

rappor



Staverton House, Trowbridge

Fidelia Care Home Ltd

Drainage Strategy Technical Note
March 2025





Document Control

Job No.	24.0453	
Project Name	Staverton House, Trowbridge	
Document Title	Drainage Technical Note	
Status	Approval	
Client	Fidelia Care Home Ltd	
	Name	Date
Prepared By	Charlotte Granger	March 2025
Checked By	Sophie Reid	March 2025
Approved By	Simon Mirams	March 2025

Record of Revisions

Revision	Date	Details	Made By
00	14/03/25	First Issue	CG
01	17/03/25	Updated to include latest layout	CG

Rappor Consultants Ltd

A: CTP House, Knapp Road, Cheltenham, GL50 3QQ

W: www.rappor.co.uk

T: 01242 523696

E: hello@rappor.co.uk

© Rappor Consultants Limited. All rights reserved. The contents of this document must not be copied or reproduced in whole or in part without the written consent of Rappor Consultants Ltd and Fidelia Care Home Ltd.



Contents

Document Control.....	1
1 Introduction	3
2 Existing Site Conditions.....	4
3 Proposed Drainage Strategy	5
4 SuDS/Drainage Management.....	8

List of Figures and Tables

Table 3.1 QBAR	5
Table 3.2 Water Quality Indices – (as per C753 The SuDS Manual)	7
Table 4.1 Initial Operation and Maintenance Plan	8

Appendices

- Appendix A – Proposed Site Plan
- Appendix B – Topographical Survey
- Appendix C – Wessex Water Asset Plan
- Appendix D – Soakaway Assessment report
- Appendix E – MicroDrainage Calculations
- Appendix F – Drainage Strategy
- Appendix G – Exceedance Flow Plan



1 Introduction

- 1.1 Rappor provide expert Transport Planning, Highways, Infrastructure and Flood Risk consultancy services throughout the UK.
- 1.2 Rappor were appointed by Fidelia Care Ltd to provide drainage consultancy in support of a proposed extension to an existing care home, involving the demolition of the Old Vicarage and the provision of a replacement building to provide 46 bedrooms. The associated planning reference is PL/2021/10327 and PL/2023/04128. The proposed development drawing is contained within **Appendix A**.
- 1.3 This Technical Note will cover the proposed surface water and foul water drainage arrangement and demonstrate compliance with the principles of Sustainable Drainage Systems (SuDS) in response to the updated scheme.



2 Existing Site Conditions

- 2.1 The existing site is an operational care home located in Trowbridge, Wiltshire. It comprises two buildings, Staverton House (the existing care home) and the Old Vicarage (building proposed to be demolished and replaced). The site also includes existing landscaped gardens and car parking areas.
- 2.2 The topographical survey undertaken in May 2021, indicates ground levels generally fall in a southerly direction. The survey is contained in **Appendix B**.

Existing Drainage

- 2.3 Drainage from the existing site is assumed to connect to the Wessex Water (WW) assets located to the west of the application site.
- 2.4 WW mapping indicates there are two public Foul manholes located within the site boundary, and it is assumed that the Foul from the operational Care Home flows to these assets. There is also a Public Surface water network to the west of the site within Littlebrook and it is assumed runoff from the site ultimately flows to this asset too. Refer to **Appendix C**.

Flood Risk

- 2.5 The proposed development site is located within Flood Zone 1, which is classified as having a less than 1 in 1,000 year annual probability of fluvial flooding and is therefore at low risk.
- 2.6 The EA Surface Water Flood Map indicates the site is at very low to low risk of pluvial flooding within the extension area.

Geology

- 2.7 Through available mapping, the site is shown to be located within an area underlain by the Kellaways Formation, comprising sanding mudstones with impeded drainage. This is overlain by superficial head deposits of clay, silt, sand and gravel.
- 2.8 Site specific testing to BRE 365 was undertaken, which confirmed an infiltration rate of 8.05×10^{-7} m/s. This rate is deemed non-compliant and therefore infiltration is not a viable means of surface water management. The full report is contained in **Appendix D**.

3 Proposed Drainage Strategy

Surface Water

- 3.1 A surface water management strategy for the development is proposed to manage and reduce the flood risk posed by surface water runoff from the site. The surface water drainage arrangements for any development site should be such that the volume and peak flow rates of surface water leaving a developed site are no greater than the rates prior to the proposed development unless specific off-site arrangements are made and result in the same net effect.
- 3.2 Sustainable drainage system measures (SuDS) should be used to control the surface water runoff from the proposed development site, thereby managing the flood risk to the site and surrounding areas from surface water runoff. These measures will also improve the quality of water discharged from the site.
- 3.3 The SuDS hierarchy demands that surface water run off should be disposed of as high up the following list as practically possible:
- a) Into the ground (infiltration) and re-use, or then;
 - b) To a surface water body, or then;
 - c) To a surface water sewer, highway drain or another drainage system, or then;
 - d) To a combined sewer.
- 3.4 In accordance with the SuDS hierarchy, the preferred method of surface water management is directly to ground. As previously outlined, infiltration testing has been undertaken and concluded that discharge to ground is not viable. A desk study review indicates there is no existing watercourse to outfall to and therefore, a connection will be sought to the Wessex Water Surface water asset.
- 3.5 As per Wiltshire Councils Drainage Betterment Strategy¹, peak runoff rates should as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event.
- 3.6 The existing greenfield runoff rates have been calculated using the MicroDrainage and the Interim Code of Practice (ICP) SuDS method. The resulting calculations are included within **Appendix E**. The runoff rates were calculated as follows in **Table 3.1**:

Return Period (Yrs)	Runoff Rate (l/s)
1	0.6
30	1.4
100	1.8
QBAR	0.8

Table 3.1 QBAR

¹https://www.wiltshire.gov.uk/media/13768/Wiltshire-Council-Drainage-Betterment-Strategy/pdf/Wiltshire_Council_Drainage_Betterment_Strategy__June_2024.pdf?m=1731336788693



- 3.7 It is not feasible to provide a flow restriction to such a low rate, and therefore a design discharge rate of 1.0 l/s has been used. This is generally the lowest discharge rate available to specify in mass-produced flow control solutions. Discharge rates lower than this can result in small orifices likely to block.
- 3.8 Surface water runoff from the proposed development shall be collected through a system of gutters and downpipes and directed to the attenuation crate system located in the parking area in the north of the site.
- 3.9 In order to achieve the required restriction on the proposed discharge rate, surface water runoff will discharge via underground attenuation crates and permeable paving sufficiently sized to accommodate the volume of runoff generated by a 1% AEP storm event that accounts for 40% climate change.
- 3.10 MicroDrainage calculations shows the maximum water depth for a 1 in 100 year + 40% climate change event is 0.730m with 0.270m freeboard, with a Half Drain time of 1997 minutes. Therefore, the Half Drain Height is 0.365m.
- After 24 hours, the water level is calculated to be 0.466m:
- $$0.365 / 1997 = 0.183 \text{ mm/hr}$$
- $$0.183 \times 1440 = 264\text{mm in 24 hours}$$
- $$0.730 - 0.264 = 0.466\text{mm}$$
- 3.11 Further MicroDrainage calculations indicate if a 10-year design storm occurred at this time, the maximum water depth would be 0.263 m.
- 3.12 Therefore, the total maximum water level in the 1.0 m deep storage when accounting for the 100 year + 40% climate change event and 10-year event is 0.729 m, thus the system has sufficient capacity to store excess flows from such events.
- 3.13 MicroDrainage calculations show the required storage volume and are included within **Appendix E**.
- 3.14 A Hydro-brake control chamber is proposed to restrict flows to 1.0 l/s prior to a proposed discharge to the Wessex Water asset.
- 3.15 It is proposed for the parking bays to be tanked permeable paving, to promote water quality measures. The proposed drainage layout is included in **Appendix F**.
- 3.16 The final design of the surface water drainage system (notably external levels and positions of RWP's) is subject to further development.

Exceedance Events

- 3.17 The soakaway system will be designed with a capacity up to a 1 in 100-year (plus 40% climate change) event based on the restricted discharge rate.
- 3.18 A storm event in excess of this design standard would be extreme and would cause the systems to backup (with no sudden deluge) and would then shed overland following the topography of the site, as per existing conditions.



- 3.19 Exceedance flow routes have been assessed for an event beyond the 1 in 100 year plus 40% CC, as shown within **Appendix G**.

Water Quality

- 3.20 The SuDS Manual (CIRIA C753) states that the design of surface water drainage should consider minimising contaminants in surface water runoff discharged from the site. The level of treatment required depends on the proposed land use, according to the pollution hazard indices. For this site contaminant risks come from the residential roof and associated parking.
- 3.21 To ensure that adequate treatment is provided, the SuDS mitigation indices for the development must be equal to, or exceed, the pollution hazard indices. Surface water runoff from residential roofs is considered to present a **very low** hazard (see **Table 3.2**) to water quality, whilst general residential parking presents a **low** hazard.
- 3.22 To ensure a suitable mitigation index is achieved the affected stormwater systems have been assessed.

		Pollution Hazard Level	Total suspended solids	Metals	Hydro-carbons
Land Use	Residential parking	Low	0.5	0.4	0.4
Total			0.5	0.4	0.4
SuDS Component	Permeable Paving		0.7	0.6	0.7
Total			0.7	0.6	0.7
Total SuDS Mitigation Indices $\geq$ Pollution Hazard Indices			Yes	Yes	Yes

Table 3.2 Water Quality Indices – (as per C753 The SuDS Manual)

- 3.23 **Table 3.2** indicates satisfactory water quality is achieved for the proposed development.
- 3.24 It is recommended gullies and chambers have suitable silt traps/catch pits to reduce sediment entering the system.

Foul Water

- 3.25 The proposed development shall collect foul water via a traditional gravity system and will be conveyed to the existing Wessex Water Foul Sewer (manhole reference: 8333) located within the west of the development. This is subject to confirmation of capacity and a S106 connection agreement.
- 3.26 The proposed drainage layout is contained within **Appendix F**.

4 SuDS/Drainage Management

- 4.1 Maintenance of SuDS features is essential to ensure that the surface water drainage systems operates effectively and that flooding of the site and surrounding areas is prevented.
- 4.2 The responsibility of maintaining the drainage components would lie with the development landowner unless responsibility is delegated to an appointed external Management Company or residents.
- 4.3 A full maintenance regime should be carried out to ensure that the drainage system remains operational over its lifetime. **Table 4.1** summarises an initial maintenance plan for the drainage components proposed within the development. The SuDS Manual (CIRIA C753) and manufacturer's guidelines should be referred to for further maintenance information.

Drainage Component	Required Action	Typical Frequency
Pipework, manholes, flow control chambers, catch pits and silt traps	Stabilise adjacent areas	As required
	Remove weeds	As required
	Clear any poor performing structures.	As required
	Inspect all structures for poor operation	Three monthly, 48 hours after large storms in first six months
	Monitor inspection chambers. Inspect silt accumulation rates and determine silt clearance frequencies	Annually
Cellular Storage	Weed removal. Inspection of inlets.	As required
	Silt removal	Annually
	Inlet repair.	Remedial maintenance
	Inspect all structures for poor operation	Three monthly, 48 hours after large storms in first six months
	Monitor inspection chambers. Inspect silt accumulation rates and determine silt clearance frequencies	Annually
Rainwater Butts	Litter and debris removal	Monthly, and after large storms

Table 4.1 Initial Operation and Maintenance Plan



Appendix A – Proposed Site Plan



SCHEDULE OF ACCOMMODATION

CARE HOME

SITE AREA 0.37 Ha/ 0.92 acres	
LOWER GROUND FLOOR (INCLUDING BASEMENT)	24 BED + ANC. + COMM
GROUND FLOOR	22 BED + ANC. + COMM
FIRST FLOOR	ANCILLARY
TOTAL	46 BEDROOMS
GROSS INTERNAL FLOOR AREA	
LOWER GROUND FLOOR (INCLUDING BASEMENT)	1,265 m ²
GROUND FLOOR	1,115 m ²
FIRST FLOOR	130 m ²
TOTAL GIFA:	2,510m ²
SPACE PER RESIDENT	54.6m ²
PARKING	16 BAYS INCL. 2 DISABLE BAYS

KEY

- EXISTING TREES
- PROPOSED TREES
- REMOVED TREES
- OUTLINE OF EXISTING BUILDING TO BE DEMOLISHED
- OUTLINE OF REFUSED SCHEME (PL/2023/04128)

P6	PARKING LAYOUT ADJUSTED	RZ	GW	13.03.2025
P5	REVISED TO ALIGN WITH LANDSCAPE DESIGN	RZ	GW	07.03.2025
P4	PARKING LAYOUT AMENDED AND TREE PLAN ADJUSTED	RZ	GW	03.03.2025
P3	ROOF PLAN UPDATED	RZ	GW	17.02.2025
P2	ISSUED FOR COMMENTS	RZ	PK	14.01.2025
P1	BUILDING FOOTPRINT AND AREAS AMENDED FOR 46 BED CARE HOME	RZ	PK	19.12.2024

Rev.	Description	Author	Checked	Date
------	-------------	--------	---------	------

CARLESS + ADAMS

01628 665131 enquiries@carless-adams.co.uk
carless-adams.co.uk

Design the best,
to live the best

Client
FIDELIA CARE

Project
STAVERTON HOUSE EXTENSION

Title
PROPOSED SITE PLAN

C+A no.
A-1075

scale
1:250

author
RZ

chk'd
VK

date
Mar. 7, 25

sheet size
A1

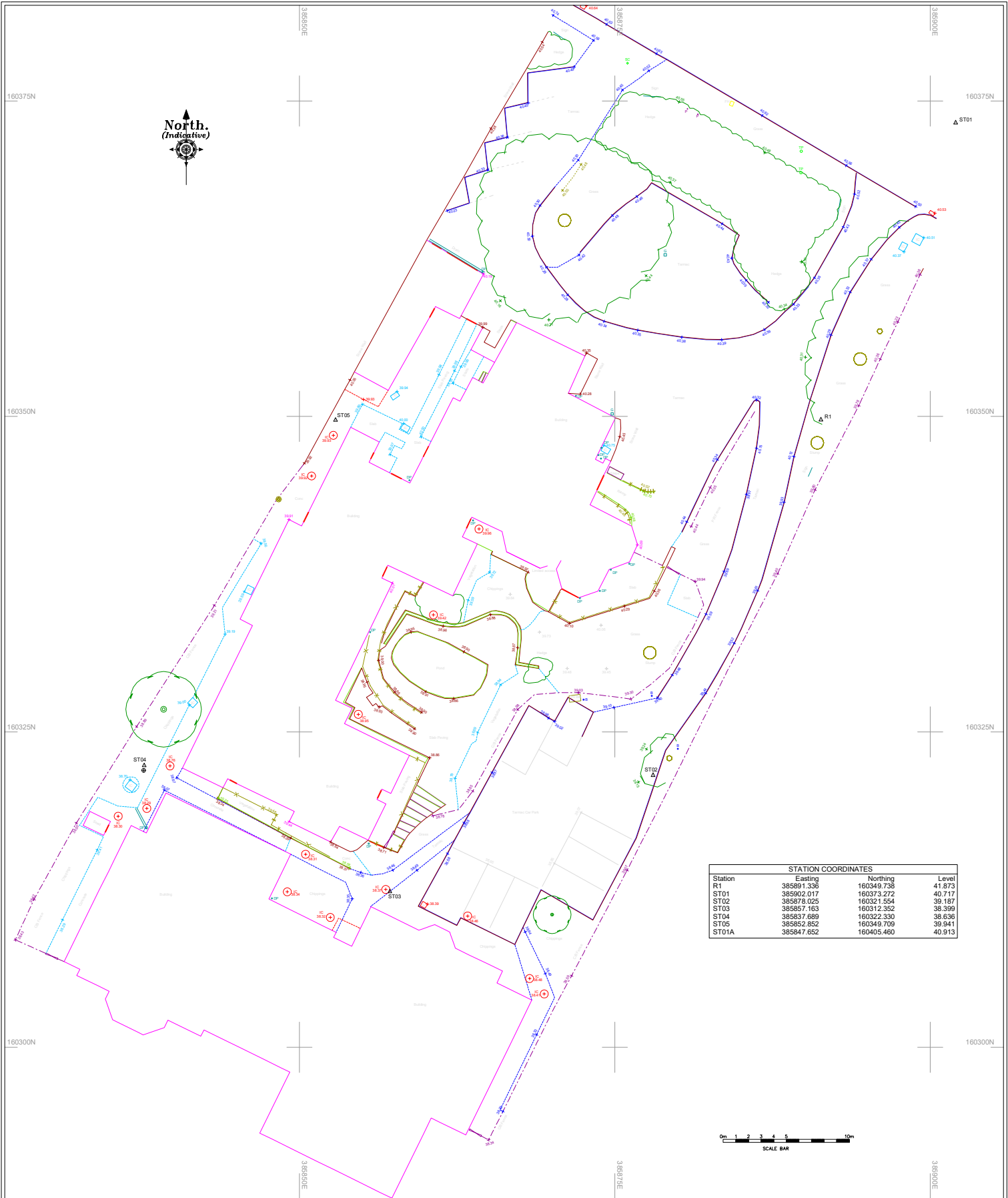
project.	org.	zone.	level.	type.	role.	class.	num.	status.	rev.
1075					A		01		P6

For construction purposes dimensions shall not be scaled & figured dimensions must be verified on site before work commences.
This drawing is Copyright ©





Appendix B – Topographical Survey



LANDMARK SURVEYS WALES

THE SURVEY PEOPLE
 ~www.sml-group.co.uk~enquiries@lmswales.co.uk~
 Tel: 01554 821 590

JOB TITLE
 Topographical Survey at
 The Old Vicarage, 51 New Terrace,
 Staverton, Trowbridge, BA14 6NX

CLIENT
 CARLESS ADAMS

DRAWING NUMBER
 8006-1

DRAWN BY
 BA

SHEET SIZE & SCALE
 A2 @ 1:200

DATE SURVEYED
 05/2021

DRAWING KEY				
Bn	Bin	Bottom of Bank	Retaining Wall	
BH	Borehole	Bin	French Drain	
BW	Benchmark	Bottom of Kerb	Sign	
B	Bollard	Building Line	Step	
CCTV	Camera / CCTV	Boundary	Style	
Col	Column	Edge of Path / Back of Pavement	Top of Bank	
DP	Downpipe	Centre Line of Road	Top of Kerb	
DPG	Downpipe / Gully	Telephone Call Box	Watercourse Bottom	
ER	Earthling Rod	Canopy Line	Watercourse Top	
Gas	Gas Cover	Change of Surface	White Line	
GC	Gas Gully	Door	Wall	
IC	Inspection Cover (Round)	Overhead Electric Cable	Milestone	
JB	Junction Box	Fence	Post	
LB	Letter Box	Gabian Wall	RE	Rodding Eye
		Gate	RS	Road Sign
		Gutter / Drain	SC	Stop Cock
		Hedge / Vegetation	SP	Sign Post
		Metal Railings	Stay	Stay
		Open Sided Building	KO	Kerb Outlet
		Quarry Face	G	Gully
			IC	Inspection Cover Round
			LP	Lamp Post
			Mkr	Marker
			S	Tree Stump
			AV	Air Valve
			BT	British Telecom Cover
			CATV	Cable TV Cover
			Tap	Water Tap
			TL	Traffic Light
			TP	Telegraph Post
				Tree (Varying Sizes)
				TV Post
				Vent Pipe
				Wet Area
				Fire Hydrant
				Gas Valve
				Inspection Cover
				Junction Box
				Inspection Cover

The depiction of a wall, fence or hedge does not necessarily represent a legal boundary. It is the clients responsibility to confirm legal boundaries with the vendor.

Unless previously agreed, all services existing on site have been surveyed apart from where access is restricted by vehicles or other significant obstructions.

If applicable, manhole covers will be lifted unless this significantly obstructs the flow of traffic or vehicular access. Manhole will not be lifted if this were to present any health & Safety risk to staff or the public. Irreplaceable or cracked covers will not be lifted.

All pipe directions are indicative only and have not been proved unless specifically instructed.

For safety reasons, pipe sizes and directions are estimated from above ground and are therefore approximate values.

All drawing units, levels and dimensions are in metres, unless otherwise stated.

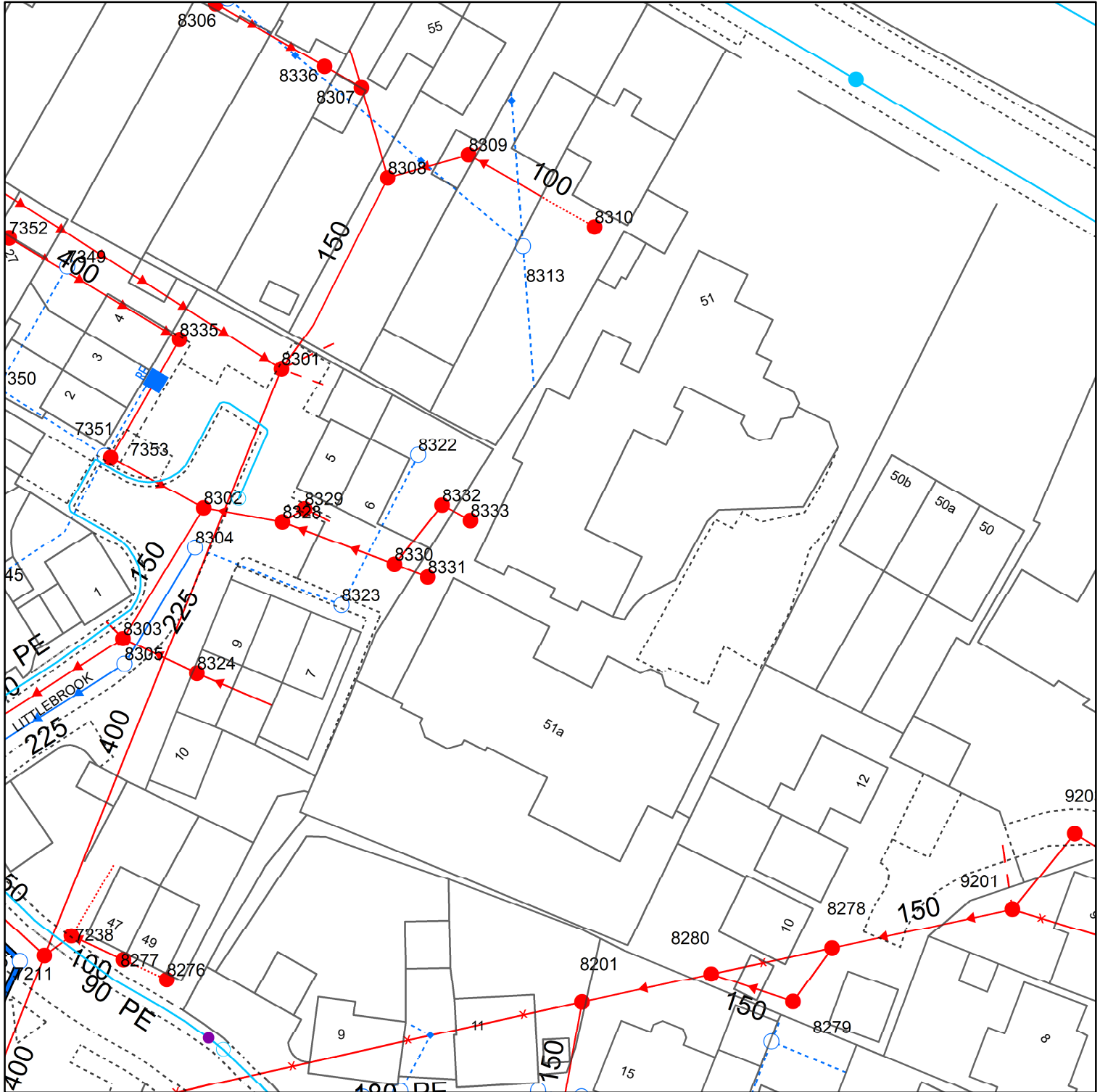
The data used for the computation of the horizontal and vertical control for this survey was recorded using our survey grade GNSS receivers. This data was provided by Leica Geosystems Smartnet RTK correction service. Therefore primary survey control is based on OSGB36(15)

Plotting on paper may lead to a variety of scaling risks/errors due to paper stretching or inaccurate plotter settings etc. Therefore any dimensions scaled from a paper reproduction of this survey should be treated with caution. This drawing must be used in conjunction with all other relevant documentation.



Appendix C – Wessex Water Asset Plan

Wessex Water Network Map



Reproduced from the Ordnance Survey map by permission on behalf of the Controller of Her Majesty's Stationery Office © Crown Copyright. Licence 100019539.

WATER MAINS	SEWERS	STRATEGIC PUBLIC	PRIVATE	SECTION 104	OTHER WESSEX PIPES	NON-WESSEX / UNKNOWN
- Distribution - Washout - Raw Water - Abandoned - Private	- Foul - Surface - Combined - Abandoned	- Colours generally indicate the use of the sewer/drain (i.e. Red - Foul, Dark Blue - Surface, Magenta - Combined/Dual Use, Light Green - Highway Drain, Mid Green - Overflow). - Some styles of line and symbol are shown on the key in sample/typical colours.	- Colours generally indicate the use of the sewer/drain (i.e. Red - Foul, Dark Blue - Surface, Magenta - Combined/Dual Use, Light Green - Highway Drain, Mid Green - Overflow). - Some styles of line and symbol are shown on the key in sample/typical colours.	- Colours generally indicate the use of the sewer/drain (i.e. Red - Foul, Dark Blue - Surface, Magenta - Combined/Dual Use, Light Green - Highway Drain, Mid Green - Overflow). - Some styles of line and symbol are shown on the key in sample/typical colours.	- Rising Mains - Standby Rising Mains - EDM - Effluent Disposal - Overflow - Syphon	- Private Rising Mains - Culverted Watercourse - Highway Drain - Use Unknown - Status Unknown
FITTINGS	STRUCTURES	STRUCTURES	STRUCTURES	STRUCTURES	OTHER STRUCTURES	OTHER STRUCTURES
- Hydrant - Other	- Manhole - Foul - Manhole - Surface - Manhole - Combined - Inlet - Outfall - Lamphole - Bifurcation - Foul - Bifurcation - Surface - Bifurcation - Combined - Combined Sewage Overflow	- Pumping Station - Surface - Pumping Stn - Foul/Combined - Gully - Vent Column - Rodding Eye - Catchpit - Flushing Chamber - Soakaway - Non Return Valve - Air Valve - Hatch Box - Washout	- Pumping Station - Surface - Pumping Stn - Foul/Combined - Gully - Vent Column - Rodding Eye - Catchpit - Flushing Chamber - Soakaway - Non Return Valve - Air Valve - Hatch Box - Washout	- Pumping Station - Surface - Pumping Stn - Foul/Combined - Gully - Vent Column - Rodding Eye - Catchpit - Flushing Chamber - Soakaway - Non Return Valve - Air Valve - Hatch Box - Washout	- Attenuation Tank - Storage Tank - Chamber - Tunnel - Interceptor	- Attenuation Tank - Storage Tank - Chamber - Tunnel - Interceptor
Information in this map is provided for identification purposes only. No warranty as to accuracy is given or implied. The precise route of pipe work may not exactly match that shown. Wessex Water does not accept liability for inaccuracies. Sewers and lateral drains adopted by Wessex Water under the Water Industry (Schemes for Adoption of Private Sewers) Regulations 2011 are to be plotted over time and may not yet be shown. In carrying out any works, you accept liability for the cost of any repairs to Wessex Water apparatus damaged as a result of your works. You are advised to commence excavations using hand tools only. Mechanical digging equipment should not be used until pipe work has been precisely located. If you are considering any form of building works and pipe work is shown within the boundary of your property or a property to be purchased (or very close by) a surveyor should plot its exact position prior to commencing works or purchase. If you are proposing to build over or near Wessex Water's apparatus you should contact the Developer Services Team, tel: 01225 526333 or e-mail: developer.enquiries@wessexwater.co.uk to discuss your proposals. Details of assets within Wessex Water's land ownership are unavailable through this service.						
Date: 16/03/2022 Centre: 385849, 160324 Scale: 1:625 (when printed at A4 size)						



Appendix D – Soakaway Assessment report

Our Ref: RJ/LF/JT0475

17 March 2022

Carless + Adams
6 Progress Business Park
Bath Road
Slough
SL1 6PQ

ST Consult
Unit 5, Hannington Farm, Hannington
Kingsclere, Hampshire, RG26 5TZ

t 01635 800950
e info@stconsult.co.uk w stconsult.co.uk

ST Consult is a regional office of Southern Testing Laboratories Ltd
Regional Manager Robert Jiagge BSc (Hons) MSc FGS MEnvSc CSci

For the attention of Chris James
cjames@carless-adams.co.uk

Dear Sirs,

Re: Factual Soakage Test Report: Staverton House, 51a Marsh Lane, Trowbridge, BA14 6NX
National Grid Reference: ST 85881 60351
Geology: Head Deposits over Kellaways Formation

1 Authority

Our authority for carrying out this work is contained in ST Consult Project Order form completed by Mr Chris James of Carless + Adams (on behalf of Fedecia Care), dated 14th March 2022.

2 Location

The site is located approximately 350m to the east of Staverton Village Hall, in Staverton near Trowbridge. The approximate National Grid Reference of the site is ST 85881 60351.

3 Proposed Construction

It is proposed to demolish the exiting building (The Old Vicarage) and replaced with a new one.

4 Scope

This report presents our exploratory hole log and soakage test result.

As with any site there may be differences in soil conditions between exploratory hole positions.

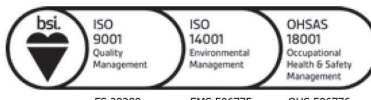
This report is not an engineering design and the figures and calculations contained in the report should be used by the Engineer, taking note that variations will apply, according to variations in design loading, in techniques used, and in site conditions. Our figures therefore should not supersede the Engineer's design.

The soakage testing investigation has been completed with reference to BS 5930 Ref [1] and BS 10175 Ref [2].

Contamination issues are not considered in this report.

The findings and opinions conveyed via this investigation report are based on information obtained from a variety of sources as detailed within this report, and which Southern Testing Laboratories Ltd. believes are reliable. Nevertheless, Southern Testing Laboratories Ltd. cannot and does not guarantee the authenticity or reliability of the information it has obtained from others.

The investigation was conducted and this report has been prepared for the sole internal use and reliance of Carless + Adams (on behalf of Fedecia Care) and their appointed Engineers. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Southern Testing Laboratories Ltd. If an unauthorised third party comes into possession of this report they rely on it at their peril and the authors owe them no duty of care and skill.



FS 29280 EMS 506775 OHS 506776

5 General Site Description

The site is known as Staverton House is located at 51a Marsh Lane, Staverton near Trowbridge. The site currently comprises two buildings, the Old Vicarage to the east and Staverton Care Home to the west.

The site is bound to the south, west and north by private houses and to the northeast by Marsh Lane beyond which is agricultural field.

The site is generally flat and laid to blacktop hardstanding.

6 Geology

The British Geological Survey covering the site indicates that the site geology consists of Head Deposits underlain by Kellaways Formation.

6.1 Head

Head is a superficial deposit comprising a poorly sorted and poorly stratified material formed mostly by solifluction and/or hillwash and soil creep. This is a polymict deposit of gravel, sand and clay depending on the local upslope geology, from which it is derived.

6.2 Kellaways Formation

The Kellaways Formation comprises grey, commonly silici-silty or silici-sandy Mudstone, with (predominantly in the upper part) beds of generally calcareous siltstone and sandstone.

7 Investigation Strategy

In accordance with the Client's instructions, and our quotations, the following was allowed for this soakage investigation:

- Soakage test within 1 No trial pit (SK01) excavated to 2.2m.

The test locations are shown on Fig 1 in Appendix A.

The fieldwork was carried out on the 14th March 2022 at which time the weather was generally dry.

8 Soils as Found

The soils encountered are described in detail in the attached exploratory hole logs (Appendix A), with a summary given below.

Depth (m)	Thickness (m)	Soil Type	Description
0.1	0.1	Blacktop	Blacktop
0.25	0.15	Made Ground (subbase)	Brown /reddish brown slightly clayey sandy GRAVEL. Gravel is angular to subrounded fine to coarse flint, limestone, brick, blacktop and concrete.
0.7	0.45	Made Ground	Soft dark brown slightly sandy very gravelly CLAY with frequent fragments of brick, concrete, ceramic and blacktop.
1.7	1.0	Head Deposits	Soft brown sandy CLAY.
2.2	Not proven	Kellaways Formation	Firm greyish brown CLAY.

9 Groundwater Observations

Slight groundwater seepage was noted at 1.6m bgl.

Groundwater levels vary considerably from season to season and year to year, often rising close to the ground surface in wet or winter weather, and falling in periods of drought. Long-term monitoring from boreholes or standpipes is required to assess the ground water regime and this was not possible during the course of this site investigation.

10 Soakage Test (after BRE Digest 365 2016)

The BRE DG365 Ref [3] paper on soakaway design allows for the design of trench soakaways as well as traditional square and circular soakaways.

The test to measure the soil infiltration rate is carried out in pits which are excavated to the full depth of the proposed soakaway. The trial pits are filled and allowed to drain to empty or near empty, three times, on the same day or on consecutive days. The pit is considered full when the water level is the same as the proposed inlet invert. Water levels are recorded against time. The time for the water level to fall from $\frac{3}{4}$ full to $\frac{1}{4}$ full is obtained and the soil infiltration rate is obtained from the following formula:

$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$$

Where: f = soil infiltration rate (in this case expressed in l/m²/minute)

V_{p75-25} = the effective storage volume of water in the trial pit between 75% and 25% effective depth;

a_{p50} = the internal surface area of the trial pit up to 50% effective depth and excluding the base area;

t_{p75-25} = the time for the water level to fall from 75% to 25% effective depth.

The trial pit was filled with water to approximately 1.0 m bgl and monitored against time as it soaked away.

The soakage rate in this report is expressed as l/m²/minute, which is a convenient rate to use. The BRE use a unit of m/sec, which is the value in l/m²/minute divided by 60,000.

11 Soakage Test Results & Discussion

The full results of the soakage tests are included in Appendix B, and a summary presented in the table below.

Results of BRE 365 Soakage Test Results				
Location	Depth (m)	Test No.	l/m ² /min	BRE Units (m/sec)
SK01	2.2	1	0.048 (non-complaint)*	8.05 x 10 ⁻⁷ (non-complaint)*

***After 4 hours of testing, the water level only dropped by 150mm. Result not compliant with BRE365 requirement since water did not fall to 25% max water depth. Calculations were based on actual fall of water level achieved.**

Based on the above result, the use of conventional soakaways is may not viable at this site. This is not unexpected given the clay soil encountered. High groundwater seepages will also hamper design (storage capacity). Alternative means of surface water disposal may need to be considered.

12 General

Any soakaway scheme will require the approval of the Environment Agency, Building Control and, where applicable, the adopting Highways Authority.

Groundwater levels can vary considerably from season to season and year to year, often rising in wet or winter weather, and falling in periods of drought. As such, a high groundwater table may affect the storage capacity of soakaways (where applicable). In addition, it should be noted that an unsaturated zone would be required between the base of soakaways and the groundwater table, by the Environment Agency.

If you have any questions in respect of this work, please do not hesitate to contact the undersigned.

Yours faithfully,



Robert Jiagge
For and on behalf of
Southern Testing Laboratories Limited
DDI: [REDACTED]
Email: [REDACTED]

REFERENCES

- [1] BSI Standards, "BS 5930 Code of practice for ground investigations," 2015.
- [2] BSI Standards, "BS10175 Investigation of potentially contaminated sites – Code of practice," 2013.
- [3] Building Research Establishment (BRE), "DG365 Soakaway Design," 2016.

APPENDIX A – SITE PLANS & EXPLORATORY HOLE LOCATIONS PLAN



NB: Positions of exploratory holes / test positions are only indicative unless dimensioned.

Site:	Staverton House, 51a Marsh Lane, Trowbridge, BA14 6NX	Project ID	JT0475
Figure 1	Site Investigation Layout Plan	Date:	17/03/2022

				Start - End Date: 14/03/2022		Project ID: JT0475		Machine Type: JCB		SK01 Sheet 1 of 1	
Project Name: Trowbridge				Remarks:		Co-ordinates:		Level (m AOD):		Logger: JB	
Location: Staverton House, 51a Marsh Lane, Trowbridge, BA14 6NX											
Client: Fidecia Care											
Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description				
Depth (m)	Type	Results									
				(0.10)		0.10	BLACKTOP		1		
				(0.15)		0.25	Brown /reddish brown slightly clayey sandy GRAVEL with occasional fragments (<10mm x 12mm x 26mm) of brick, blacktop and concrete. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of flint, sandstone, mudstone and limestone. MADE GROUND				
				(0.45)			Soft dark brown slightly sandy very gravelly CLAY with frequent fragments (<100mm x 130mm x 140mm) of brick, concrete, ceramic and blacktop. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of flint. MADE GROUND				
						0.70	geotextile membrane (<2mm) @ 0.25m Soft brown sandy CLAY. Sand is fine to coarse. HEAD				
				(1.00)		1.70	Firm greyish brown CLAY. KELLAWAYS FORMATION		2		
				(0.50)							
						2.20	Pit terminated at 2.20m.				
Pit Dimension (m)			Pit Stability:				Water Strikes:				
Width:		0.60	Stable				Slow ingress at 1.60m				
Length:		1.80									
Depth:		2.20									

Key to Exploratory Hole Logs, Plans and Sections

Backfill Symbols		Pipe Symbols		Principal Soil Types		Principal Rock Types		Drilling Records	
Arisings		Plain Pipe		Topsoil		Mudstone		Water Strike	
Concrete		Slotted Pipe		Made Ground		Claystone		Depth Water Rose	
Blacktop		Piezometer		Clay		Siltstone		Total Core Recovery (%) [TCR]	
Bentonite		Piezometer Tip		Silt		Sandstone		Solid Core Recovery (%) [SCR]	
Gravel Filter		Filter Tip		Sand		Limestone		Rock Quality Index (%) RQD]	
Sand Filter		Extensometer		Gravel		Chalk		Fracture Index (fractures / m) [FI]	
		Inclinometers		Peat					

All soil and rock descriptions are in general accordance with BS5930 2015, BS EN ISO 14688-1:2002+A1:2013 and BS EN ISO 14689-1:2003. Chalk descriptions are also based on CIRIA C574 and "Logging the Chalk – R.N. Mortimer 2015". The Geology Code is only provided where a positive identification of the sample strata has been made.

Location / Method Identifiers		In-situ Test Location / Method	
BH	Borehole (undefined)	DP	Dynamic Probe
CP	Cable Percussive	CPT	Cone Penetration Test
RC	Rotary Core	CBR	In-situ CBR Test
RO	Rotary Open Hole	DCP	CBR using Dynamic Cone Penetrometer
ODC	Rotary Odex/Symmetrix drilling cased	CBRT	CBR using TRL Probe
CP+RC	Cable Percussive to Rotary Core	PB	Plate Bearing Test
SNC	Sonic	SPT (S)	Standard Penetration Test (Split Barrel Sampler)
CFA	Continuous Flight Auger	SPT (C)	Standard Penetration Test (Solid Cone)
FA	Flight Auger	N	SPT Result
VC	Vibro Core	-/-	Blows/Penetration (mm) after seating drive
WLS+RC	Windowless (Dynamic) Sampler to Rotary Core	-*/-	Total Blows / Penetration (mm)
WLS	Windowless Sampler	()	Extrapolated Value
WS	Window Sampler	PPT	Perth Penetration (In-House Method - Equivalent N Value)
HA	Hand Auger	HP / UCS	Strength from Hand Penetrometer (kN/m ²)
C	Road / Pavement Core	IVN	Strength from Hand Vane ((kN/m ²) P = peak, R = residual
IP	Inspection Pit (Hand Excavation)	PID	Photo Ionisation Detector (ppm)
TP	Trial Pit (Machine Excavated)	MEXE	Mexi-Cone CBR (%)
OP	Observation Pit (Supported Excavation Hand or Machine)		

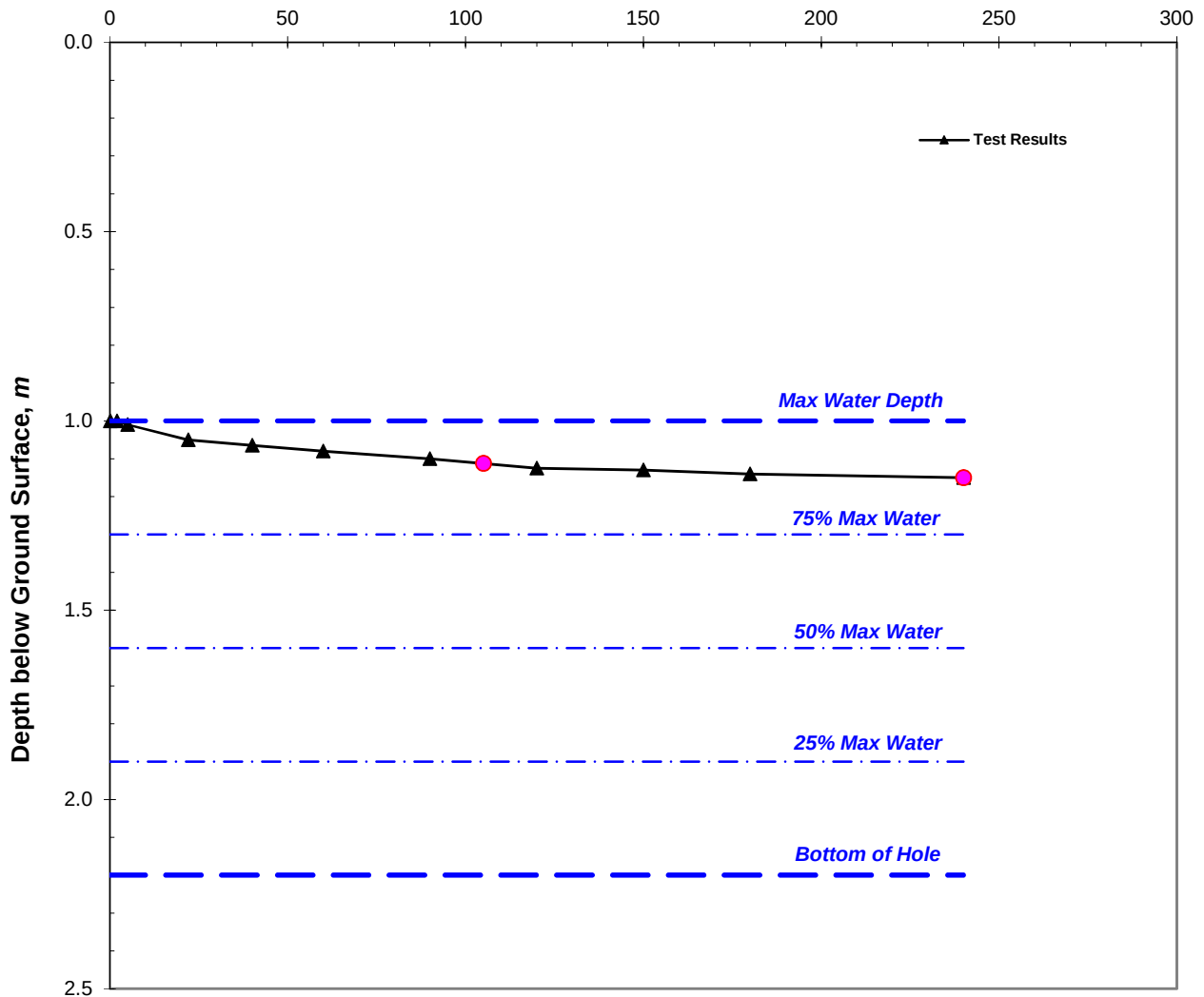
Samples / Test Type		Samples / Test Type	
B	Bulk Sample	SPTLS	Standard Penetration Test Split Barrel Sample
BLK	Block Sample	TW	Thin Wall Push In Sample (e.g. Shelby Sampler)
C	Core Sample	U	Undisturbed Open Drive Sample (blows to take)
CBRS	CBR Mould Sample	UT	Thin Wall Undisturbed Open Drive Sample (blows to take)
D	Small Disturbed Sample	W	Water Sample (Geotechnical)
ES	Environmental Sample (Soil)	SP	Sample from Stockpile
EW	Environmental Sample (Water)	P	Piston Sample
GS	Environmental Sample (Gas)	AMAL	Amalgamated Sample

APPENDIX B – SOAKATE TEST RESULTS

BRE Digest DG365 Soakage Test

Test Hole No: SK01
Test No: Test No 1 (Initial)

Time from Filling to Maximum Water Depth, *minute*



Pit Length, m	1.800	Depth to Water at Start of Test, m	1.000
Pit Width, m	0.600	Max Water Dropdown during Test, m	0.150
Depth to Pit Base, m	2.200	Total Soakage Test Time, min	240.0
Depth to Top of Permeable Soils, m		Mean Internal Discharge Area, m ²	6.210
Depth to Groundwater Surface, m	2.180	Discharge Rate, litre/min	0.300
Depth to Top of Granular Fill, m		Soakage Rate, litre/m ² /min	0.048
Voids Assumed for Granular Fill, %	100%	BRE Soil Infiltration Rate, m/sec	8.05E-07

Comments:

Water level did not fall to 75% max water depth, calculations were based on actual fall of water level achieved.
Result not compliant with BRE365 requirement since water did not fall to 25% max water depth.

Client: Carless & Adams	Job No: JT0475	Test Date: 14/Mar/2022	
Site: 51a Staverton, Trowbridge	Tested By: SS	Engineer: RJ	Fig. S1

Summary Sheet

Results of BRE Digest DG365 Soakage Tests

Site : 51a Staverton, Trowbridge					Job No : JT0475		
Client : Carless & Adams					O S Reference : ST 85881 60351		
Tested By : SS				Engineer: RJ		Test Date : 14/Mar/2022	
Hole No	Test No	Hole Depth <i>m</i>	Soakage Rate for Each Test <i>litre/m²/min</i>	Soakage Rate for Each Hole <i>litre/m²/min m/sec</i>		Water Level at Finish of Test	Remarks
SK01	No 1	2.20	0.048	0.048	8.05E-7	Pit was not emptied; Non compliant value was calculated.	Depth to existing ground water level was 2.18m.
Mean Value of All Calculated Soakage Rates :				0.048 <i>litre/m²/min</i>	8.05E-7 <i>m/sec</i>		



Appendix E – MicroDrainage Calculations

Cotswold Transport Planning							Page 1																																																																																																																																																																																																																																																																																	
CTP House, Knapp Road Cheltenham Gloucestershire, GL50 3QQ			Staverton House 100 Year & CC																																																																																																																																																																																																																																																																																					
Date 18/03/2025 14:50 File CELLULAR STORAGE.SRCX			Designed by CF Checked by CG																																																																																																																																																																																																																																																																																					
Innovyze			Source Control 2020.1.3																																																																																																																																																																																																																																																																																					
<u>Summary of Results for 100 year Return Period (+40%)</u> Half Drain Time : 1997 minutes. <table><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Control (l/s)</th><th>Max Σ Outflow (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr><tr><td>15 min Summer</td><td>39.012</td><td>0.282</td><td>0.0</td><td>0.8</td><td>0.8</td><td>70.6</td><td>O K</td></tr><tr><td>30 min Summer</td><td>39.100</td><td>0.370</td><td>0.0</td><td>0.8</td><td>0.8</td><td>92.9</td><td>O K</td></tr><tr><td>60 min Summer</td><td>39.191</td><td>0.461</td><td>0.0</td><td>0.8</td><td>0.8</td><td>115.7</td><td>O K</td></tr><tr><td>120 min Summer</td><td>39.280</td><td>0.550</td><td>0.0</td><td>0.8</td><td>0.8</td><td>137.9</td><td>O K</td></tr><tr><td>180 min Summer</td><td>39.327</td><td>0.597</td><td>0.0</td><td>0.8</td><td>0.8</td><td>149.7</td><td>O K</td></tr><tr><td>240 min Summer</td><td>39.356</td><td>0.626</td><td>0.0</td><td>0.8</td><td>0.8</td><td>157.1</td><td>O K</td></tr><tr><td>360 min Summer</td><td>39.397</td><td>0.667</td><td>0.0</td><td>0.8</td><td>0.8</td><td>167.3</td><td>O K</td></tr><tr><td>480 min Summer</td><td>39.422</td><td>0.692</td><td>0.0</td><td>0.9</td><td>0.9</td><td>173.5</td><td>O K</td></tr><tr><td>600 min Summer</td><td>39.437</td><td>0.707</td><td>0.0</td><td>0.9</td><td>0.9</td><td>177.3</td><td>O K</td></tr><tr><td>720 min Summer</td><td>39.447</td><td>0.717</td><td>0.0</td><td>0.9</td><td>0.9</td><td>179.7</td><td>O K</td></tr><tr><td>960 min Summer</td><td>39.454</td><td>0.724</td><td>0.0</td><td>0.9</td><td>0.9</td><td>181.7</td><td>O K</td></tr><tr><td>1440 min Summer</td><td>39.445</td><td>0.715</td><td>0.0</td><td>0.9</td><td>0.9</td><td>179.3</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>39.412</td><td>0.682</td><td>0.0</td><td>0.9</td><td>0.9</td><td>171.0</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>39.381</td><td>0.651</td><td>0.0</td><td>0.8</td><td>0.8</td><td>163.3</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>39.330</td><td>0.600</td><td>0.0</td><td>0.8</td><td>0.8</td><td>150.5</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>39.286</td><td>0.556</td><td>0.0</td><td>0.8</td><td>0.8</td><td>139.3</td><td>O K</td></tr><tr><td>7200 min Summer</td><td>39.244</td><td>0.514</td><td>0.0</td><td>0.8</td><td>0.8</td><td>128.9</td><td>O K</td></tr><tr><td>8640 min Summer</td><td>39.205</td><td>0.475</td><td>0.0</td><td>0.8</td><td>0.8</td><td>119.0</td><td>O K</td></tr><tr><td>10080 min Summer</td><td>39.167</td><td>0.437</td><td>0.0</td><td>0.8</td><td>0.8</td><td>109.6</td><td>O K</td></tr><tr><td>15 min Winter</td><td>39.012</td><td>0.282</td><td>0.0</td><td>0.8</td><td>0.8</td><td>70.6</td><td>O K</td></tr></table> <table><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Discharge Volume (m³)</th><th>Time-Peak (mins)</th></tr><tr><td>15 min Summer</td><td>142.067</td><td>0.0</td><td>66.7</td><td>27</td></tr><tr><td>30 min Summer</td><td>93.647</td><td>0.0</td><td>65.5</td><td>42</td></tr><tr><td>60 min Summer</td><td>58.745</td><td>0.0</td><td>118.5</td><td>72</td></tr><tr><td>120 min Summer</td><td>35.532</td><td>0.0</td><td>129.1</td><td>130</td></tr><tr><td>180 min Summer</td><td>26.086</td><td>0.0</td><td>129.4</td><td>190</td></tr><tr><td>240 min Summer</td><td>20.828</td><td>0.0</td><td>129.5</td><td>250</td></tr><tr><td>360 min Summer</td><td>15.185</td><td>0.0</td><td>129.8</td><td>368</td></tr><tr><td>480 min Summer</td><td>12.117</td><td>0.0</td><td>130.3</td><td>488</td></tr><tr><td>600 min Summer</td><td>10.163</td><td>0.0</td><td>130.9</td><td>606</td></tr><tr><td>720 min Summer</td><td>8.799</td><td>0.0</td><td>131.6</td><td>726</td></tr><tr><td>960 min Summer</td><td>7.003</td><td>0.0</td><td>133.2</td><td>964</td></tr><tr><td>1440 min Summer</td><td>5.068</td><td>0.0</td><td>134.6</td><td>1440</td></tr><tr><td>2160 min Summer</td><td>3.661</td><td>0.0</td><td>260.9</td><td>1820</td></tr><tr><td>2880 min Summer</td><td>2.904</td><td>0.0</td><td>255.9</td><td>2196</td></tr><tr><td>4320 min Summer</td><td>2.092</td><td>0.0</td><td>237.4</td><td>2992</td></tr><tr><td>5760 min Summer</td><td>1.655</td><td>0.0</td><td>320.8</td><td>3816</td></tr><tr><td>7200 min Summer</td><td>1.380</td><td>0.0</td><td>334.3</td><td>4680</td></tr><tr><td>8640 min Summer</td><td>1.189</td><td>0.0</td><td>345.7</td><td>5464</td></tr><tr><td>10080 min Summer</td><td>1.049</td><td>0.0</td><td>355.8</td><td>6352</td></tr><tr><td>15 min Winter</td><td>142.067</td><td>0.0</td><td>66.7</td><td>27</td></tr></table>								Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status	15 min Summer	39.012	0.282	0.0	0.8	0.8	70.6	O K	30 min Summer	39.100	0.370	0.0	0.8	0.8	92.9	O K	60 min Summer	39.191	0.461	0.0	0.8	0.8	115.7	O K	120 min Summer	39.280	0.550	0.0	0.8	0.8	137.9	O K	180 min Summer	39.327	0.597	0.0	0.8	0.8	149.7	O K	240 min Summer	39.356	0.626	0.0	0.8	0.8	157.1	O K	360 min Summer	39.397	0.667	0.0	0.8	0.8	167.3	O K	480 min Summer	39.422	0.692	0.0	0.9	0.9	173.5	O K	600 min Summer	39.437	0.707	0.0	0.9	0.9	177.3	O K	720 min Summer	39.447	0.717	0.0	0.9	0.9	179.7	O K	960 min Summer	39.454	0.724	0.0	0.9	0.9	181.7	O K	1440 min Summer	39.445	0.715	0.0	0.9	0.9	179.3	O K	2160 min Summer	39.412	0.682	0.0	0.9	0.9	171.0	O K	2880 min Summer	39.381	0.651	0.0	0.8	0.8	163.3	O K	4320 min Summer	39.330	0.600	0.0	0.8	0.8	150.5	O K	5760 min Summer	39.286	0.556	0.0	0.8	0.8	139.3	O K	7200 min Summer	39.244	0.514	0.0	0.8	0.8	128.9	O K	8640 min Summer	39.205	0.475	0.0	0.8	0.8	119.0	O K	10080 min Summer	39.167	0.437	0.0	0.8	0.8	109.6	O K	15 min Winter	39.012	0.282	0.0	0.8	0.8	70.6	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	15 min Summer	142.067	0.0	66.7	27	30 min Summer	93.647	0.0	65.5	42	60 min Summer	58.745	0.0	118.5	72	120 min Summer	35.532	0.0	129.1	130	180 min Summer	26.086	0.0	129.4	190	240 min Summer	20.828	0.0	129.5	250	360 min Summer	15.185	0.0	129.8	368	480 min Summer	12.117	0.0	130.3	488	600 min Summer	10.163	0.0	130.9	606	720 min Summer	8.799	0.0	131.6	726	960 min Summer	7.003	0.0	133.2	964	1440 min Summer	5.068	0.0	134.6	1440	2160 min Summer	3.661	0.0	260.9	1820	2880 min Summer	2.904	0.0	255.9	2196	4320 min Summer	2.092	0.0	237.4	2992	5760 min Summer	1.655	0.0	320.8	3816	7200 min Summer	1.380	0.0	334.3	4680	8640 min Summer	1.189	0.0	345.7	5464	10080 min Summer	1.049	0.0	355.8	6352	15 min Winter	142.067	0.0	66.7	27
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status																																																																																																																																																																																																																																																																																	
15 min Summer	39.012	0.282	0.0	0.8	0.8	70.6	O K																																																																																																																																																																																																																																																																																	
30 min Summer	39.100	0.370	0.0	0.8	0.8	92.9	O K																																																																																																																																																																																																																																																																																	
60 min Summer	39.191	0.461	0.0	0.8	0.8	115.7	O K																																																																																																																																																																																																																																																																																	
120 min Summer	39.280	0.550	0.0	0.8	0.8	137.9	O K																																																																																																																																																																																																																																																																																	
180 min Summer	39.327	0.597	0.0	0.8	0.8	149.7	O K																																																																																																																																																																																																																																																																																	
240 min Summer	39.356	0.626	0.0	0.8	0.8	157.1	O K																																																																																																																																																																																																																																																																																	
360 min Summer	39.397	0.667	0.0	0.8	0.8	167.3	O K																																																																																																																																																																																																																																																																																	
480 min Summer	39.422	0.692	0.0	0.9	0.9	173.5	O K																																																																																																																																																																																																																																																																																	
600 min Summer	39.437	0.707	0.0	0.9	0.9	177.3	O K																																																																																																																																																																																																																																																																																	
720 min Summer	39.447	0.717	0.0	0.9	0.9	179.7	O K																																																																																																																																																																																																																																																																																	
960 min Summer	39.454	0.724	0.0	0.9	0.9	181.7	O K																																																																																																																																																																																																																																																																																	
1440 min Summer	39.445	0.715	0.0	0.9	0.9	179.3	O K																																																																																																																																																																																																																																																																																	
2160 min Summer	39.412	0.682	0.0	0.9	0.9	171.0	O K																																																																																																																																																																																																																																																																																	
2880 min Summer	39.381	0.651	0.0	0.8	0.8	163.3	O K																																																																																																																																																																																																																																																																																	
4320 min Summer	39.330	0.600	0.0	0.8	0.8	150.5	O K																																																																																																																																																																																																																																																																																	
5760 min Summer	39.286	0.556	0.0	0.8	0.8	139.3	O K																																																																																																																																																																																																																																																																																	
7200 min Summer	39.244	0.514	0.0	0.8	0.8	128.9	O K																																																																																																																																																																																																																																																																																	
8640 min Summer	39.205	0.475	0.0	0.8	0.8	119.0	O K																																																																																																																																																																																																																																																																																	
10080 min Summer	39.167	0.437	0.0	0.8	0.8	109.6	O K																																																																																																																																																																																																																																																																																	
15 min Winter	39.012	0.282	0.0	0.8	0.8	70.6	O K																																																																																																																																																																																																																																																																																	
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)																																																																																																																																																																																																																																																																																				
15 min Summer	142.067	0.0	66.7	27																																																																																																																																																																																																																																																																																				
30 min Summer	93.647	0.0	65.5	42																																																																																																																																																																																																																																																																																				
60 min Summer	58.745	0.0	118.5	72																																																																																																																																																																																																																																																																																				
120 min Summer	35.532	0.0	129.1	130																																																																																																																																																																																																																																																																																				
180 min Summer	26.086	0.0	129.4	190																																																																																																																																																																																																																																																																																				
240 min Summer	20.828	0.0	129.5	250																																																																																																																																																																																																																																																																																				
360 min Summer	15.185	0.0	129.8	368																																																																																																																																																																																																																																																																																				
480 min Summer	12.117	0.0	130.3	488																																																																																																																																																																																																																																																																																				
600 min Summer	10.163	0.0	130.9	606																																																																																																																																																																																																																																																																																				
720 min Summer	8.799	0.0	131.6	726																																																																																																																																																																																																																																																																																				
960 min Summer	7.003	0.0	133.2	964																																																																																																																																																																																																																																																																																				
1440 min Summer	5.068	0.0	134.6	1440																																																																																																																																																																																																																																																																																				
2160 min Summer	3.661	0.0	260.9	1820																																																																																																																																																																																																																																																																																				
2880 min Summer	2.904	0.0	255.9	2196																																																																																																																																																																																																																																																																																				
4320 min Summer	2.092	0.0	237.4	2992																																																																																																																																																																																																																																																																																				
5760 min Summer	1.655	0.0	320.8	3816																																																																																																																																																																																																																																																																																				
7200 min Summer	1.380	0.0	334.3	4680																																																																																																																																																																																																																																																																																				
8640 min Summer	1.189	0.0	345.7	5464																																																																																																																																																																																																																																																																																				
10080 min Summer	1.049	0.0	355.8	6352																																																																																																																																																																																																																																																																																				
15 min Winter	142.067	0.0	66.7	27																																																																																																																																																																																																																																																																																				
©1982-2020 Innovyze																																																																																																																																																																																																																																																																																								

Cotswold Transport Planning		Page 3
CTP House, Knapp Road Cheltenham Gloucestershire, GL50 3QQ	Staverton House 100 Year & CC	
Date 18/03/2025 14:50 File CELLULAR STORAGE.SRCX	Designed by CF Checked by CG	
Innovyze Source Control 2020.1.3		

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	1.000
Region	England and Wales	Cv (Winter)	1.000
M5-60 (mm)	20.700	Shortest Storm (mins)	15
Ratio R	0.389	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.202

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To:	(ha)	From: To:	(ha)	From: To:	(ha)
0 4	0.067	4 8	0.067	8 12	0.068

©1982-2020 Innovyze

Cotswold Transport Planning		Page 4
CTP House, Knapp Road Cheltenham Gloucestershire, GL50 3QQ	Staverton House 100 Year & CC	
Date 18/03/2025 14:50 File CELLULAR STORAGE.SRCX	Designed by CF Checked by CG	
Innovyze Source Control 2020.1.3		

Model Details

Storage is Online Cover Level (m) 40.430

Cellular Storage Structure

Invert Level (m) 38.730 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	264.0	195.0	1.001	0.0	251.0
1.000	264.0	251.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0046-1000-1050-1000
Design Head (m) 1.050
Design Flow (l/s) 1.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 46
Invert Level (m) 38.680
Minimum Outlet Pipe Diameter (mm) 75
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.050	1.0
Flush-Flo™	0.205	0.8
Kick-Flo®	0.412	0.7
Mean Flow over Head Range	-	0.8

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.7	1.200	1.1	3.000	1.6	7.000	2.4
0.200	0.8	1.400	1.1	3.500	1.7	7.500	2.4
0.300	0.8	1.600	1.2	4.000	1.8	8.000	2.5
0.400	0.7	1.800	1.3	4.500	1.9	8.500	2.6
0.500	0.7	2.000	1.3	5.000	2.0	9.000	2.7
0.600	0.8	2.200	1.4	5.500	2.1	9.500	2.7
0.800	0.9	2.400	1.4	6.000	2.2		
1.000	1.0	2.600	1.5	6.500	2.3		

©1982-2020 Innovyze

Cotswold Transport Planning							Page 1																																																																																																																																																																																																																																																																																	
CTP House, Knapp Road Cheltenham Gloucestershire, GL50 3QQ			Staverton House 10 Year																																																																																																																																																																																																																																																																																					
Date 18/03/2025 14:50 File CELLULAR STORAGE.SRCX			Designed by CF Checked by CG																																																																																																																																																																																																																																																																																					
Innovyze			Source Control 2020.1.3																																																																																																																																																																																																																																																																																					
<u>Summary of Results for 10 year Return Period</u> Half Drain Time : 698 minutes. <table><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (1/s)</th><th>Max Control (1/s)</th><th>Max Σ Outflow (1/s)</th><th>Max Volume (m³)</th><th>Status</th></tr><tr><td>15 min Summer</td><td>38.849</td><td>0.119</td><td>0.0</td><td>0.8</td><td>0.8</td><td>30.0</td><td>O K</td></tr><tr><td>30 min Summer</td><td>38.884</td><td>0.154</td><td>0.0</td><td>0.8</td><td>0.8</td><td>38.6</td><td>O K</td></tr><tr><td>60 min Summer</td><td>38.918</td><td>0.188</td><td>0.0</td><td>0.8</td><td>0.8</td><td>47.2</td><td>O K</td></tr><tr><td>120 min Summer</td><td>38.951</td><td>0.221</td><td>0.0</td><td>0.8</td><td>0.8</td><td>55.4</td><td>O K</td></tr><tr><td>180 min Summer</td><td>38.967</td><td>0.237</td><td>0.0</td><td>0.8</td><td>0.8</td><td>59.6</td><td>O K</td></tr><tr><td>240 min Summer</td><td>38.977</td><td>0.247</td><td>0.0</td><td>0.8</td><td>0.8</td><td>62.1</td><td>O K</td></tr><tr><td>360 min Summer</td><td>38.988</td><td>0.258</td><td>0.0</td><td>0.8</td><td>0.8</td><td>64.7</td><td>O K</td></tr><tr><td>480 min Summer</td><td>38.991</td><td>0.261</td><td>0.0</td><td>0.8</td><td>0.8</td><td>65.5</td><td>O K</td></tr><tr><td>600 min Summer</td><td>38.990</td><td>0.260</td><td>0.0</td><td>0.8</td><td>0.8</td><td>65.3</td><td>O K</td></tr><tr><td>720 min Summer</td><td>38.987</td><td>0.257</td><td>0.0</td><td>0.8</td><td>0.8</td><td>64.6</td><td>O K</td></tr><tr><td>960 min Summer</td><td>38.981</td><td>0.251</td><td>0.0</td><td>0.8</td><td>0.8</td><td>62.8</td><td>O K</td></tr><tr><td>1440 min Summer</td><td>38.966</td><td>0.236</td><td>0.0</td><td>0.8</td><td>0.8</td><td>59.3</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>38.948</td><td>0.218</td><td>0.0</td><td>0.8</td><td>0.8</td><td>54.6</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>38.930</td><td>0.200</td><td>0.0</td><td>0.8</td><td>0.8</td><td>50.2</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>38.896</td><td>0.166</td><td>0.0</td><td>0.8</td><td>0.8</td><td>41.7</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>38.866</td><td>0.136</td><td>0.0</td><td>0.8</td><td>0.8</td><td>34.1</td><td>O K</td></tr><tr><td>7200 min Summer</td><td>38.840</td><td>0.110</td><td>0.0</td><td>0.8</td><td>0.8</td><td>27.5</td><td>O K</td></tr><tr><td>8640 min Summer</td><td>38.818</td><td>0.088</td><td>0.0</td><td>0.8</td><td>0.8</td><td>22.1</td><td>O K</td></tr><tr><td>10080 min Summer</td><td>38.800</td><td>0.070</td><td>0.0</td><td>0.8</td><td>0.8</td><td>17.7</td><td>O K</td></tr><tr><td>15 min Winter</td><td>38.850</td><td>0.120</td><td>0.0</td><td>0.8</td><td>0.8</td><td>30.0</td><td>O K</td></tr></table> <table><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Discharge Volume (m³)</th><th>Time-Peak (mins)</th></tr><tr><td>15 min Summer</td><td>61.525</td><td>0.0</td><td>30.9</td><td>26</td></tr><tr><td>30 min Summer</td><td>39.911</td><td>0.0</td><td>40.2</td><td>41</td></tr><tr><td>60 min Summer</td><td>24.848</td><td>0.0</td><td>50.1</td><td>70</td></tr><tr><td>120 min Summer</td><td>15.080</td><td>0.0</td><td>60.8</td><td>128</td></tr><tr><td>180 min Summer</td><td>11.167</td><td>0.0</td><td>67.6</td><td>188</td></tr><tr><td>240 min Summer</td><td>8.999</td><td>0.0</td><td>72.6</td><td>246</td></tr><tr><td>360 min Summer</td><td>6.633</td><td>0.0</td><td>80.4</td><td>364</td></tr><tr><td>480 min Summer</td><td>5.336</td><td>0.0</td><td>86.2</td><td>482</td></tr><tr><td>600 min Summer</td><td>4.506</td><td>0.0</td><td>91.0</td><td>600</td></tr><tr><td>720 min Summer</td><td>3.923</td><td>0.0</td><td>95.1</td><td>680</td></tr><tr><td>960 min Summer</td><td>3.152</td><td>0.0</td><td>101.7</td><td>788</td></tr><tr><td>1440 min Summer</td><td>2.313</td><td>0.0</td><td>112.0</td><td>1040</td></tr><tr><td>2160 min Summer</td><td>1.697</td><td>0.0</td><td>123.2</td><td>1448</td></tr><tr><td>2880 min Summer</td><td>1.361</td><td>0.0</td><td>131.8</td><td>1852</td></tr><tr><td>4320 min Summer</td><td>0.997</td><td>0.0</td><td>144.9</td><td>2644</td></tr><tr><td>5760 min Summer</td><td>0.799</td><td>0.0</td><td>154.9</td><td>3408</td></tr><tr><td>7200 min Summer</td><td>0.673</td><td>0.0</td><td>163.1</td><td>4120</td></tr><tr><td>8640 min Summer</td><td>0.585</td><td>0.0</td><td>170.1</td><td>4848</td></tr><tr><td>10080 min Summer</td><td>0.520</td><td>0.0</td><td>176.3</td><td>5552</td></tr><tr><td>15 min Winter</td><td>61.525</td><td>0.0</td><td>30.9</td><td>26</td></tr></table>								Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (1/s)	Max Control (1/s)	Max Σ Outflow (1/s)	Max Volume (m³)	Status	15 min Summer	38.849	0.119	0.0	0.8	0.8	30.0	O K	30 min Summer	38.884	0.154	0.0	0.8	0.8	38.6	O K	60 min Summer	38.918	0.188	0.0	0.8	0.8	47.2	O K	120 min Summer	38.951	0.221	0.0	0.8	0.8	55.4	O K	180 min Summer	38.967	0.237	0.0	0.8	0.8	59.6	O K	240 min Summer	38.977	0.247	0.0	0.8	0.8	62.1	O K	360 min Summer	38.988	0.258	0.0	0.8	0.8	64.7	O K	480 min Summer	38.991	0.261	0.0	0.8	0.8	65.5	O K	600 min Summer	38.990	0.260	0.0	0.8	0.8	65.3	O K	720 min Summer	38.987	0.257	0.0	0.8	0.8	64.6	O K	960 min Summer	38.981	0.251	0.0	0.8	0.8	62.8	O K	1440 min Summer	38.966	0.236	0.0	0.8	0.8	59.3	O K	2160 min Summer	38.948	0.218	0.0	0.8	0.8	54.6	O K	2880 min Summer	38.930	0.200	0.0	0.8	0.8	50.2	O K	4320 min Summer	38.896	0.166	0.0	0.8	0.8	41.7	O K	5760 min Summer	38.866	0.136	0.0	0.8	0.8	34.1	O K	7200 min Summer	38.840	0.110	0.0	0.8	0.8	27.5	O K	8640 min Summer	38.818	0.088	0.0	0.8	0.8	22.1	O K	10080 min Summer	38.800	0.070	0.0	0.8	0.8	17.7	O K	15 min Winter	38.850	0.120	0.0	0.8	0.8	30.0	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	15 min Summer	61.525	0.0	30.9	26	30 min Summer	39.911	0.0	40.2	41	60 min Summer	24.848	0.0	50.1	70	120 min Summer	15.080	0.0	60.8	128	180 min Summer	11.167	0.0	67.6	188	240 min Summer	8.999	0.0	72.6	246	360 min Summer	6.633	0.0	80.4	364	480 min Summer	5.336	0.0	86.2	482	600 min Summer	4.506	0.0	91.0	600	720 min Summer	3.923	0.0	95.1	680	960 min Summer	3.152	0.0	101.7	788	1440 min Summer	2.313	0.0	112.0	1040	2160 min Summer	1.697	0.0	123.2	1448	2880 min Summer	1.361	0.0	131.8	1852	4320 min Summer	0.997	0.0	144.9	2644	5760 min Summer	0.799	0.0	154.9	3408	7200 min Summer	0.673	0.0	163.1	4120	8640 min Summer	0.585	0.0	170.1	4848	10080 min Summer	0.520	0.0	176.3	5552	15 min Winter	61.525	0.0	30.9	26
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (1/s)	Max Control (1/s)	Max Σ Outflow (1/s)	Max Volume (m³)	Status																																																																																																																																																																																																																																																																																	
15 min Summer	38.849	0.119	0.0	0.8	0.8	30.0	O K																																																																																																																																																																																																																																																																																	
30 min Summer	38.884	0.154	0.0	0.8	0.8	38.6	O K																																																																																																																																																																																																																																																																																	
60 min Summer	38.918	0.188	0.0	0.8	0.8	47.2	O K																																																																																																																																																																																																																																																																																	
120 min Summer	38.951	0.221	0.0	0.8	0.8	55.4	O K																																																																																																																																																																																																																																																																																	
180 min Summer	38.967	0.237	0.0	0.8	0.8	59.6	O K																																																																																																																																																																																																																																																																																	
240 min Summer	38.977	0.247	0.0	0.8	0.8	62.1	O K																																																																																																																																																																																																																																																																																	
360 min Summer	38.988	0.258	0.0	0.8	0.8	64.7	O K																																																																																																																																																																																																																																																																																	
480 min Summer	38.991	0.261	0.0	0.8	0.8	65.5	O K																																																																																																																																																																																																																																																																																	
600 min Summer	38.990	0.260	0.0	0.8	0.8	65.3	O K																																																																																																																																																																																																																																																																																	
720 min Summer	38.987	0.257	0.0	0.8	0.8	64.6	O K																																																																																																																																																																																																																																																																																	
960 min Summer	38.981	0.251	0.0	0.8	0.8	62.8	O K																																																																																																																																																																																																																																																																																	
1440 min Summer	38.966	0.236	0.0	0.8	0.8	59.3	O K																																																																																																																																																																																																																																																																																	
2160 min Summer	38.948	0.218	0.0	0.8	0.8	54.6	O K																																																																																																																																																																																																																																																																																	
2880 min Summer	38.930	0.200	0.0	0.8	0.8	50.2	O K																																																																																																																																																																																																																																																																																	
4320 min Summer	38.896	0.166	0.0	0.8	0.8	41.7	O K																																																																																																																																																																																																																																																																																	
5760 min Summer	38.866	0.136	0.0	0.8	0.8	34.1	O K																																																																																																																																																																																																																																																																																	
7200 min Summer	38.840	0.110	0.0	0.8	0.8	27.5	O K																																																																																																																																																																																																																																																																																	
8640 min Summer	38.818	0.088	0.0	0.8	0.8	22.1	O K																																																																																																																																																																																																																																																																																	
10080 min Summer	38.800	0.070	0.0	0.8	0.8	17.7	O K																																																																																																																																																																																																																																																																																	
15 min Winter	38.850	0.120	0.0	0.8	0.8	30.0	O K																																																																																																																																																																																																																																																																																	
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)																																																																																																																																																																																																																																																																																				
15 min Summer	61.525	0.0	30.9	26																																																																																																																																																																																																																																																																																				
30 min Summer	39.911	0.0	40.2	41																																																																																																																																																																																																																																																																																				
60 min Summer	24.848	0.0	50.1	70																																																																																																																																																																																																																																																																																				
120 min Summer	15.080	0.0	60.8	128																																																																																																																																																																																																																																																																																				
180 min Summer	11.167	0.0	67.6	188																																																																																																																																																																																																																																																																																				
240 min Summer	8.999	0.0	72.6	246																																																																																																																																																																																																																																																																																				
360 min Summer	6.633	0.0	80.4	364																																																																																																																																																																																																																																																																																				
480 min Summer	5.336	0.0	86.2	482																																																																																																																																																																																																																																																																																				
600 min Summer	4.506	0.0	91.0	600																																																																																																																																																																																																																																																																																				
720 min Summer	3.923	0.0	95.1	680																																																																																																																																																																																																																																																																																				
960 min Summer	3.152	0.0	101.7	788																																																																																																																																																																																																																																																																																				
1440 min Summer	2.313	0.0	112.0	1040																																																																																																																																																																																																																																																																																				
2160 min Summer	1.697	0.0	123.2	1448																																																																																																																																																																																																																																																																																				
2880 min Summer	1.361	0.0	131.8	1852																																																																																																																																																																																																																																																																																				
4320 min Summer	0.997	0.0	144.9	2644																																																																																																																																																																																																																																																																																				
5760 min Summer	0.799	0.0	154.9	3408																																																																																																																																																																																																																																																																																				
7200 min Summer	0.673	0.0	163.1	4120																																																																																																																																																																																																																																																																																				
8640 min Summer	0.585	0.0	170.1	4848																																																																																																																																																																																																																																																																																				
10080 min Summer	0.520	0.0	176.3	5552																																																																																																																																																																																																																																																																																				
15 min Winter	61.525	0.0	30.9	26																																																																																																																																																																																																																																																																																				
©1982-2020 Innovyze																																																																																																																																																																																																																																																																																								

Cotswold Transport Planning							Page 2
CTP House, Knapp Road Cheltenham Gloucestershire, GL50 3QQ			Staverton House 10 Year				
Date 18/03/2025 14:50 File CELLULAR STORAGE.SRCX			Designed by CF Checked by CG				
Innovyze			Source Control 2020.1.3				
<u>Summary of Results for 10 year Return Period</u>							
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	38.884	0.154	0.0	0.8	0.8	38.6	O K
60 min Winter	38.918	0.188	0.0	0.8	0.8	47.3	O K
120 min Winter	38.951	0.221	0.0	0.8	0.8	55.5	O K
180 min Winter	38.968	0.238	0.0	0.8	0.8	59.8	O K
240 min Winter	38.979	0.249	0.0	0.8	0.8	62.3	O K
360 min Winter	38.989	0.259	0.0	0.8	0.8	65.1	O K
480 min Winter	38.993	0.263	0.0	0.8	0.8	66.0	O K
600 min Winter	38.993	0.263	0.0	0.8	0.8	66.0	O K
720 min Winter	38.990	0.260	0.0	0.8	0.8	65.3	O K
960 min Winter	38.981	0.251	0.0	0.8	0.8	63.0	O K
1440 min Winter	38.963	0.233	0.0	0.8	0.8	58.5	O K
2160 min Winter	38.935	0.205	0.0	0.8	0.8	51.5	O K
2880 min Winter	38.908	0.178	0.0	0.8	0.8	44.7	O K
4320 min Winter	38.859	0.129	0.0	0.8	0.8	32.3	O K
5760 min Winter	38.819	0.089	0.0	0.8	0.8	22.4	O K
7200 min Winter	38.789	0.059	0.0	0.7	0.7	14.9	O K
8640 min Winter	38.768	0.038	0.0	0.7	0.7	9.5	O K
10080 min Winter	38.753	0.023	0.0	0.7	0.7	5.8	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)			
30 min Winter	39.911	0.0	40.2	40			
60 min Winter	24.848	0.0	50.1	68			
120 min Winter	15.080	0.0	60.8	126			
180 min Winter	11.167	0.0	67.5	184			
240 min Winter	8.999	0.0	72.6	242			
360 min Winter	6.633	0.0	80.3	356			
480 min Winter	5.336	0.0	86.2	470			
600 min Winter	4.506	0.0	91.0	580			
720 min Winter	3.923	0.0	95.1	688			
960 min Winter	3.152	0.0	101.8	874			
1440 min Winter	2.313	0.0	112.0	1094			
2160 min Winter	1.697	0.0	123.2	1544			
2880 min Winter	1.361	0.0	131.9	1968			
4320 min Winter	0.997	0.0	144.9	2772			
5760 min Winter	0.799	0.0	154.9	3520			
7200 min Winter	0.673	0.0	163.0	4192			
8640 min Winter	0.585	0.0	170.1	4848			
10080 min Winter	0.520	0.0	176.3	5456			
©1982-2020 Innovyze							

Cotswold Transport Planning		Page 3
CTP House, Knapp Road Cheltenham Gloucestershire, GL50 3QQ	Staverton House 10 Year	
Date 18/03/2025 14:50 File CELLULAR STORAGE.SRCX	Designed by CF Checked by CG	
Innovyze Source Control 2020.1.3		

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	10	Cv (Summer)	1.000
Region	England and Wales	Cv (Winter)	1.000
M5-60 (mm)	20.700	Shortest Storm (mins)	15
Ratio R	0.389	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.202

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:
0	4 0.067	4	8 0.067	8	12 0.068

©1982-2020 Innovyze

Cotswold Transport Planning		Page 4
CTP House, Knapp Road Cheltenham Gloucestershire, GL50 3QQ	Staverton House 10 Year	
Date 18/03/2025 14:50 File CELLULAR STORAGE.SRCX	Designed by CF Checked by CG	
Innovyze Source Control 2020.1.3		

Model Details

Storage is Online Cover Level (m) 40.430

Cellular Storage Structure

Invert Level (m) 38.730 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	264.0	195.0	1.001	0.0	251.0
1.000	264.0	251.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0046-1000-1050-1000
Design Head (m) 1.050
Design Flow (l/s) 1.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 46
Invert Level (m) 38.680
Minimum Outlet Pipe Diameter (mm) 75
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.050	1.0
Flush-Flo™	0.205	0.8
Kick-Flo®	0.412	0.7
Mean Flow over Head Range	-	0.8

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.7	1.200	1.1	3.000	1.6	7.000	2.4
0.200	0.8	1.400	1.1	3.500	1.7	7.500	2.4
0.300	0.8	1.600	1.2	4.000	1.8	8.000	2.5
0.400	0.7	1.800	1.3	4.500	1.9	8.500	2.6
0.500	0.7	2.000	1.3	5.000	2.0	9.000	2.7
0.600	0.8	2.200	1.4	5.500	2.1	9.500	2.7
0.800	0.9	2.400	1.4	6.000	2.2		
1.000	1.0	2.600	1.5	6.500	2.3		

©1982-2020 Innovyze



Appendix F – Drainage Strategy



Notes:

1. Do not scale from this drawing. All dimensions are in metres, unless stated otherwise.
2. This drawing is based on the Architect's layout by Carless + Adams, received on 04.03.25.
3. Drawing to be read in conjunction with all other drawings. Any discrepancies are to be reported to the engineer 5 working days in advance of undertaking any work.
4. Work to be undertaken in accordance with Wiltshire Council Specification.
5. This drawing is for information purposes only, subject to detailed design and is not to be used for Construction.
6. Existing drainage to be surveyed on-site prior to commencement of on-site works.

Key:

Existing

----- Foul Water Sewer

----- Surface Water Sewer

Proposed

----- Surface Water Sewer

----- Foul Water Sewer

Attenuation Crates

Application Boundary



P02	17/03/25	Updated to include latest layout	CG	SR	SM
P01	14/03/25	First Issue	CG	SR	SM
Rev	Date	Details	By	Chkd	Appd

rappor



CLIENT:		Fidelia Care Home Limited	
PROJECT:		Staverton House	
TITLE:		Proposed Drainage Layout	
STATUS:		For Information	SCALE: 1:250
DRAWING NO: 240453-RAP-XX-XX-DR-D-3100		REVISION: P02	



Appendix G – Exceedance Flow Plan



Notes:

1. Do not scale from this drawing. All dimensions are in metres, unless stated otherwise.
2. This drawing is based on the Architect's layout by Carless + Adams, received on 04.03.25.
3. Drawing to be read in conjunction with all other drawings. Any discrepancies are to be reported to the engineer 5 working days in advance of undertaking any work.
4. Work to be undertaken in accordance with Wiltshire Council Specification.
5. This drawing is for information purposes only, subject to detailed design and is not to be used for Construction.
6. Existing drainage to be surveyed on-site prior to commencement of on-site works.

Key:

 Exceedance Flow Route



P02	17/03/25	Updated to include latest layout	CG	SR	SM
P01	14/03/25	First Issue	CG	SR	SM
Rev	Date	Details	By	Chkd	Appd

rappor



CLIENT:	Fidelia Care Home Limited
PROJECT:	Staverton House
TITLE:	Exceedance Flow Plan
STATUS:	For Information
DRAWING NO:	240453-RAP-XX-XX-DR-D-3101
SCALE:	1:250
REVISION:	P02

rappor



Rappor Consultants Ltd

www.rappor.co.uk

Cheltenham
Bristol
London
Bedford
Exeter
Cirencester

