a responsible organization. Maintenance requirements are described in the table below. Maintenance plans and schedules should be developed during the design phase. Specific maintenance needs of the system should be monitored, and maintenance schedules adjusted to suit requirements.

Silt traps and catch pits – operation and maintenance requirements

Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly
	Debris removal from catchment surface (where may cause risks to performance)	Monthly
	Inspection of silt traps and catch pits to assess silt accumulation	Monthly (and after large storms)
	Removal of accumulated silt from silt trap and catch pit sumps	Annually, or as required
Remedial actions	Repair/rehabilitation of inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, and overflows to ensure that they are in good condition and operating as designed	Annually and after large storms

ATTENUATION STORAGE TANKS

DESCRIPTION

Attenuation storage tanks are used to create a below-ground void space for the temporary storage of surface water before infiltration, controlled release or use. The storage structure is usually formed using one of the following methods:

1. geo-cellular storage systems
2. plastic corrugated arch structures (constructed over and backfilled with an open-graded aggregate base)
3. oversized concrete pipes
4. oversized plastic pipes
5. corrugated steel pipes
6. precast or/ *in situ* concrete box culvert sections and tanks (including flat-packed concrete panels)
7. glass-reinforced plastic (GRP) tanks
8. hybrid structures using reinforced earth walls and concrete roof panels

OPERATION AND MAINTENANCE REQUIREMENTS

Regular inspection and maintenance is required to ensure the effective long-term operation of belowground storage systems. Maintenance responsibility for systems should be placed with a responsible organisation. The table below provides guidance on the type of operational and maintenance requirements that may be appropriate. The list of actions is not exhaustive, and some actions may not always be required.

Maintenance Plans and schedules should be developed during the design phase and will be specific to the type of tank that is adopted. Specific maintenance needs of the system should be monitored, and maintenance schedules adjusted to suit requirements. Further detail on the preparation of maintenance specifications and schedules of work is given in Chapter 32 of CIRIA C753.

CDM 2015 requires designers to ensure that all maintenance risks have been identified, eliminated, reduced and/or controlled where appropriate. This information will be required as part of the health and safety file.

Attenuation Storage Tanks – operation and maintenance requirements

Maintenance schedule	Required action	Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and/or internal forebays	Annually, or as required
Remedial Actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

FLOW CONTROL CHAMBERS AND DEVICES

Description

Flow control devices are usually installed in circular or rectangular manholes and are small orifice or vortex devices designed to hold back surface water and discharge at a low pre-specified rate. They are usually associated with up-stream storage tanks or modular storage that accommodates the peak flow volume until drain down at the attenuated discharge rate controlled by the flow control device.

OPERATION AND MAINTENANCE REQUIREMENTS

Regular inspection and maintenance is required to ensure the effective long-term operation of flow control devices. Maintenance responsibility for systems should be placed with a responsible organization. Maintenance requirements are described in the table below. Maintenance plans and schedules should be developed during the design phase. Specific maintenance needs of the system should be monitored, and maintenance schedules adjusted to suit requirements.

Silt traps and catchpits – operation and maintenance requirements

Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly
	Debris removal from catchment surface (where may cause risks to performance)	Monthly
	Inspection of flow control chamber to assess if system is draining down correctly and that the orifice or flow control device is not blocked. Assess if there are any silt accumulations in the chamber sump.	Monthly (and after large storms)
	Removal of accumulated silt from silt trap and catchpit sumps	Annually, or as required
Remedial actions	Repair/rehabilitation of inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, and overflows to ensure that they are in good condition and operating as designed	Annually and after large storms

APPENDIX A - MONITORING AND MAINTENANCE RECORD

You need to keep a record of the checks you have completed that are set out in the checklist below along with any additional checks you have made.

If you have a maintenance contract with a contractor, keep a record of any work carried out on your pond system by them. If invoices state the work carried out, these will be sufficient.

If you do the checks you should enter:

- The check or maintenance job
- Who did it;
- The result (for example when abnormal noise heard, called in specialist to investigate).

Action	Date and Time	Carried out by	Result
For example, inlet and outlet pipes checked	06/04/2012 09.30	Mr A N Other	Obstruction cleared.

APPENDIX B - ACCIDENT AND INCIDENT RECORD

You should record any accidents, other incidents or near misses relating to the operation of the SUDS system for example untreated sewage being released into the ponds. The form could also be used to record health and safety incidents.

"Other incidents" covers impacts on the environment that are not accidents, such as failing to maintain the system, or vandals causing damage to the detention pond.

Date and time of the incident	
What happened, what was it about?	
Was anyone else aware of this – other witnesses? If so who?	
What caused it?	
What action did you take to fix the problem?	
What have you done to make sure that it does not happen again?	
Was there any significant pollution – for example: untreated sewage being discharged into a drain, river or stream? Yes / No If yes, what pollution occurred?	
If there was significant pollution then you must notify the Environment Agency on 0800 807060 as soon as possible. Have you done so?	Yes/No/not applicable At what time did you phone? EA Incident reference no.
You must also write or send an email to confirm this to the local office (see your accident management plan for the address). Have you done so?	Yes/No/not applicable
Please print your name, sign and date.	

APPENDIX C - KEY SITE AND EMERGENCY CONTACTS

This table contains information and contacts you may need in an emergency

SITE DETAILS		
Address:		
Postcode:		
Site access grid reference:		
SITE CONTACTS	Office Hours (specify)	Out of hours
Owner:		
General manager:		
Site manager:		
Site supervisor:		
Security contact:		
Landowner / agent:		
EMERGENCY SERVICES	Office Hours	Out of hours
Emergency		
Medical:		
Police:		
Fire:		
REGULATORS	Office Hours	Out of hours
Health and Safety Executive (HSE):		
Local Authority:		
Environment Agency	General number:	08708 506 506
	24 hour emergency hotline:	0800 80 70 60
Natural England/Countryside Council for Wales		
OTHER KEY CONTACTS	Office Hours	Out of hours
Adjacent landowners:		
Neighbours:		
Specialist advisors:		



Appendix H - Collaboration Agreement

DATED 19 February 2020

- (1) PHILIP DYMOKE WHITE, FIONA ELIZABETH WHITE and ALEXANDER STUART DYMOKE WHITE as Trustees of P.D. White
- (2) BELLWAY HOMES LIMITED
- (3) JUDITH MARY DARMADY, SARAH JANE WILLIAMS and EDWARD JOHN DARMADY
- (4) JUDITH MARY DARMADY, EDWARD JOHN DARMADY, SIMON GERALD PIGOT WILLIAMS and LUCY GEORGIANA PIGOT WILLIAMS

AGREEMENT FOR COLLABORATION

of the redevelopment of land at Bartons Road and
Helmsley House Havant

WE HEREBY CERTIFY THAT THIS IS A TRUE
AND COMPLETE COPY OF THE ORIGINAL

TRETHOWANS LLP
THE PAVILION
BOTLEIGH GRANGE BUSINESS PARK
HEDGE END
SOUTHAMPTON SO30 2AF

Trethowans LLP
19/02/2020

CONTENTS

1	DEFINITIONS	2
2	INTERPRETATION	5
3	OVERARCHING OBJECTIVE	6
4	DRAINAGE	6
5	ACCESS	7
6	BOUNDARY FENCES	8
7	CO-OPERATION AND NO OBJECTION	8
8	COSTS	9
9	INDEMNITY AND GUARANTEE	9
10	DEALINGS	9
11	TAX	9
12	DISPUTE RESOLUTION	10
13	NOTICES	10
14	WHOLE AGREEMENT	11
15	LAW & JURISDICTION	12
16	TRUSTEES' LIABILITY	12
17	EXECUTION	12

THIS AGREEMENT is made this

19 February

2010

BETWEEN:

- (1) **PHILIP DYMOKE WHITE** and **FIONA ELIZABETH WHITE** and **ALEXANDER STUART DYMOKE WHITE** of Chidden Farmhouse Chidden Hambledon Hampshire PO7 4TD as Trustees of P.D. White ("**White**");
- (2) **BELLWAY HOMES LIMITED** (Co. No. 00670176) whose registered office is Seaton Burn House, Dudley Lane, Seaton Burn, Newcastle-upon-Tyne NE13 6BE ("**Bellway**")
- (3) **JUDITH MARY DARMADY** of Meadow View 26 Vyne Road, Sherborne St John, Basingstoke, Hampshire RG24 9HX, **SARAH JANE WILLIAMS** of Aldsworth House Aldsworth, Emsworth, Hampshire PO10 8QT and **EDWARD JOHN DARMADY** of 99 Fir Hill Alness Ross-shire IV17 ORT ("**Darmady 1**"); and
- (4) **JUDITH MARY DARMADY** of Meadow View 26 Vyne Road Sherborne St John Basingstoke Hampshire RG24 9HX, **EDWARD JOHN DARMADY** of 99 Fir Hill Alness Ross-shire IV17 ORT, **SIMON GERALD PIGOT WILLIAMS** of The Old Farmhouse Pitts Lane Bishopstone Salisbury SP5 4DQ and **LUCY GEORGINA PIGOT WILLIAMS** of 23 Weiss Road London SW15 1DH ("**Darmady 2**").

BACKGROUND:

- (A) White is the registered freehold owner of the Purple Land.
- (B) Bellway is the registered freehold owner of the Red Land.
- (C) Darmady 1 is the registered freehold owner of the Blue Land.
- (D) Darmady 2 is the registered freehold owner of the Green Land.
- (E) The Parties have agreed to collaborate together to assist with the development of the Barton Site and the Helmsley Site on the terms set out in this Agreement.

NOW THIS DEED WITNESSES

1 DEFINITIONS

In this Agreement (including the preamble and the recitals) the following expressions shall have the following meanings:

Barton Site

together the Red Land and the Purple Land;

Barton Site Planning Permission

the outline planning permission ref: APP/15/01435 for residential development on the Barton Site; including any variation substitution or further

	consent for development on the Barton Site
Blue Land	the land edged blue on Plan 1 registered at HM Land Registry under number SH32766;
Spur Road	means the land cross-hatched black on Plan 2
Darmady:	together Darmady 1 and Darmady 2
Darmady's Solicitors:	means Trethowans LLP of Botleigh Grange Business Park, Pavilion Rd, Southampton SO30 2AF (reference: ejb/329094) or such other solicitors as may be appointed by the Darmady from time to time and notified to White in writing;
Dispute Procedure:	means (in the absence of there being specific other provision for dispute resolution) the dispute resolution procedure set out at clause 12;
Expert	the independent expert appointed pursuant to clause 12;
Green Land	the land edged green on Plan 1 registered at HM Land Registry under title number SH23161;
Hatched Land	the part of the Barton Site shown hatched black on Plan 2;
Helmsley Site	together the Blue Land and the Green Land
Interest:	means in the case of: (a) monies due from one party to another interest calculated at the rate of 2% per annum above the base rate of Barclays Bank PLC;

(b) monies earned as a result of funds being on deposit with a financial institution interest actually earned;

Local Planning Authority: means any authority in its capacity as the local planning authority for the Property;

Overarching Objective shall have the meaning given to it in clause 3;

Parties: means White Darmady and Bellway and (where the context so admits) "**Party**" shall be construed accordingly;

Plan 1: means the plan attached and marked 'Plan 1'

Plan 2: means the plan attached and marked 'Plan 2'

Plan 3: means the plan attached and marked 'Plan 3' or such substituted plan as may be agreed between the parties acting reasonably

Planning Act: means the Town and Country Planning Act 1990 as amended by the Planning and Compensation Act 1991 and the Planning (Listed Buildings and Conservation Areas) Act 1990;

Purple Land: means the land edged purple on Plan 1 being part of land registered at HM Land Registry with title number SH34071

Red Land: means the land edged red on Plan 1 registered at HM Land Registry under title number SH48894

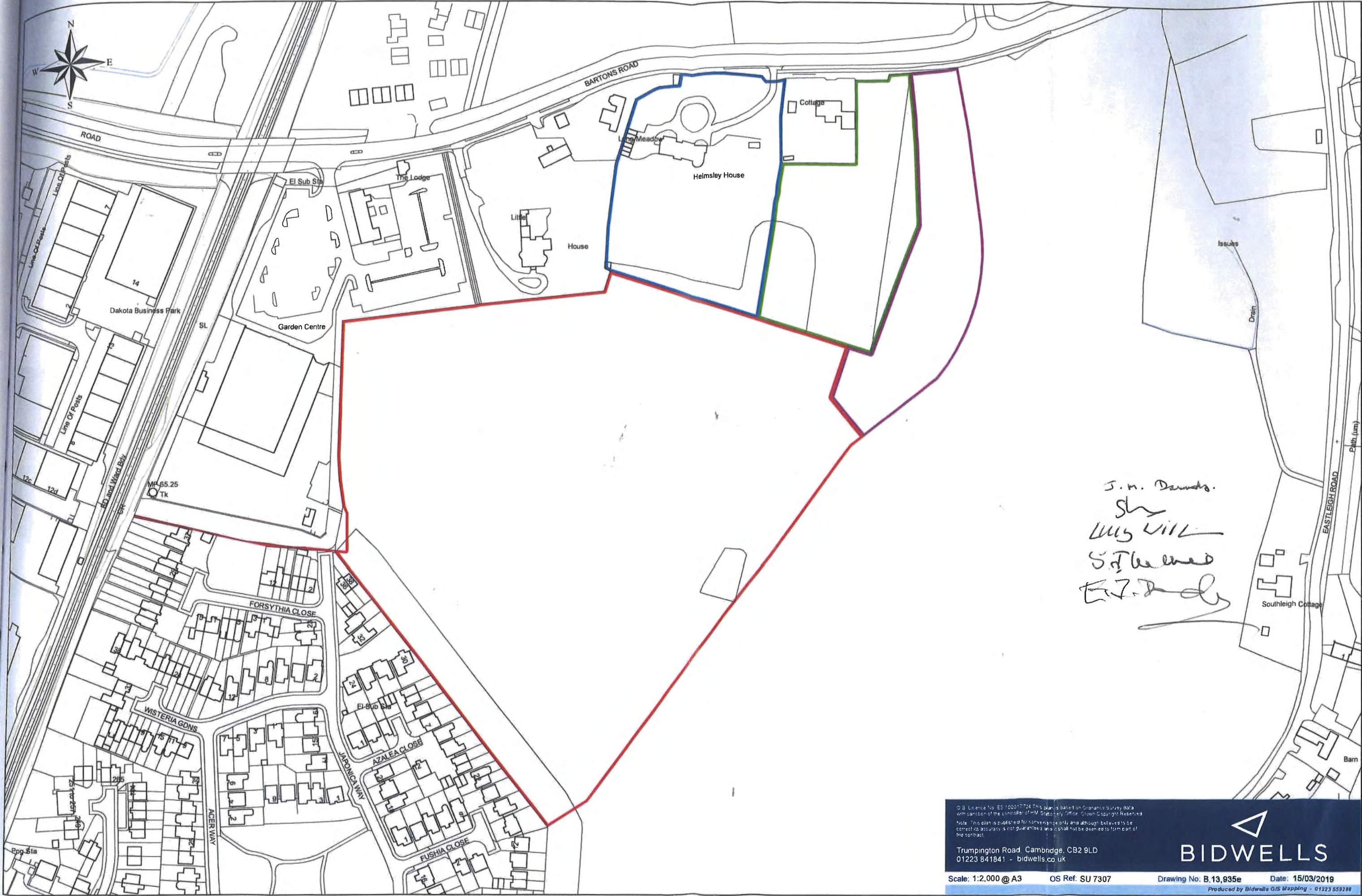
Section 104 Agreement means any agreement required by the statutory undertaker in relation to the adoption of the foul and surface water infrastructure more specifically referred to in clause 4.1.

VAT Act: means the Value Added Tax Act 1994;

VAT Election: means an election to waive exemption from VAT in respect of the Property within

Land South of Bartons Road, Havant

PLAN 1



S.M. Daniels.
Sh.
LMS VILL
S. of the line
E. of the line

alignments are illustrative only

KEY

section of 'spur' road on
White land wholly funded
by Helmsley development

Apportionment of construction costs on 'White' land

Notes:-

1. Where this drawing has been issued in electronic .dwg format it has been done so in good faith. jnpgroup do not take any responsibility for any inaccuracies in the electronic data, which should be checked against the paper (or .pdf) drawing issue. Any apparent discrepancies should be immediately reported to jnpgroup. The electronic .dwg file should not be assumed to be in scale and should not be used for 'overlays', setting out or checking of any third party information. All dimensions should be taken from the paper (or .pdf) version of the drawing. Electronic drawings may contain third party information, jnpgroup take no responsibility for this information, which should be checked against the original paper drawing(s).
2. All working dimensions to be checked on site.
3. Do not scale.
4. Any discrepancies between drawings of different scales, and between drawings and specification where appropriate to be notified to The Engineer for decision.
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Health and Safety Note:
The details on this drawing have been prepared on the assumption that a competent contractor will be carrying out the works. If the contractor(s) considers that there is insufficient Health and Safety information on this drawing, this should immediately be brought to the attention of the designer.



Context Plan

NTS

Refer to drawing no. C85850-D164 for private drainage notes

Rev.	Date	Amendment	By	Chk.
E	09.10.19	New foul drainage connection from off-site Helmsley House development to public sewer notes added	KT	KT
D	07.06.19	Drainage levels updated to suit updated garden levels in plots south of Road 1.	KM	KT
C	11.02.19	Boundary levels and retaining structures between phase 1 and Phase 2 revised following phase 2 revised external levels	IS	KM
B	21.01.19	Phase 1 revised to suit client comments	IS	KM
A	09.10.18	Status revised to construction. Drainage updated.	CT	KM
Rev.	Date	Amendment	By	Chk.
Construction				

Bellway

john newton & partners
jnpgroup
Consulting Engineers
www.jnpgroup.co.uk
D1926 889555 leamingtonspa@jnpgroup.co.uk

Client Bellway Homes
Job Bartons Road Havant, Hampshire
Title Phase 1 Private Drainage Layout Sheet 2 of 3

Scale 1:200 © A1 Date July 2018
Drawn by CT Checked by KM Approved by KM

BATROCA HAS Constructionline

Drawing No. C85850-D165 Rev. C

All connections to the existing public sewer network from off-site developments (Helmsley House) are subject to S106 approval from Southern Water, to be undertaken by others.

New foul flows from Helmsley House development to connect to existing Southern Water public foul water sewer. Discharge rate maximum 2.2 l/s.

Exact location and route of existing foul sewer to be confirmed and diverted as necessary, design by others.

EX FWHM1802
CL 29.260
IL 28.040

F102
CL 29.262
IL 27.862

F104
CL 28.558
IL 25.818

F105
CL 28.340
IL 25.598

Handwritten notes:
Luis Villa
J. M. Duran
Shs
S. T. Helle

2no 1.2mØ Twin Wall Plastic Pipework @ 1:500

2no 1.2mØ Twin Wall Plastic Pipework @ 1:500

Foul Drainage Legend

(Dimensions are approx. internal sizes).

- Existing Southern Water public foul sewer
- Existing Southern Water public foul sewer to be diverted
- New Adoptable Foul water sewer and manhole
- New private foul drain
- New private foul inspection chamber 225 mm dia polypropylene or vitrified clay up to 600 mm deep, Max pipe dia, 150mm
- New private foul inspection chamber 450 mm dia polypropylene up to 3000 mm deep, Max pipe dia, 150mm
- New adoptable foul water type 3 inspection chamber and vitrified clay lateral

Rainwater down pipes and internal foul down pipes are shown indicatively only. The contractor shall refer to architects drawings for actual locations, external drainage runs may require relocating to suit.

Surface Water Drainage Legend

(Dimensions are approx. internal sizes).

- Existing Southern Water public storm water sewer
- Existing Southern Water public storm water sewer to be removed
- New adoptable surface water sewer
- New adoptable surface water manhole
- New private surface water inspection chamber 225 mm dia polypropylene or vitrified clay up to 600 mm deep, Max pipe dia, 150mm
- New private surface water inspection chamber 450 mm dia polypropylene up to 3000 mm deep, Max pipe dia, 150mm
- New private yard gully / road gully
- New private channel drain
- New private rodding eye
- New indicative private rain water pipe
- New adoptable surface water type 3 inspection chamber and vitrified clay lateral
- Tree Root Protection Area, Refer to Tree Survey & Constraint Plan by Bernie Harverson & Tree Report by ACD Environmental
- New private deep trapped road gully in shared parking courts
- New trench drain to connect to the nearest bed and surround granular material.

IMPORTANT

All construction works undertaken prior to the approvals below will be undertaken at the contractors risk.

- Section 278
- Section 36
- Section 104
- Building Regulations

Existing Utilities

The contractor shall refer to the existing and proposed services information, provided by Bellway Homes (Wessex).

It is the Contractor's responsibility to liaise with all relevant services companies to ensure that all existing services are accurately located and adequately protected during construction.

It is the Contractor's responsibility to liaise with the Developer and all relevant services companies to ensure that all new and diverted services are accurately located and adequately protected during construction.

All works to existing services to be undertaken as required by the Developer. Refer to Developer design.

All buried concrete Design Class DS-2 and AEC site classification of AC-1s. For existing ground conditions refer to Phase II Ground Investigation Report by Soite Limited, document ref. 16524/GIR, dated October 2017 and Supplementary Geotechnical Investigation Report by JNP Group, dated August 2018.

This drawing is based on the following information provided by others:

- Topographical Survey undertaken by SiteLine Geomatics Surveyors, ref. 05H401, dated January 2018.
- Site Layout plan by OSP Architecture, ref. 17300 - P101 Rev G, dated November 2018.
- Tree Survey by Bernie Harverson, ref. 0767 - BJH 0102, dated October 2015.
- Landscape Proposals by ACD Environmental, ref. BEL21747 11F, date March 2019.

1. Where this drawing has been issued in electronic .dwg format it has been done so in good faith. jgroup do not take any responsibility for any inaccuracies in the electronic data, which should be checked against the paper (or .pdf) drawing issue. Any apparent discrepancies should be immediately reported to jgroup. The electronic .dwg file should not be assumed to be to scale and should not be used for 'overlaying', setting out or checking of any third party information. All dimensions should be taken from the paper (or .pdf) version of the drawing. Electronic drawings may contain third party information, jgroup take no responsibility for this information, which should be checked against the originators paper drawings).

2. All working dimensions to be checked on site.

3. Do not scale.

4. Any discrepancies between drawings of different scales, and between drawings and specification where appropriate to be notified to The Engineer for decision.

5. Copyright reserved. This drawing may only be used for The Client and location specified in the title block. It may not be copied or disclosed to any third party without the prior written consent of Ingroup.

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Context Plan

NTS

Refer to drawing no. C85850-D164 for private drainage notes.

E	09.10.19	Now low drainage connection from off-site Hemley House development to public sewer notes added.	KT	
D	07.06.19	Drainage levels updated to suit updated ground levels in plots south of Road 1.	KM	
C	11.02.19	Boundary levels and retaining structures between phase 1 and Phase 2 revised following phase2 revised external levels	IS	
B	21.01.19	Phase 1 revised to suit client comments	IS	
A	09.10.18	Status revised to construction. Drainage updated.	CT	
Rev.	Date	Amendment	By	Cl

Status	Construction
--------	--------------

Bellway



Client	Bellway Homes
--------	---------------

Job	Bartons Road Havant, Hampshire
-----	-----------------------------------

Title	Phase 1 Private Drainage Layout Sheet 2 of 3
-------	---

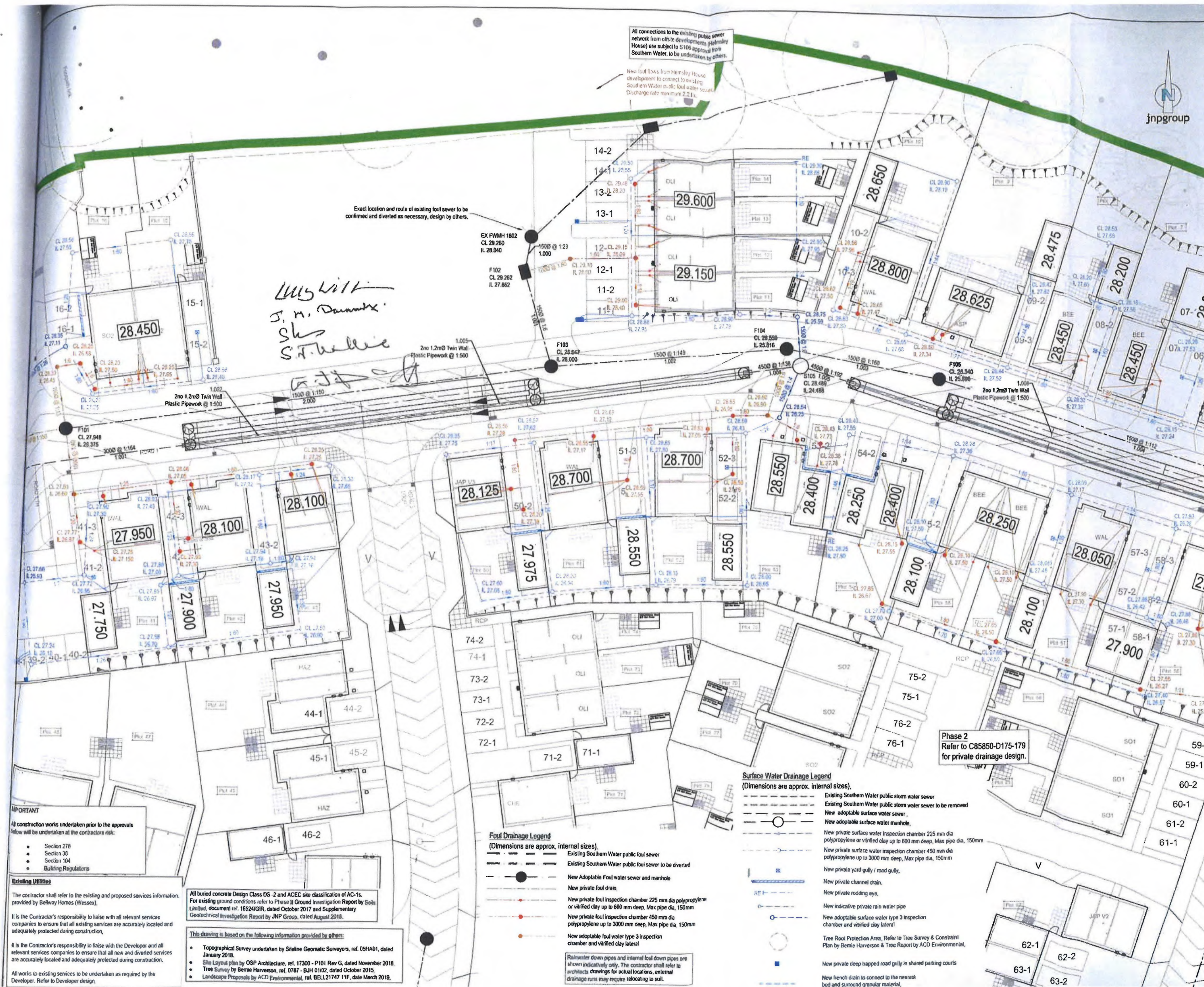
Scale 1:200	GA1	Date July 2018
-------------	-----	----------------

Drawn by CT	Checked by KM	Approved by KM
-------------	---------------	----------------



Drawing No. C85850-D165

Rev	
E	



the meaning of paragraph 2 of schedule 10 to the VAT Act;

VAT:

means Value Added Tax;

White's Solicitors:

means Charles Russell Speechlys LLP of 5 Fleet Place London EC4M 7RD (reference SLM/119197/7) ;

Working Day:

means Monday to Friday inclusive but not including any public holiday in England;

2 INTERPRETATION

The provisions of this Agreement shall unless the context otherwise requires be construed as follows:

- 2.1 Obligations and liabilities of a Party comprising more than one person are obligations and liabilities of such persons jointly and severally;
- 2.2 Words importing one gender include all other genders;
- 2.3 The singular includes the plural and vice versa;
- 2.4 In construing this Agreement the rule known as the "**eiusdem generis**" rule shall not apply nor shall any similar rule or approach to the construction of this Agreement and accordingly general words introduced or followed by the word "**other**" "**include**" "**includes**" or "**including**" or "**in particular**" shall not be given a restrictive meaning because they are followed or preceded (as the case may be) by particular examples intended to fall within the meaning of the general words;
- 2.5 Reference to a statute includes any amendment modification extension consolidation or re-enactment of it and any statutory instrument regulation or order made under it which is for the time being in force;
- 2.6 Headings to Clauses of and in Schedules and Appendices (if any) to this Agreement do not affect the interpretation or construction of this Agreement;
- 2.7 Unless as expressly otherwise stated references to Clauses Schedules and Appendices shall be references to clauses schedules and appendices in this Agreement.
- 2.8 Darmady includes Darmady's successors in title and any other person who becomes entitled to the Helmsley Site.
- 2.9 White and Bellway includes (unless specifically excepted) White's successors in title and Bellway's successors in title and any other person who becomes entitled to the relevant part of the Barton Site.

3

OVERARCHING OBJECTIVE

3.1

White and Darmady agree that the Overarching Objective of this Agreement comprises:

- 3.1.1 to co-operate on their respective development sites applying commercially prudent objectives with regard to drainage, access and boundary fences;
- 3.1.2 to facilitate the development on their respective sites applying commercially prudent objectives.

4

DRAINAGE

4.1

For the benefit of the Helmsley Site and each and every part White and Bellway hereby agree to enter into a deed of easement with Darmady (or Darmady's successors in title) to grant rights (free of any costs) for Darmady (or its successors in title as the case may be) to:-

- 4.1.1 connect into surface water apparatus at the connection point as shown within Plan 3 (Drawing No. C85850-D164 Rev.E) subject to not exceeding a flow rate of 5 l/s.
- 4.1.2 connect into the foul water apparatus at the connection point as shown within Plan 4 (Drawing No. C85850-D165 Rev.E) at a maximum discharge rate of 2.2l/s and within Plan 3 (Drawing No. C85850-D164 Rev.E) at a maximum discharge rate of 0.8l/s. Drainage at both connection points is subject always to sufficient capacity being available to drain the Helmsley Site having been confirmed by Southern Water. lay and construct the said apparatus (at Darmady's own cost) with all such necessary rights of way and access onto the Barton Site (with or without workmen vehicles and plant machinery) to accommodate the same and make good promptly any damage caused to the Barton Site.
- 4.1.3 to freely use and enjoy the passage of such services through the apparatus and service media referred to above in 4.1.1 and 4.1.2 subject to all necessary consents and approvals being obtained from all necessary authorities.

rights of way and access onto the Barton Site to maintain repair and replace such apparatus and service media referred to above

4.2

To the extent that any proposed drainage apparatus requires works to be carried out to the roadway to be constructed on the Hatched Land Darmady shall co-operate with the developers of the Barton Site as to the timing of such works all parties applying commercially prudent and reasonable objectives.

4.3

The deed of easement referred to in this clause 4 shall be entered into between the Parties and completed no later than 10 Working Days after the completion date of the first dwelling on the Barton Site and White and Bellway hereby agree that on the completion date of the said deed they will hand over to Darmady the relevant certificates/consents required

to enable the deed to be registered against the titles to the Barton Site and the Helmsley Site.

- 4.4 Bellway covenants with Darmady that Bellway as landowner will enter into any S.104 Agreement necessary for the adoption of the surface water and foul drainage apparatus on and serving the Helmsley Site subject to Darmady (or its successors in title as the case may be) indemnifying Bellway in relation to any proper costs incurred by Bellway in so doing.

5 ACCESS

- 5.1 (Subject to clause 5.2) White hereby consents to Darmady having access to such part of the Hatched Land as is reasonably necessary to construct a Spur Road to the Helmsley Site in the approximate position shown on Plan 2 with the right to connect the Helmsley Site to the Hatched Land at an exact location to be approved by White acting reasonably in all the circumstances

- 5.2 The right at 5.1 is subject to Darmady paying:

- (a) the full cost of construction of the Spur Road and any costs incurred by White and/or Bellway in making good damage caused by Darmady as a direct consequence of the construction of the Spur Road to the roadway within the Hatched Land and any costs associated with adoption (if any) of the Spur Road ;
- (b) to White (being the original first party to this agreement only) 20% of the cost of construction to an adoptable standard of the roadway to be constructed on the Hatched Land from Bartons Road to the junction with the Spur Road such payment to be made in the time and manner set out below.

- 5.3 The payment to be made by Darmady to White and/or Bellway (as the case may be) under clause 5.2 above shall be made ten Working Days after the later of:

5.3.1 The date the roadway referred to in clause (b) is constructed and available to be used by Darmady and those authorised by it;

5.3.2 The date of a sale of the whole or part of the Helmsley Site (subject to 5.4 below).

- 5.4 In the event that only part of the Helmsley Site is sold, the payment due under clause 5.3 shall be the same proportion of the sum due under clause (b) that the proportion of the land sold bears to the Helmsley Site, provided that the remaining sum shall be due upon a further sale of the remaining part.

- 5.5 Subject to the existing rights granted by White to Bellway in respect of the hatched land by a Transfer dated 23rd February 2018 made between (1) White and (2) Bellway White hereby agrees to enter into a deed of easement granting a free right at all times and for all purposes to Darmady and its successors in title for the benefit of the Helmsley Site and each and every part over and along the roadway to be constructed on the Barton Site

within the Hatched Land and over and along the Spur Road until such time as the same are adopted.

5.6 The deed of easement referred to above in clause 5.5 shall be entered into by the date three months after the completion of the Spur Road to base course ready for use by pedestrians and vehicles and White hereby agrees that on the completion of the said deed it will hand over to Darmady the relevant consent/certificate required to enable the same to be registered against the titles to the Barton Site.

5.7 White covenants with Darmady to use reasonable endeavours to procure that the roadway is adopted and to enter, as landowner only, into such S.38 or S.278 agreement as is necessary to achieve adoption.

6 BOUNDARY FENCES

6.1 The parties hereby agree that they shall co-operate and use reasonable endeavours to agree the exact location of the boundary between the Helmsley Site and the Barton Site and once agreed shall physically mark the location on the ground by some mutually agreed method.

6.2 The cost of any fencing required on the boundary referred to in clause 6.1 above shall be borne by the party requiring the fencing.

6.3 Notwithstanding 6.2 above White hereby acknowledges that the cost of any fencing required to satisfy the Barton Site Planning Permission shall be the responsibility of White and not Darmady whether or not on the Helmsley Site.

6.4 Notwithstanding 6.2 above White hereby acknowledges that the cost of any landscaping required to satisfy the Barton Site Planning Permission shall be the responsibility of White and not Darmady whether or not on the Helmsley Site.

7 CO-OPERATION AND NO OBJECTION

7.1 White covenants with Darmady that it will neither object to nor support any objection to any planning application or construction works in respect of the proposed development of the Helmsley Site provided that White is not obliged to comply with this covenant where such application would impede, hinder or restrict the development of the Barton Site pursuant to the Barton Site Planning Permission applying commercially prudent objectives in all the circumstances.

7.2 Darmady covenants with White that it will neither object to nor support any objection to any planning application or construction works in respect of the proposed development of the Barton Site and in particular shall not:

7.2.1 object to any applications by White for any planning application or application for reserved matters approval or other consent in respect of the Barton Site; and

7.2.2 shall not make any representations on any planning policy documents in respect of the Barton Site without the consent of White.

- 7.3 The parties agree that (with the exception of the payments referred to in clauses 5.2 and 5.3 neither will seek any payment for the grant of any easements which may be required.

8 COSTS

On completion of this Agreement Darmady shall pay a contribution of £3,000 plus VAT towards the legal costs of White's Solicitors in connection with this Agreement (receipt of which White acknowledges).

9 INDEMNITY AND GUARANTEE

Each Party shall indemnify and keep the other ^{Parties and effectively} ~~Party~~ fully indemnified against all damage losses expenses liabilities costs claims proceedings and demands whatsoever arising as a consequence of any breach of this Agreement by the ^{indemnifying} other Party or their respective contractors sub-contractors servants or agents. *To the extent*

10 DEALINGS

- 10.1 Darmady covenants with White not to transfer its legal interest in the whole or any part of the Helmsley Site without delivering a Deed of Covenant to comply with the terms of this agreement from the transferee in favour of White.
- 10.2 White and Bellway covenant with Darmady not to transfer their interest in the Hatched Land (or prior to the grant of the deed of easement for drainage referred to in clause 4 hereof, the Barton Site) without delivering a deed of covenant from the transferee in favour of Darmady whereby the transferee will covenant directly with Darmady to be bound by the obligations on the part of White and Bellway contained or referred to in this Agreement.

11 TAX

11.1 Value Added Tax

- 11.1.1 Save as the context requires or as otherwise stated herein all references to payments or amounts made in this Agreement are references to such payments or amounts exclusive of any VAT chargeable in respect of the supply of goods or services for which the payments or amounts are or are deemed to be consideration.
- 11.1.2 Save as otherwise stated herein insofar as any payment falls to be made under this Agreement any VAT chargeable in respect of any supply for which that payment is or is deemed to be the consideration shall be added to the amount and against provision of a proper tax invoice therefor paid in addition thereto.
- 11.1.3 Without prejudice to the generality of the preceding clause 11.1.2 where any taxable supply of goods or services is made or deemed to be made pursuant to this Agreement the recipient of such supply shall against provision of a proper tax invoice therefor pay to the supplier the amount of any VAT chargeable in respect thereof.

- 11.1.4 Where under the terms of this Agreement any cost or expense is to be reimbursed refunded paid or borne by any person other than the person who originally incurred it that cost or expense shall be paid inclusive of any VAT comprised therein.

11.2 No Partnership

Nothing contained in this Agreement or in any document entered into or in any assignment made or in the course of dealings conducted under or in any way relating to this Agreement shall be construed as creating any partnership or agency arrangement between Darmady and White or with any third party.

12 DISPUTE RESOLUTION

Any dispute which may arise under this Agreement may if not resolved between Parties within 20 Working Days be referred by either party to a person having appropriate professional qualifications and experience in such matters appointed jointly by the parties or if agreement on the identity of such person cannot be agreed between the parties within 10 Working Days by the president for the time being of the professional institute relevant to the dispute (or on his behalf) on the application of either party. The Expert shall act as an Expert and not as an arbitrator. In the absence of manifest error the decision of the Expert shall be final and binding upon the parties and the following provisions shall apply to the Expert:

- 12.1 the charges and the expenses of the Expert shall be borne equally between the parties or in other proportions as the Expert may direct;
- 12.2 the Expert shall give the parties an opportunity to make representations to him before making his decision;
- 12.3 the Expert shall be entitled to obtain opinions from others if he so wishes;
- 12.4 the Expert shall make his decisions on matters of costs within the range of any representations made by the parties;
- 12.5 the Expert shall give reasons for his decision;
- 12.6 the Expert shall comply with any time limit or other directions agreed by both parties on or before his appointment and failing such agreement the Expert shall have a period of 20 Working Days from the date of his appointment to determine the dispute and to publish his decision;
- 12.7 if the Expert dies or refuses or is unable to act or unreasonably delays in acting the procedure for his appointment will be repeated as often as necessary.

13 NOTICES

- 13.1 Any notice given under this Agreement must be in writing and signed by or on behalf of the party giving it.

Any notice or document to be given or delivered under this Agreement must be given by delivering it personally or sending it by pre-paid first class post or recorded or special delivery to the address and for the attention of the relevant party as follows:

to White at:

Chidden Farmhouse, Chidden, Hambledon, Hampshire PO7 4TD marked for the attention of Philip White

and at the White's Solicitor, quoting the reference SLM/119197/00007;

13.1.1 to Darmady at:

Darmady's Solicitor, quoting the reference ejb/329094

13.2 Any such notice or document will be deemed to have been received:

13.2.1 if delivered personally, at the time of delivery provided that if delivery occurs before 9.00 am on a working day, the notice will be deemed to have been received at 9.00 am on that day, and if delivery occurs after 5.00 pm on a working day, or on a day which is not a working day, the notice will be deemed to have been received at 9.00 am on the next working day;

13.2.2 in the case of pre-paid first class or recorded or special delivery post, at 9.00 am on the second working day after posting.

13.3 In proving delivery, it will be sufficient to prove that delivery was made or that the envelope containing the notice or document was properly addressed and posted as a prepaid first class or recorded or special delivery letter, as the case may be.

13.4 A notice or document delivered under this Agreement shall not be validly given or delivered if sent by e-mail or fax.

14 **WHOLE AGREEMENT**

14.1 This Agreement embodies the entire understanding of the Parties and there are no other arrangements between the Parties relating to the subject matter of this Agreement.

14.2 No amendment or modification of this Agreement shall be valid or binding on any Party unless the same:

14.2.1 is made in writing;

14.2.2 refers expressly to this Agreement;

14.2.3 is signed by the Party concerned or its duly authorised representative.

15 **LAW & JURISDICTION**

This Agreement shall be governed by and construed in accordance with English Law and it is irrevocably agreed that the courts of England are to have exclusive jurisdiction to settle any disputes which may arise out of or in connection with this Agreement.

16 **TRUSTEES' LIABILITY**

- 16.1 Philip Dymoke White, Fiona Elizabeth White and Alexander Stuart Dymoke White enter into this Agreement in their capacity as trustees of P.D. White only and not in their personal capacity (and shall not incur any personal liability of any sort under or by virtue of this Agreement nor in relation to any related documents, matters or claims whatsoever) and their liability as trustees shall be limited to the value of the trust assets (after deduction of any relevant taxes, costs, liabilities and other reasonable and proper expenses) which are in their possession or under their control from time to time by virtue of their respective appointments as trustees of P.D. White.
- 16.2 Judith Mary Darmady and Sarah Jane Williams as part of Darmady 1, enter into this Agreement in their capacity as trustees of Helmsley House Settlement and Land adjoining Helmsley House Settlement and not in their personal capacity (and shall not incur any personal liability of any sort under or by virtue of this Agreement nor in relation to any related documents matters or claims whatsoever) and their liability as trustees shall be limited to the value of the assets of the trusts (after deduction of any relevant taxes costs liabilities and other reasonable and proper expenses) which are in their possession or under their control from to time to time by virtue of their respective appointments as trustees of Helmsley House Settlement and Land adjoining Helmsley House Settlement.

17 **EXECUTION**

- 17.1 White Bellway Darmady 1 and Darmady 2 have executed this Agreement as a deed on the day and year first before written.
- 17.2 This Agreement has been engrossed and executed in four parts of which one copy has been executed by White, one by Bellway, one by Darmady 1 and the other copy has been executed by Darmady 2.

EXECUTED as a **DEED** by **PHILIP DYMOKE**)
WHITE in the presence of:) **PHILIP DYMOKE WHITE**

Witness signature

Witness name
(block capitals)

Witness address

Witness occupation

EXECUTED as a **DEED** by **FIONA**)
ELIZABETH WHITE in the presence of:) **FIONA ELIZABETH WHITE**

Witness signature

Witness name
(block capitals)

Witness address

Witness occupation

EXECUTED as a **DEED** by **ALEXANDER**)
STUART DYMOKE WHITE in the presence) **ALEXANDER STUART DYMOKE WHITE**
of:

Witness signature

Witness name
(block capitals)

Witness address

Witness occupation

SIGNED AS A DEED by the said BELLWAY
HOMES LIMITED acting by a director in the
presence of

Director

X

X

WITNESS

Signature.....

Name (print).....

Address.....

Occupation.....

EXECUTED as a DEED by JUDITH MARY) *J. M. Darmady*
DARMADY in the presence of:) JUDITH MARY DARMADY

Witness signature *C. Temple*

Witness name CHRISTINE ANNE TEMPLE
(block capitals)

Witness address 74 GOLDFINCH RD, CREEKMOOR, POOLE, DORSET BH17 7TD

Witness occupation CARER

EXECUTED as a DEED by SARAH JANE)
WILLIAMS in the presence of:)

S.J. Williams

SARAH JANE WILLIAMS

Witness signature

Witness name
(block capitals)

M.S. CSAKHY

Witness address

FLINT STONES, ALDSWORTH, DO10 8QT

Witness occupation

FILM PRODUCER + DIRECTOR

EXECUTED as a DEED by EDWARD JOHN)
DARMADY in the presence of:)

E. J. Darmady

EDWARD JOHN DARMADY

Witness signature

T M

Witness name
(block capitals)

TERESA BROWN

Witness address

1, MAIN ST. BAINTON ROSSSHIRE
IV20 1EH

Witness occupation

RETIRED.

EXECUTED as a DEED by JUDITH MARY)
DARMADY in the presence of:)

J. M. Darmady

JUDITH MARY DARMADY

Witness signature

C. Temple

Witness name
(block capitals)

CHRISTINE ANNE TEMPLE

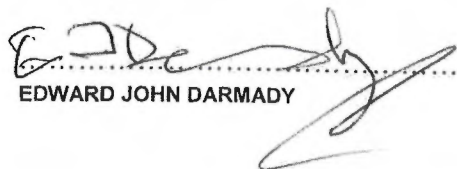
Witness address

74 GOLDFINCH RD, CREEKMOOR, POOLE, DORSET, BH17 7TD

Witness occupation

CARER.

EXECUTED as a DEED by EDWARD JOHN)
DARMADY in the presence of:)


EDWARD JOHN DARMADY

Witness signature



Witness name

(block capitals)

TERESA BROWN

Witness address

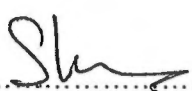
1, MAIN ST BALINTORE ROSSSHIRE

Witness occupation

IV201EU

RETIRED.

EXECUTED as a DEED by SIMON GERALD)
PIGOT WILLIAMS in the presence of:)


SIMON GERALD PIGOT WILLIAMS

Witness signature



Witness name

(block capitals)

CHRISTINE BUSH

Witness address

Flat 8 Greenhouse, Highcroft Rd.
Manchester M20 2RS

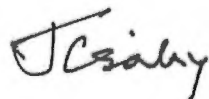
Witness occupation

DOCTOR.

EXECUTED as a DEED by LUCY)
GEORGIANA PIGOT WILLIAMS in the)
presence of:


LUCY GEORGIANA PIGOT WILLIAMS

Witness signature



Witness name

(block capitals)

JEAN CSAKY

Witness address

FLINT STONES, ALDSNORTH. WEST SUSSEX PO10 8QT

Witness occupation

WRITER